SECTION EC
ENGINE CONTROL SYSTEM

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ENG OVER TEMP	P1217	1	×	EC-448
EVAP GROSS LEAK	P0455	2	×	EC-361
EVAP PURG FLOW/MON	P0441	2	×	EC-311
EVAP SMALL LEAK	P0442	2	×	EC-320
EVAP SMALL LEAK	P1442	2	×	EC-472
EVAP SYS PRES SEN	P0452	2	×	EC-344
EVAP SYS PRES SEN	P0453	2	×	EC-351
EVAP VERY SML LEAK	P0456	2	×	EC-372
EVAP VERY SML LEAK	P1456	2	×	EC-493
FTT SEN/CIRCUIT	P0182	2	×	EC-249
FTT SEN/CIRCUIT	P0183	2	×	EC-249
FTT SENSOR	P0181	2	×	EC-244
FUEL LEV SEN SLOSH	P0460	2	×	EC-383
FUEL LEVEL SEN/CIRC	P1464	2	×	EC-504
FUEL LEVEL SENSOR	P0461	2	×	EC-387
FUEL LEVL SEN/CIRC	P0462	2	×	EC-389
FUEL LEVL SEN/CIRC	P0463	2	×	EC-389
FUEL SYS-LEAN-B1	P0171	2	×	EC-231

Items (CONSULT-II screen terms)	DTC*1 *2 CONSULT-II GST	Trip	MIL lighting up	Reference page
FUEL SYS-RICH-B1	P0172	2	×	EC-238
HO2S1 (B1)	P0132	2	×	EC-191
HO2S1 (B1)	P0133	2	×	EC-198
HO2S1 (B1)	P0134	2	×	EC-208
HO2S1 (B1)	P1143	2	×	EC-422
HO2S1 (B1)	P1144	2	×	EC-427
HO2S1 HTR (B1)	P0031	2	×	EC-128
HO2S1 HTR (B1)	P0032	2	×	EC-128
HO2S2 (B1)	P0138	2	×	EC-215
HO2S2 (B1)	P0139	2	×	EC-222
HO2S2 (B1)	P1146	2	×	EC-432
HO2S2 (B1)	P1147	2	×	EC-439
HO2S2 HTR (B1)	P0037	2	×	EC-133
HO2S2 HTR (B1)	P0038	2	×	EC-133
IAT SEN/CIRCUIT	P0112	1	×	EC-152
IAT SEN/CIRCUIT	P0113	1	×	EC-152
IAT SENSOR	P0127	2	×	EC-183
ISC SYSTEM/CIRC	P0505	2	×	EC-398
ISC SYSTEM	P0506	2	×	EC-403
ISC SYSTEM	P0507	2	×	EC-408
KNOCK SEN/CIRC-B1	P0327	1	—	EC-265
KNOCK SEN/CIRC-B1	P0328	1	—	EC-265
MAF SEN/CIRCUIT	P0101	2	×	EC-139
MAF SEN/CIRCUIT	P0102	1	×	EC-146
MAF SEN/CIRCUIT	P0103	1	×	EC-146
MULTI CYL MISFIRE	P0300	2	×	EC-258
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	—	—	—
P-N POS SW/CIRCUIT	P1706	2	×	EC-523
PURG VOLUME CONT/V	P0444	2	×	EC-332
PURG VOLUME CONT/V	P0445	2	×	EC-332
PURG VOLUME CONT/V	P1444	2	×	EC-474
THERMSTAT FNCTN	P0128	2	×	EC-189
TOR CONV CLTCH S/V	P1775*3	2	×	EC-530, AT-41
TOR CONV CLTCH S/V	P1776*3	2	×	EC-534
TP SEN/CIRCUIT	P0121	2	×	EC-162
TP SEN/CIRCUIT	P0122	1	×	EC-171
TP SEN/CIRCUIT	P0123	1	×	EC-171
TW CATALYST SYS-B1	P0420	2	×	EC-306
VC CUT/V BYPASS/V	P1491	2	×	EC-513
VC/V BYPASS/V	P1490	2	×	EC-507
VEH SPEED SEN/CIRC	P0500	2	×	EC-393

Items (CONSULT-II screen terms)	DTC*1 *2 CONSULT-II GST	Trip	MIL lighting up	Reference page
VENT CONTROL VALVE	P0447	2	×	EC-338
VENT CONTROL VALVE	P1446	2	×	EC-483
VENT CONTROL VALVE	P1448	2	×	EC-487

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: For the A/T models.

DTC No. Index

UBS00D0O

×: Applicable —: Not applicable

DTC*1 *2 CONSULT-II GST	Items (CONSULT-II screen terms)	Trip	MIL lighting up	Reference page
—	Unable to access ECM	—	—	EC-73
P0000	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	—
P0031	HO2S1 HTR (B1)	2	×	EC-128
P0032	HO2S1 HTR (B1)	2	×	EC-128
P0037	HO2S2 HTR (B1)	2	×	EC-133
P0038	HO2S2 HTR (B1)	2	×	EC-133
P0101	MAF SEN/CIRCUIT	2	×	EC-139
P0102	MAF SEN/CIRCUIT	1	×	EC-146
P0103	MAF SEN/CIRCUIT	1	×	EC-146
P0112	IAT SEN/CIRCUIT	1	×	EC-152
P0113	IAT SEN/CIRCUIT	1	×	EC-152
P0117	ECT SEN/CIRCUIT	1	×	EC-157
P0118	ECT SEN/CIRCUIT	1	×	EC-157
P0121	TP SEN/CIRCUIT	2	×	EC-162
P0122	TP SEN/CIRCUIT	1	×	EC-171
P0123	TP SEN/CIRCUIT	1	×	EC-171
P0125	ECT SENSOR	2	×	EC-177
P0127	IAT SENSOR	2	×	EC-183
P0128	THERMSTAT FNCTN	2	×	EC-189
P0132	HO2S1 (B1)	2	×	EC-191
P0133	HO2S1 (B1)	2	×	EC-198
P0134	HO2S1 (B1)	2	×	EC-208
P0138	HO2S2 (B1)	2	×	EC-215
P0139	HO2S2 (B1)	2	×	EC-222
P0171	FUEL SYS-LEAN-B1	2	×	EC-231
P0172	FUEL SYS-RICH-B1	2	×	EC-238
P0181	FTT SENSOR	2	×	EC-244
P0182	FTT SEN/CIRCUIT	2	×	EC-249
P0183	FTT SEN/CIRCUIT	2	×	EC-249
P0217	ENG OVER TEMP	1	×	EC-253
P0300	MULTI CYL MISFIRE	2	×	EC-258

DTC*1 *2 CONSULT-II GST	Items (CONSULT-II screen terms)	Trip	MIL lighting up	Reference page
P0301	CYL1 MISFIRE	2	×	EC-258
P0302	CYL2 MISFIRE	2	×	EC-258
P0303	CYL3 MISFIRE	2	×	EC-258
P0304	CYL4 MISFIRE	2	×	EC-258
P0327	KNOCK SEN/CIRC-B1	1	—	EC-265
P0328	KNOCK SEN/CIRC-B1	1	—	EC-265
P0335	CKP SEN/CIRCUIT	2	×	EC-269
P0340	CMP SEN/CIRCUIT	2	×	EC-275
P0400	EGR SYSTEM	2	×	EC-282
P0402	EGRC-BPT VALVE	2	×	EC-293
P0405	EGR TEMP SEN/CIRC	2	×	EC-299
P0406	EGR TEMP SEN/CIRC	2	×	EC-299
P0420	TW CATALYST SYS-B1	2	×	EC-306
P0441	EVAP PURG FLOW/MON	2	×	EC-311
P0442	EVAP SMALL LEAK	2	×	EC-320
P0444	PURG VOLUME CONT/V	2	×	EC-332
P0445	PURG VOLUME CONT/V	2	×	EC-332
P0447	VENT CONTROL VALVE	2	×	EC-338
P0452	EVAP SYS PRES SEN	2	×	EC-344
P0453	EVAP SYS PRES SEN	2	×	EC-351
P0455	EVAP GROSS LEAK	2	×	EC-361
P0456	EVAP VERY SML LEAK	2	×	EC-372
P0460	FUEL LEV SEN SLOSH	2	×	EC-383
P0461	FUEL LEVEL SENSOR	2	×	EC-387
P0462	FUEL LEVL SEN/CIRC	2	×	EC-389
P0463	FUEL LEVL SEN/CIRC	2	×	EC-389
P0500	VEH SPEED SEN/CIRC	2	×	EC-393
P0505	ISC SYSTEM/CIRC	2	×	EC-398
P0506	ISC SYSTEM	2	×	EC-403
P0507	ISC SYSTEM	2	×	EC-408
P0510	CLOSED TP SW/CIRC	2	×	EC-413
P0605	ECM	2	×	EC-420
P1143	HO2S1 (B1)	2	×	EC-422
P1144	HO2S1 (B1)	2	×	EC-427
P1146	HO2S2 (B1)	2	×	EC-432
P1147	HO2S2 (B1)	2	×	EC-439
P1148	CLOSED LOOP-B1	1	×	EC-446
P1217	ENG OVER TEMP	1	×	EC-448
P1336	CKP SENSOR (COG)	2	×	EC-452
P1400	EGRC SOLENOID/V	2	×	EC-457
P1402	EGR SYSTEM	2	×	EC-463
P1442	EVAP SMALL LEAK	2	×	EC-463

DTC*1 *2 CONSULT-II GST	Items (CONSULT-II screen terms)	Trip	MIL lighting up	Reference page
P1444	PURG VOLUME CONT/V	2	×	EC-474
P1446	VENT CONTROL VALVE	2	×	EC-483
P1448	VENT CONTROL VALVE	2	×	EC-487
P1456	EVAP VERY SML LEAK	2	×	EC-493
P1464	FUEL LEVL SEN/CIR	2	×	EC-504
P1490	VC/V BYPASS/V	2	×	EC-507
P1491	VC CUT/V BYPASS/V	2	×	EC-513
P1706	P-N POS SW/CIRCUIT	2	×	EC-523
P1775*3	TOR CONV CLTCH S/V	2	×	EC-530, AT-41
P1776*3	TOR CONV CLTCH S/V	2	×	EC-534

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: For the A/T models.

PRECAUTIONS

PFP:00001

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

UBS00EMB

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. This system may include seat belt switch inputs and dual stage front air bag modules. If equipped with dual stage front air bag modules, the SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

The vehicle may be equipped with a passenger air bag deactivation switch. Because no rear seat exists where a rear-facing child restraint can be placed, the switch is designed to turn off the passenger air bag so that a rear-facing child restraint can be used in the front passenger seat. The switch is located in the center of the instrument panel, near the ashtray. When the switch is turned to the ON position, the passenger air bag is enabled and could inflate for certain types of collision. When the switch is turned to the OFF position, the passenger air bag is disabled and will not inflate. A passenger air bag OFF indicator on the instrument panel lights up when the passenger air bag is switched OFF. The driver air bag always remains enabled and is not affected by the passenger air bag deactivation switch.

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.**
- **The vehicle may be equipped with a passenger air bag deactivation switch which can be operated by the customer. When the passenger air bag is switched OFF, the passenger air bag is disabled and will not inflate. When the passenger air bag is switched ON, the passenger air bag is enabled and could inflate for certain types of collision. After SRS maintenance or repair, make sure the passenger air bag deactivation switch is in the same position (ON or OFF) as when the vehicle arrived for service.**

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

UBS00D0Q

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-4, "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 EGR system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.**

Engine Fuel & Emission Control System

UBS00D0R

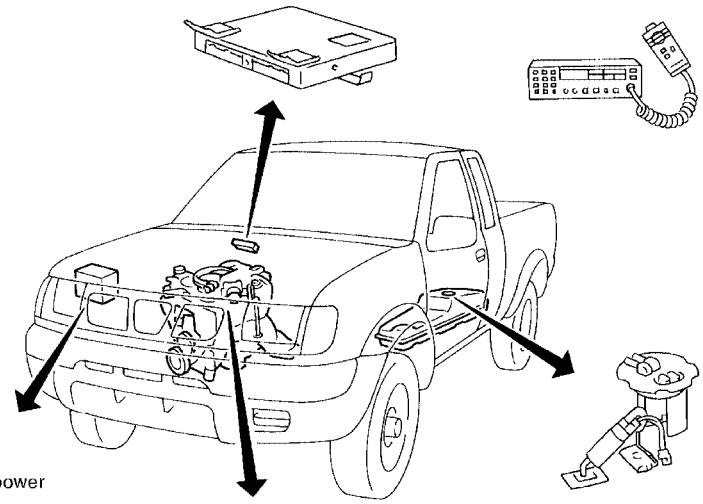
ECM

- 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.

WIRELESS EQUIPMENT

- When installing CB ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.

1) Keep the antenna as far away as possible from the electronic control units.
2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls.
   Do not let them run parallel for a long distance.
3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
4) Be sure to ground the radio to vehicle body.



BATTERY

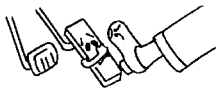
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.

WHEN STARTING

- 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.

ECM PARTS HANDLING

- 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 IACV-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the camshaft position sensor or crankshaft position sensor (OBD).



FUEL PUMP

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

ECM HARNESS HANDLING

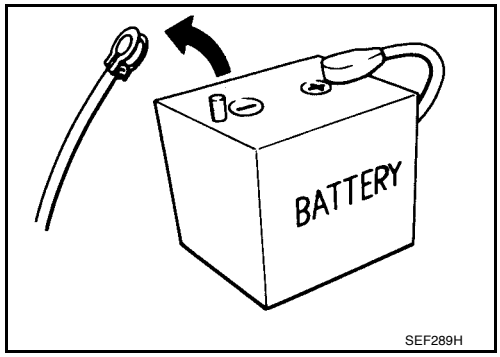
- Securely connect ECM harness connectors.
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in.) away from adjacent harnesses to prevent an engine control system malfunction due to recieving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

LEC027A

Precautions

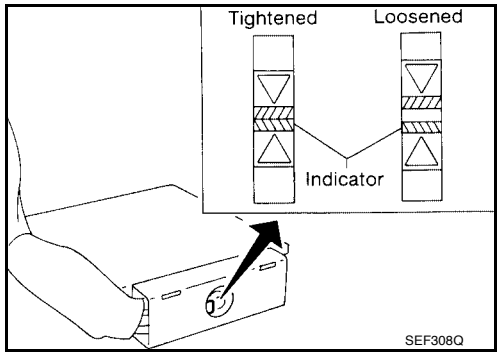
UBS00D0S

- **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.**

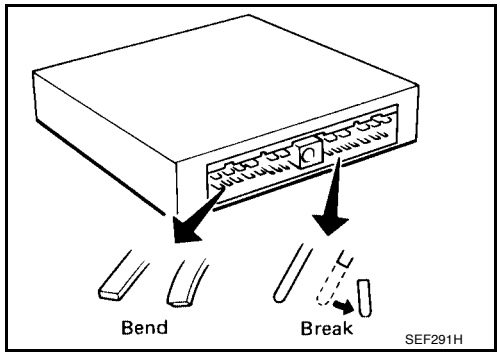


- **When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.**

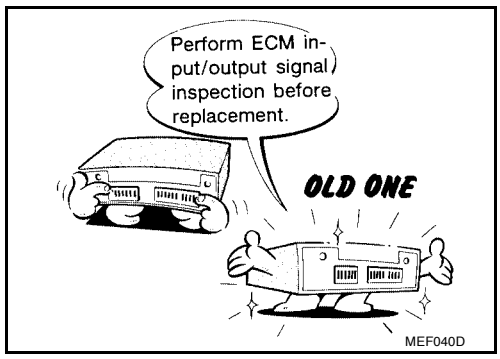
  : 3 - 5 N·m (0.3 - 0.5 kg-m, 26 - 43 in-lb)



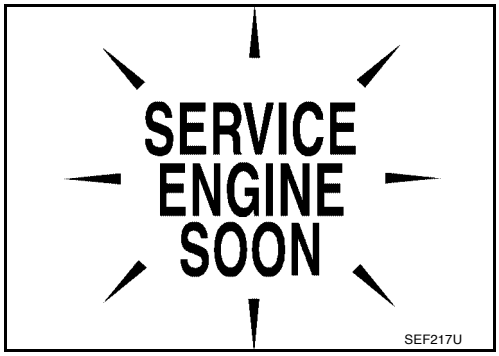
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminals when connecting pin connectors.



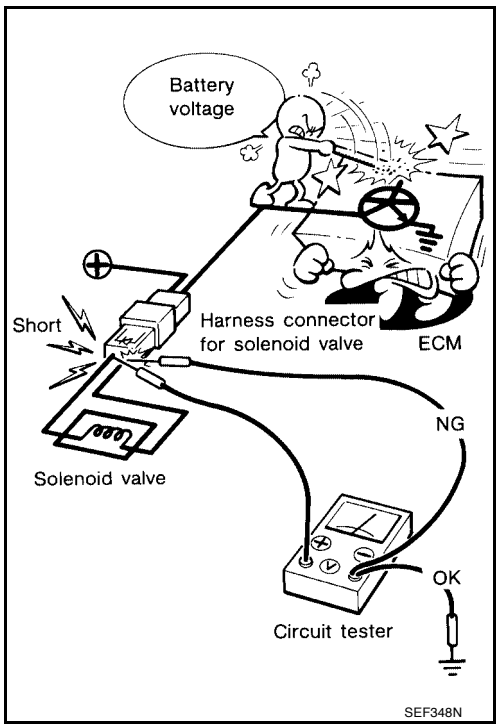
- **Before replacing ECM, perform Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-91 .**



- **After performing each TROUBLE DIAGNOSIS, perform Overall Function Check or DTC Confirmation Procedure.**
  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 the ECM terminals, such as the ground.**



Wiring Diagrams and Trouble Diagnosis

UBS00D0T

When you read Wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams".
- PG-9, "POWER SUPPLY ROUTING".

When you perform trouble diagnosis, refer to the following:

- GI-9, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES".
- GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident"

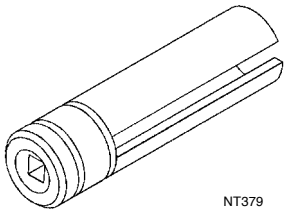
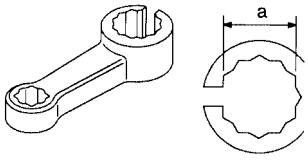
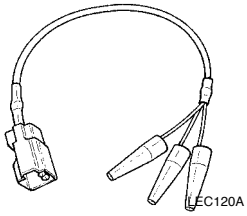
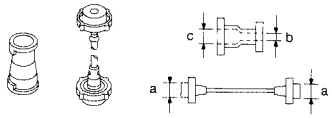
PREPARATION

PFP:00002

Special Service Tools

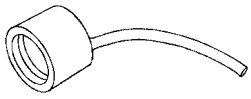
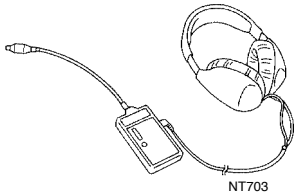
UBS00D0U

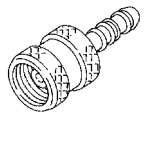
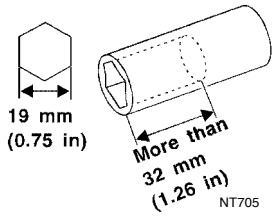
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV10117100 (J-36471-A) Heated oxygen sensor wrench  NT379	Loosening or tightening heated oxygen sensor 1 with 22 mm (0.87 in) hexagon nut
KV10114400 (J-38365) Heated oxygen sensor wrench  NT636	Loosening or tightening heated oxygen sensor 2 **a: 22 mm (0.87 in)**
(J-45178) TPS test connector  EC120A	Used to test the throttle position sensor
EG17650301 (J-33984-A) Radiator cap tester adapter  S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)

Commercial Service Tools

UBS00D0V

Tool name	Description
Fuel filler cap adapter  NT653	Checking fuel tank vacuum relief valve opening pressure
Leak detector i.e.: (J-41416)  NT703	Locating the EVAP leak

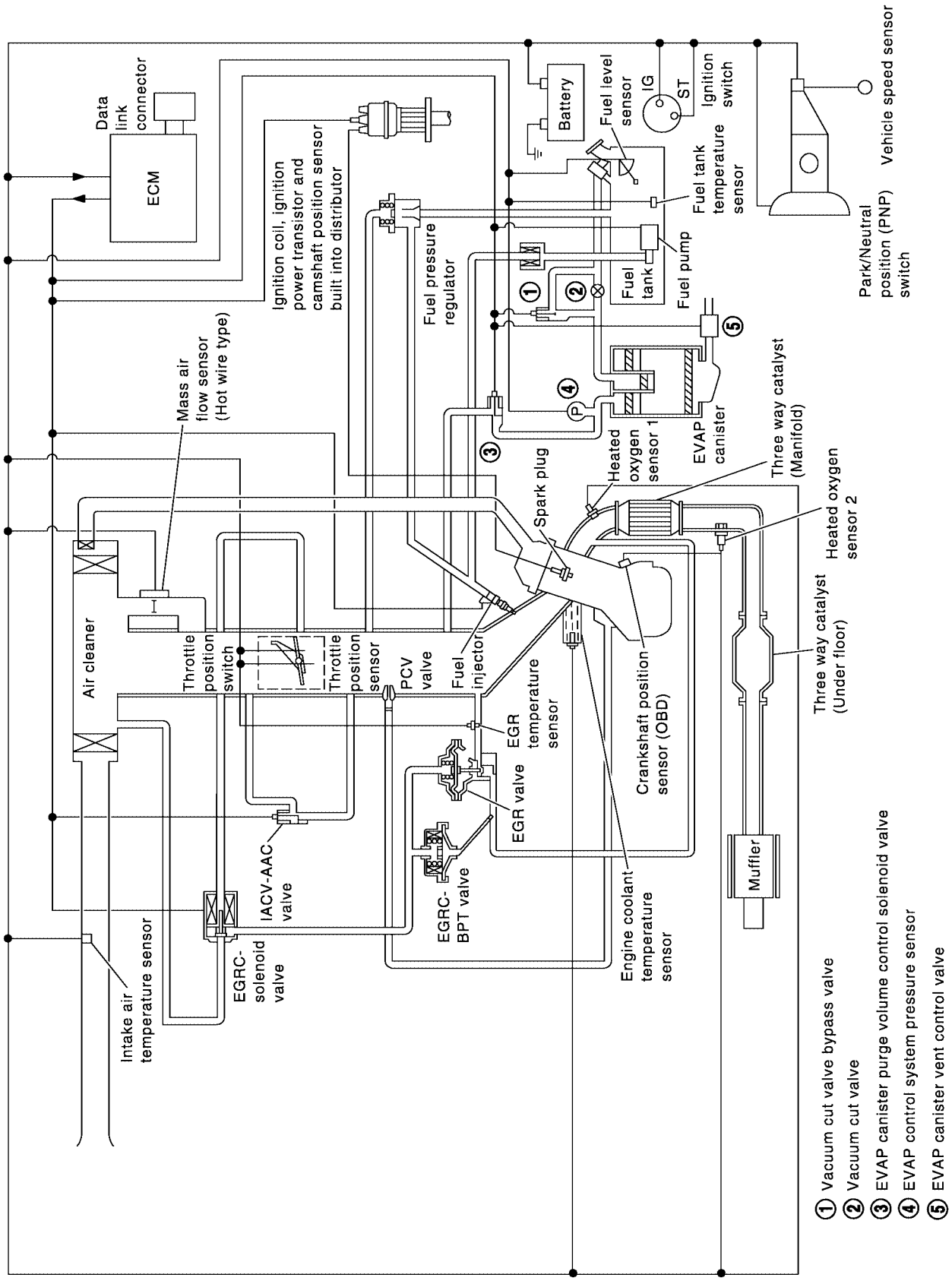
Tool name	Description
EVAP service port adapter i.e.: (J-41413-OBD)  NT704	Applying positive pressure through EVAP service port
Socket wrench  NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner i.e.: (J-43897-18) i.e.: (J-43897-12)	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown in “Commercial Service tools”. 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 i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

ENGINE CONTROL SYSTEM

PFP:23710

System Diagram

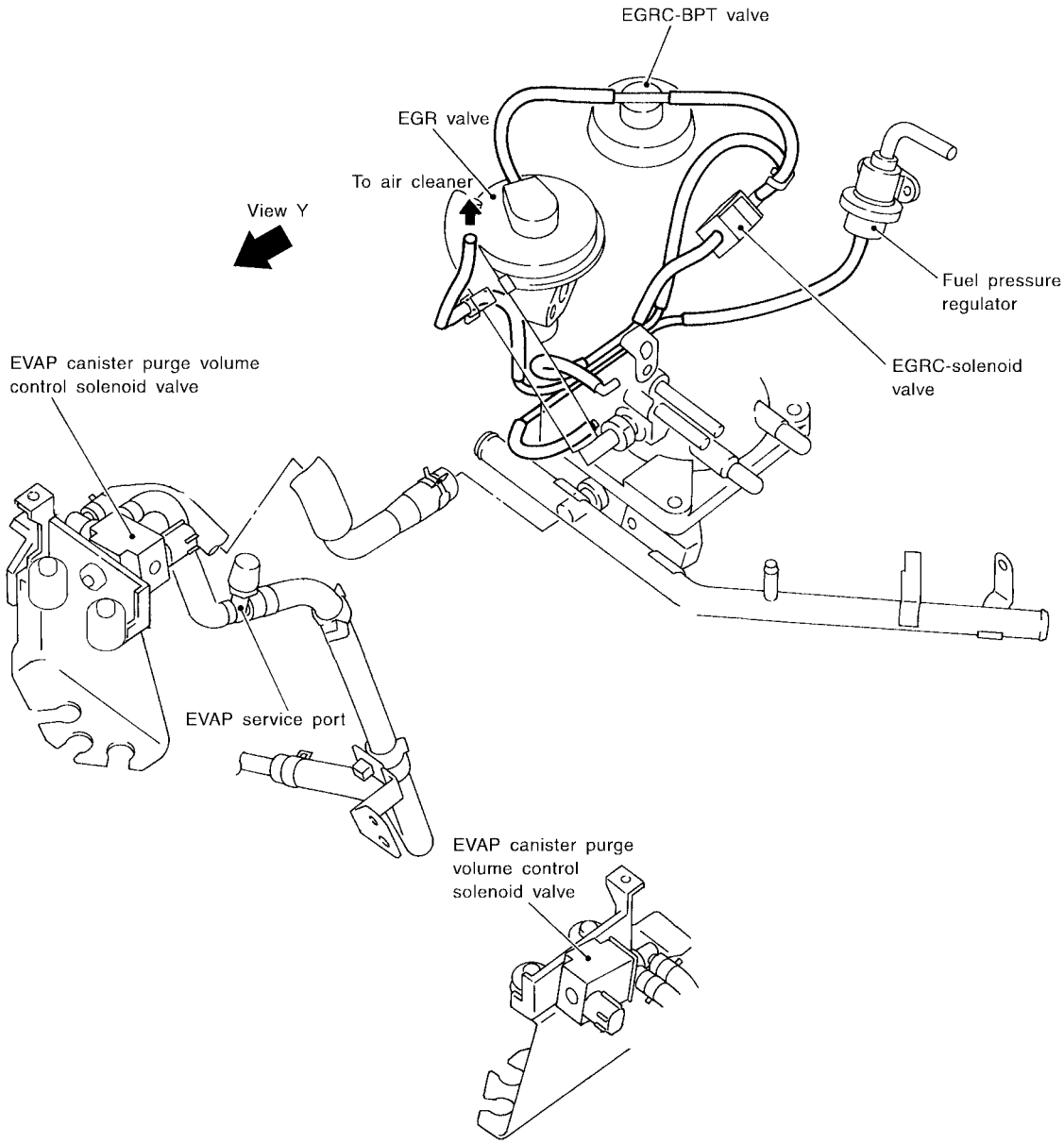
UBS00D0W



PBIB1401E

Vacuum Hose Drawing

UBS00D0X



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

WEC551

Refer to EC-29, "System Diagram" for vacuum control system.

System Chart

UBS00D0Y

Input (Sensor)	ECM Function	Output (Actuator)
● Camshaft position sensor ● Mass air flow sensor ● Engine coolant temperature sensor ● Heated oxygen sensor 1 ● Ignition switch ● Throttle position sensor ● Park/neutral position (PNP) switch ● Air conditioner switch ● Knock sensor ● EGR temperature sensor*1 ● Crankshaft position sensor (OBD) ● EVAP control system pressure sensor*1 ● Fuel tank temperature sensor ● Battery voltage ● Fuel level sensor*1 ● Power steering oil pressure switch ● Vehicle speed sensor ● Intake air temperature sensor ● Heated oxygen sensor 2*2 ● Closed throttle position switch*3	Fuel injection & mixture ratio control	Fuel injector
	Distributor ignition system	Power transistor
	Idle air control system	IACV-AAC valve and IACV-FICD solenoid valve
	Fuel pump control	Fuel pump relay
	Heated oxygen sensor 1 monitor & on board diagnostic system	Malfunction indicator lamp (On the instrument panel)
	EGR control	EGRC-solenoid valve
	Heated oxygen sensors 1, 2 heater control	Heated oxygen sensor heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	ON BOARD DIAGNOSIS for EVAP system	● EVAP canister vent control valve ● Vacuum cut valve bypass valve

*1: This sensor is not used to control the engine system. This is used only for the on board diagnosis.
*2: This sensor is not used to control the engine system under normal conditions.
*3: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

Multiport Fuel Injection (MFI) System

UBS00D0Z

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Camshaft position sensor	Engine speed and piston position	Fuel injection & mixture ratio control	Fuel injector
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 Throttle valve idle position		
Park/neutral position (PNP) switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2*	Density of oxygen in exhaust gas		

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

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 camshaft position sensor and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

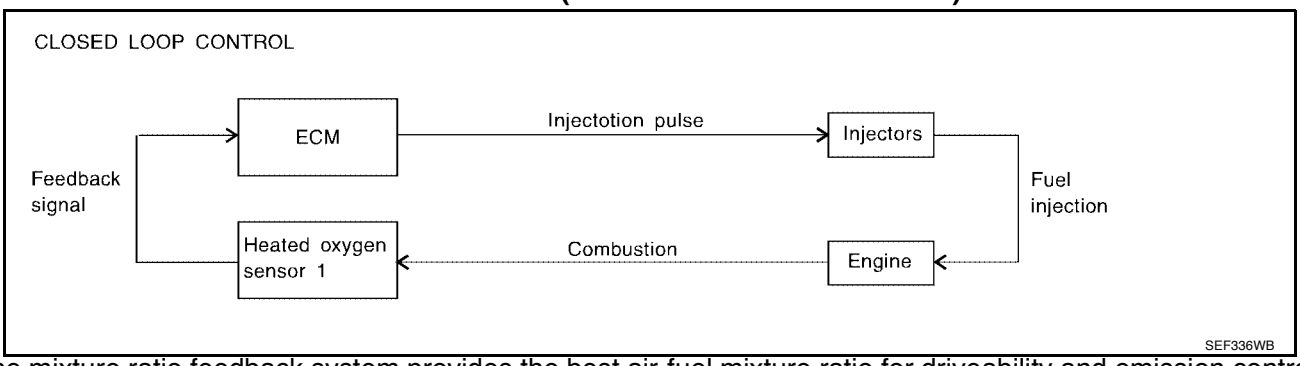
In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.
<Fuel increase>

- 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 a heated oxygen sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1, refer to EC-198 . 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 the heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from the heated oxygen sensor 2.

Open Loop Control

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

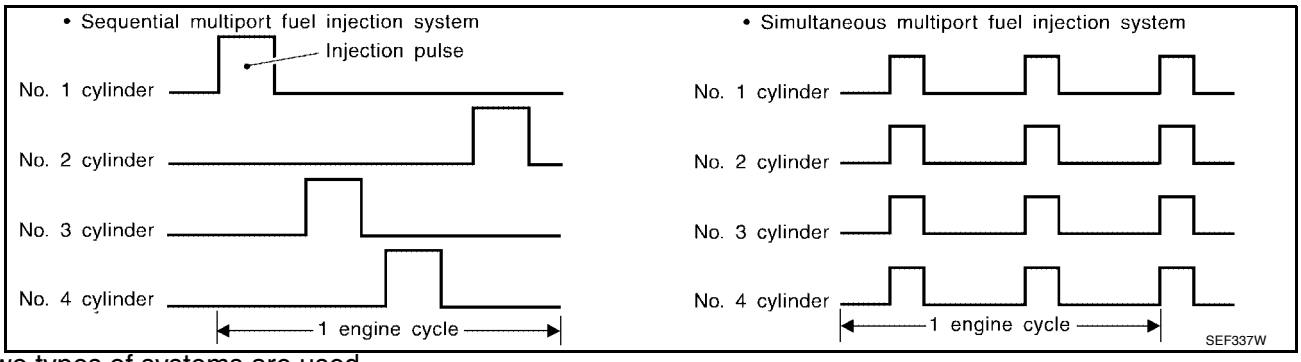
- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 or its circuit
- Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (A/T models)
-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

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the 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 the heated oxygen sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
“Long term fuel trim” is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

Sequential Multiport Fuel Injection System

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

Simultaneous Multiport Fuel Injection System

Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The four injectors will then receive the signals two times for each engine cycle.
This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

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

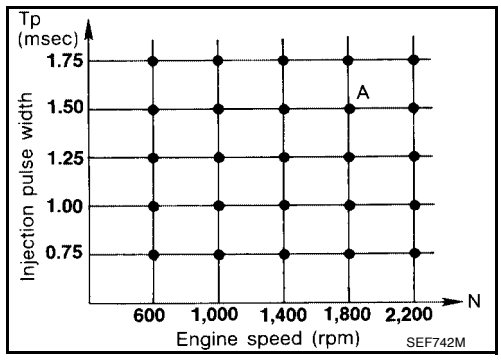
Distributor Ignition (DI) System

UBS00D10

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Camshaft position sensor	Engine speed and piston position	Ignition timing control	Power transistor
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position Throttle valve idle position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage		

SYSTEM DESCRIPTION



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

The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
e.g., N: 1,800 rpm, Tp: 1.50 msec
A°BTDC
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

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

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

Air Conditioning Cut Control

UBS00D11

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Air conditioner switch	Air conditioner ON signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Camshaft position sensor	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Vehicle speed sensor	Vehicle speed		
Power steering oil pressure switch	Power steering operation		

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.
- When the engine coolant temperature becomes excessively high.
- When operating power steering and air conditioner during low engine speed or when fully releasing accelerator pedal.
- When engine speed is excessively low.

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

UBS00D12

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Fuel injector
Park/neutral position (PNP) switch	Neutral position		
Throttle position sensor	Throttle position		
Camshaft position sensor	Engine speed		

SYSTEM DESCRIPTION

If the engine speed is above 3,000 rpm under no load, (for example, the shift position is Neutral and engine speed is over 3,000 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.
Fuel cut will operate until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

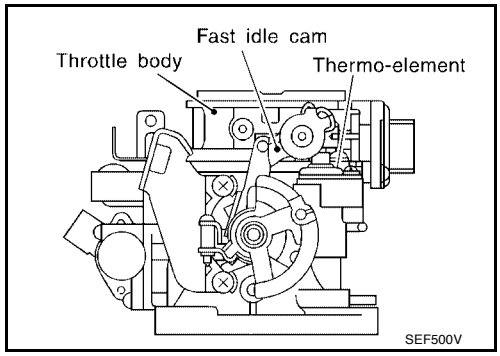
NOTE:
This function is different from deceleration control listed under EC-31, "Multiport Fuel Injection (MFI) System" .

Fast Idle Cam (FIC)

UBS00D13

COMPONENT DESCRIPTION

The FIC is installed on the throttle body to maintain adequate engine speed while the engine is cold. It is operated by a volumetric change in wax located inside the thermo-element. The thermo-element is operated by engine coolant temperature.
For inspection refer to EC-74, "Basic Inspection" .



BASIC SERVICE PROCEDURE

PFP:00018

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

UBS00D14

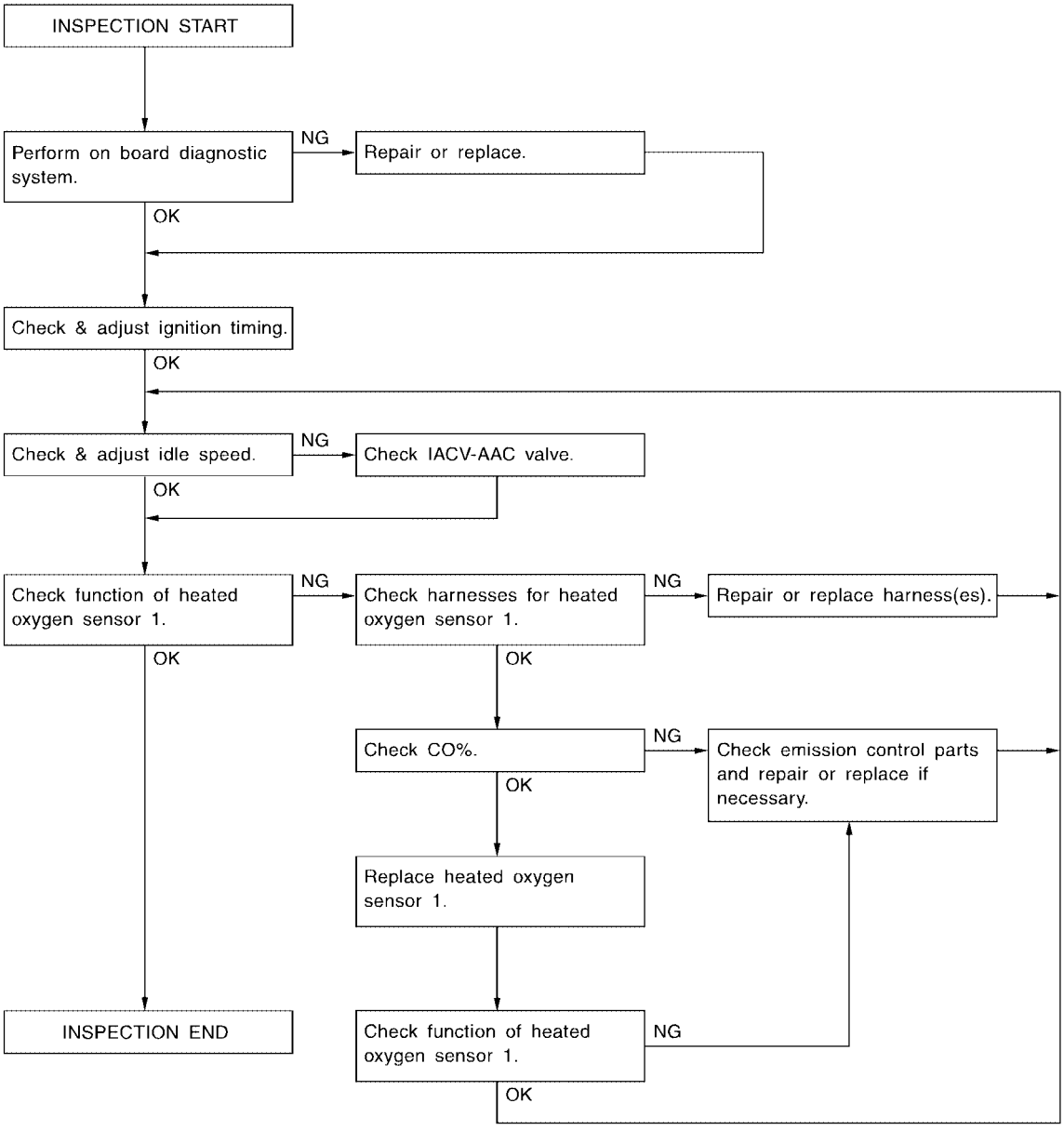
PREPARATION

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**
- **EGR valve operation**
- **Throttle valve**
- **EVAP system**

2. **On models equipped with air conditioner, checks should be carried out while the air conditioner is OFF.**
3. **On models equipped with automatic transmission, when checking idle speed, ignition timing and mixture ratio, checks should be carried out while shift lever is in P or N (A/T), Neutral (M/T) position.**
4. **When measuring CO percentage, insert probe more than 40 cm (15.7 in) into tail pipe.**
5. **Turn switch OFF headlamp and heater blower.**
6. **Keep front wheels pointed straight ahead.**

OVERALL INSPECTION SEQUENCE



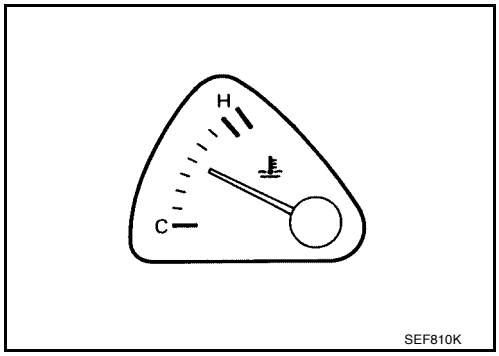
SEF554YA

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. Visually check the following:
- Air cleaner clogging
- Hoses and duct for leaks
- EGR valve operation
- Electrical connectors
- Gasket (intake manifold, cylinder head, exhaust system)
- Throttle valve and throttle position sensor operation
2. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge. Ensure engine speed stays below 1,000 rpm.
3. Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no-load.
4. Make sure that no DTC is displayed with CONSULT-II or GST.



OK or NG

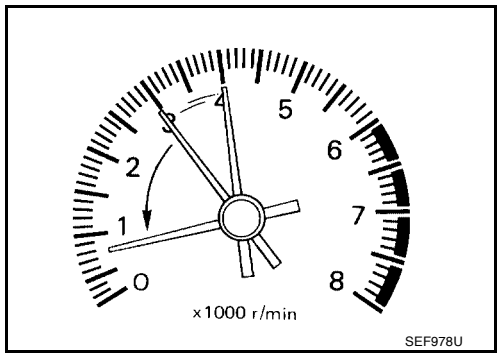
OK >> ● GO TO 2 (With CONSULT-II).
● GO TO 3 (Without CONSULT-II).

NG >> ● Repair or replace components as necessary.
● GO TO 2 (With CONSULT-II).
● GO TO 3 (Without CONSULT-II).

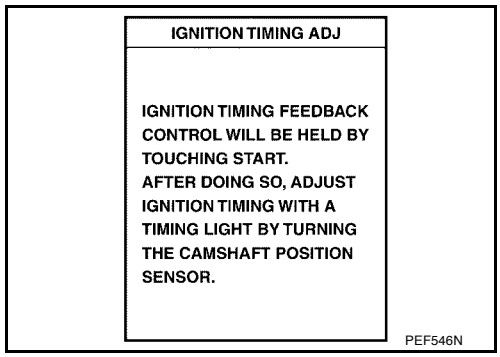
2. CHECK IGNITION TIMING

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine two or three times under no-load, then run engine at idle speed for about 1 minute.
3. Select “IGNITION TIMING ADJ” in WORK SUPPORT mode.



4. Touch “START”.
5. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.

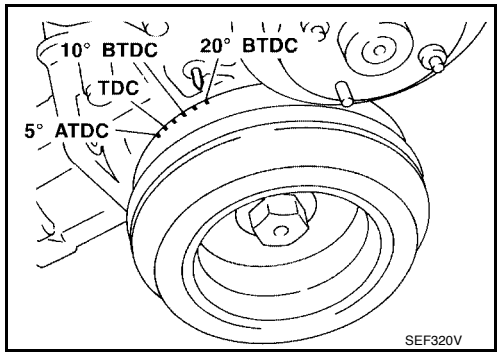


6. Check ignition timing with a timing light.

M/T : 20°±5° BTDC (in Neutral position)
A/T : 20°±5° BTDC (in P or N position)

OK or NG

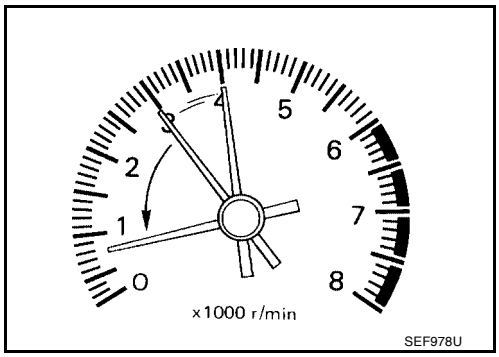
OK >> GO TO 5.
NG >> GO TO 4.



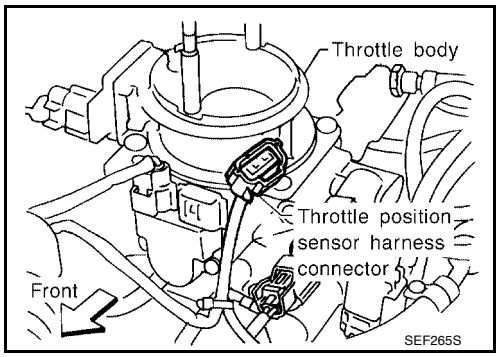
3. CHECK IGNITION TIMING

Without CONSULT-II

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



3. Stop engine and disconnect throttle position sensor harness connector.
4. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.

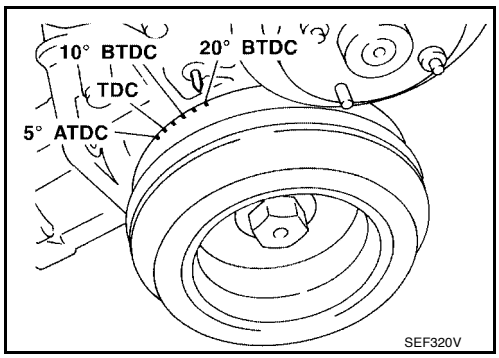


5. Check ignition timing with a timing light.

M/T : 20°±5° BTDC (in Neutral position)
A/T : 20°±5° BTDC (in P or N position)

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



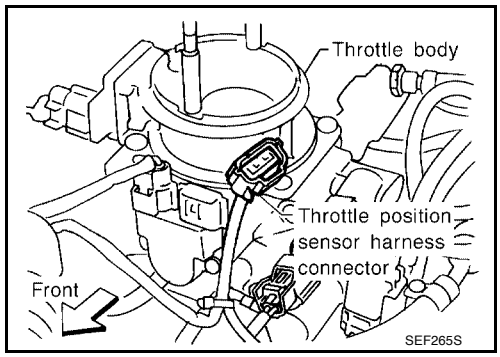
4. ADJUST IGNITION TIMING

With CONSULT-II

1. Adjust ignition timing to the specified value by turning distributor after loosening bolts which secure distributor.

Without CONSULT-II

1. Adjust ignition timing to the specified value by turning distributor after loosening bolts which secure distributor.
2. Stop engine and connect throttle position sensor harness connector to throttle position sensor.



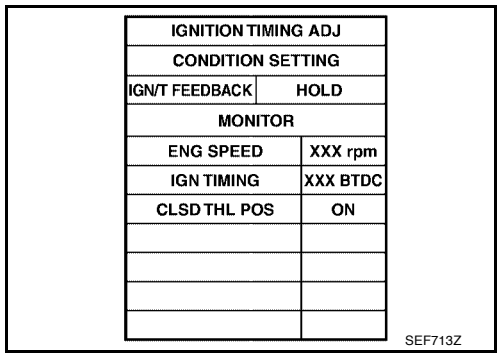
With CONSULT-II >> GO TO 2.
Without CONSULT-II >> GO TO 3.

5. CHECK BASE IDLE SPEED

With CONSULT-II

1. Read idle speed in “IGNITION TIMING ADJ” in “WORK SUPPORT” mode.

M/T : 750±50 rpm (in Neutral position)
A/T : 750±50 rpm (in P or N position)



Without CONSULT-II

1. Check idle speed.

M/T : 750±50 rpm (in Neutral position)
A/T : 750±50 rpm (in P or N position)

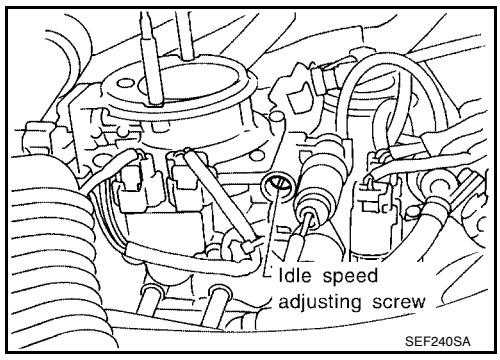
OK or NG

OK (With CONSULT-II) >> GO TO 7.
OK (Without CONSULT-II) >> GO TO 8.
NG >> GO TO 6.

6. ADJUST BASE IDLE SPEED

1. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
2. Adjust idle speed by turning idle speed adjusting screw.

M/T : 750±50 rpm (in Neutral position)
A/T : 750±50 rpm (in P or N position)

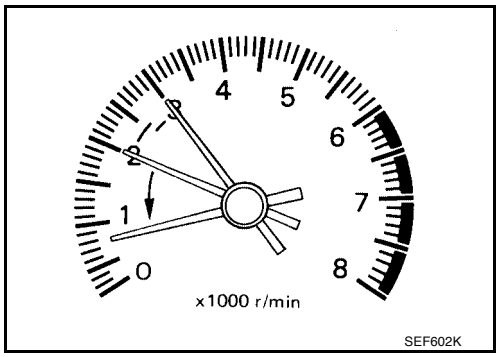


With CONSULT-II >> GO TO 7.
Without CONSULT-II >> GO TO 8.

7. CHECK TARGET IDLE SPEED

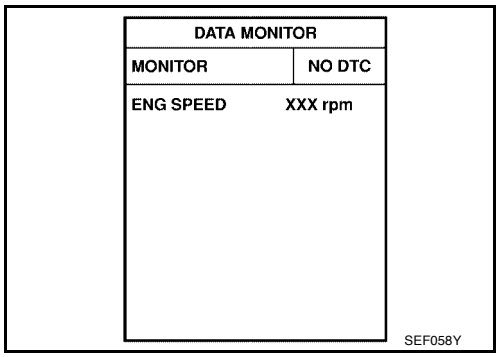
With CONSULT-II

1. Touch “BACK” on CONSULT-II.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.



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

M/T : 800±50 rpm (in Neutral position)
A/T : 800±50 rpm (in P or N position)



OK or NG

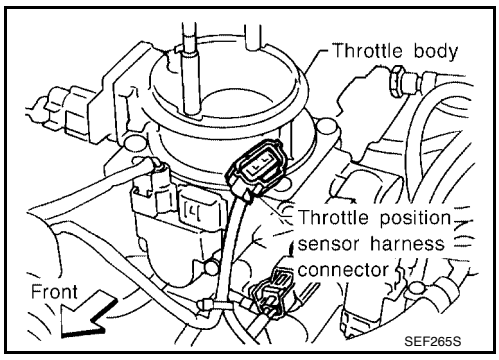
OK >> GO TO 10.
NG >> GO TO 9.

8. CHECK TARGET IDLE SPEED

Without CONSULT-II

1. Stop engine and connect throttle position sensor harness connector.
2. Start engine.
3. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
4. Check target idle speed.

M/T : 800±50 rpm (in Neutral position)
A/T : 800±50 rpm (in P or N position)



OK or NG

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

9. DETECT MALFUNCTIONING PART

Check the following.

1. Check IACV-AAC valve and replace if necessary. Refer to EC-403 , EC-408 .
2. Check IACV-AAC valve harness and repair if necessary. Refer to EC-398 .
3. Check ECM function by substituting another known-good ECM. (ECM may be the cause of an incident, but this is a rare case.)

>> GO TO 10.

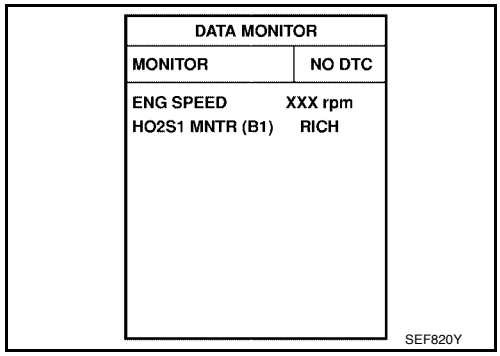
10. CHECK HEATED OXYGEN SENSOR 1 SIGNAL

With CONSULT-II

1. See “HO2S1 MNTR (B1)” in “DATA MONITOR” mode.
2. Run engine at about 2,000 rpm for about 2 minutes under no-load.
3. Maintain engine at 2,000 rpm under no-load (engine is warmed up to normal operating temperature) and 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

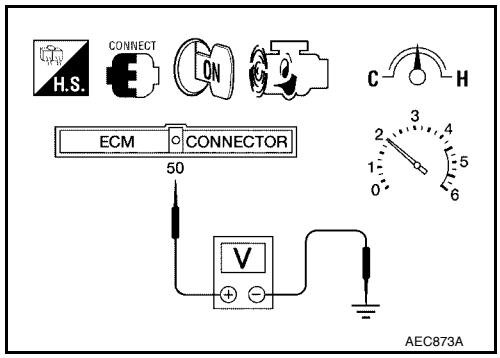


Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Set voltmeter probe between ECM terminal 50 and ground.
3. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.

   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



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11.

11. CHECK HEATED OXYGEN SENSOR 1 HARNESS

1. Stop engine and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 harness connector.
4. Check for continuity between terminal 50 of ECM harness connector and heated oxygen sensor 1 terminal 2. Refer to wiring diagram.

   Continuity should exist.

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

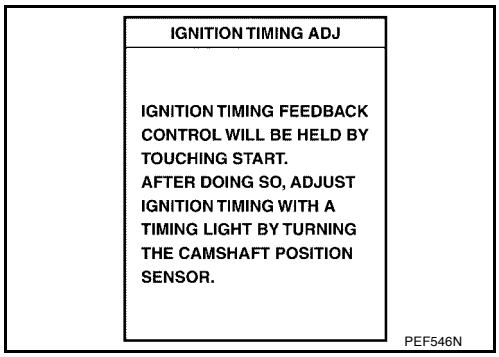
OK or NG

OK (With CONSULT-II) >> GO TO 13.
OK (Without CONSULT-II) >> GO TO 14.
NG >> 1. Repair or replace harness between ECM and heated oxygen sensor 1
2. GO TO 12.

12. PREPARATION FOR IDLE SPEED ADJUSTING

With CONSULT-II

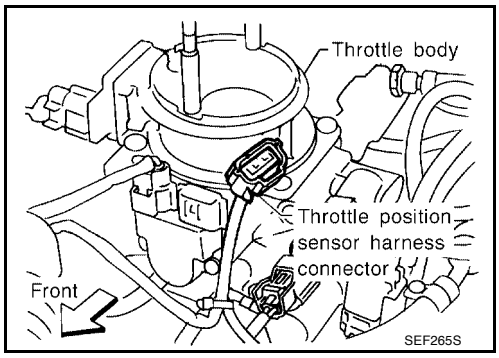
1. Select “IGNITION TIMING ADJ” in “WORK SUPPORT” mode.
2. Touch “START”.



Without CONSULT-II

1. Stop engine and disconnect throttle position sensor harness connector.
2. Start engine.

>> GO TO 6.

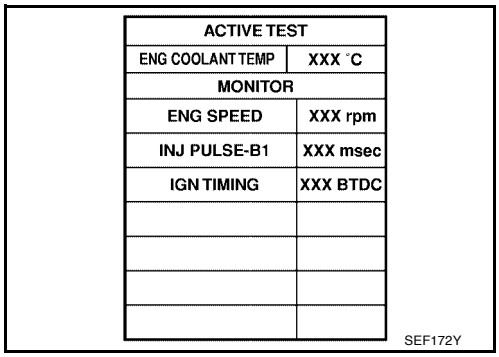


13. CHECK CO%

With CONSULT-II

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

Idle CO : 0.7 - 9.1%and engine runs smoothly.



OK or NG

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

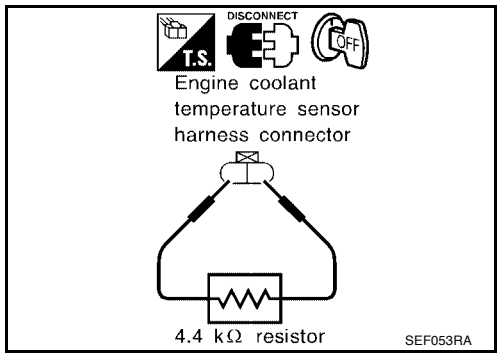
14. CHECK CO%

Without CONSULT-II

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

   Idle CO: 0.7 – 9.1% and engine runs smoothly.

8. 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 15.
NG >> GO TO 16.

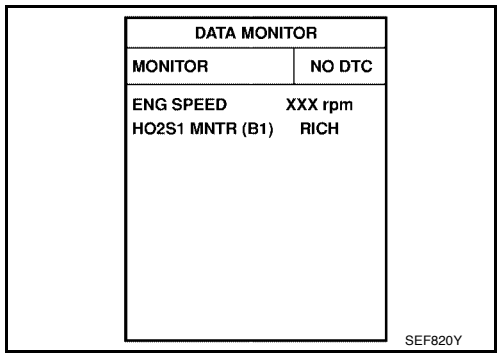
15. CHECK HEATED OXYGEN SENSOR 1 SIGNAL

With CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1.
3. Restart engine and warm it up until engine coolant temperature indicator points the middle gauge.
4. See “HO2S1 MNTR (B1)” in “DATA MONITOR” mode.
5. Maintain engine at 2,000 rpm under no-load (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

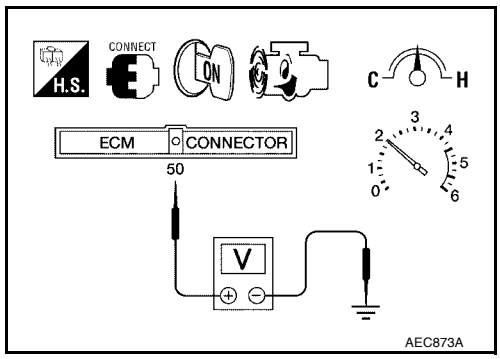


Without CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1.
3. Restart engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. Set voltmeter probe between ECM terminal 50 and ground.
6. Make sure that voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.

   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



OK or NG

OK >> GO TO 12.
NG >> GO TO 16.

16. DETECT MALFUNCTIONING PART

1. Stop engine.
2. Connect heated oxygen sensor 1 harness connector.
3. Check the following:

- Check fuel pressure regulator and repair or replace if necessary. Refer to EC-48 .
- Check mass air flow sensor and its circuit and repair or replace if necessary. Refer to EC-139 , EC-146 .
- Check injector and its circuit and repair or replace if necessary. Refer to EC-545 .
- Check engine coolant temperature sensor and its circuit and repair or replace if necessary. Refer to EC-157 , EC-177 .
- Check ECM function by substituting another known-good ECM. (ECM may be the cause of an incident, but this is a rare case.)

>> GO TO 12.

- **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.**

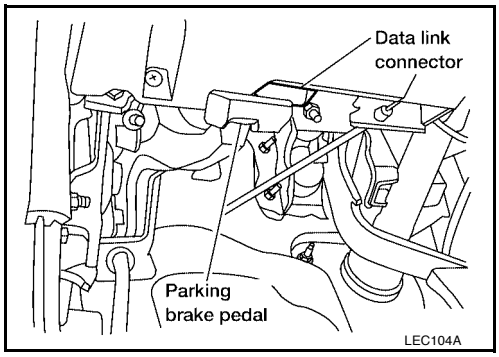
Fuel Pressure Check

UBS00D15

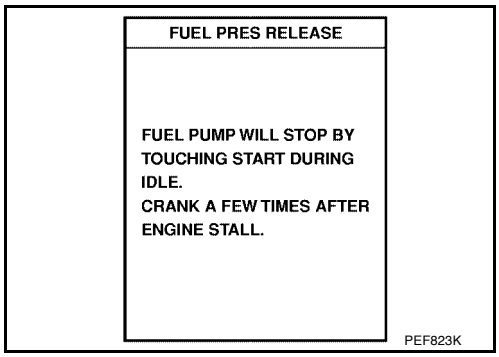
FUEL PRESSURE RELEASE

With CONSULT-II

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

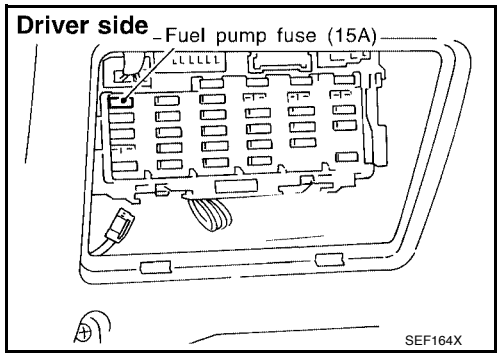


4. Turn ignition switch OFF.



Without CONSULT-II

1. Remove fuse for fuel pump.
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.



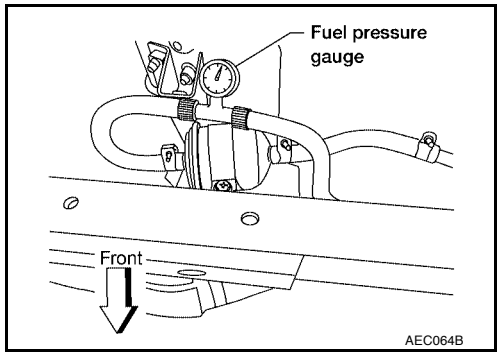
FUEL PRESSURE CHECK

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

NOTE:

- **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.**

1. Release fuel pressure to zero.
2. Disconnect fuel hose between fuel filter and fuel tube (engine side).
3. Install pressure gauge between fuel filter and fuel tube.

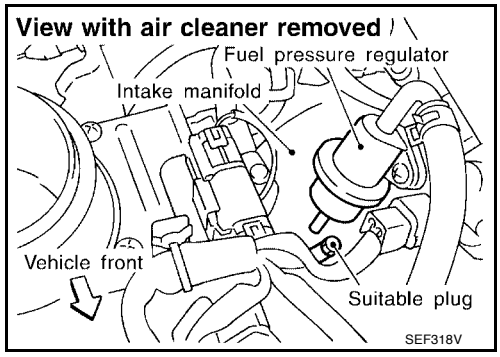


4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

At idle speed:

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 EC-48, "Fuel Pressure Regulator Check" .

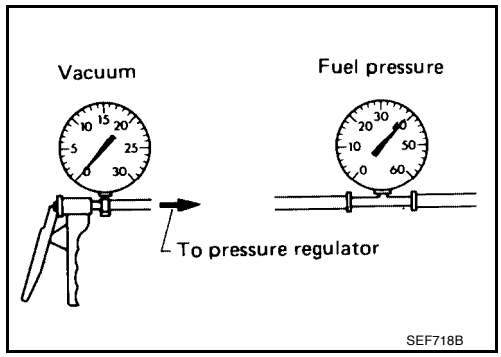


Fuel Pressure Regulator Check

UBS00D16

1. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
2. Plug intake manifold with a rubber 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

UBS00D17

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:

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	×	×*	×	—	×	×

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

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-73 .)

Two Trip Detection Logic

UBS00D18

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 display-ing	2nd trip display-ing	1st trip display-ing	2nd trip display-ing
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-18 .)	—	×	—	—	×	—	—	—
Fail-safe items (Refer to EC-73 .)	—	×	—	—	×*	—	—	—
Except above	—	—	—	×	—	×	×	—

*: Except “ECM”

Emission-related Diagnostic Information

UBS00D19

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

×: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1*2 CONSULT-II GST	SRT code	Test value/ Test limit (GST only)	1st trip DTC	Reference page
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	—	—	—	—
HO2S1 HTR (B1)	P0031	×	×	×*4	EC-128
HO2S1 HTR (B1)	P0032	×	×	×*4	EC-128
HO2S2 HTR (B1)	P0037	×	×	×*4	EC-133
HO2S2 HTR (B1)	P0038	×	×	×*4	EC-133
MAF SEN/CIRCUIT	P0101	—	—	×	EC-139
MAF SEN/CIRCUIT	P0102	—	—	—	EC-146
MAF SEN/CIRCUIT	P0103	—	—	—	EC-146
IAT SEN/CIRCUIT	P0112	—	—	—	EC-152
IAT SEN/CIRCUIT	P0113	—	—	—	EC-152
ECT SEN/CIRCUIT	P0117	—	—	—	EC-157
ECT SEN/CIRCUIT	P0118	—	—	—	EC-157
TP SEN/CIRCUIT	P0121	—	—	×	EC-162
TP SEN/CIRCUIT	P0122	—	—	—	EC-171
TP SEN/CIRCUIT	P0123	—	—	—	EC-171
ECT SENSOR	P0125	—	—	×	EC-177
IAT SENSOR	P0127	—	—	×	EC-183
THERMSTAT FNCTN	P0128	—	—	×	EC-189
HO2S1 (B1)	P0132	—	×	×	EC-191
HO2S1 (B1)	P0133	×	×	×*4	EC-198
HO2S1 (B1)	P0134	—	×	×	EC-208
HO2S2 (B1)	P0138	—	×	×	EC-215
HO2S2 (B1)	P0139	×	×	×*4	EC-222
FUEL SYS-LEAN-B1	P0171	—	—	×	EC-231
FUEL SYS-RICH-B1	P0172	—	—	×	EC-238
FTT SENSOR	P0181	—	—	×	EC-244
FTT SEN/CIRCUIT	P0182	—	—	×	EC-249
FTT SEN/CIRCUIT	P0183	—	—	×	EC-249
ENG OVER TEMP	P0217	—	—	—	EC-253
MULTI CYL MISFIRE	P0300	—	—	×	EC-258
CYL1 MISFIRE	P0301	—	—	×	EC-258
CYL2 MISFIRE	P0302	—	—	×	EC-258
CYL3 MISFIRE	P0303	—	—	×	EC-258
CYL4 MISFIRE	P0304	—	—	×	EC-258
KNOCK SEN/CIRC-B1	P0327	—	—	—	EC-265
KNOCK SEN/CIRC-B1	P0328	—	—	—	EC-265
CKP SEN/CIRCUIT	P0335	—	—	×	EC-269
CMP SEN/CIRCUIT	P0340	—	—	×	EC-275
EGR SYSTEM	P0400	×	×	×*4	EC-282

Items (CONSULT-II screen terms)	DTC*1*2 CONSULT-II GST	SRT code	Test value/ Test limit (GST only)	1st trip DTC	Reference page
EGRC-BPT VALVE	P0402	×	×	×*4	EC-293
EGR TEMP SEN/CIRC	P0405	—	—	×	EC-299
EGR TEMP SEN/CIRC	P0406	—	—	×	EC-299
TW CATALYST SYS-B1	P0420	×	×	×*4	EC-306
EVAP PURG FLOW/MON	P0441	×	×	×*4	EC-311
EVAP SMALL LEAK	P0442	×	×	×*4	EC-320
PURG VOLUME CONT/V	P0444	—	—	×	EC-332
PURG VOLUME CONT/V	P0445	—	—	×	EC-332
VENT CONTROL VALVE	P0447	—	—	×	EC-338
EVAP SYS PRES SEN	P0452	—	—	×	EC-344
EVAP SYS PRES SEN	P0453	—	—	×	EC-351
EVAP GROSS LEAK	P0455	—	—	×	EC-361
EVAP VERY SML LEAK	P0456	×*3	×	×*4	EC-372
FUEL LEV SEN SLOSH	P0460	—	—	×	EC-383
FUEL LEVEL SENSOR	P0461	—	—	×	EC-387
FUEL LEVL SEN/CIRC	P0462	—	—	×	EC-389
FUEL LEVL SEN/CIRC	P0463	—	—	×	EC-389
VEH SPEED SEN/CIRC	P0500	—	—	×	EC-393
ISC SYSTEM/CIRC	P0505	—	—	×	EC-398
ISC SYSTEM	P0506	—	—	×	EC-403
ISC SYSTEM	P0507	—	—	×	EC-408
CLOSED TP SW/CIRC	P0510	—	—	×	EC-413
ECM	P0605	—	—	×	EC-420
HO2S1 (B1)	P1143	×	×	×*4	EC-422
HO2S1 (B1)	P1144	×	×	×*4	EC-427
HO2S2 (B1)	P1146	×	×	×*4	EC-432
HO2S2 (B1)	P1147	×	×	×*4	EC-439
CLOSED LOOP-B1	P1148	—	—	—	EC-446
ENG OVER TEMP	P1217	—	—	—	EC-448
CKP SENSOR (COG)	P1336	—	—	×	EC-452
EGRC SOLENOID/V	P1400	—	—	×	EC-457
EGR SYSTEM	P1402	×	×	×*4	EC-463
EVAP SMALL LEAK	P1442	×	×	×*4	EC-472
PURG VOLUME CONT/V	P1444	—	—	×	EC-474
VENT CONTROL VALVE	P1446	—	—	×	EC-483
VENT CONTROL VALVE	P1448	—	—	×	EC-487
EVAP VERY SML LEAK	P1456	×*3	×	×*4	EC-493
FUEL LEVEL SEN/CIRC	P1464	—	—	×	EC-504
VC/V BYPASS/V	P1490	—	—	×	EC-507
VC CUT/V BYPASS/V	P1491	—	—	×	EC-513
P-N POS SW/CIRCUIT	P1706	—	—	×	EC-523

Items (CONSULT-II screen terms)	DTC*1*2 CONSULT-II GST	SRT code	Test value/ Test limit (GST only)	1st trip DTC	Reference page
TOR CONV CLTCH S/V	P1775*5	—	—	×	EC-530, AT-41
TOR CONV CLTCH S/V	P1776*5	—	—	×	EC-534

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: SRT code will not be set if the self-diagnostic results is NG.
*4: This is not displayed with GST.
*5: For the A/T models.

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 EC-61, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
For malfunctions in which 1st trip DTCs are displayed, refer to EC-50, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" . These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.
1st trip DTC is specified in Mode 7 of 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-69, "WORK FLOW" . 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, P1148, P1706, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

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

A sample of CONSULT-II display for DTC 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
CKP SEN/CIRCUIT [P0335]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	1t

PBIB0911E

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, throttle valve opening, 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-103, "Freeze Frame Data and 1st Trip Freeze Frame Data" .
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/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 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in EC-61, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.
As part of enhanced emissions test for Inspection and Maintenance (I/M), certain states require that 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 and 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 “CMPLT” 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.
This service manual contains the service procedure and support information to perform a comprehensive road test that enables the ECM to complete the SRT.

SRT Item

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

SRT item (CONSULT-II indication)	Performance Priority *	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
EVAPORATIVE SYSTEM	1	EVAP control system	P0442,P1442
	2	EVAP control system	P0456, P1456
	2	EVAP control system purge flow monitoring	P0441
HO2S	2	Heated oxygen sensor 1	P0133
		Heated oxygen sensor 1	P1143
		Heated oxygen sensor 1	P1144
		Heated oxygen sensor 2	P0139
		Heated oxygen sensor 2	P1147
		Heated oxygen sensor 2	P1146
HO2S HTR	2	Heated oxygen sensor 1 heater	P0031, P0032
		Heated oxygen sensor 2 heater	P0037, P0038
EGR SYSTEM	3	EGR function	P0400
		EGRC-BPT valve function	P0402
	1	EGR function	P1402

*: 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 them and is shown in the following table.

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.

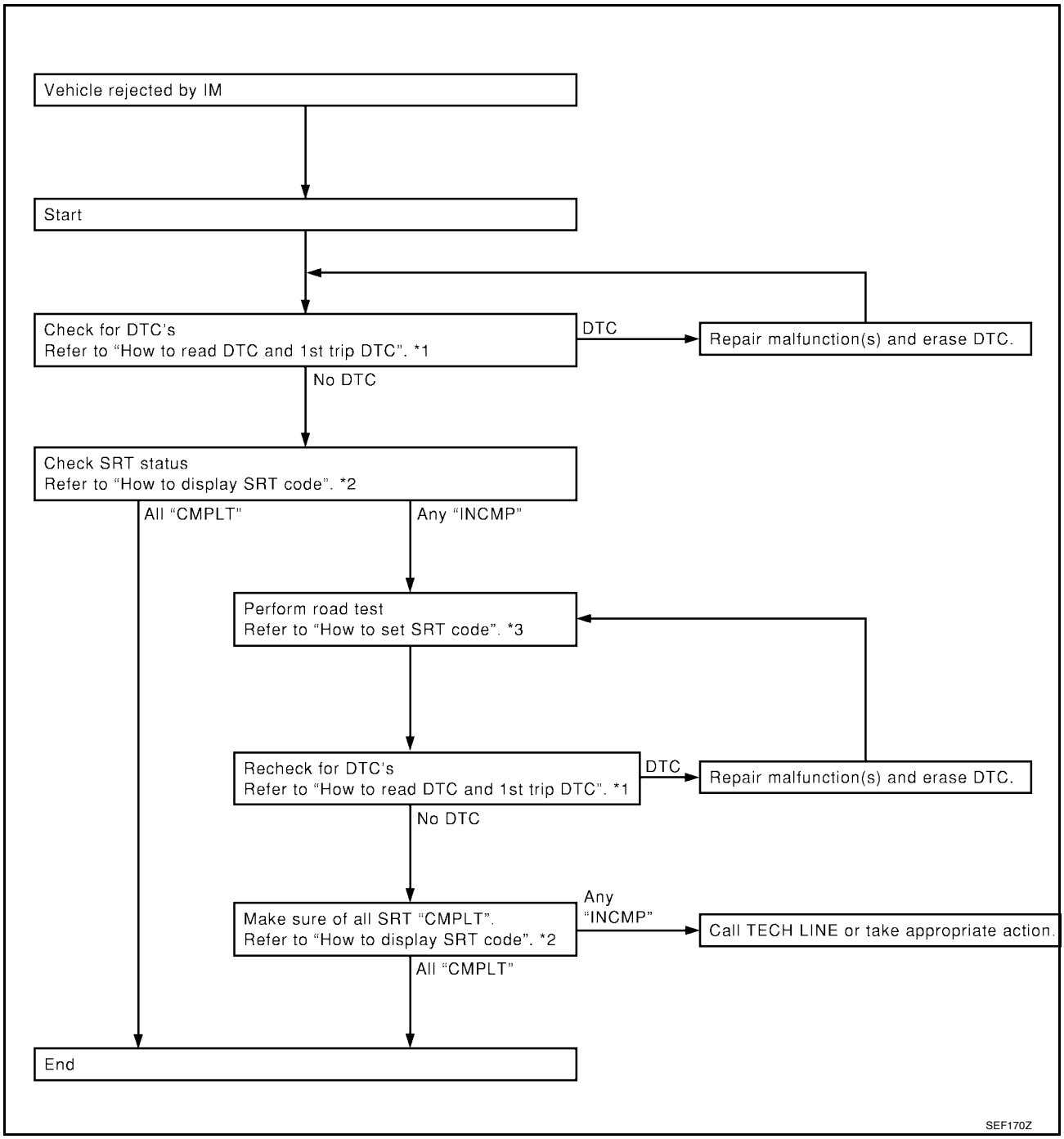
When all SRT related self-diagnoses showed OK results in a same cycle (Ignition OFF – ON – OFF), the SRT will indicate “CMPLT”.
→ Case 1 above
When all SRT related self-diagnoses show OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses 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 “COMPLT”.
→ Case 3 above
The previous table shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 and 2) or two (2) for one self-diagnosis (Case 3). However, in preparation for the State emissions inspection, it is unnecessary of each self-diagnosis to be executed twice (Case 3) because of 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-diagnostic 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 been rejected for the State emissions inspection due to one or more SRT items indicating "INCMP", review the following flowchart diagnostic sequence.



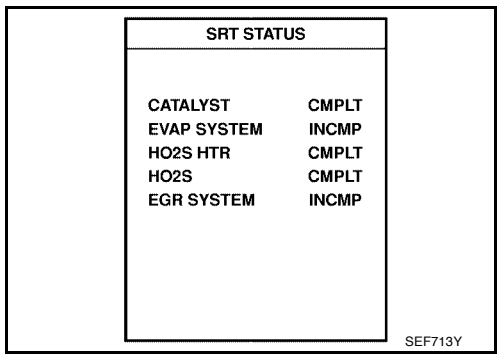
*1 EC-52 *2 EC-56 *3 EC-57

How to Display SRT Code

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.
Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.
A sample of CONSULT-II display for SRT code is shown below.

"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.

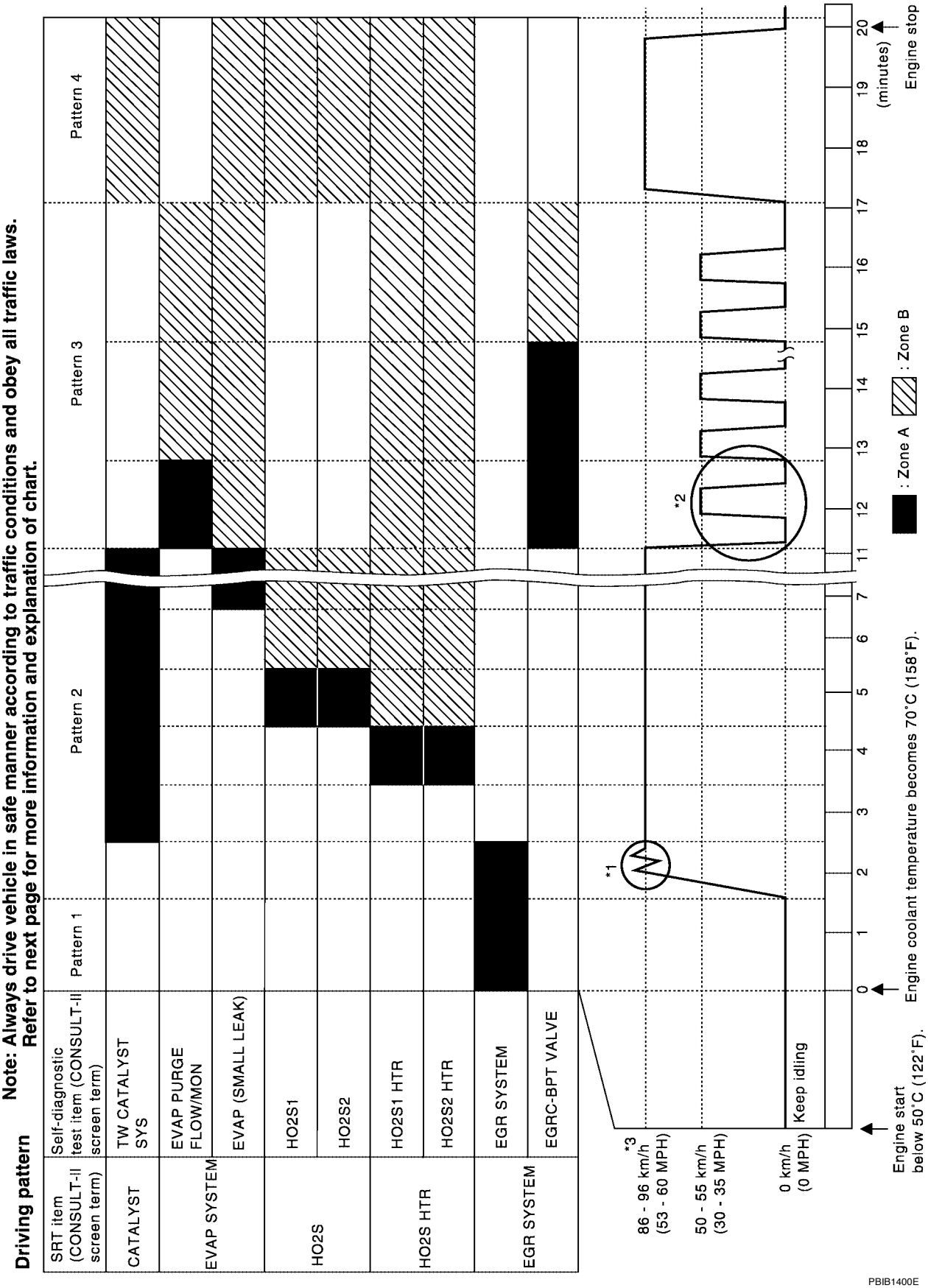
With CONSULT-II

Perform corresponding DTC confirmation procedure one by one based on Performance Priority in the table on EC-54, "SRT Item" .

Without CONSULT-II

The most efficient driving pattern in which SRT codes can be properly set is explained on EC-58, "Driving Pattern" . 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 59 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 59 and ground is lower than 1.4V).**
- **The engine is started at the tank fuel temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 60 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 below at least 10 times.

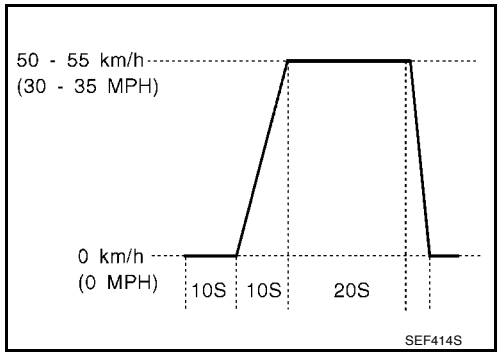
– **During acceleration, hold the accelerator pedal as steady as possible.**

3. Repeat steps 1 and 2 until the EGR system SRT is set.

*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.

Suggested upshift speeds for M/T models
Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.



	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:		For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	CRUISE shift point km/h (MPH)	km/h (MPH)
1st to 2nd	21 (13)	21 (13)	24 (15)

2nd to 3rd	37 (23)	297(16)	40 (25)
3rd to 4th	53 (33)	43 (27)	64 (40)
4th to 5th	63 (39)	58 (36)	72 (45)

Suggested Maximum Speed in Each Gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.
Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	km/h (MPH) 2WD (AUTO mode)
1st	50 (30)
2nd	95 (60)

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.
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.

Item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit	Conversion
			TID	CID		
CATALYST	Three way catalyst function (Bank 1)	P0420	01H	01H	Max.	1/128
		P0420	02H	81H	Min.	1
EVAP SYSTEM	EVAP control system (Small leak)	P0442	05H	03H	Max.	1/128 mm^2
		P1442	05H	03H	Max.	1/128 mm^2
	EVAP control system purge flow monitoring	P0441	06H	83H	Min.	20 mV
	EVAP control system (Very small leak)	P0456	07H	03H	Max.	1/128 mm^2
		P1456	07H	03H	Max.	1/128 mm^2
HO2S	Heated oxygen sensor 1	P0133	09H	04H	Max.	16 ms
		P1143	0AH	84H	Min.	10 mV
		P1144	0BH	04H	Max.	10 mV
		P0132	0CH	04H	Max.	10 mV
		P0134	0DH	04H	Max.	1s
	Heated oxygen sensor 2	P0139	19H	86H	Min.	10 mV/500 ms
		P1147	1AH	86H	Min.	10 mV
		P1146	1BH	06H	Max.	10 mV
		P0138	1CH	06H	Max.	10 mV
HO2S HEATER	Heated oxygen sensor 1 heater	P0032	29H	08H	Max.	20 mV
		P0031	2AH	88H	Min.	20 mV
	Heated oxygen sensor 2 heater	P0038	2DH	0AH	Max.	20 mV
		P0037	2EH	8AH	Min.	20 mV

Item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit	Conversion
			TID	CID		
EGR SYSTEM	EGR function	P0400	31H	8CH	Min.	1°C
		P0400	32H	8CH	Min.	1°C
		P0400	33H	8CH	Min.	1°C
		P0400	34H	8CH	Min.	1°C
		P1402	35H	0CH	Max.	1°C
	EGR-BPT valve function	P0402	36H	0CH	Max.	1 count
		P0402	37H	8CH	Min.	1 count

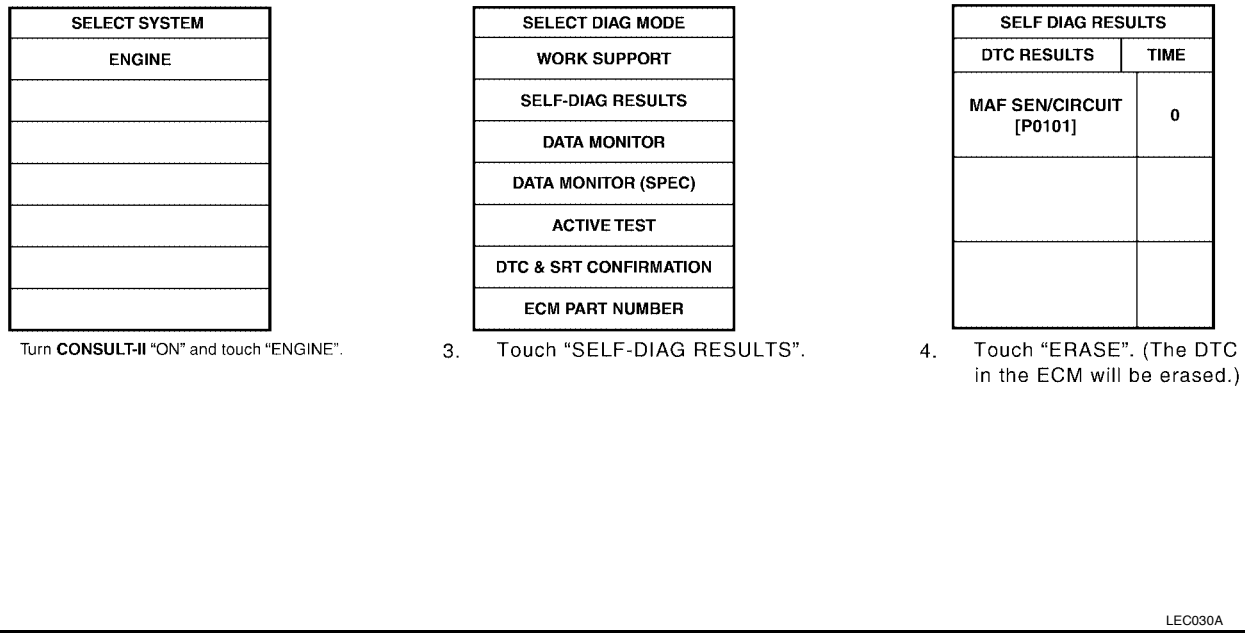
HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

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 5 seconds and then turn it ON (engine stopped) again.
2. Turn CONSULT-II “ON” and touch “ENGINE”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. (The DTC in the ECM will be erased.)

How to erase DTC (With CONSULT-II)

1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 5 seconds and then turn it “ON” (engine stopped) again.



2. Turn **CONSULT-II** “ON” and touch “ENGINE”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. (The DTC in the ECM will be erased.)

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

How to Erase DTC (With GST)

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Select Mode 4 with GST (Generic Scan Tool).

The emission-related diagnostic information in the ECM can be erased by selecting Mode 4 with GST (Generic Scan Tool).

NOTE:

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

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.

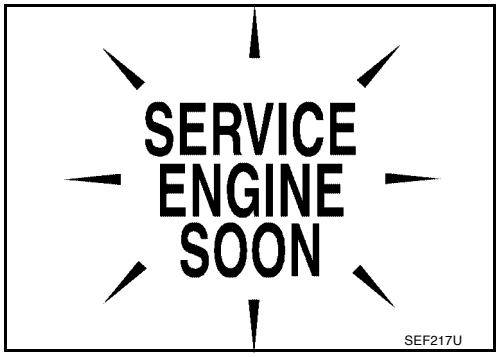
Malfunction Indicator Lamp (MIL)

UBS00D1A

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-25, "WARNING LAMPS" or see EC-569, "DATA LINK CONNECTOR" .
2. When the engine is started, the MIL should go off.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following two 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) ● One trip detection diagnoses

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-25, "WARNING LAMPS" or see EC-569, "DATA LINK CONNECTOR" .

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

MIL	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

OBD System Operation Chart

UBS00D1B

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

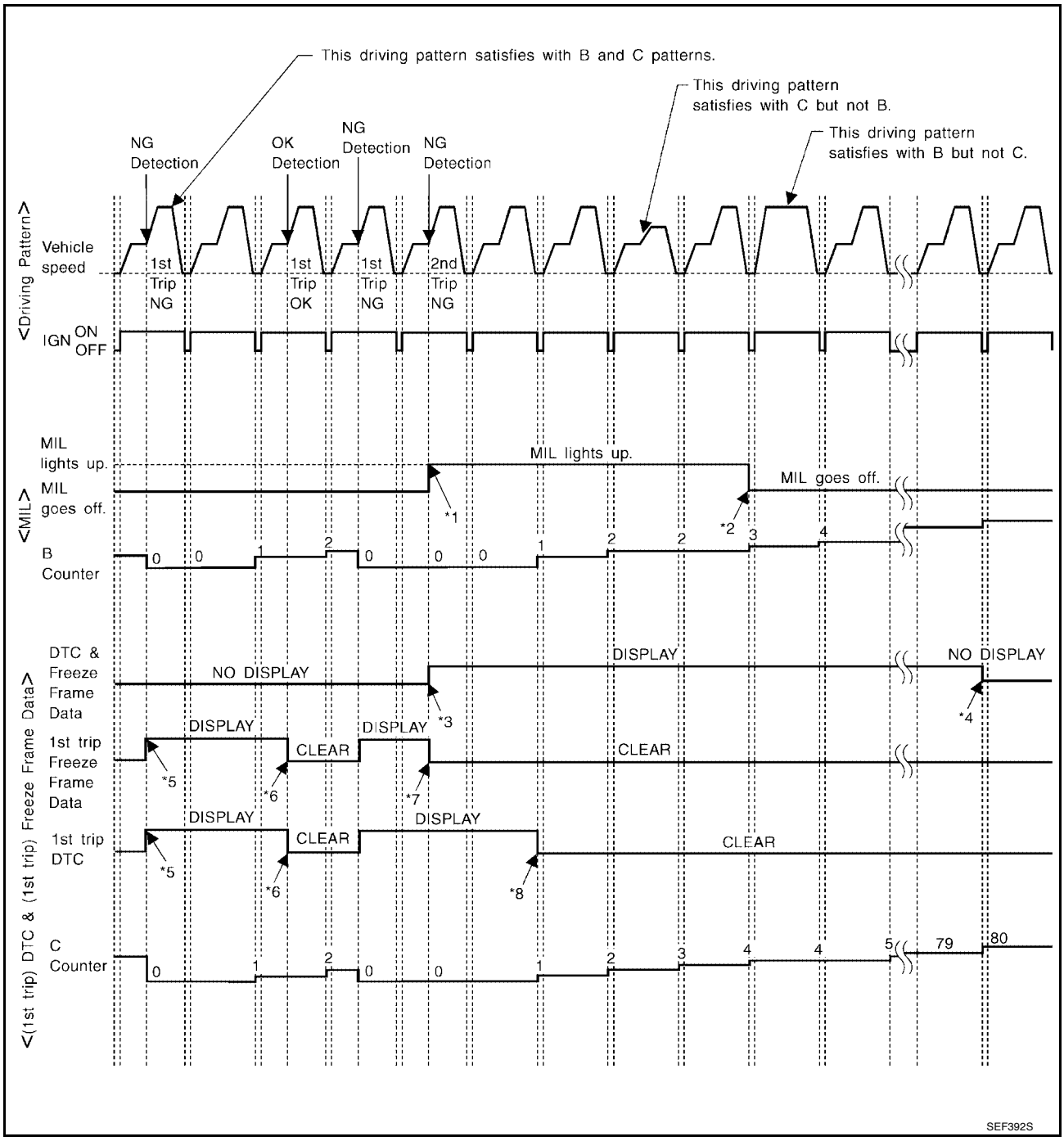
- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to EC-49, "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-65 .
For details about patterns A and B under Other, see EC-67 .
*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:

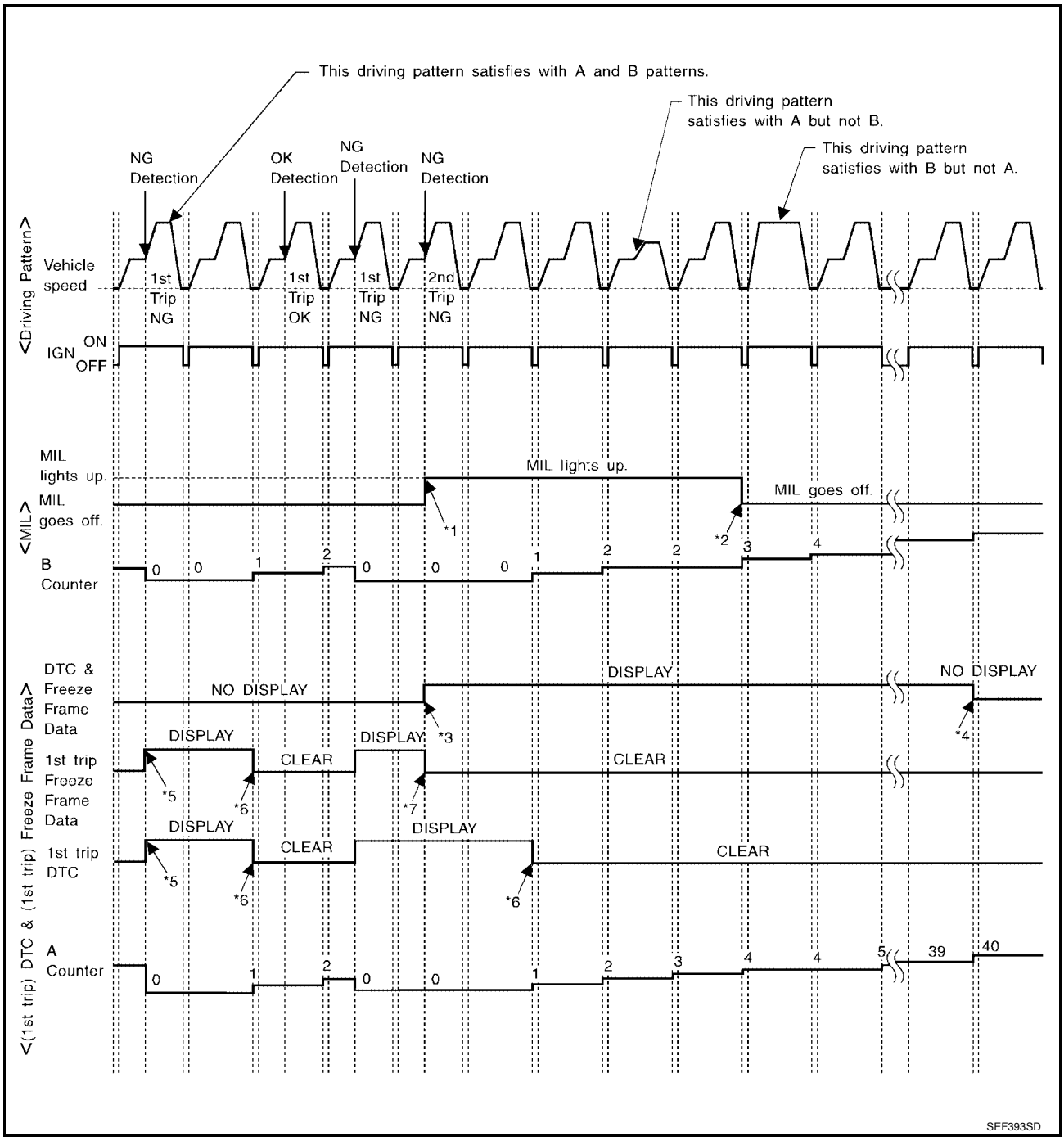
1. The following conditions should be satisfied at the same time:
   Engine speed: (Engine speed in the freeze frame data) ±375 rpm
   Calculated load value: (Calculated load value in the freeze frame data) × (1±0.1) [%]
   Engine coolant temperature (T) condition:

- 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.)

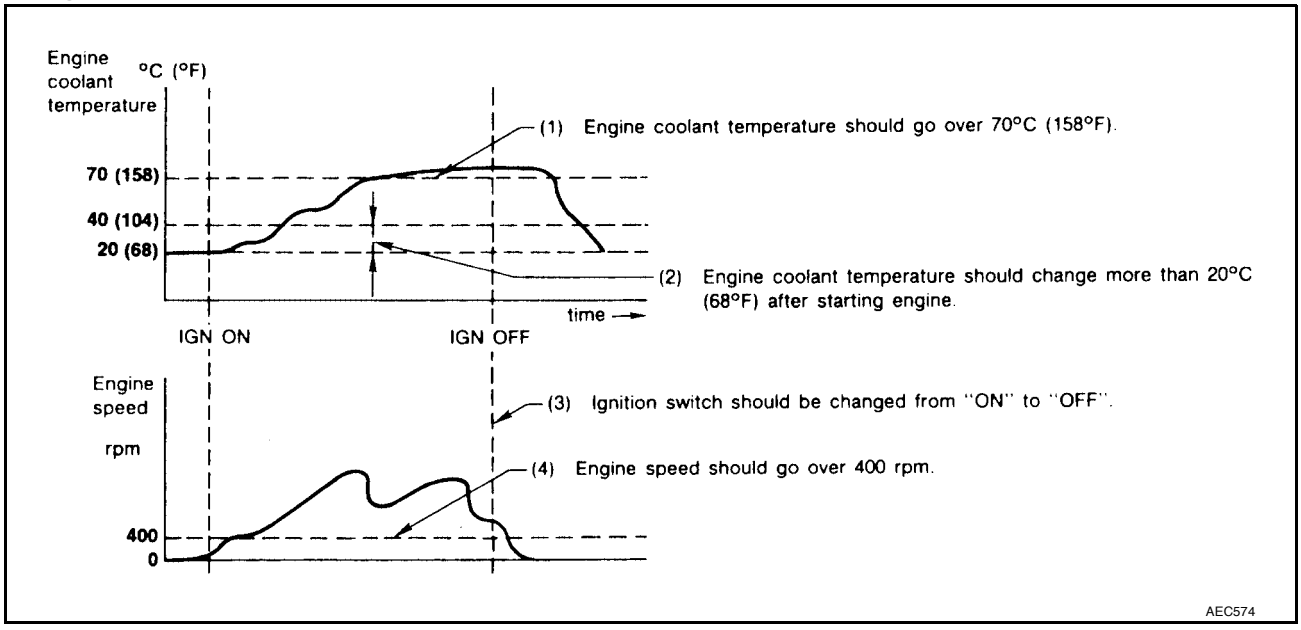
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*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

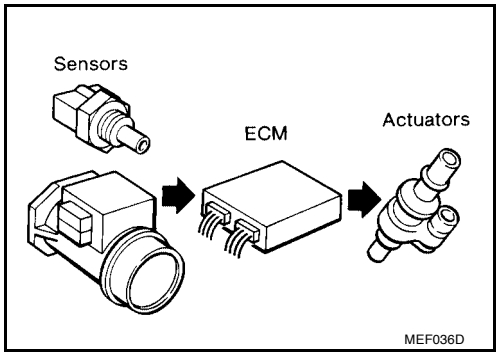
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Trouble Diagnosis Introduction

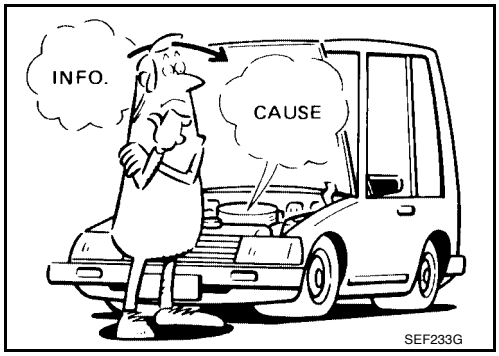
UBS00D1C

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



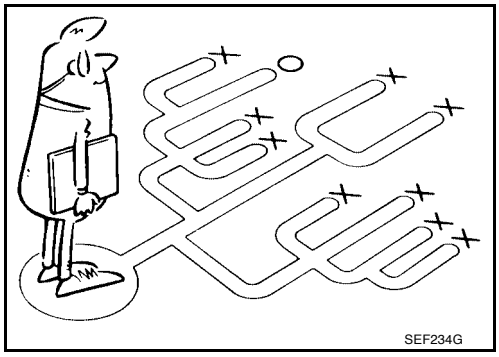
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



A visual check only may not find the cause of the incidents. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the Work Flow on EC-69 .

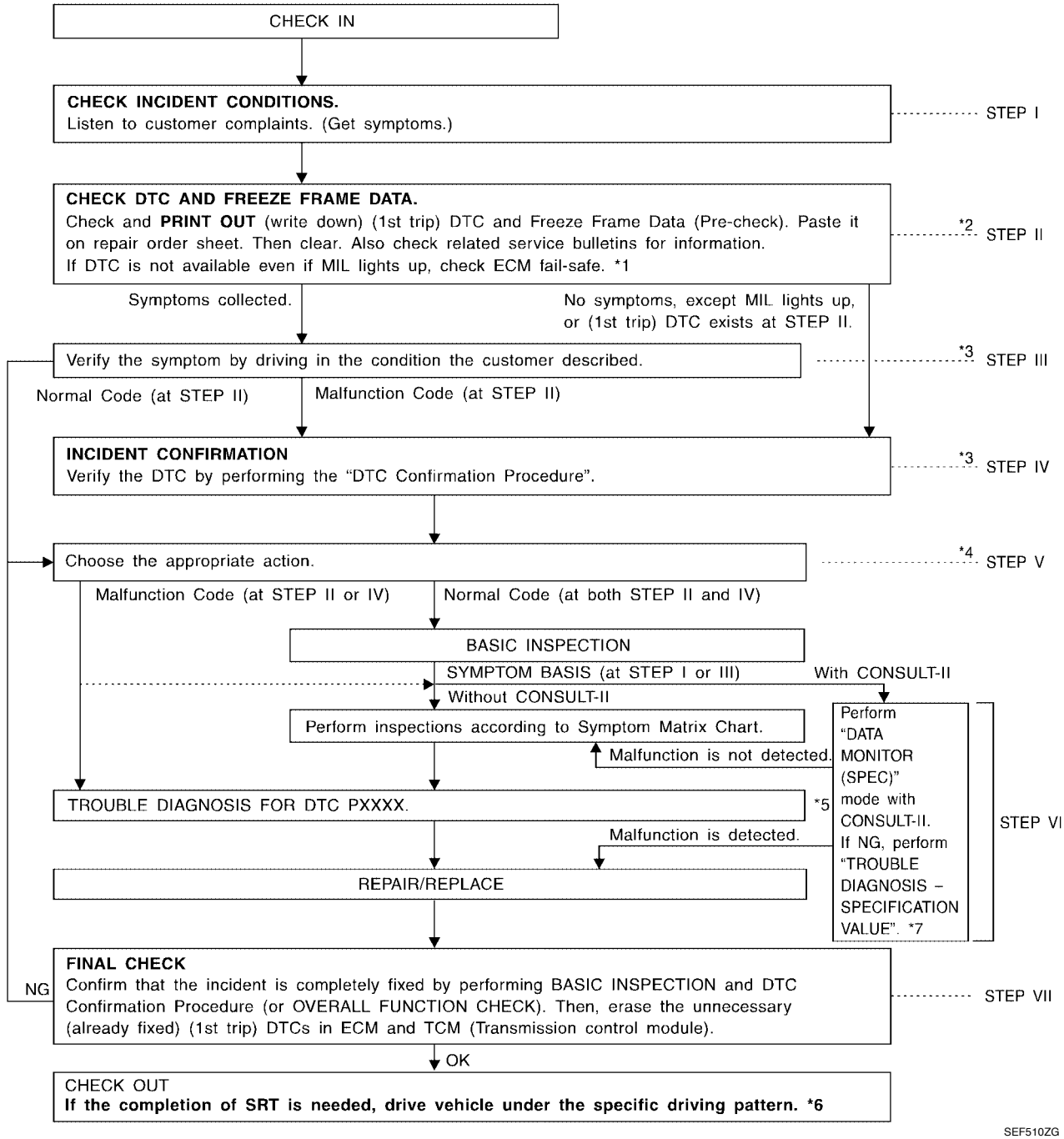
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic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

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



WORK FLOW

Flow Chart



SEF510ZG

*1: EC-73, "Fail-safe Chart"

*2: If time data of "SELF-DIAG RESULTS" is other than "0" or "1t" refer to EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*3: If the incident cannot be duplicated, refer to EC-120, "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-121, "POWER SUPPLY AND GROUND CIRCUIT" .

*5: If the malfunctioning part cannot be found, refer to EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*6: EC-58, "Driving Pattern"

*7: EC-116, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE"

Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the EC-71, "DIAGNOSTIC WORKSHEET" .
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 freeze frame data. (Refer to EC-61, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. 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-84 .) 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 “INCIDENT SIMULATION TESTS” in GI-25, "How to Perform Efficient Diagnosis for an Electrical 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 “INCIDENT SIMULATION TESTS” in GI-25, "How to Perform Efficient Diagnosis for an Electrical 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-74 .) If CONSULT-II is available, perform “DATA MONITOR (SPEC)” mode with CONSULT-II and proceed to the “TROUBLE DIAGNOSIS — SPECIFICATION VALUE”, EC-116 . (If malfunction is detected, proceed to “REPAIR/REPLACE”.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-84 .)
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-91, "ECM Terminals and Reference Value" , EC-112, "CONSULT-II Reference Value in Data Monitor Mode" . 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” inGI-25, "How to Perform Efficient Diagnosis for an Electrical Incident" . Repair or replace the malfunction parts.
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 different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM. (Refer to EC-61, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .)

DIAGNOSTIC WORKSHEET

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

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

Utilize a diagnostic worksheet like the one on EC-71, "Worksheet Sample" 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.

KEY POINTS

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

SEF907L

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	

LEC031A

DTC Inspection Priority Chart

UBS00D1D

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

Priority	Detected items (DTC)
1	● P0101, P0102, P0103 MAF sensor ● P0112, P0113, P0127 IAT sensor ● P0117, P0118, P0125 ECT sensor ● P0121, P0122, P0123 TP sensor ● P0128 Thermostat function ● P0181, P0182, P0183 FTT sensor ● P0327, P0328 KS ● P0340 CMP sensor ● P0460, P0461, P0462, P0463, P1464 Fuel level sensor ● P0500 VSS ● P0605 ECM ● P1400 EGRC-solenoid valve ● P1706 PNP switch
2	● P0031, P0032 HO2S1 heater ● P0037, P0038 HO2S2 heater ● P0132, P0133, P0134, P1143, P1144 HO2S1 ● P0138, P0139, P1146, P1147 HO2S2 ● P0335, P1336 CKP sensor ● P0405, P0406 EGRT sensor ● P0441 EVAP control system purge flow monitoring ● P0444, P0445, P1444 EVAP canister purge volume control solenoid valve ● P0447, P1446, P1448 EVAP canister vent control valve ● P0452, P0453 EVAP control system pressure sensor ● P0510 CTP switch ● P1442 EVAP control system (SMALL LEAK) ● P1490, P1491 Vacuum cut valve bypass valve ● P1775, P1776 TCC solenoid valve
3	● P0171, P0172 Fuel injection system function ● P0300 - P0304 Misfire ● P0400, P1402 EGR function ● P0402 EGRC-BPT valve ● P0420 Three way catalyst function ● P0442 EVAP control system (SMALL LEAK) ● P0455 EVAP control system (GROSS LEAK) ● P0456, P1456 EVAP control system (VERY SMALL LEAK) ● P0505, P0506, P507 ISC system ● P1148 Closed loop control

Fail-safe Chart

UBS00D1E

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.

DTC No. CONSULT-II GST	Detected items	Engine operating condition in fail-safe mode	
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0112 P0113	Intake air temperature sensor	The ECM functions on the assumption that the intake air temperature is 25°C (77°F).	
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch to 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 to 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)
P0122 P0123	Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
		Condition	Driving condition
		When engine is idling	Normal
		When accelerating	Poor acceleration
Unable to access ECM	ECM	**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 IACV-AAC valve operation are controlled under certain limitations.	
			ECM fail-safe operation
		Engine speed	**Engine speed will not rise more than 3,000 rpm**
		Fuel injection	Simultaneous multiport fuel injection system
		Ignition timing	Ignition timing is fixed at the preset valve
		Fuel pump	Fuel pump relay is ON when engine is running and OFF when engine stalls
		IACV-AAC valve	Full open
		Replace ECM, if ECM fail-safe condition is confirmed.	

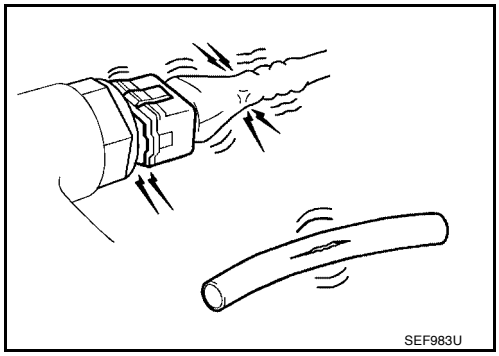
Basic Inspection

UBS00D1F

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:

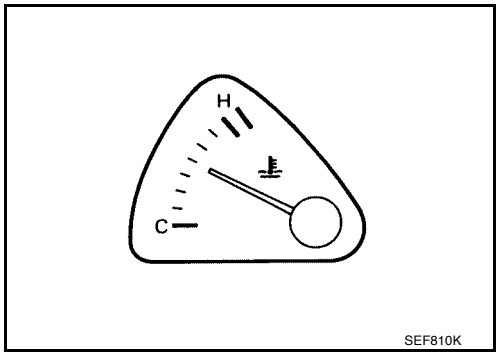
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket



3. Confirm that electrical or mechanical loads are not applied.

- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.

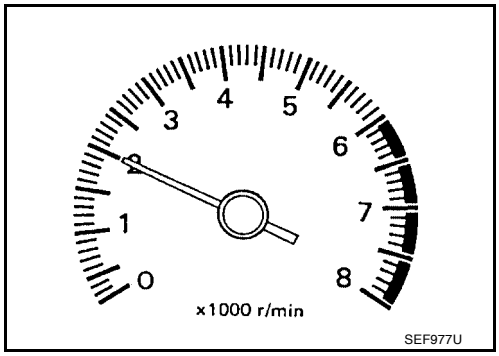
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
   Ensure engine stays below 1,000 rpm.



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

OK or NG

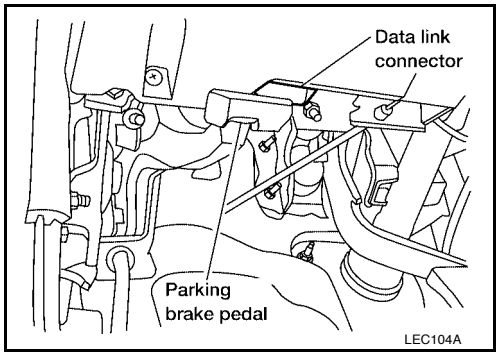
OK (With CONSULT-II) >> GO TO 2.
OK (With GST) >> GO TO 4.
NG >> Repair or replace components as necessary according to corresponding Diagnostic Procedure.



2. CONNECT CONSULT-II TO THE VEHICLE

Connect “CONSULT-II” and CONSULT-II CONVERTER to the data link connector and select “ENGINE” from the menu. Refer to EC-101, "INSPECTION PROCEDURE" .

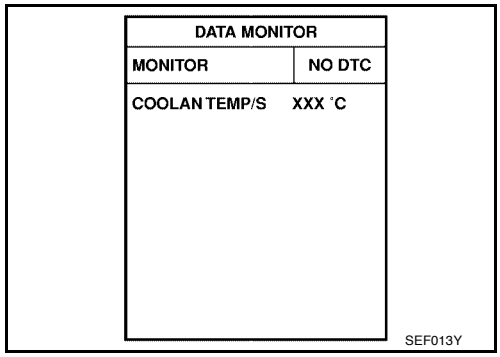
>> GO TO 3.



3. CHECK FI CAM FUNCTION

With CONSULT-II

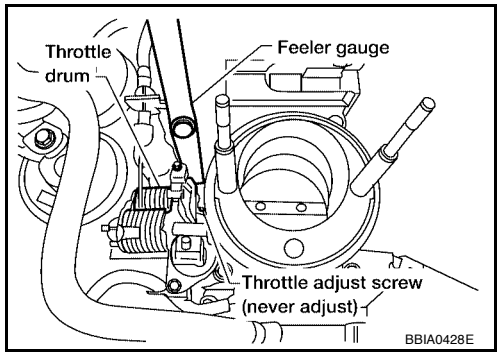
1. Adjust accelerator wire. Refer to ACC-2, "Adjusting Accelerator Wire" .
2. Warm up engine to 75°C (167°F).
3. Stop engine and wait at least 5 seconds, then turn ignition switch ON.
4. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.



5. When the engine coolant temp is 75 to 85°C (167 to 185°F), confirm the clearance is less than 0.05 mm (0.0020 in), between stopper and throttle drum as shown in the figure.

OK or NG

OK >> GO TO 5.
NG >> 1. Replace throttle body assembly. Refer to EM-13, "OUTER COMPONENT PARTS" .
2. GO TO 5.



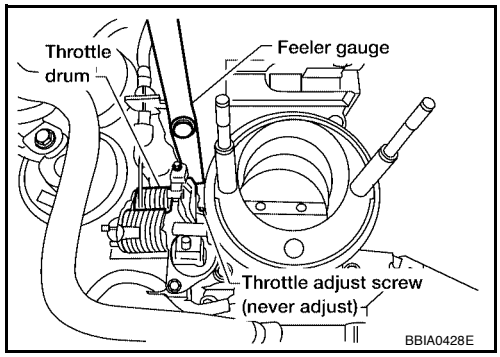
4. CHECK FI CAM FUNCTION

With GST

1. Adjust accelerator wire. Refer to ACC-2, "Adjusting Accelerator Wire" .
2. Warm up engine to 75°C (167°F).
3. Stop engine and wait at least 10 seconds, then turn ignition switch ON.
4. Select “MODE 1” with GST.
5. When the engine coolant temp is 75 to 85°C (167 to 185°F), confirm the clearance is less than 0.05 mm (0.0020 in), between stopper and throttle drum as shown in the figure.

OK or NG

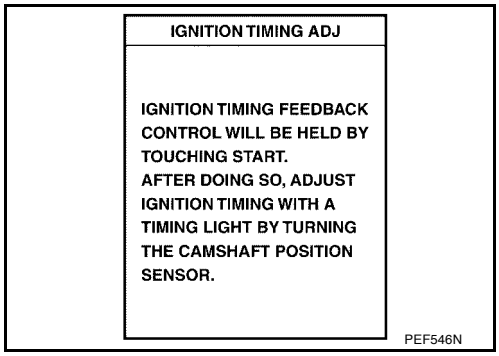
OK >> GO TO 12.
NG >> 1. Replace throttle body assembly. Refer to EM-13, "OUTER COMPONENT PARTS" .
2. GO TO 12.



5. CHECK IGNITION TIMING

With CONSULT-II

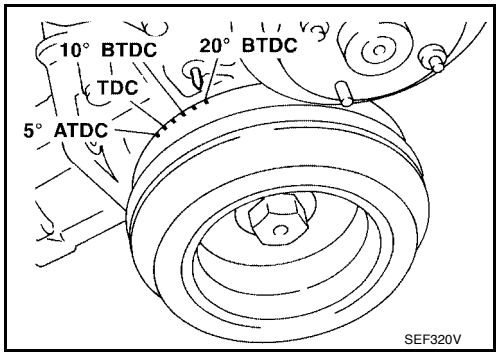
1. Warm up engine to normal operating temperature.
2. Select “IGNITION TIMING ADJ” in “WORK SUPPORT” mode.
3. Touch “START”.



4. Check ignition timing at idle using timing light.

M/T: 20°±5° BTDC (in Neutral position)

A/T: 20°±5° BTDC (in P or N position)



OK or NG

OK >> GO TO 6.

NG >> 1. Adjust ignition timing by turning distributor. Refer to EC-36, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" .
2. GO TO 6.

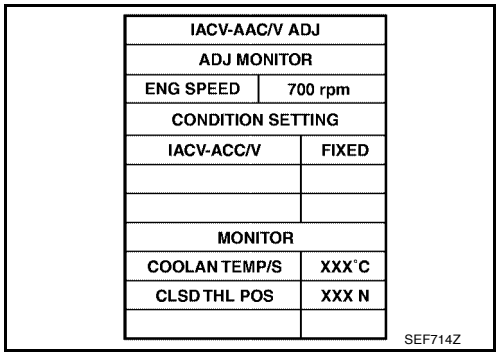
6. CHECK BASE IDLE SPEED

With CONSULT-II

1. Select “IGNITION TIMING ADJ” in “WORK SUPPORT” mode and touch “START”.
2. Check idle speed.

M/T: 750±50 rpm (in Neutral position)

A/T: 750±50 rpm (in P or N position)



OK or NG

OK >> GO TO 7.

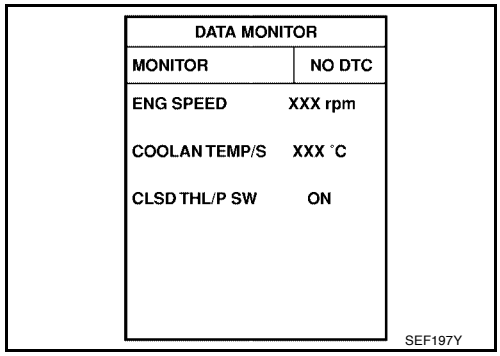
NG >> 1. Adjust base idle speed by turning idle speed adjusting screw. Refer to EC-36, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" .
2. GO TO 7.

7. CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION (CHECK THROTTLE POSITION SENSOR IDLE POSITION)

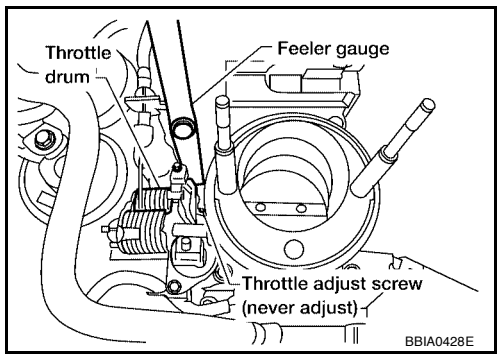
With CONSULT-II

NOTE:
Always check ignition timing and base idle speed before performing the following.

1. Warm up engine to normal operating temperature.
2. Check FI cam. Refer to procedure 3.
3. Stop engine.
4. Turn ignition switch ON.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Select “CLSD THL/P SW” from the menu.
7. Read “CLSD THL/P SW” signal under the following conditions.



- Insert a 0.1 mm (0.004 in) and 0.3 mm (0.012 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure and check the signal.
  “CLSD THL/P SW” signal should remain “ON” while inserting 0.1 mm (0.004 in) feeler gauge.
  “CLSD THL/P SW” signal should remain “OFF” while inserting 0.3 mm (0.012 in) feeler gauge.



OK or NG

OK >> GO TO 11.
NG >> GO TO 8.

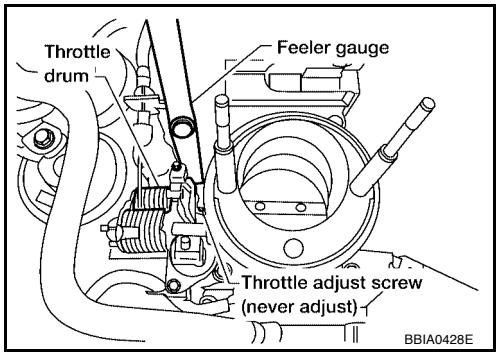
8. ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-1

With CONSULT-II

NOTE:

- **Never adjust throttle adjust screw (TAS).**
- **Do not touch throttle drum when checking "CLSD THL/P SW" signal. Doing so may cause an incorrect adjustment.**

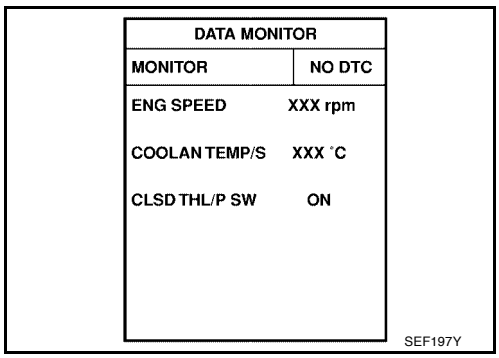
1. Warm engine up to normal operating temperature.
2. Check FI cam. Refer to procedure 3.
3. Stop engine.
4. Loosen throttle position sensor fixing bolts.
5. Turn ignition switch ON.
6. Select "CLSD THL/P SW" in "DATA MONITOR" mode.
7. Insert a 0.1 mm (0.004 in) feeler gauge between throttle adjust screw and throttle drum as shown in the figure.
8. Open throttle valve and then close.



9. Check "CLSD THL/P SW" signal.
   "CLSD THL/P SW" signal should remain "OFF" when the throttle valve is closed.
   If it is impossible to adjust closed throttle position switch, replace throttle position sensor.

OK or NG

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

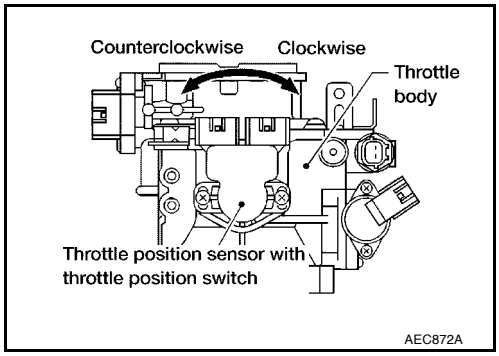


9. ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-2

With CONSULT-II

Turn throttle position sensor body counterclockwise until "CLSD THL/P SW" signal switches to "OFF".

>> GO TO 10.



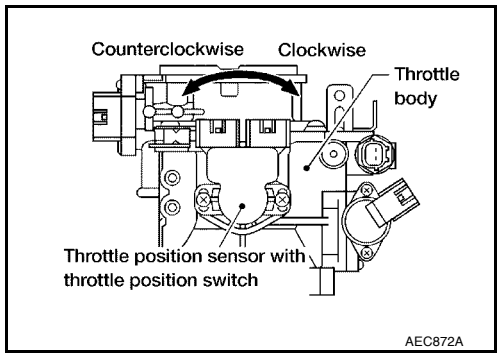
10. ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-3

With CONSULT-II

1. Temporarily tighten sensor body fixing bolts as follows.

– **Gradually move the sensor body clockwise and stop it when "CLSD THL/P SW" signal switches from "OFF" to "ON" when tightening sensor body fixing bolts.**

2. Make sure two or three times that the signal is "ON" when the throttle valve is closed and "OFF" when it is opened.
3. Remove 0.1 mm (0.004 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
4. Make sure two or three times that the signal remains "OFF" when the throttle valve is closed.
5. Tighten throttle position sensor.
6. Check "CLSD THL/P SW" signal again.
   The signal remains "OFF" while closing throttle valve.



OK or NG

OK >> 1. Remove 0.3 mm (0.012 in) feeler gauge.
2. GO TO 11.

NG >> GO TO 8.

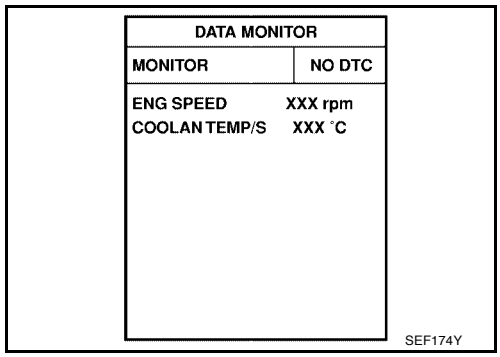
11. CHECK TARGET IDLE SPEED

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "ENG SPEED" in "DATA MONITOR" mode.
3. Check idle speed.

M/T: 800±50 rpm (in Neutral position)

A/T: 800±50 rpm (in P or N position)



OK or NG

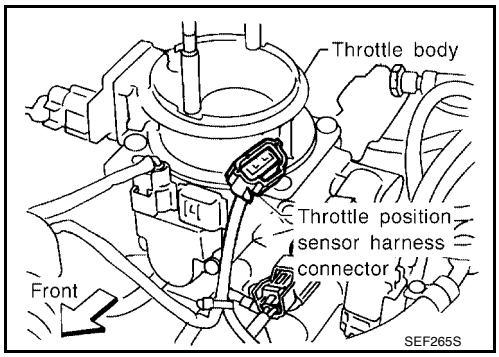
OK >> **INSPECTION END**

NG >> Adjust idle speed. Refer to EC-36, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" . Inspection end after adjust idle speed.

12. CHECK IGNITION TIMING

Without CONSULT-II

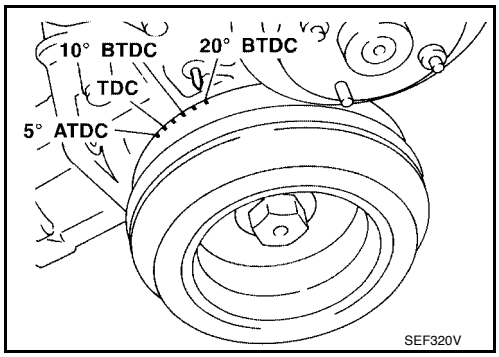
1. Warm up engine to normal operating temperature.
2. Stop engine and disconnect throttle position sensor harness connector.
3. Start engine.
4. Rev engine (2,000 to 3,000 rpm) two or three times under no-load and then run engine at idle speed.



5. Check ignition timing at idle using timing light.

M/T: 20°±5° BTDC (in Neutral position)

A/T: 20°±5° BTDC (in P or N position)



OK or NG

OK >> GO TO 13.

NG >> 1. Adjust ignition timing by turning distributor. Refer to EC-36, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" .
2. GO TO 13.

13. CHECK BASE IDLE SPEED

Without CONSULT-II

Make sure that engine speed falls to the following speed.

M/T: 750±50 rpm (in Neutral position)

A/T: 750±50 rpm (in P or N position)

OK or NG

OK >> GO TO 14.

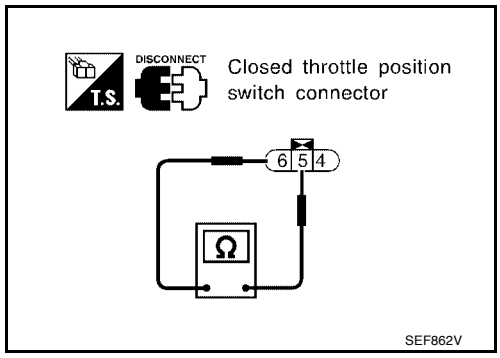
NG >> 1. Adjust base idle speed by turning idle speed adjusting screw. Refer to EC-36, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" .
2. GO TO 14.

14. CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION (CHECK THROTTLE POSITION SENSOR IDLE POSITION)

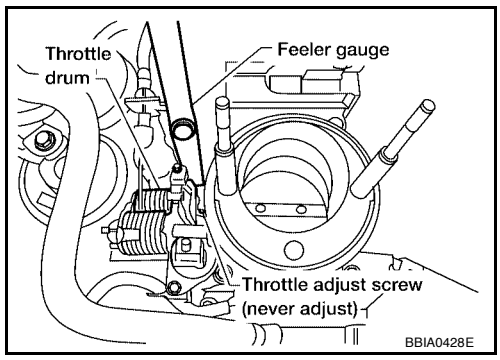
Without CONSULT-II

NOTE:
Always check ignition timing and base idle speed before performing the following.

1. Warm up engine to normal operating temperature.
2. Check FI cam. Refer to procedure 4.
3. Stop engine.
4. Disconnect closed throttle position switch harness connector.
5. Connect the tester probe to closed throttle position switch terminals 5 and 6.
6. Check harness continuity under the following conditions.



– Insert the 0.1 mm (0.004 in) and 0.3 mm (0.012 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure.
"Continuity should exist" while inserting 0.1 mm (0.004 in) feeler gauge.
"Continuity should not exist" while inserting 0.3 mm (0.012 in) feeler gauge.



OK or NG

OK >> GO TO 18.
NG >> GO TO 15.

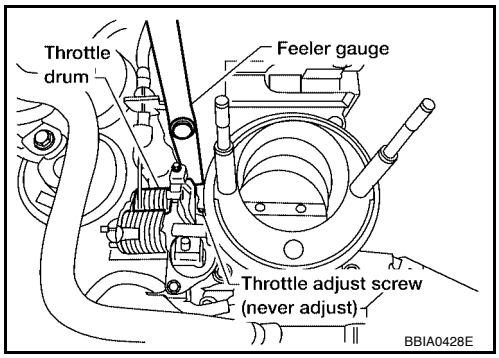
15. ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-1

Without CONSULT-II

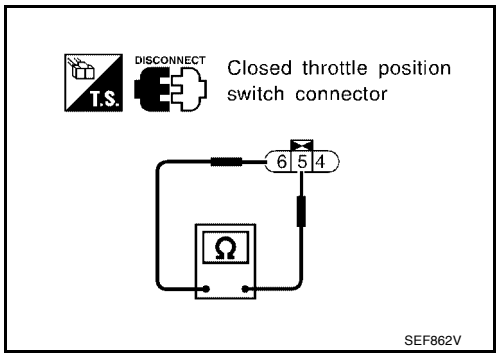
NOTE:

- **Never adjust throttle adjust screw (TAS).**
- **Do not touch throttle drum when checking continuity. Doing so may cause an incorrect adjustment.**

1. Warm engine up to normal operating temperature.
2. Check FI cam. Refer to procedure 4.
3. Stop engine.
4. Loosen throttle position sensor fixing bolts.
5. Disconnect closed throttle position sensor harness connector.
6. Insert 0.1 mm (0.004 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure.
7. Open throttle valve then close.



8. Check continuity between closed throttle position switch terminal 5 and 6.
   The continuity should not exist while closing the throttle position sensor body.
   If it is impossible to adjust closed throttle position switch, replace throttle position sensor.



OK or NG

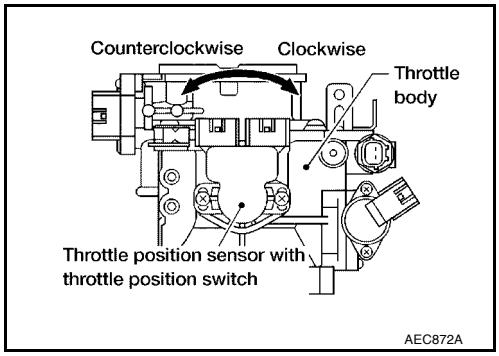
OK >> GO TO 17.
NG >> GO TO 16.

16. ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-2

Without CONSULT-II

Turn throttle position sensor body counterclockwise until continuity does not exist.

>> GO TO 17.



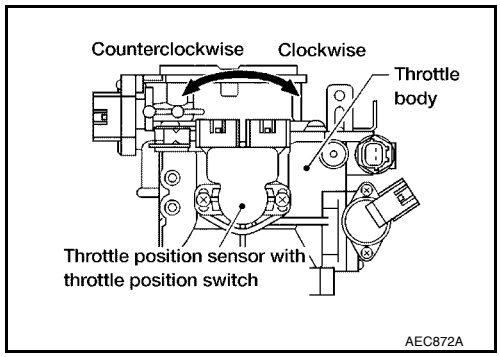
17. ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-3

Without CONSULT-II

1. Temporarily tighten sensor body fixing bolts as follows.

– **Gradually move the sensor body clockwise and stop it when the continuity comes to exist, then tighten sensor body fixing bolts.**

2. Make sure two or three times that the continuity exists when the throttle valve is closed and continuity does not exist when it is opened.
3. Remove 0.1 mm (0.004 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
4. Make sure two or three times that continuity does not exist when the throttle valve is closed.
5. Tighten throttle position sensor.
6. Check the continuity again.
   Continuity does not exist while closing the throttle valve.



OK or NG

OK >> GO TO 18.
NG >> GO TO 15.

18. REINSTALLATION

Without CONSULT-II

1. Remove 0.3 mm (0.012 in) feeler gauge.
2. Reconnect throttle position sensor harness connector and closed throttle position switch harness connector.
3. Rev engine (2,000 to 3,000 rpm) two or three times under no-load and then run engine at idle speed.

>> GO TO 19.

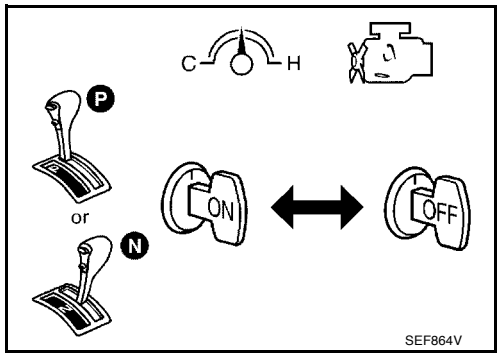
19. RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

Without CONSULT-II

NOTE:
Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.

1. Start engine.
2. Warm up engine to normal operating temperature.
3. Stop engine. (Turn ignition switch OFF.)
4. Turn ignition switch ON and wait at least 5 seconds.
5. Turn ignition switch OFF and wait at least 5 seconds.
6. Repeat steps 4 and 5 for 20 times.

>> GO TO 20.



20. CHECK TARGET IDLE SPEED

Without CONSULT-II

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

M/T: 800±50 rpm (in Neutral position)

A/T: 800±50 rpm (in P or N position)

OK or NG

OK >> GO TO 21.

NG >> 1. Adjust target idle speed. Refer to EC-36, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" .
2. GO TO 21.

21. ERASE UNNECESSARY DTC

After this inspection, unnecessary DTC No. might be displayed.
Erase the stored memory in ECM and TCM.
Refer to EC-61, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> **INSPECTION END**

Symptom Matrix Chart

UBS00D1G

SYSTEM — ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-554
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-48
	Injector circuit	1	1	2	3	2		2	2			2			EC-545
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-570
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-586
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-74
	IACV-AAC valve circuit	1	1	2	3	3	2	2	2	2		2		2	EC-398, EC-403, EC-408
	IACV-FICD solenoid valve circuit	2	2	3	3	3	3	3	3	3		3			EC-564

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-74
	Ignition circuit	1	1	2	2	2		2	2			2			EC-538
EGR	EGRC-solenoid valve circuit		2	2	3	3						3			EC-457
	EGR system	2	1	2	3	3	3	2	2	3		3			EC-282, EC-293, EC-463
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3		2	EC-121
Air conditioner circuit		2	2	3	3	3	3	3	3	3		3		2	MTC-22
Camshaft position sensor circuit		2	2	3	3	3		3	3			3			EC-275
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			EC-139, EC-146
Heated oxygen sensor 1 circuit			1	2	3	2		2	2			2			EC-191, EC-198, EC-208, EC-422, EC-427
Engine coolant temperature sensor circuit		1	1	2	3	2	3	2	2	3		2			EC-157, EC-177
Throttle position sensor circuit			1	2		2	2	2	2	2		2			EC-162, EC-171
Incorrect throttle position sensor adjustment			3	1		1	1	1	1	1		1			EC-38
Vehicle speed sensor circuit			2	3		3						3			EC-393
Knock sensor circuit				2								3			EC-265
ECM		2	2	3	3	3	3	3	3	3	3	3			EC-73, EC-420
Start signal circuit		2													EC-550
PNP switch circuit				3		3		3	3			3			EC-523
Power steering oil pressure switch circuit			2					3	3						EC-560

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

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-3
	Fuel piping			5	5	5		5	5			5			—
	Vapor lock														
	Valve deposit	5		5	5	5		5	5			5			
	Poor fuel (Heavy weight gasoline, Low octane)														
Air	Air duct	5	5	5	5	5	5	5	5	5		5			
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)														
	Throttle body, Throttle wire														ACC-2
	Air leakage from intake manifold/Collector/Gasket														—
Cranking	Battery	1	1	1		1		1	1			1		1	SC-4
	Alternator circuit														SC-26
	Starter circuit	3													SC-9
	Flywheel/Drive plate	6													EM-48
	PNP switch	4													—

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

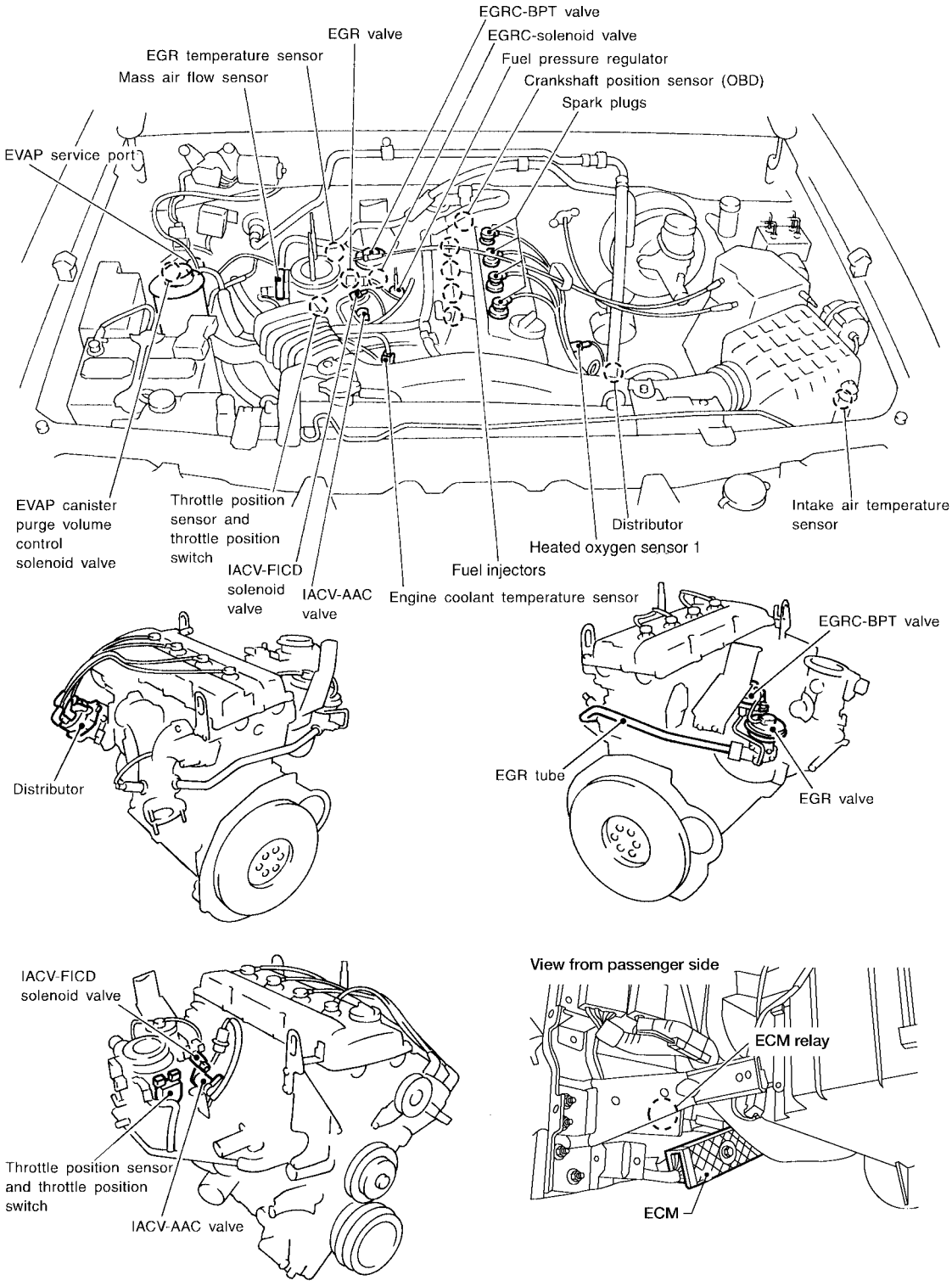
(continued on next page)

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-32, EM-48
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM-19, EM-32
	Camshaft														
	Intake valve												3		
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EX-3
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			MA-20, LU-8
	Oil level (Low)/Filthy oil														
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-7
	Thermostat									5					
	Water pump														
	Water gallery														
	Coolant level (low)/Contaminated coolant														CO-8

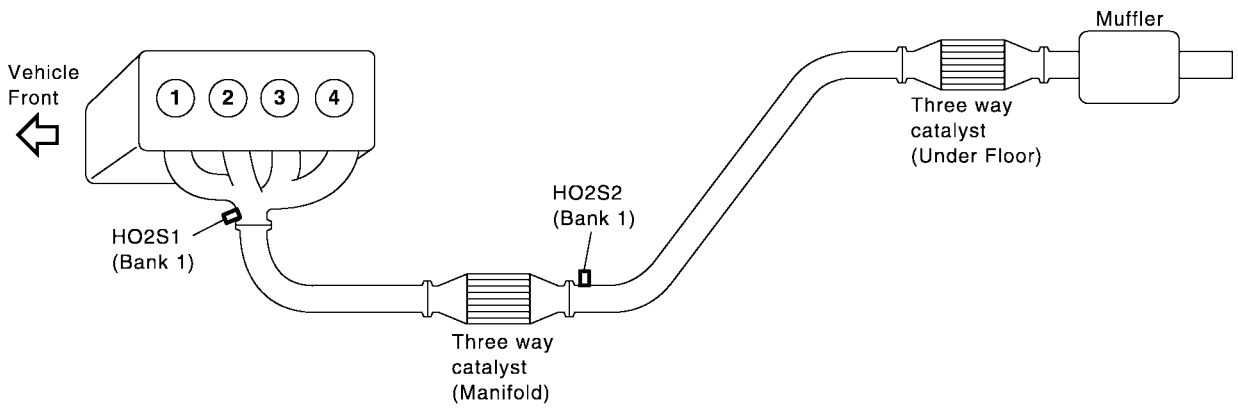
1 - 6: The numbers refer to the order of inspection.

Engine Control Component Parts Location

UBS00D1H



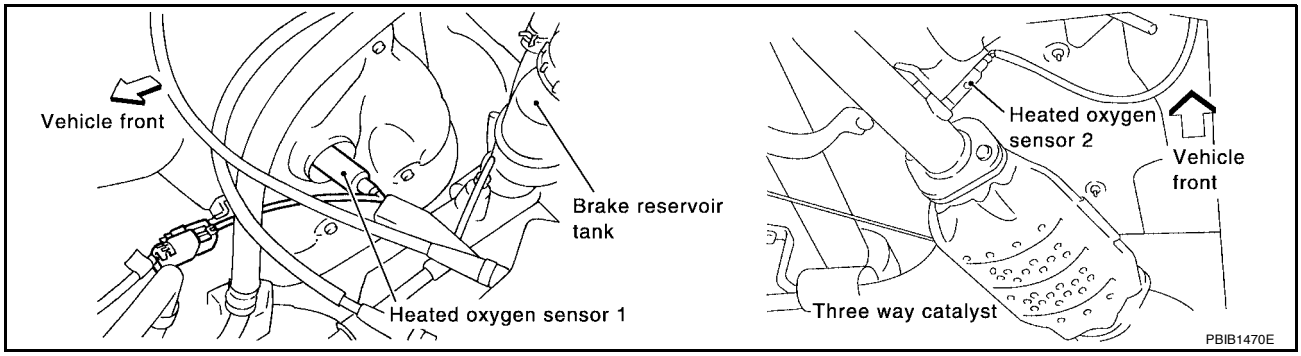
BBIA0433E



Bank
Specific group of cylinder sharing a common control sensor, bank 1 always contains cylinder number 1, bank 2 is the opposite bank.

No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on

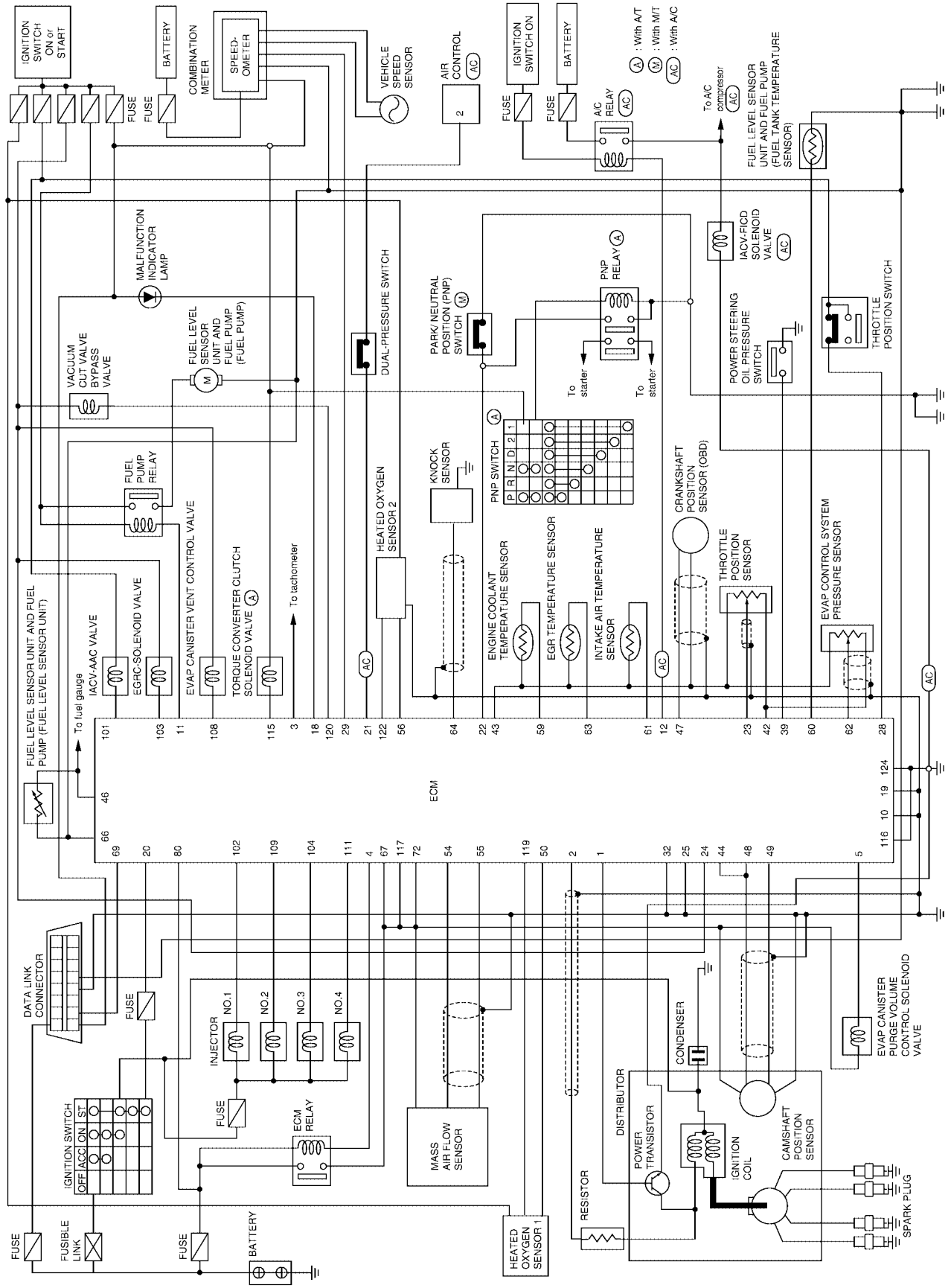
PBIB1175E



PBIB1470E

Circuit Diagram

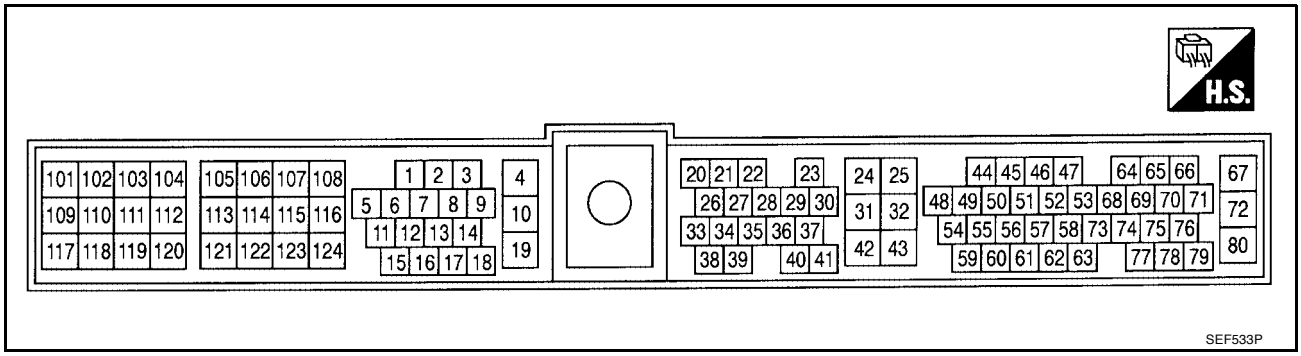
UBS00D1I



BBWA0434E

ECM Harness Connector Terminal Layout

UBS00D1J

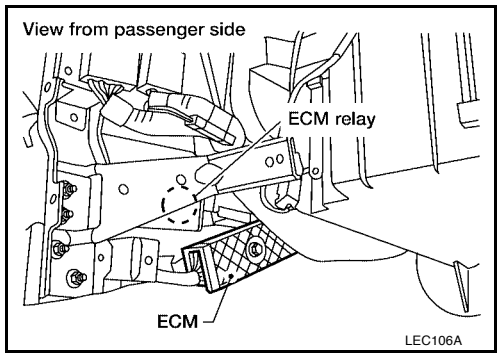


ECM Terminals and Reference Value

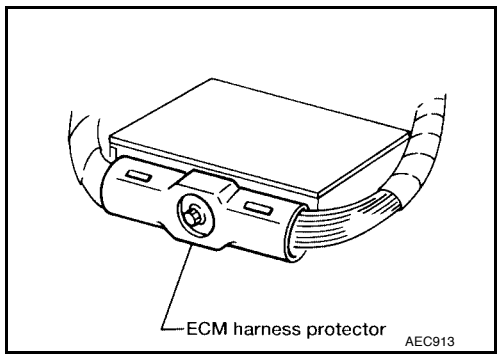
UBS00D1K

PREPARATION

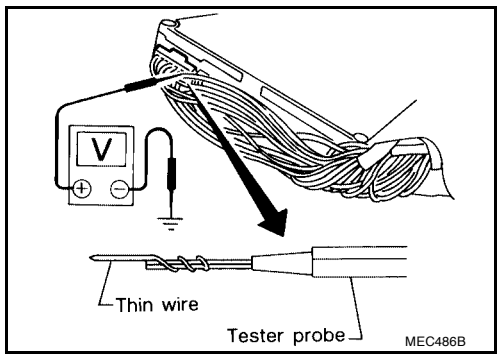
1. ECM is located behind the instrument lower cover. For this inspection:
   - Remove instrument lower cover.



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 1 time.
   - Data is for comparison and may not be exact.

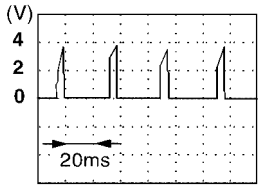
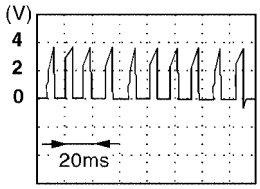
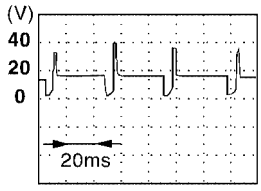
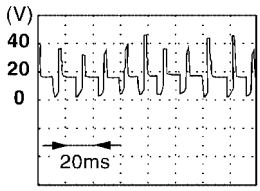
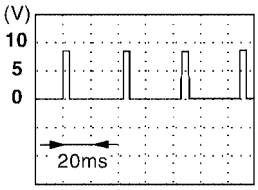
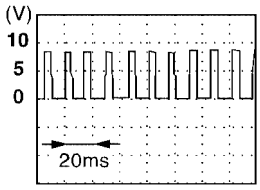


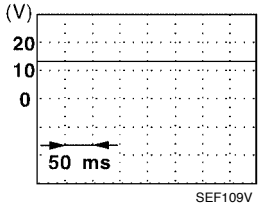
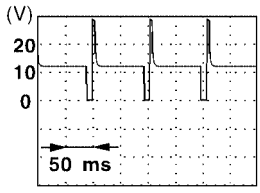
ECM INSPECTION TABLE

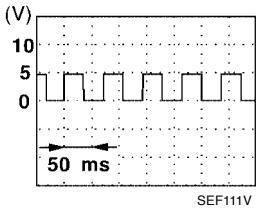
Specification data are reference values and are measured between each terminal and ground.

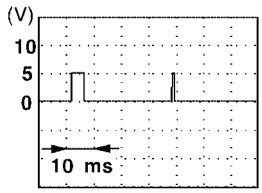
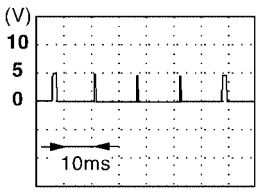
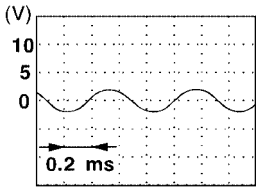
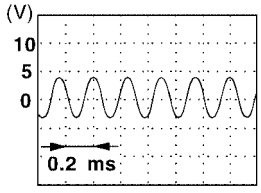
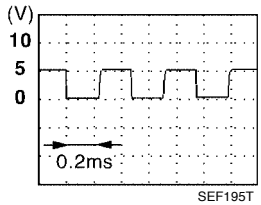
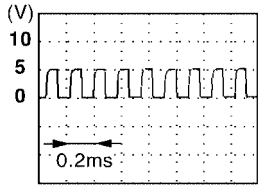
CAUTION:

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

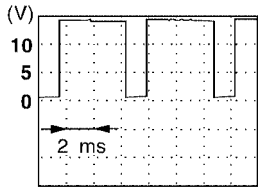
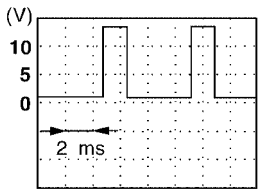
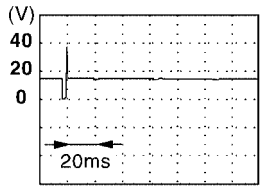
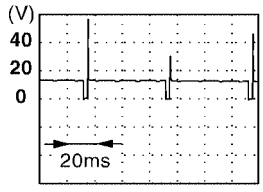
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 0.5V★  SEF186T
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0.2 - 1.0V★  SEF187T
2	B	Ignition check	**[Engine is running]** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	12 - 14V★  SEF188T
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	12 - 13V★  SEF189T
3	P/L	Tachometer	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 1V★  SEF190T
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0.5 - 2V★  SEF191T

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	LG/R	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  SEF109V
			[Engine is running] ● Engine speed is 2,000 rpm (More than 200 seconds after starting engine)	12 - 13V★  SEF110V
10	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
11	W/R	Fuel pump relay	**[Ignition switch: ON]** ● For a few seconds after turning ignition switch ON. **[Engine is running]**	0 - 1V
			[Ignition switch: ON] ● More than a few seconds after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
12	P	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are ON* *: Any mode except OFF, ambient air temperature above 10°C (50°F).	Approximately 0V
			[Engine is running] ● A/C switch: OFF	BATTERY VOLTAGE (11 - 14V)
18	R/W	Malfunction indicator lamp	**[Ignition switch: ON]**	0 - 1V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
19	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
20	L/OR	Start signal	**[Ignition switch: ON]**	Approximately 0V
			[Ignition switch: START]	BATTERY VOLTAGE (11 - 14V)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
21	G/R	Air conditioner dual-pressure switch	**[Engine is running]** ● Both air conditioner switch and blower switch: ON (Compressor operates)	Approximately 0V
			[Engine is running] ● Air conditioner switch: OFF	BATTERY VOLTAGE (11 - 14V)
22	L/B	Park/neutral position (PNP) switch	**[Ignition switch: ON]** ● Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] ● Except above position	Approximately 5V
23	L	Throttle position sensor	**[Ignition switch: ON]** ● **Warm-up condition** ● Accelerator pedal is fully released	0.2 - 0.8V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal is fully depressed	3.5 - 4.5V
24	W/G	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
28	BR/W	Throttle position switch (Closed position)	**[Ignition switch: ON]** ● **Warm-up condition** ● Accelerator pedal is fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal is slightly depressed	Approximately 0V
29	G/B	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle ● Shift lever: D (A/T), 2nd (M/T) ● Vehicle speed: 40 km/h (25 MPH)	1 - 4V★  SEF111V
32	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
39	GY/R	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is turned	Approximately 0V
			[Engine is running] ● Steering wheel is not turned	Approximately 5V
42	BR	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
43	B/W	Sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
44 48	PU PU	Camshaft position sensor (Reference signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0.2 - 0.5V★  SEF114V
			[Engine is running] ● Engine speed is 2,000 rpm	0 - 0.5V★  SEF200T
46	OR/B	Fuel level sensor	**[Ignition switch: ON]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	Approximately 0V★  SEF112V
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 0V★  SEF113V
49	LG	Camshaft position sensor (Position signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	Approximately 2.6V★  SEF195T
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5 - 2.6V★  SEF196T
50	B	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V (Periodically change)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.9 - 1.8V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.9 - 2.3V
55	G	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
56	OR	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - Approximately 1.0V
59	LG/R	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature
60	Y/B	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel temperature
61	PU/R	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature
62	Y	EVAP control system pressure sensor	**[Ignition switch: ON]**	1.8 - 4.8V
63	G/OR	EGR temperature sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Less than 4.5V
			[Engine is running] ● **Warm-up condition** ● EGR system is operating	0 - 1.5V
64	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.4V
66	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
69	LG/R	Data link connector	**[Ignition switch: ON]** ● CONSULT-II or GST is disconnected.	Approximately 2V
80	SB	Power supply (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	10.5 - 11.5V★  SEF645U
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	1 - 13V★  SEF646U
102 104 109 111	W/B W/R W/L W/PU	Injector No. 1 Injector No. 3 Injector No. 2 Injector No. 4	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)★  SEF204T
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEF205T
103	G/W	EGRC-solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Lift up the vehicle ● Shift lever: D (A/T), 1st (M/T) ● Revving engine from idle to 3,000 rpm quickly	0 - 1V
108	R/G	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
115*	L/Y	Torque converter clutch solenoid valve	**[Engine is running]** ● Idle speed	Approximately 1V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
119	BR/Y	Heated oxygen sensor heater 1	**[Engine is running]** ● Engine speed is below 3,600 rpm.	Approximately 0.4V
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
120	P/B	Vacuum cut valve bypass valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
122	R/B	Heated oxygen sensor heater 2	**[Engine is running]** ● Engine speed is below 4,000 rpm after the following conditions are met. ● Engine: after warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	Approximately 0.4V
			[Ignition switch ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 4,000 rpm	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*: For the A/T models.

CONSULT-II Function

UBS00D1L

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. *
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output of the specification for the basic fuel schedule, AFM, A/F, feedback control valve and the other data monitor items can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECM part number	ECM part numbers can be read.

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

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values
- 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 STA-TUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Camshaft position sensor		×	×	×	×			
		Mass air flow sensor		×		×	×			
		Engine coolant temperature sensor		×	×	×	×	×		
		Heated oxygen sensor 1		×		×	×		×	×
		Heated oxygen sensor 2		×		×	×		×	×
		Vehicle speed sensor		×	×	×	×			
		Throttle position sensor	×	×		×	×			
		Fuel tank temperature sensor		×		×	×	×		
		EVAP control system pressure sensor		×		×	×			
		EGR temperature sensor		×		×	×			
		Intake air temperature sensor		×	×	×	×			
		Crankshaft position sensor (OBD)		×						
		Knock sensor		×						
		Fuel level sensor		×		×	×			
		Ignition switch (start signal)				×				
		Closed throttle position switch		×		×				
		Closed throttle position switch (throttle position sensor signal)				×				
		Air conditioner switch				×				
		Park/Neutral position (PNP) switch		×		×				
		Power steering oil pressure switch				×				
		Air conditioner pressure switch				×				
		Battery voltage				×				

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 STA-TUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injectors				×	×	×		
		Power transistor (Ignition tim-ing)	×			×	×	×		
		IACV-AAC valve	×	×		×	×	×		
		EVAP canister purge volume control solenoid valve		×		×	×	×		×
		Air conditioner relay				×	×			
		Fuel pump relay	×			×	×	×		
		EGRC-solenoid valve		×		×	×	×		
		Heated oxygen sensor 1 heater		×		×	×		×	
		Heated oxygen sensor 2 heater		×		×	×		×	
		Torque converter clutch sole-noid valve		×		×	×			×
		EVAP canister vent control valve	×	×		×	×	×		
		Vacuum cut valve bypass valve	×	×		×	×	×		×
		Calculated load value			×	×	×			

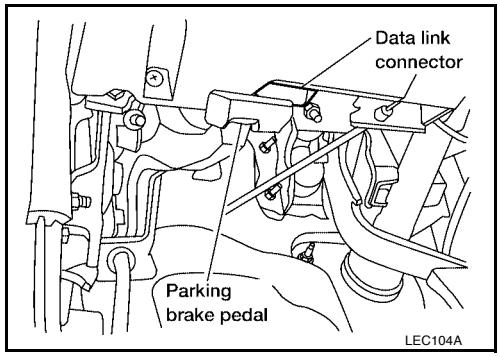
×: Applicable

*1: This item includes 1st trip DTCs.

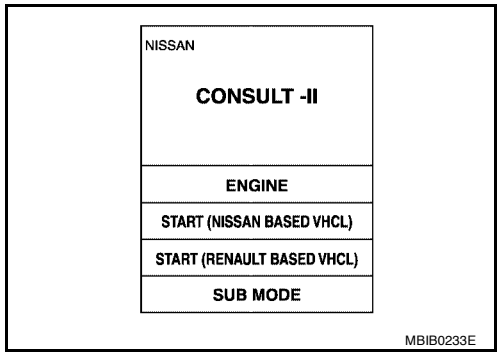
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-52 .

INSPECTION PROCEDURE

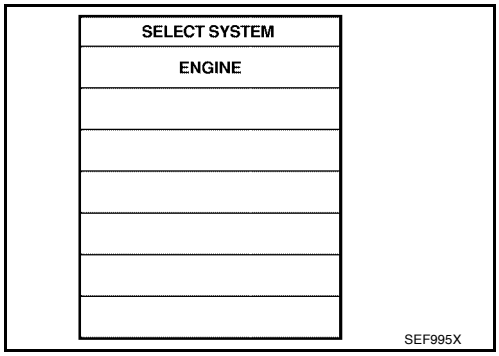
1. Turn ignition switch OFF.
2. Connect “CONSULT-II” and CONSULT-II CONVERTER to data link connector which is located behind the fuse box cover.
3. Turn ignition switch ON.



4. Touch “START(NISSAN BASED VHCL)”.

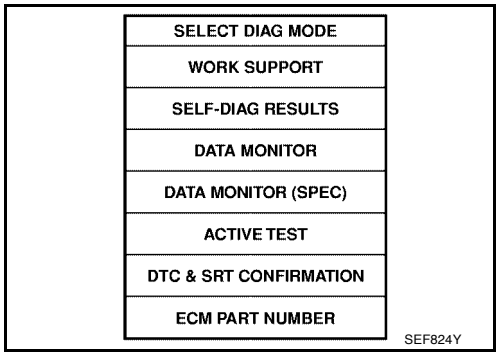


5. Touch “ENGINE”.
   If “ENGINE” is not indicated, go to GI-36, "CONSULT-II Data Link Connector (DLC) Circuit" .



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

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



WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	● FOLLOW THE BASIC INSPECTION IN THE SERVICE MANUAL	When adjusting the idle throttle position
IGNITION TIMING ADJ	● IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING “START”. AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CRANKSHAFT POSITION SENSOR.	When adjusting initial ignition timing
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
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When releasing the coefficient of self-learning control value

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. ● BATTERY VOLTAGE IS SUFFICIENT. ● 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 CONDITIONS ABOVE, CONSULT-II WILL DISCONTINUE AND DISPLAY INSTRUCTIONS. **NOTE:** **WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY “BATTERY VOLTAGE IS LOW. CHARGE BATTERY”, EVEN WHEN USING A CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system
TARGET IDLE RPM ADJ*	● IDLE CONDITION	When setting target idle speed

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

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-18, "INDEX FOR DTC" .

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	● Engine Control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to EC-18, "INDEX FOR DTC" .)
FUEL SYS-B1	● “Fuel injection system status” at the moment a malfunction is detected is displayed. ● One mode in the following is displayed. Mode 2: Open loop due to detected system malfunction Mode 3: Open loop due to driving conditions (power enrichment, deceleration enleanment) 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 TRM-B1 [%]	● “Short-term fuel trim” at the moment a malfunction is detected is displayed. ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
L-FUEL TRM-B1 [%]	● “Long-term fuel trim” at the moment a malfunction is detected is displayed. ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VEHICLE SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH-P/S [%]	● The throttle valve opening angle at the moment a malfunction is detected is displayed.

Freeze frame data item*	Description
B/FUEL SCHDL [msec]	● The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	● The intake air temperature at the moment a malfunction is detected is displayed.

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

DATA MONITOR MODE

Monitored Item

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
ENG SPEED [rpm]		×	● Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor.	● Accuracy becomes poor if engine speed drops below the idle rpm. ● If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor is displayed.	● When the engine is stopped, a certain value is indicated.
B/FUEL SCHDL [msec]		×	● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
A/F ALPHA-B1 [%]		×	● Indicates the mean value of the air-fuel ratio feedback correction factor per cycle.	● When the engine is stopped, a certain value is indicated. ● This data also includes the data for the air-fuel ratio learning control.
COOLAN TEMP/S [°C] or [°F]	×	×	● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	● When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
HO2S1 (B1) [V]	×	×	● The signal voltage of the heated oxygen sensor 1 is displayed.	
HO2S2 (B1) [V]	×	×	● The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S1 MNTR (B1) [RICH/LEAN]	×		● Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH: Means the mixture became “rich”, and control is being affected toward a leaner mixture. LEAN: Means the mixture became “lean”, and control is being affected toward a rich mixture.	● After turning ON the ignition switch, “RICH” is displayed until air-fuel mixture ratio feedback control begins. ● When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S2 MNTR (B1) [RICH/LEAN]	×		● Display of heated oxygen sensor 2 signal: RICH: Means the amount of oxygen after three way catalyst is relatively small. LEAN: Means the amount of oxygen after three way catalyst is relatively large.	● When the engine is stopped, a certain value is indicated.
VHCL SPEED SE [km/h] or [mph]	×	×	● The vehicle speed computed from the vehicle speed sensor signal is displayed.	
BATTERY VOLT [V]	×	×	● The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	×	×	● The throttle position sensor signal voltage is displayed.	

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
FUEL T/TMP SE [°C] or [°F]	×		● The fuel temperature judged from the fuel tank temperature sensor signal voltage 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.	
EGR TEMP SEN [V]	×	×	● The signal voltage of the EGR temperature sensor is displayed.	
EVAP SYS PRES [V]	×		● The signal voltage of EVAP control system 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 throttle position sensor signal.	
CLSD THL/P SW [ON/OFF]	×		● Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.	
AIR COND SIG [ON/OFF]	×	×	● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioning signal.	
P/N POSI SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the PNP switch signal.	
PW/ST SIGNAL [ON/OFF]	×	×	● Indicates [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure switch signal.	
IGNITION SW [ON/OFF]	×		● Indicates [ON/OFF] condition from ignition switch.	
INJ PULSE-B1 [msec]		×	● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	● When the engine is stopped, a certain computed value is indicated.
IGN TIMING [BTDC]		×	● Indicates the ignition timing computed by ECM according to the input signals.	
CAL/LD VALUE [%]			● Calculated load value indicates the value of the current airflow divided by peak airflow.	
ABSOL TH·P/S [%]			● Absolute throttle position sensor indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor.	
MASS AIRFLOW [g·m/s]			● Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor.	
IACV-AAC/V [%]		×	● Indicates the IACV-AAC valve control value computed by ECM according to the input signals.	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
PURG VOL C/V [%]			● Indicates the EVAP canister purge volume control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
AIR COND RLY [ON/OFF]		×	● Indicates the air conditioner relay control condition determined by ECM according to the input signals.	
EGRC SOL/V [ON/OFF] (FLOW/CUT)		×	● Indicates the control condition of the EGRC-solenoid valve determined by ECM according to the input signals. ● ON: EGR valve is operational OFF: EGR valve operation is cut-off	
TCC SOL/V			● Indicates [ON/OFF] condition of torque converter clutch solenoid valve determined by ECM according to the input signals.	
FUEL PUMP RLY [ON/OFF]		×	● Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
VC/V BYPASS/V [ON/OFF]			● The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) 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 signal) is indicated. ● ON: Closed OFF: Open	
HO2S1 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals.	
HO2S2 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
VOLTAGE [V]			● Voltage measured by the voltage probe.	
Frequency [msec] or [Hz] or [%]			● Pulse width, frequency or duty cycle measured by the pulse 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.

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

DATA MONITOR (SPEC) MODE

Monitored Item

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor.	
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor specification is displayed.	● When engine is running specification range is indicated.
B/FUEL SCHDL [msec]			● Base fuel schedule indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	● When engine is running specification range is indicated.
A/F ALPHA-B1 [%]		×	● 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 connector ● Fuel injector ● 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.	● Adjust initial ignition timing
IACV-AAC/V OPENING	● Engine: After warming up, idle the engine. ● Change the IACV-AAC valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connector ● IACV-AAC valve
POWER BALANCE	● Engine: After warming up, idle the engine. ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connector ● Compression ● Fuel injector ● Power transistor ● Spark plug ● Ignition coil
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature indication using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connector ● Engine coolant temperature sensor ● Fuel injector
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 connector ● Fuel pump relay

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
EGRC SOLENOID VALVE	● Ignition switch: ON ● Turn EGRC-solenoid valve “ON” and “OFF” using CONSULT-II and listen to operating sound.	EGRC-solenoid valve makes an operating sound.	● Harness and connector ● EGRC-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 connector ● EVAP canister purge volume control solenoid valve
FUEL T/TEMP SEN	● Change the fuel tank temperature using CONSULT-II.		
VENT CONTROL/V	● Ignition switch: ON (Engine stopped) ● Turn solenoid valve “ON” and “OFF” using CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	● Harness and connector ● Solenoid valve
VC/V BYPASS/V	● Ignition switch: ON (Engine stopped) ● Turn solenoid valve “ON” and “OFF” using CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	● Harness and connector ● Solenoid valve

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer toEC-53, "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
EVAPORATIVE SYSTEM	PURG FLOW P0441	Refer to corresponding trouble diagnosis for DTC.	EC-311
	EVAP SML LEAK P0442/P1442		EC-320, EC-472
	EVAP V/S LEAK P0456/P1456		EC-372, EC-493
	PURG VOL CN/V P1444		EC-474
	VC CUT/V BP/V P1491		EC-513
HO2S1	HO2S1 (B1) P0133		EC-198
	HO2S1 (B1) P0134		EC-208
	HO2S1 (B1) P1143		EC-422
	HO2S1 (B1) P1144		EC-427
HO2S2	HO2S2 (B1) P0139		EC-222
	HO2S2 (B1) P1146		EC-432
	HO2S2 (B1) P1147		EC-439
EGR SYSTEM	EGR SYSTEM P0400		EC-282
	EGRC-BPT/VLV P0402		EC-293
	EGR SYSTEM P1402		EC-463

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 left, and the data after the malfunction detection is recorded. Then 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.

Use these triggers as follows:

Operation

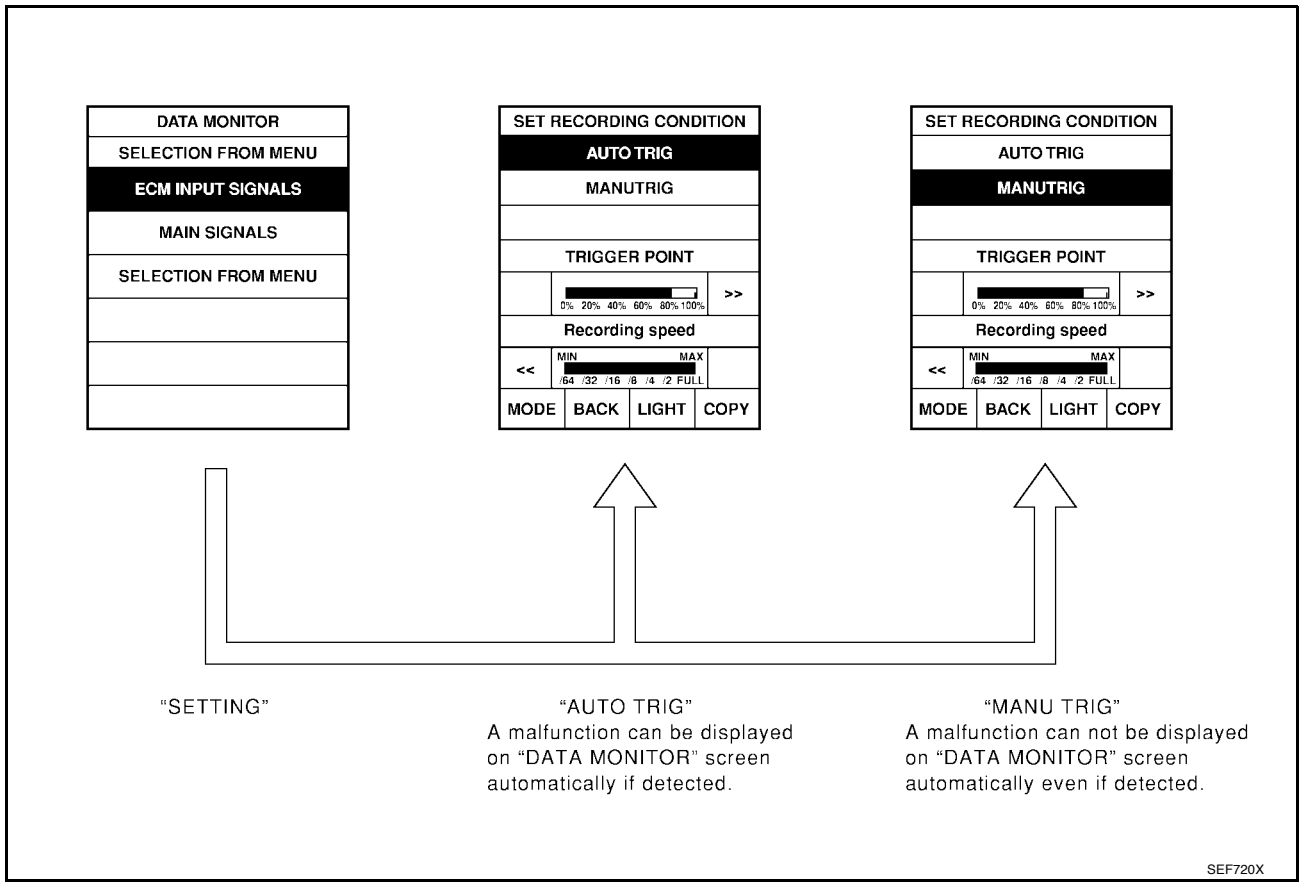
1. “AUTO TRIG”

- 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-25, "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.

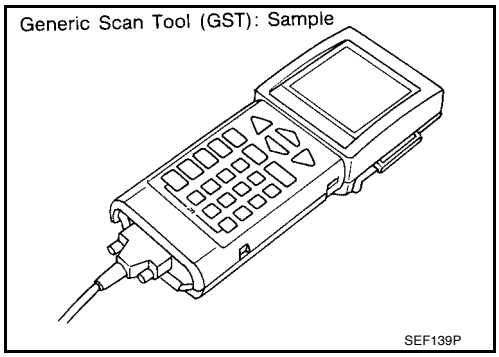


Generic Scan Tool (GST)

UBS00D1M

DESCRIPTION

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



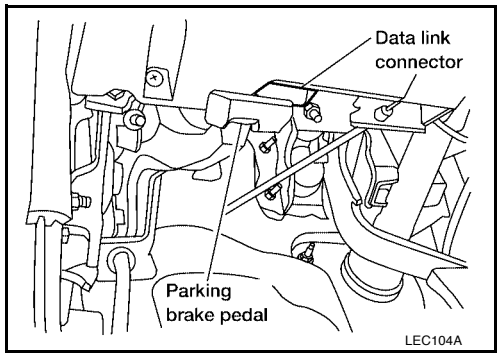
FUNCTION

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-53, "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	—	—
MODE 9	(CALIBRATION ID)	This mode is to enable the off-board to request vehicle specific information such as Vehicle Identification Number (VIN) and Calibration ID.

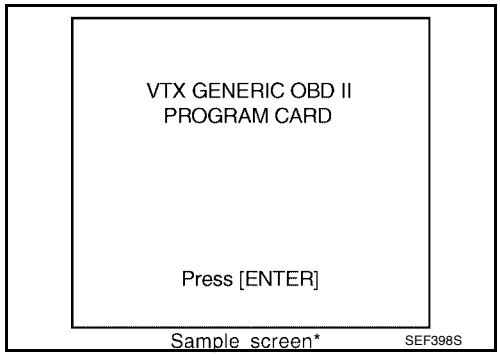
INSPECTION PROCEDURE

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.



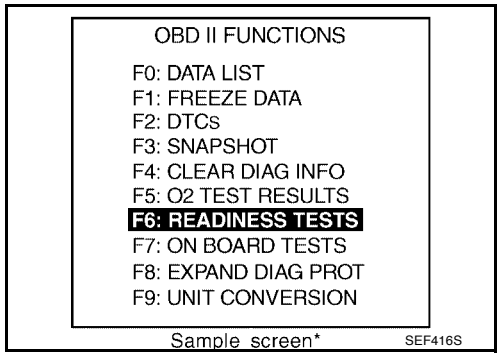
4. Enter the program according to instruction on the screen or in the operation manual.

(*: 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

UBS00D1N

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. Specification data might be displayed even when ignition timing is not adjusted to specification. This IGN TIMING monitors the data calculated by the ECM according to the input signals from the camshaft position sensor and other ignition timing related sensors.)

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	● Run engine and compare the CONSULT-II value with tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	0.9 - 1.8V
		2,500 rpm	1.9 - 2.3V
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ←→ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1)	● Engine: After warming up ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH
VHCL SPEED SE	● Turn drive wheels and compare the CONSULT-II value with speedometer indication.		Almost the same speed as the speedometer indication
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
THRTL POS SEN	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: Fully closed	0.2 - 0.8V
		Throttle valve: Fully opened	3.5 - 4.5V
EGR TEMP SEN	● Engine: After warming up		Less than 4.5V
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL/P SW	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
CLSD THL POS	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	● Engine: After warming up, idle the engine	A/C switch: OFF	OFF
		A/C switch: ON (Compressor operates.)	ON
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Except above	OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		Steering wheel is turned	ON
IGNITION SW	● Ignition switch: ON → OFF → ON		ON → OFF → ON
INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	2.5 - 3.3 msec
		2,000 rpm	2.4 - 3.2 msec

MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	0.8 - 1.2 msec
		2,000 rpm	0.8 - 1.2 msec
IGN TIMING	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	Approx. 20° BTDC
		2,000 rpm	More than 25° BTDC
IACV-AAC/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	Approx. 30%
		2,000 rpm	—
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch: OFF ● No-load	Idle	0%
		2,000 rpm (More than 200 seconds after starting engine)	—
A/F ALPHA-B1	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	50 - 159%
EVAP SYS PRES	● Ignition switch: ON		1.8 - 4.8V
AIR COND RLY	● Air conditioner switch: OFF → ON		OFF → ON
FUEL PUMP RLY	● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking		ON
	● Except as shown above		OFF
EGRC SOL/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	OFF
		Engine speed: Revving engine from idle to 3,000 rpm quickly.	ON
VENT CONT/V	● Ignition switch: ON		OFF
HO2S1 HTR (B1)	● Engine speed: Below 3,600 rpm		ON
	● Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1)	● Engine speed is running below 4,000 rpm after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under on load		ON
	● Ignition switch: ON (Engine stopped)		OFF
VC/V BYPASS/V	● Ignition switch: ON		OFF
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	9.5 - 34.0%
		2,500 rpm	13.9 - 24.9%
ABSOL TH·P/S	● Engine: After warming up, engine stopped ● Ignition switch: ON	Throttle valve: Fully closed	0.0%
		Throttle valve: Fully opened	Approx. 80%

MONITOR ITEM	CONDITION		SPECIFICATION
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	0.9 - 5.8 g·m/s
		2,500 rpm	7.5 - 13.2 g·m/s

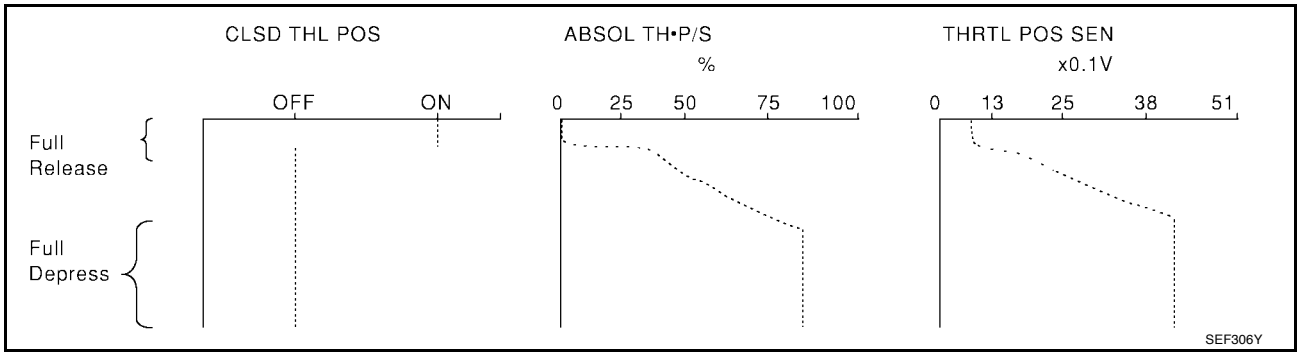
Major Sensor Reference Graph in Data Monitor Mode

UBS00D1O

The following are the major sensor reference graphs in “DATA MONITOR” mode.
(Select “MANU TRIG” in “DATA MONITOR” with CONSULT-II. “Trigger Point” is set to 100%, “Recording Speed” is set to MAX..)

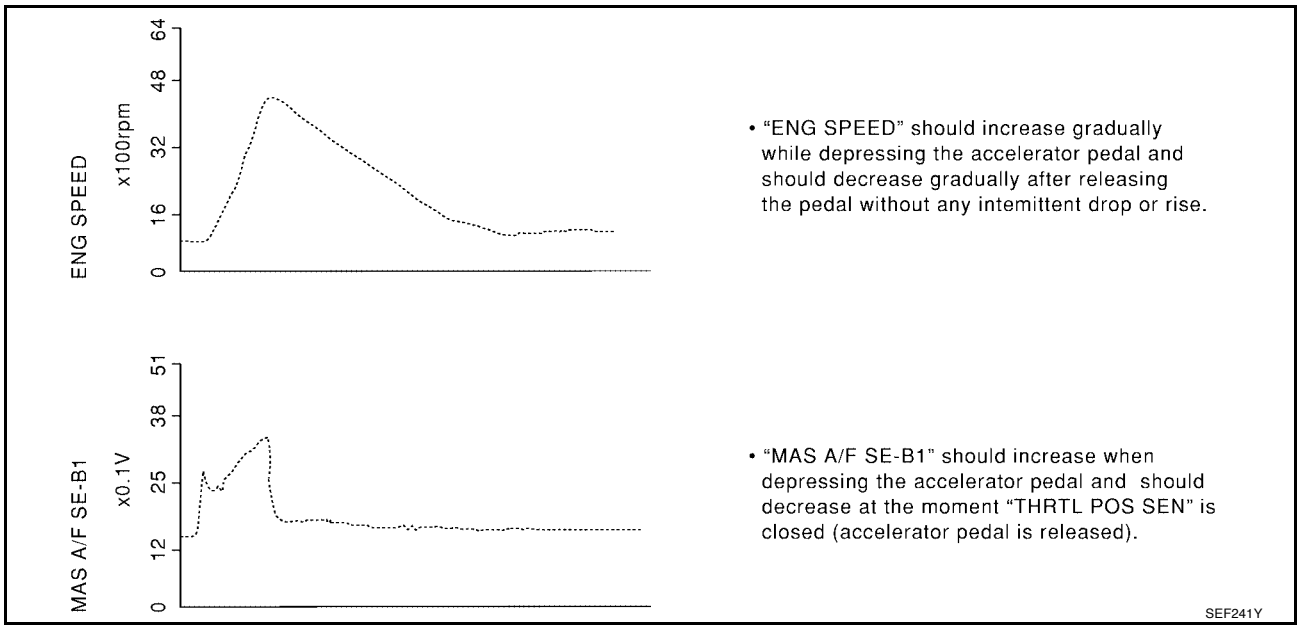
THRTL POS SEN, ABSOL TH·P/S, CLSD THL POS

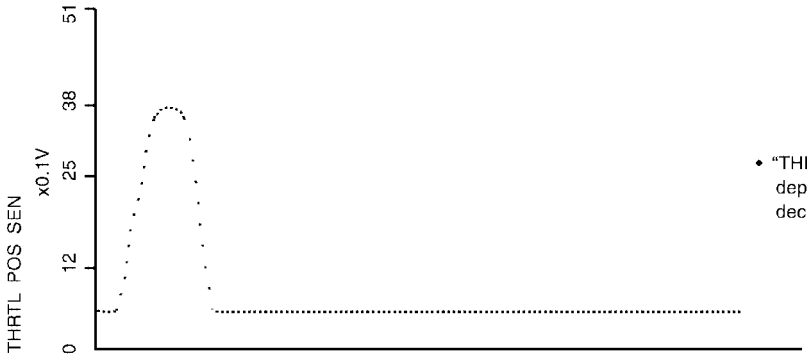
Below is the data for “THRTL POS SEN”, “ABSOL TH·P/S” and “CLSD THL POS” when depressing the accelerator pedal with the ignition switch ON.
The signal of “THRTL POS SEN” and “ABSOL TH·P/S” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from “ON” to “OFF”.



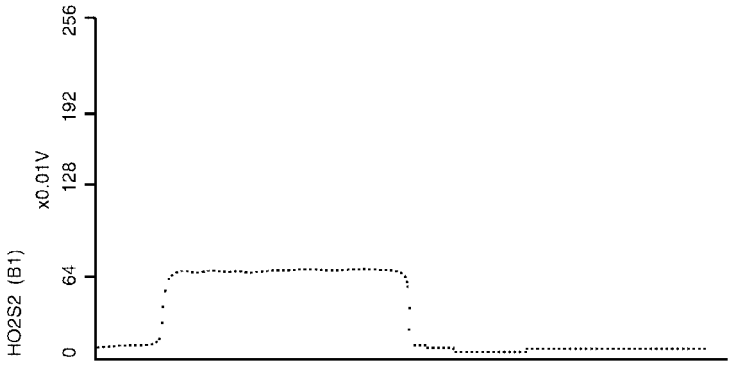
ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

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 to normal operating temperature.
Each value is for reference, the exact value may vary.

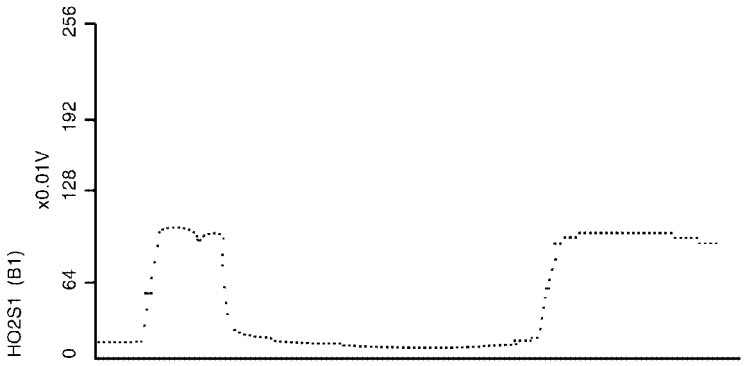




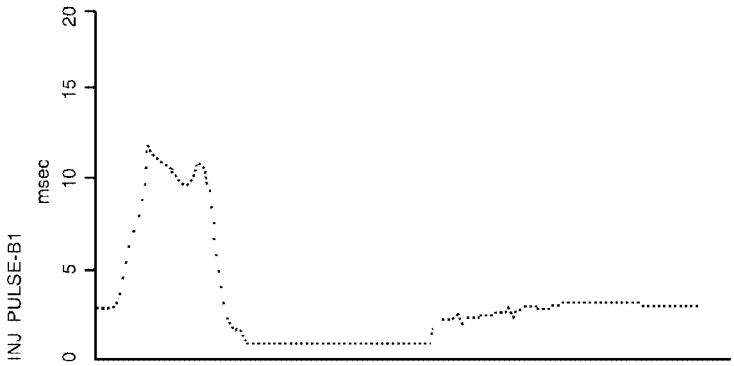
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "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

UBS00D1P

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

UBS00D1Q

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 101.3 kPa (760.0 mmHg, 29.92 inHg)±3 kPa (22.5 mmHg, 0.89 inHg)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up*1
- Electrical load: Not applied*2
- Engine speed: Idle

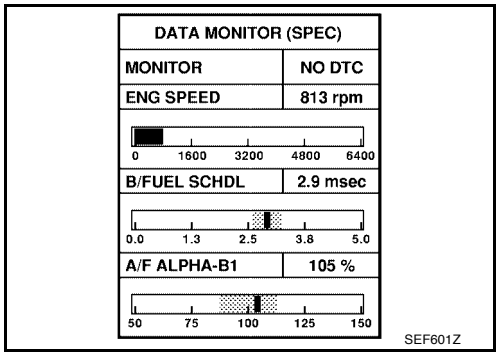
*1: For A/T models, after the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates less than 0.9V. For M/T models, drive vehicle for 5 minutes after the engine is warmed up to normal operating temperature.
*2: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

Inspection Procedure

UBS00D1R

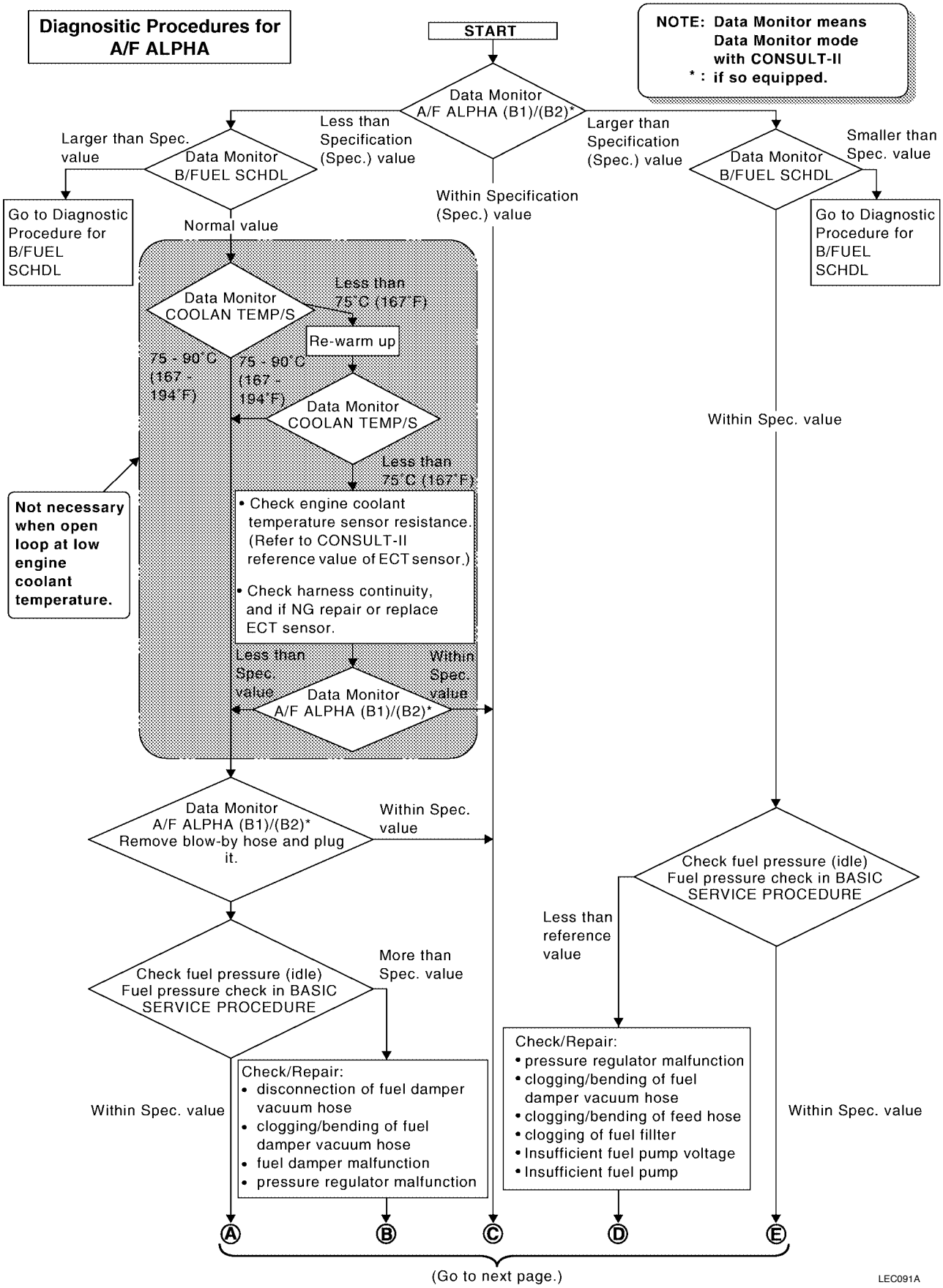
NOTE:
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

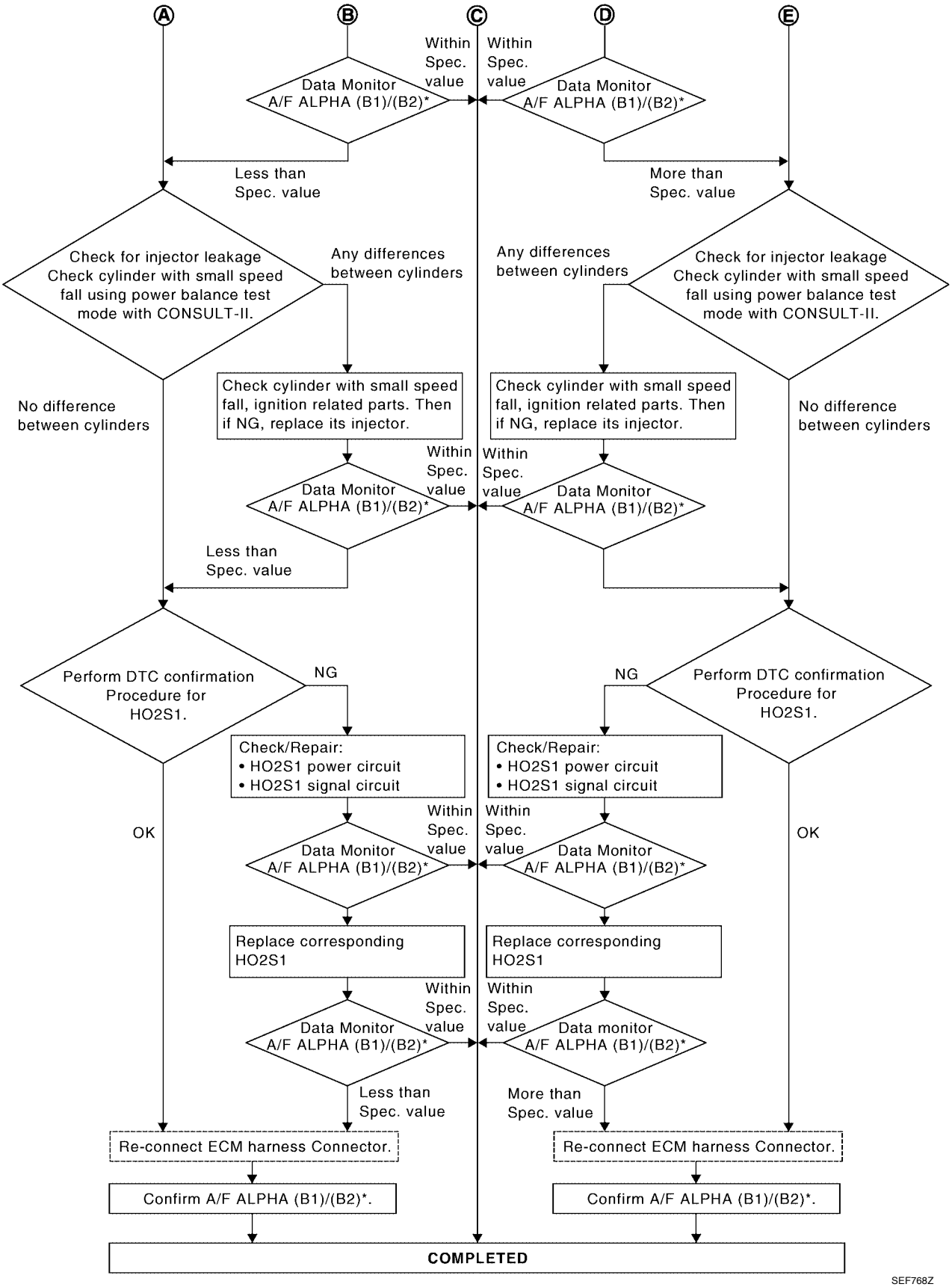
1. Perform EC-74, "Basic Inspection" .
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-117, "Diagnostic Procedure" .

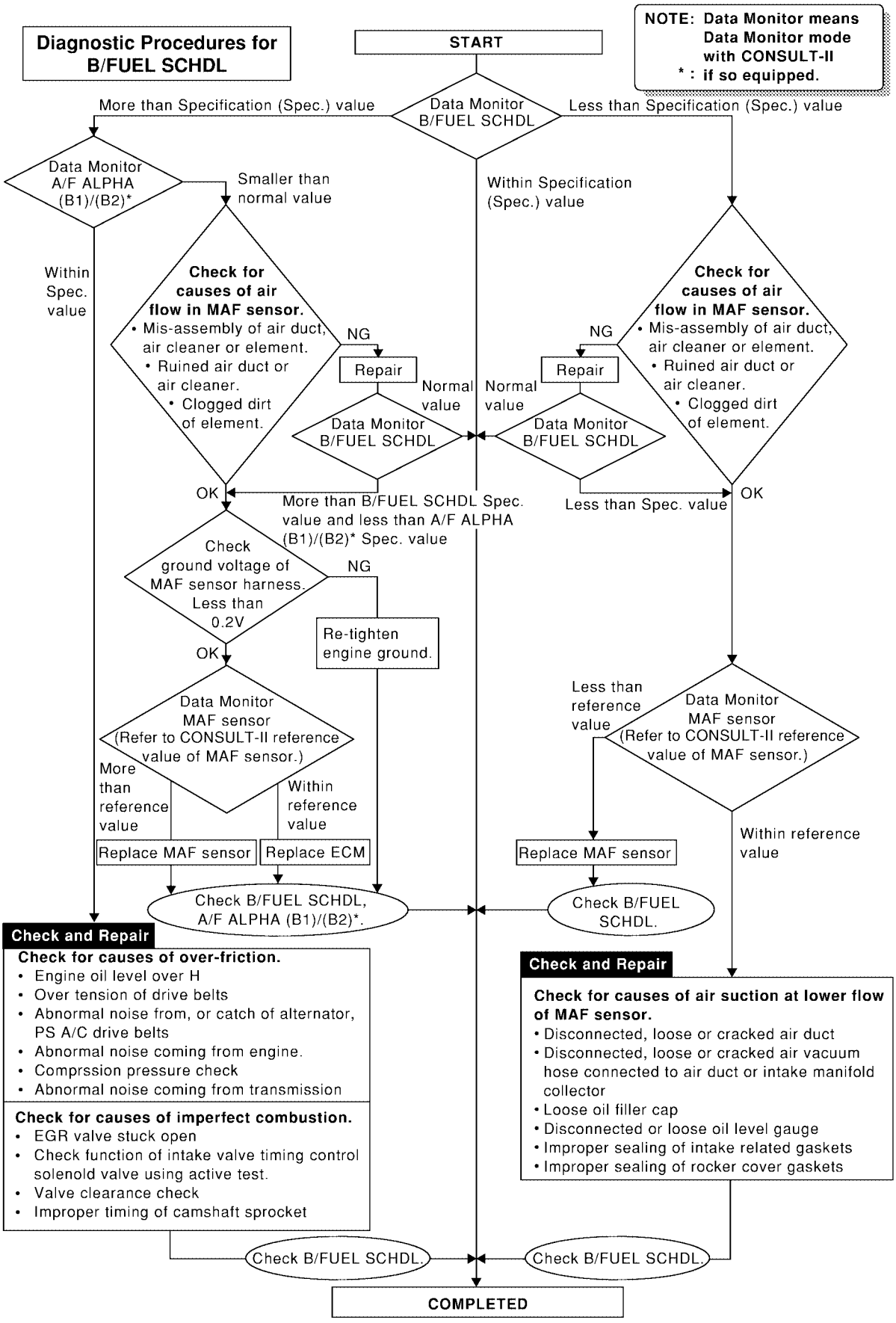


Diagnostic Procedure

UBS00D1S




Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
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.)
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

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

UBS00D1T

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

Common I/ 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 data does not appear during the DTC Confirmation Procedure.
VI	The TROUBLE DIAGNOSIS for PXXXX does not indicate the malfunctioning area.

Diagnostic Procedure

UBS00D1U

1. INSPECTION START

Erase (1st trip) DTCs. Refer to EC-61, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection. Refer to “CIRCUIT INSPECTION”, “Ground Inspection” in GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident" .

OK or NG

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

3. SEARCH FOR ELECTRICAL INCIDENT

Perform “INCIDENT SIMULATION TESTS” in GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident" .

OK or NG

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

4. CHECK CONNECTOR TERMINALS

Refer to “How to Check Enlarged Contact Spring of Terminal”, “HOW TO PROBE CONNECTORS” in GI-22, "How to Check Terminal" .

OK or NG

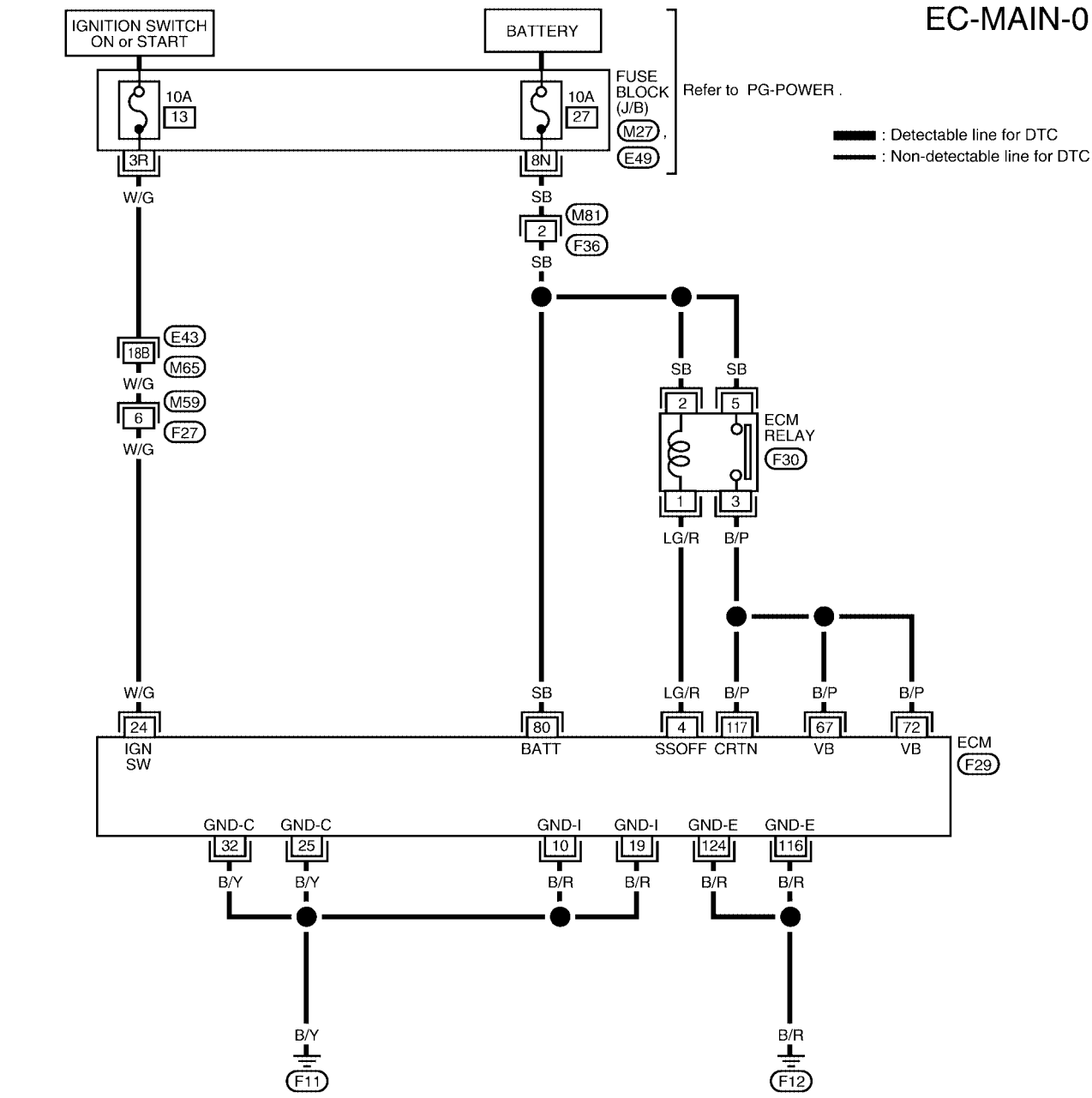
OK >> **INSPECTION END**
NG >> Repair or replace connector.

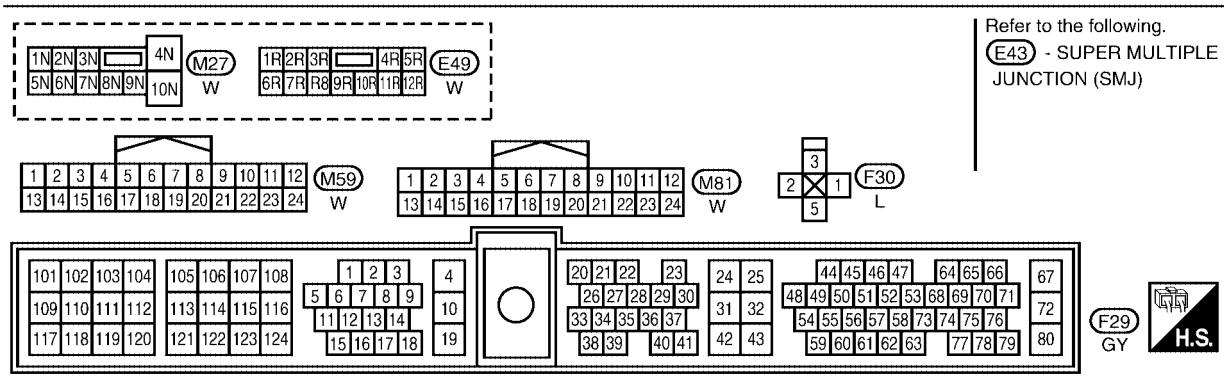
POWER SUPPLY AND GROUND CIRCUIT

PFP:24110

Wiring Diagram

UBS00D1V





BBWA1054E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	LG/R	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
10	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
19	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
24	W/G	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
32	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
80	SB	Power supply (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

Diagnostic Procedure

UBS00D1W

1. INSPECTION START

Start engine.

Is engine running?

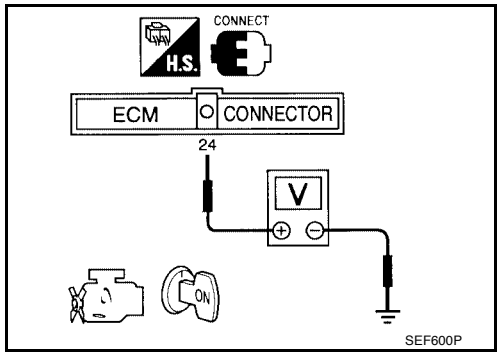
Yes or No

Yes >> GO TO 6.
No >> GO TO 2.

2. CHECK POWER SUPPLY-I

1. Turn ignition switch OFF and then ON.
2. Check voltage between ECM terminal 24 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

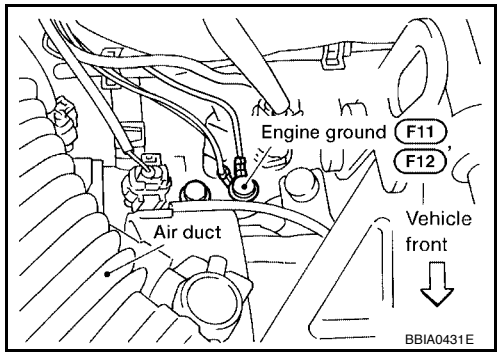
Check the following.

- Harness connectors M65, E43
- Harness connectors M59, F27
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between ECM and fuse

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

4. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
Refer to EC-127, "Ground Inspection" .



OK or NG

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

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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and ground.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for 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.

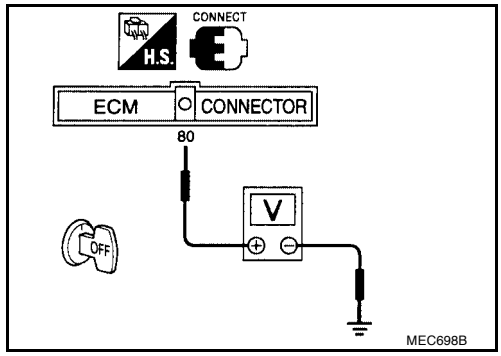
6. CHECK POWER SUPPLY-II

1. Stop engine.
2. Check voltage between ECM terminal 80 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 M81, F36
- Fuse block (J/B) connector M27
- 10A fuse
- Harness for open or short between ECM and battery.

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

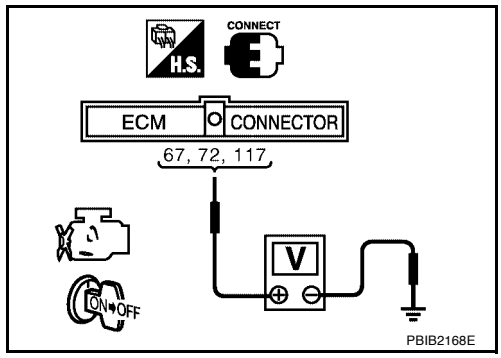
8. CHECK POWER SUPPLY-III

1. Turn ignition switch ON and then OFF.
2. Check voltage between ECM terminals 67, 72, 117 and ground with CONSULT-II or tester.

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

OK or NG

OK >> GO TO 14.
NG (Battery voltage does not exist.)>>GO TO 9.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 12.



9. CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM

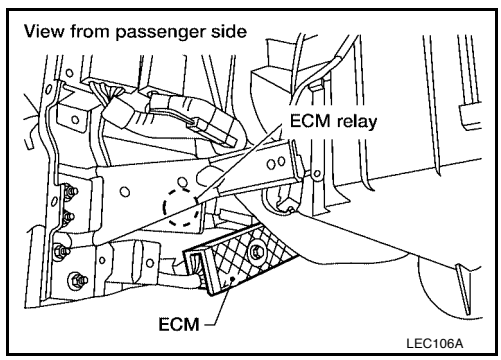
1. Disconnect ECM harness connector.
2. Disconnect ECM relay.
3. Check harness continuity between ECM terminals 67, 72, 117 and ECM relay terminal 3.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

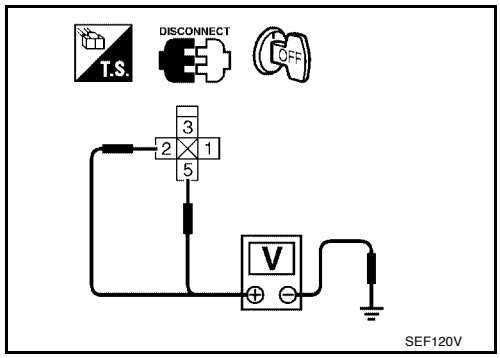
OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



10. CHECK VOLTAGE BETWEEN ECM RELAY AND GROUND

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

Voltage : Battery voltage



OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check harness for open or short between ECM relay and harness connector F36

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

12. CHECK OUTPUT SIGNAL CIRCUIT

1. Check harness continuity between ECM terminal 4 and ECM relay terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

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

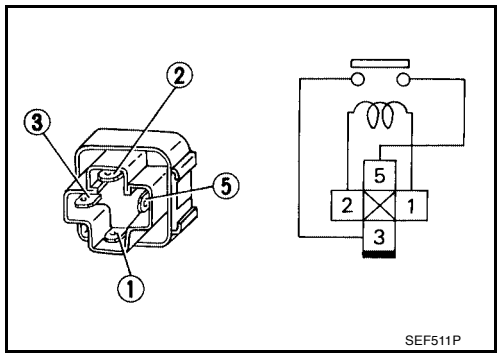
OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ECM RELAY

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

12V (1 - 2) applied	: Continuity exists.
No voltage applied	: No continuity

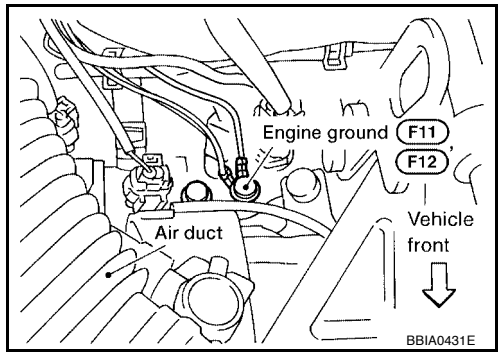


OK or NG

OK >> GO TO 14.
NG >> Replace ECM relay.

14. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .



OK or NG

OK >> GO TO 15.
NG >> Repair or replace ground connections.

15. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

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

16. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Ground Inspection

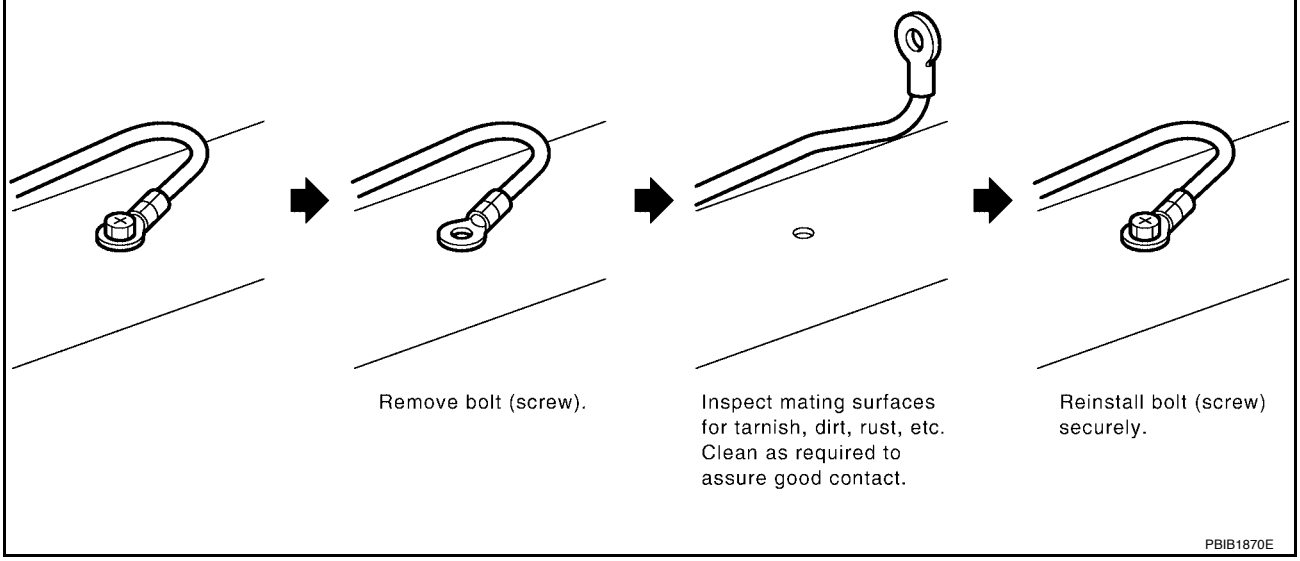
UBS00GYY

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

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

For detailed ground distribution information, refer to PG-17, "Ground Distribution" .

Ground Inspection



DTC P0031, P0032 HO2S1 HEATER

PFP:22690

Description

UBS00D1X

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Engine coolant temperature sensor	Engine coolant temperature		

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

OPERATION

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

CONSULT-II Reference Value in Data Monitor Mode

UBS00D1Y

Specification data are reference values.

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

On Board Diagnosis Logic

UBS00D1Z

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

DTC Confirmation Procedure

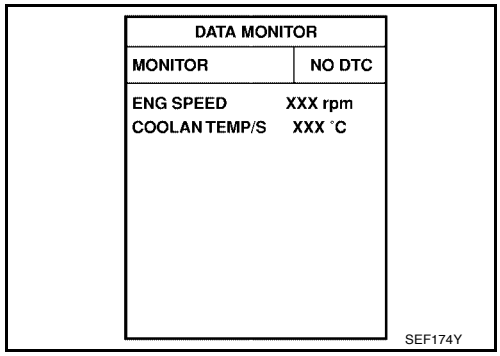
UBS00D20

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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. 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 “DATA MONITOR” mode with CONSULT-II.
4. Start engine and run it for at least 6 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-131, "Diagnostic Procedure" .



WITH GST

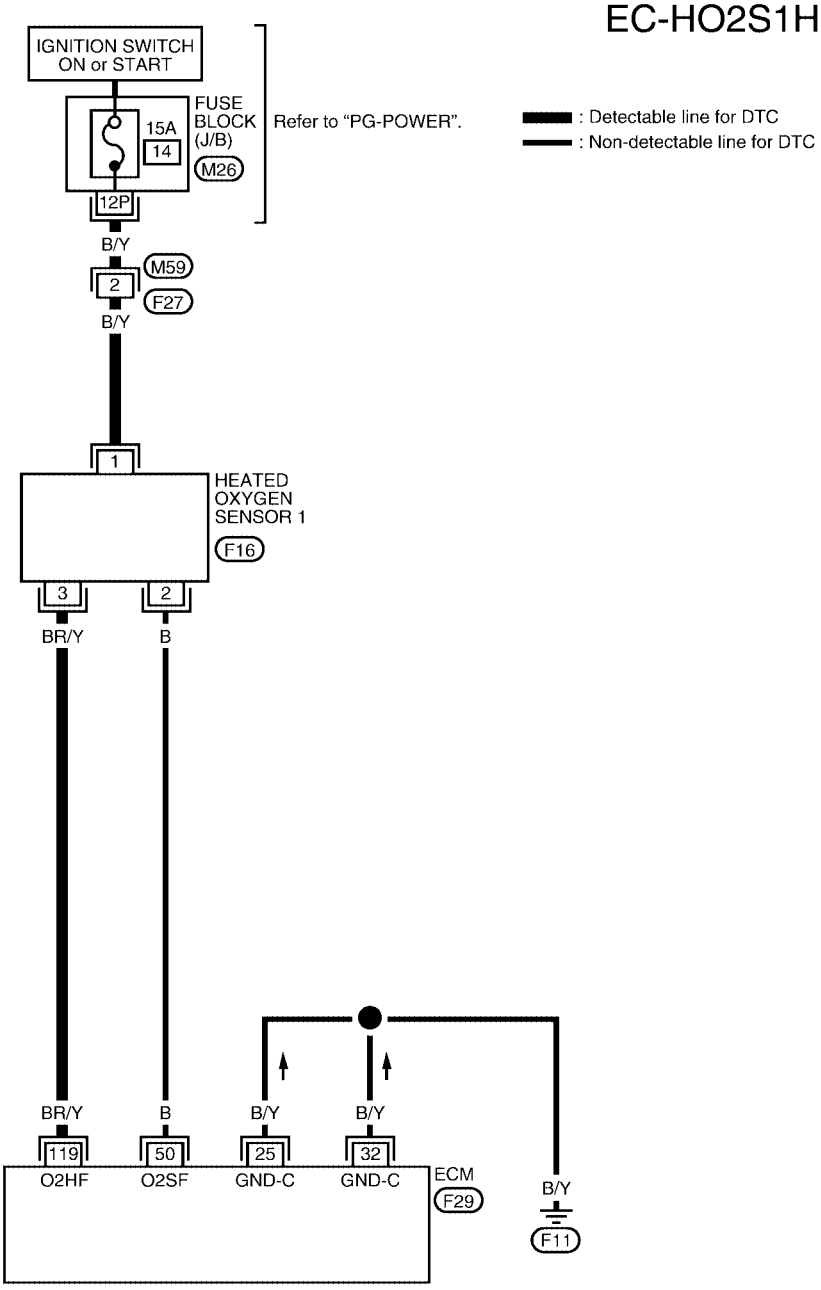
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and warm it up to normal operating temperature.
3. Start engine and run it for at least 6 seconds at idle speed.
4. Turn ignition switch OFF and wait least 5 seconds.
5. Start engine and run it for at least 6 seconds at idle speed.
6. Select “MODE 3” with GST.
7. If DTC is detected, go to EC-131, "Diagnostic Procedure" .

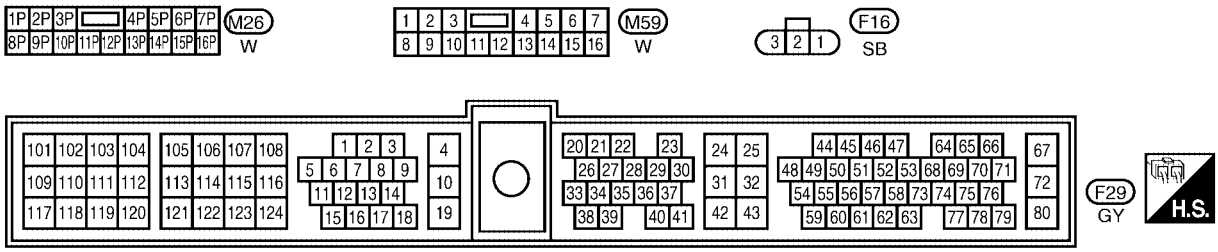
- **When using GST, DTC Confirmation Procedure should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

UBS00D21

EC-HO2S1H-01





BBWA0436E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119	BR/Y	Heated oxygen sensor 1 heater	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,600 rpm.	Approximately 0.4V
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

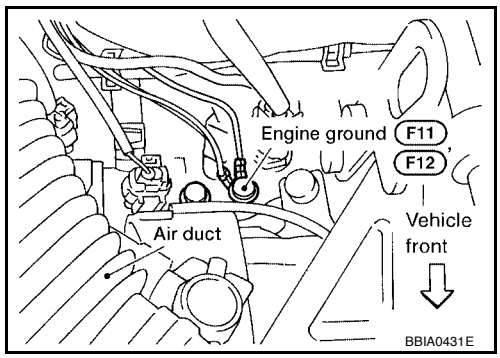
UBS00D22

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

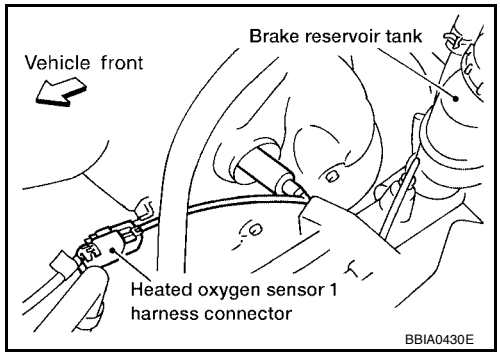
OK or NG

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



2. CHECK POWER SUPPLY

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

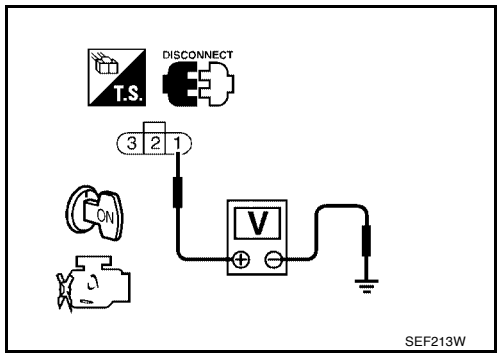


3. Check voltage between terminal 1 and ground with CONSULT-II or tester.

Voltage : Battery voltage

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- 15A fuse
- Fuse block (J/B) connector M26
- Harness for open or short between heated oxygen sensor 1 and fuse

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

4. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between heated oxygen sensor 1 terminal 3 and ECM terminal 119. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

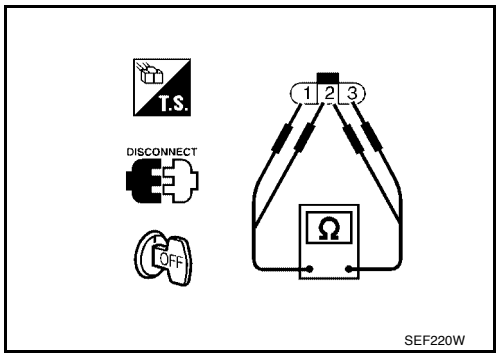
5. CHECK HEATED OXYGEN SENSOR 1 HEATER

Check resistance between terminals 3 and 1.

Resistance : 3.3 - 4.0 Ω [at 25°C (77°F)]

Check continuity between terminals 2 and 1, 3 and 2.

Continuity should not exist.



CAUTION:

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

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00D23

HEATED OXYGEN SENSOR 1

Refer to EM-13, "OUTER COMPONENT PARTS" .

DTC P0037, P0038 HO2S2 HEATER

PFP:226A0

Description

UBS00D24

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Engine coolant temperature sensor	Engine coolant temperature sensor		
Mass air flow sensor	Amount of intake air		

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

OPERATION

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

CONSULT-II Reference Value in Data Monitor Mode

UBS00D25

Specification data are reference values.

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

On Board Diagnosis Logic

UBS00D26

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

DTC Confirmation Procedure

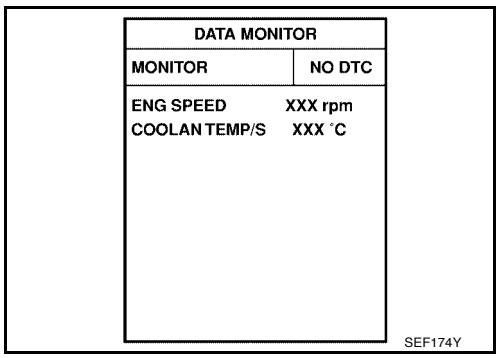
UBS00D27

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is in between 10.5V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. If 1st trip DTC is detected, go to EC-136, "Diagnostic Procedure" .



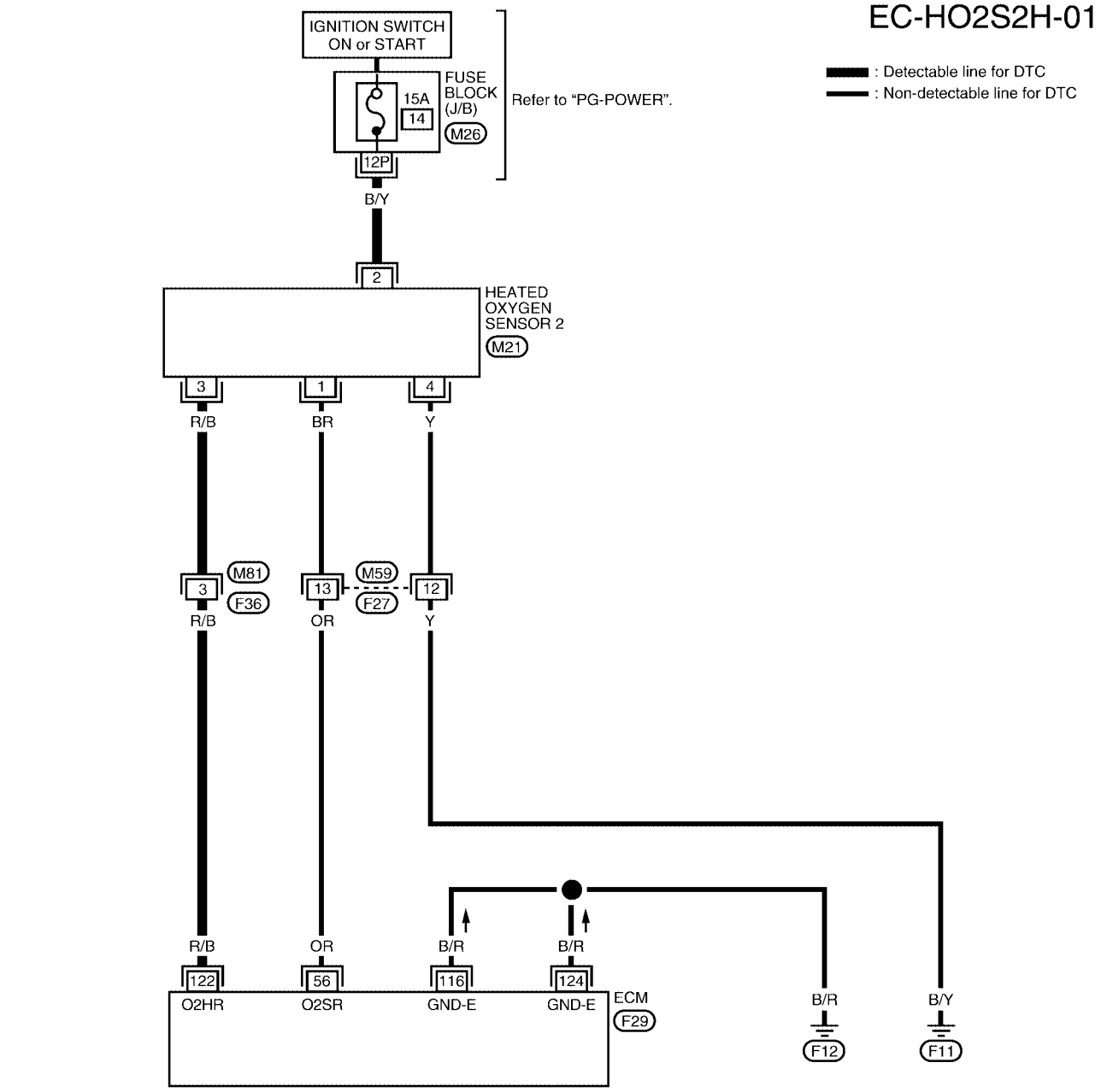
WITH GST

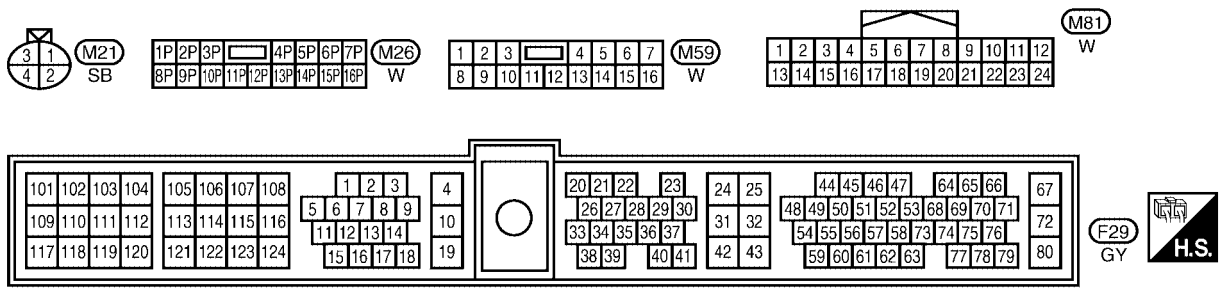
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
7. Let engine idle for 1 minute.
8. Select “MODE 3” with GST.
9. If DTC is detected, go to EC-136, "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

UBS00D28





BBWA1058E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122	R/B	Heated oxygen sensor 2 heater	**[Engine is running]** ● **Warm-up condition** ● Engine speed: Below 4,000 rpm after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 4,000 rpm.	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

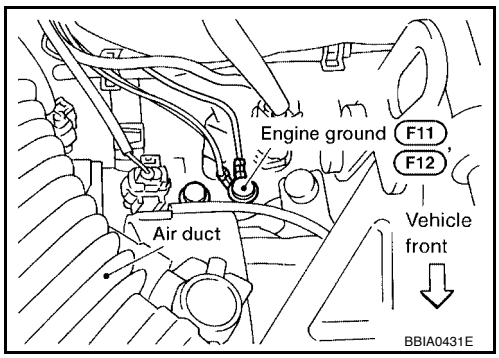
UBS00D29

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

OK or NG

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



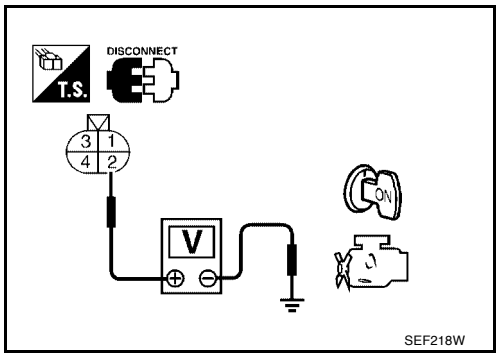
2. CHECK POWER SUPPLY

1. Disconnect heated oxygen sensor 2 harness connector.
2. Turn ignition switch ON.
3. Check voltage between terminal 2 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.

- Fuse block (J/B) connector M26
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

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

4. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between heated oxygen sensor 2 terminal 3 and ECM terminal 122. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M81, F36
- 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.

6. CHECK HEATED OXYGEN SENSOR 2 HEATER

Check the following.

1. Check resistance between terminals 2 and 3.

Resistance : 3.3 - 4.0Ω [at 25°C (77°F)]

2. Check continuity.

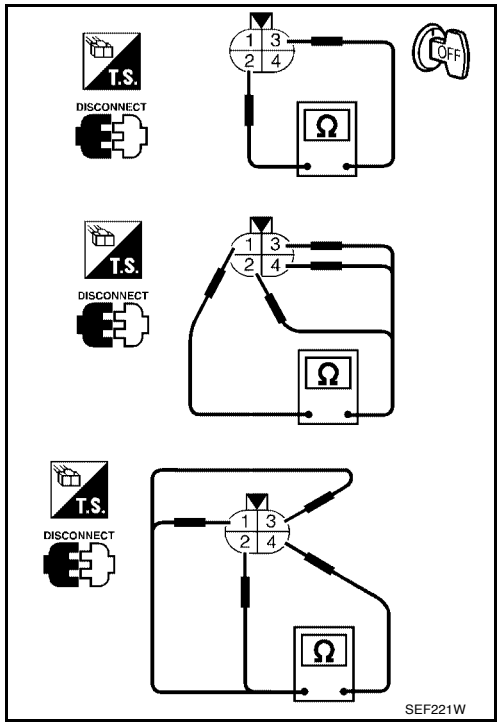
Terminal No.	Continuity
1 and 2, 3, 4	No
4 and 1, 2, 3	

CAUTION:

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

OK or NG

OK >> GO TO 7.
NG >> Replace heated oxygen sensor 2.



7. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00D2A

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

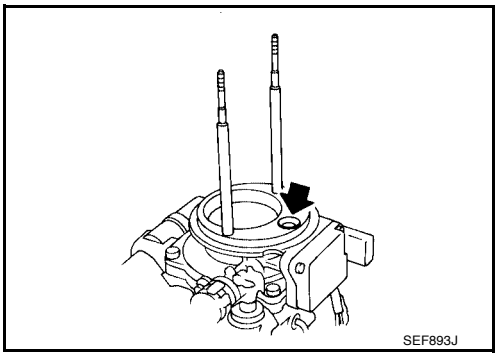
DTC P0101 MAF SENSOR

PFP:22680

Component Description

UBS00D2B

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


SEF893J

CONSULT-II Reference Value in Data Monitor Mode

UBS00D2C

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	0.9 - 1.8V
		2,500 rpm	1.9 - 2.3V
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	9.5 - 34.0%
		2,500 rpm	13.9 - 24.9%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	0.9 - 5.8 g·m/s
		2,500 rpm	7.5 - 13.2 g·m/s

On Board Diagnosis Logic

UBS00D2D

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0101	Mass air flow sensor circuit range/performance problem	A)	A high voltage from the sensor is sent to ECM under light load driving condition.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor
		B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor

DTC Confirmation Procedure

UBS00D2E

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

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 5 seconds before conducting the next test.

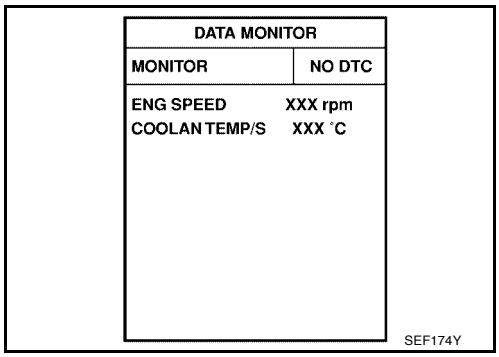
PROCEDURE FOR MALFUNCTION A

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-143, "Diagnostic Procedure" .



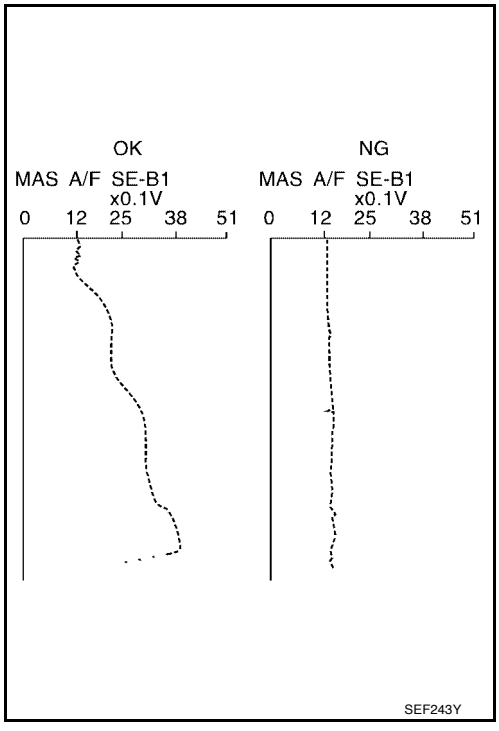
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

With CONSULT-II

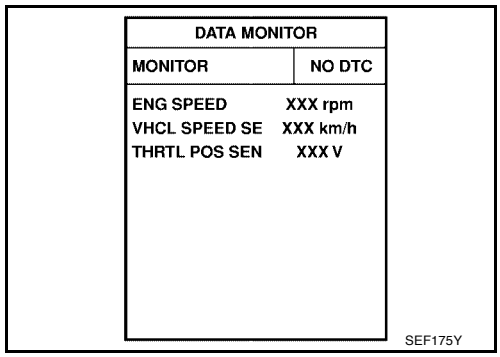
1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
   If engine cannot be started, go to EC-143, "Diagnostic Procedure" .
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Check the voltage of “MAS A/F SE-B1” with “DATA MONITOR”.
5. Increases engine speed to about 4,000 rpm.
6. Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to EC-143, "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 POS SEN	More than 3V
Shift 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-143, "Diagnostic Procedure" .



Overall Function Check

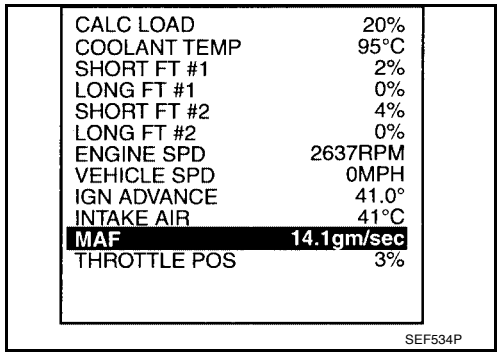
UBS00D2F

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.

PROCEDURE FOR MALFUNCTION B

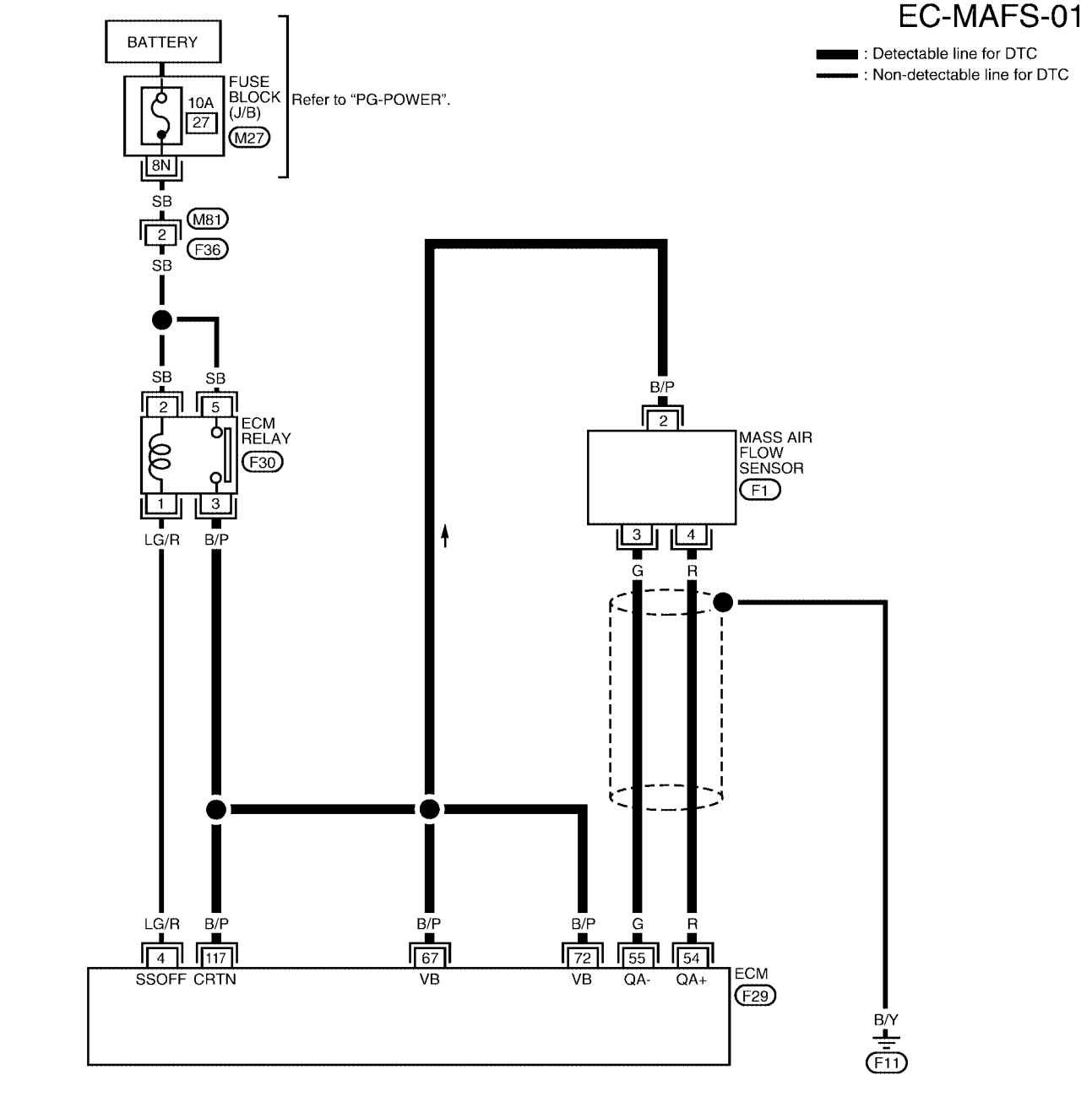
With GST

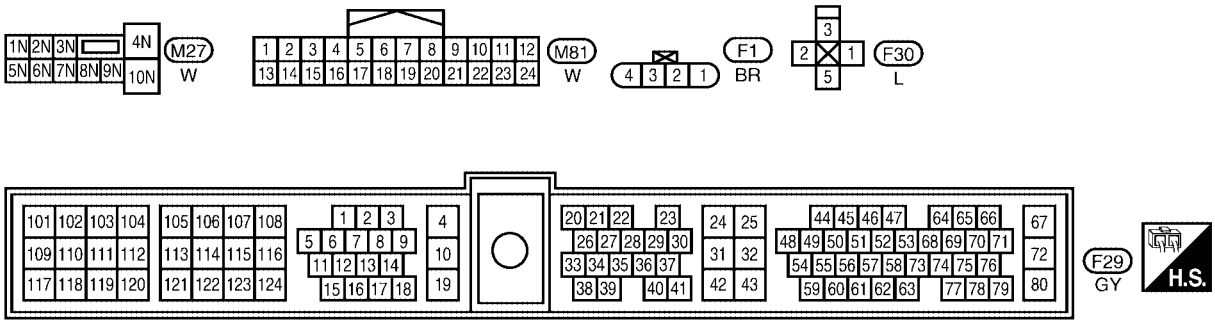
1. Start engine and warm it up to normal operating temperature.
2. Select “MODE 1” with GST.
3. Check the mass air flow sensor signal with “MODE 1”.
4. Check for linear mass air flow rise in response to increases to about 4,000 rpm in engine speed.
5. If NG, go to EC-143, "Diagnostic Procedure" .



Wiring Diagram

UBS00D2G





BBWA1055E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.9 - 1.8V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.9 - 2.3V
55	G	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00D2H

1. INSPECTION START

Which malfunction (A or B) is duplicated?

A or B

A >> GO TO 3.
B >> GO TO 2.

2. CHECK INTAKE SYSTEM

Check the followings for connection.

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

OK or NG

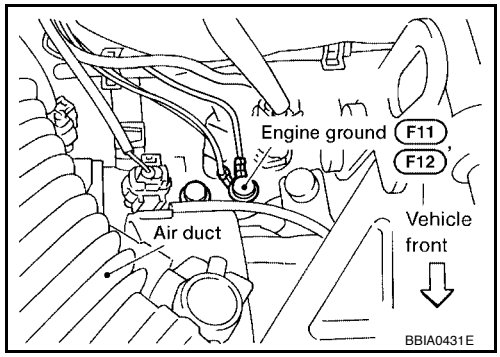
OK >> GO TO 3.
NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

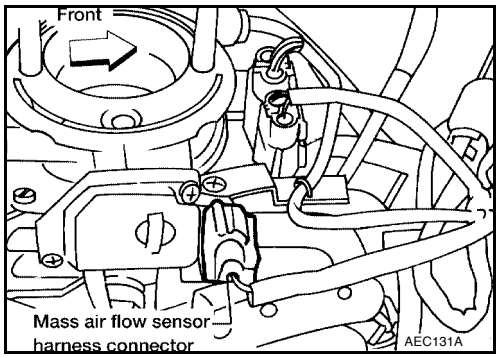
OK or NG

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



4. CHECK POWER SUPPLY

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

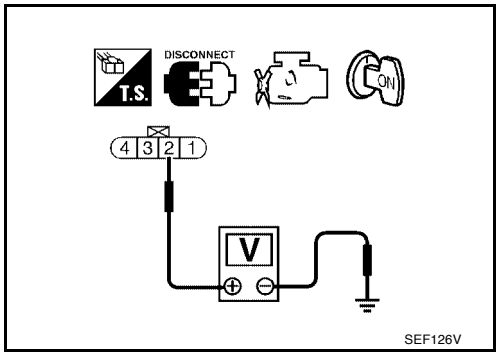


3. Check voltage between terminal 2 and ground with CONSULT-II or tester.

Voltage : Battery voltage

OK or NG

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



5. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM relay and MAF sensor
- Harness for open or short between MAF sensor and ECM

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

6. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 55. 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 INPUT SIGNAL CIRCUIT

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 54. Refer to Wiring Diagram.

Continuity should exist.

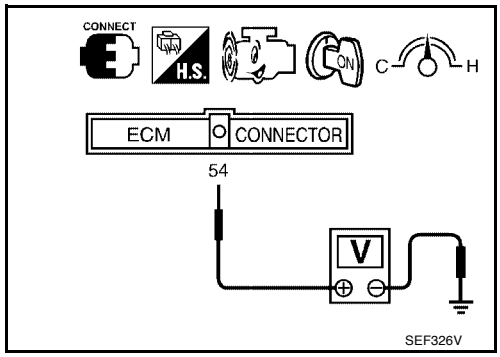
2. Also check harness for short to ground and short to power.

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

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Start engine and warm it up to normal operating temperature.
4. Check voltage between ECM terminal 54 (mass air flow sensor signal) and ground.



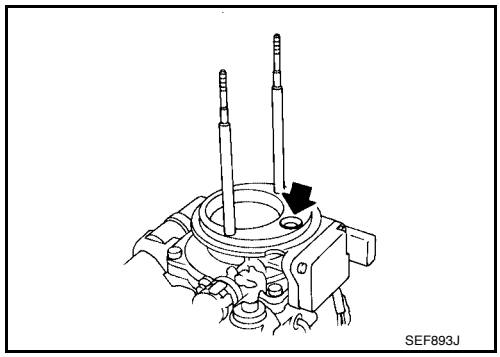
Condition	Voltage V
Ignition switch ON (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	0.9 - 1.8 to Approx. 3.0

*: Make sure linear voltage rises as engine speed increase to about 4,000 rpm.

5. 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

6. If NG, remove mass air flow sensor from intake manifold. Check hot wire for damage or dust.
7. If NG, clean or replace mass air flow sensor.



OK or NG

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

9. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END.**

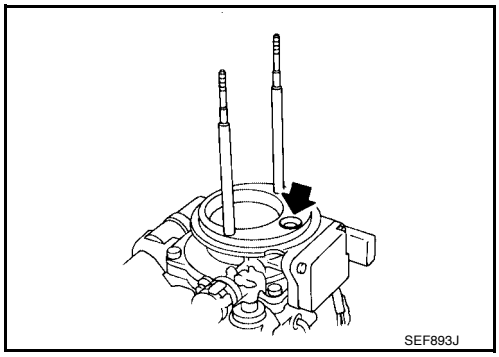
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

UBS00D2I

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


SEF893J

CONSULT-II Reference Value in Data Monitor Mode

UBS00D2J

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	0.9 - 1.8V
		2,500 rpm	1.9 - 2.3V
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	9.5 - 34.0%
		2,500 rpm	13.9 - 24.9%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	0.9 - 5.8 g·m/s
		2,500 rpm	7.5 - 13.2 g·m/s

On Board Diagnosis Logic

UBS00D2K

These self-diagnoses have the one trip detection logic.

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

FAIL-SAFE MODE

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

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

DTC Confirmation Procedure

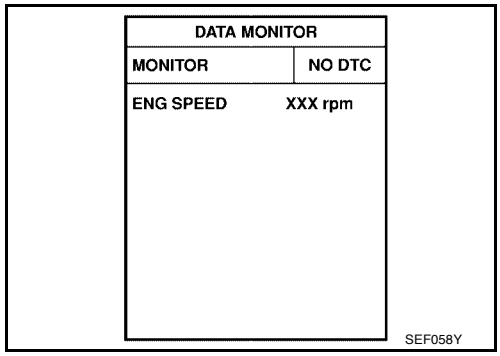
UBS00D2L

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR DTC P0102

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 DTC is detected, go to EC-149, "Diagnostic Procedure" .



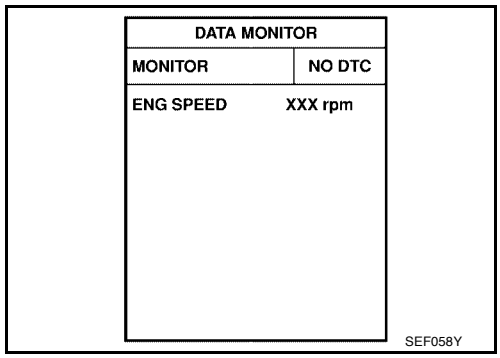
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR DTC P0103

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 6 seconds.
4. If DTC is detected, go to EC-149, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Start engine and let it idle for at least 6 seconds.
6. If DTC is detected, go to EC-149, "Diagnostic Procedure" .

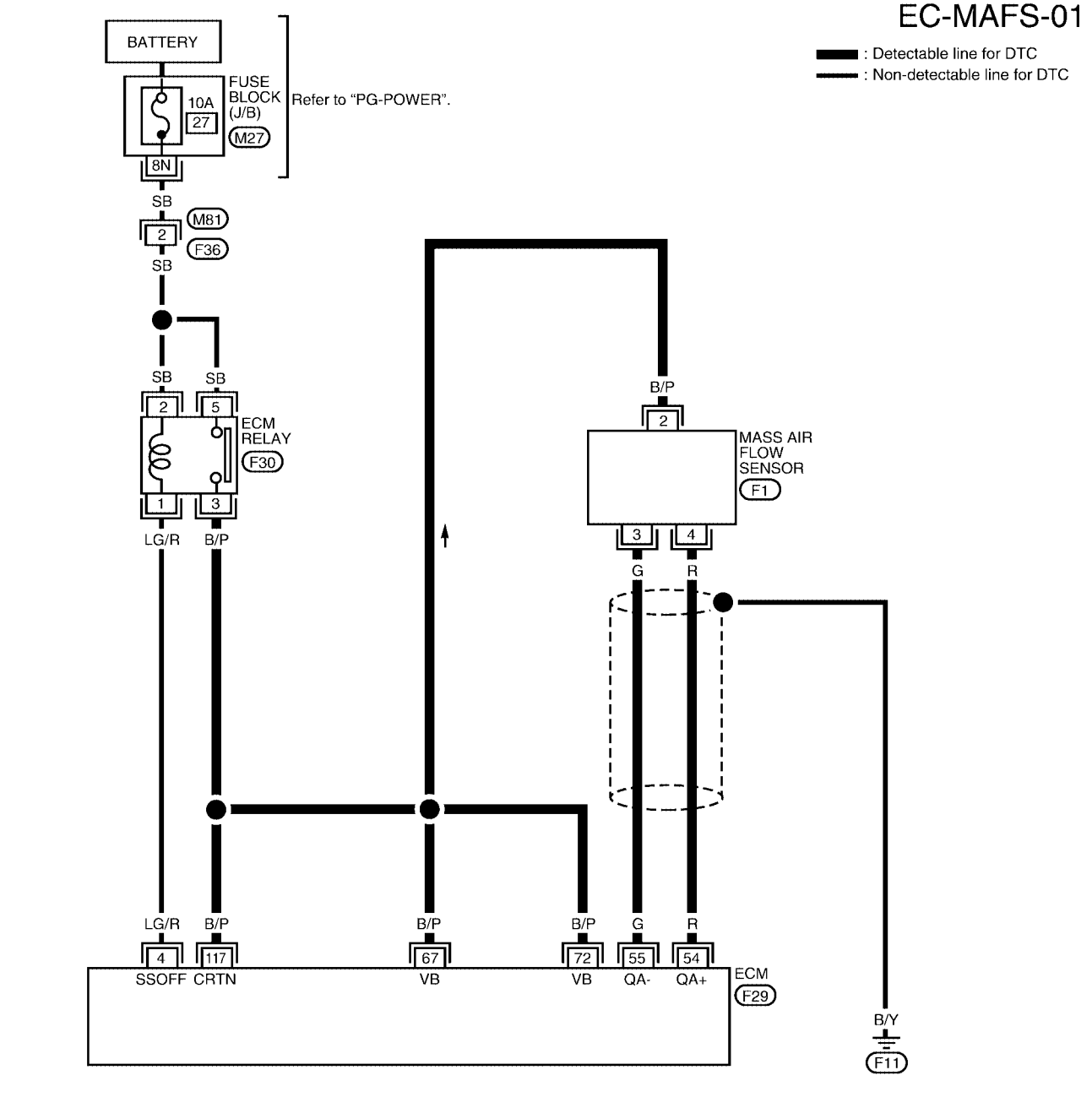


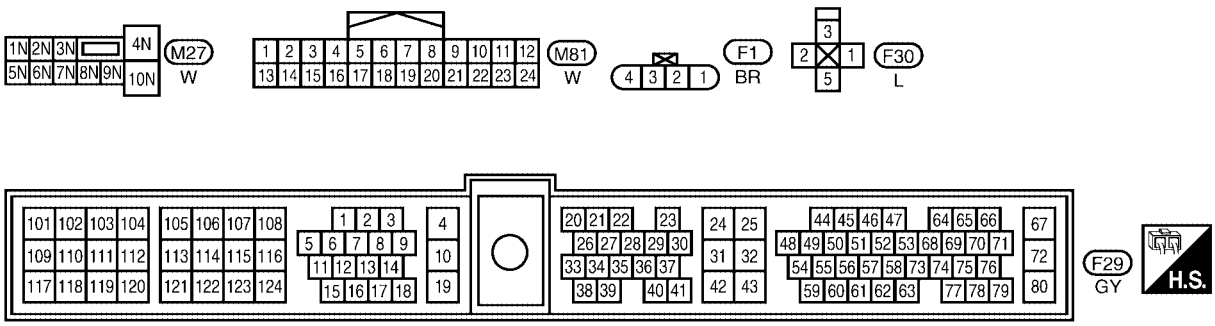
With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00D2M





BBWA1055E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.9 - 1.8V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.9 - 2.3V
55	G	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00D2N

1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2. CHECK INTAKE SYSTEM

Check the followings for connection.

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

OK or NG

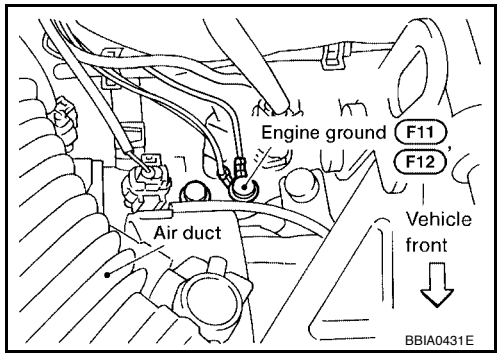
OK >> GO TO 3.
NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

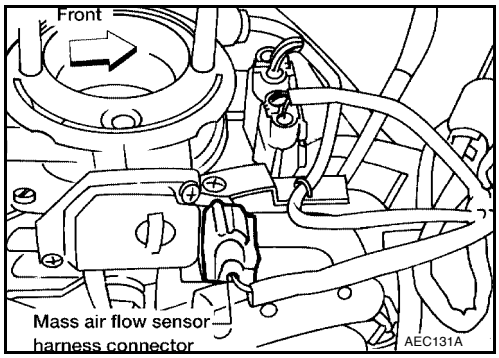
OK or NG

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



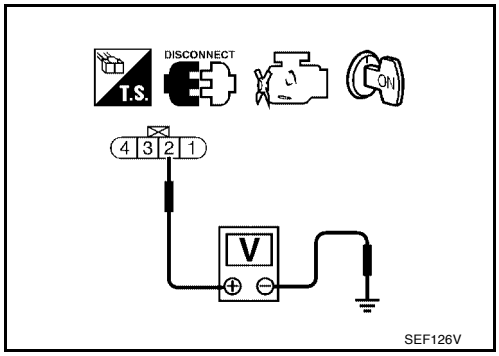
4. CHECK POWER SUPPLY

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



3. Check voltage between terminal 2 and ground with CONSULT-II or tester.

Voltage : Battery voltage



OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM relay and MAF sensor
- Harness for open or short between ECM and MAF sensor

>> Repair harness or connectors.

6. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 55. 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 INPUT SIGNAL CIRCUIT

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 54. Refer to Wiring Diagram.

Continuity should exist.

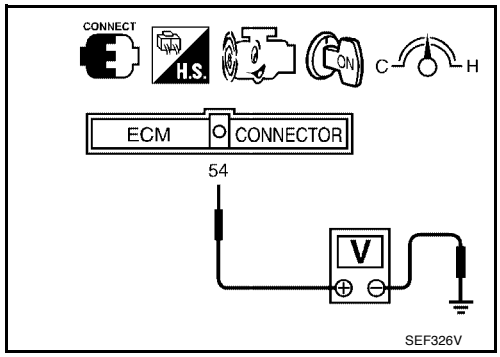
2. Also check harness for short to ground and short to power.

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

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Start engine and warm it up to normal operating temperature.
4. Check voltage between ECM terminal 54 (mass air flow sensor signal) and ground.



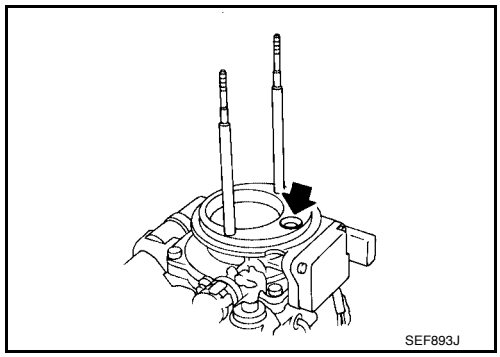
Condition	Voltage V
Ignition switch ON (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	0.9 - 1.8 to Approx. 3.0

*: Make sure linear voltage rises as engine speed increase to about 4,000 rpm.

5. 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

6. If NG, remove mass air flow sensor from intake manifold. Check hot wire for damage or dust.
7. If NG, clean or replace mass air flow sensor.



OK or NG

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

9. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END.**

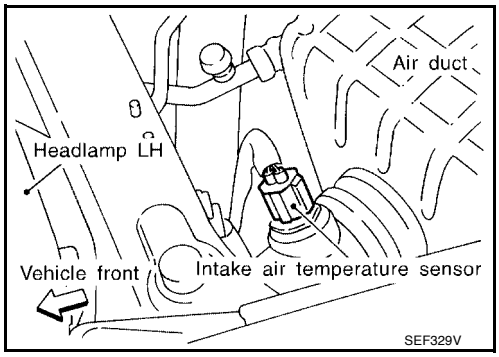
DTC P0112, P0113 IAT SENSOR

PFP:22630

Component Description

UBS00D2O

The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.

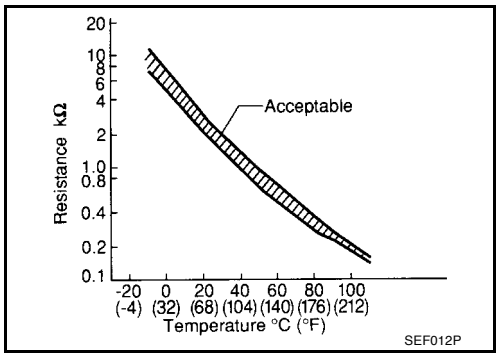


The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
80 (176)	1.23	0.27 - 0.38

*: This data is reference value and is measured between ECM terminal 61 (Intake air temperature sensor) and ground.



CAUTION:

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

On Board Diagnosis Logic

UBS00D2P

These self-diagnoses have the one trip detection logic.

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

FAIL-SAFE MODE

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

Detected items	Engine operating condition in fail-safe mode
Intake air temperature sensor circuit	The ECM functions on the assumption that the intake air temperature is 25°C (77°F).

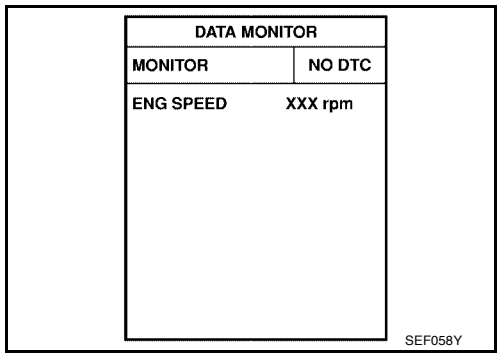
DTC Confirmation Procedure

UBS00D2Q

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-155, "Diagnostic Procedure" .



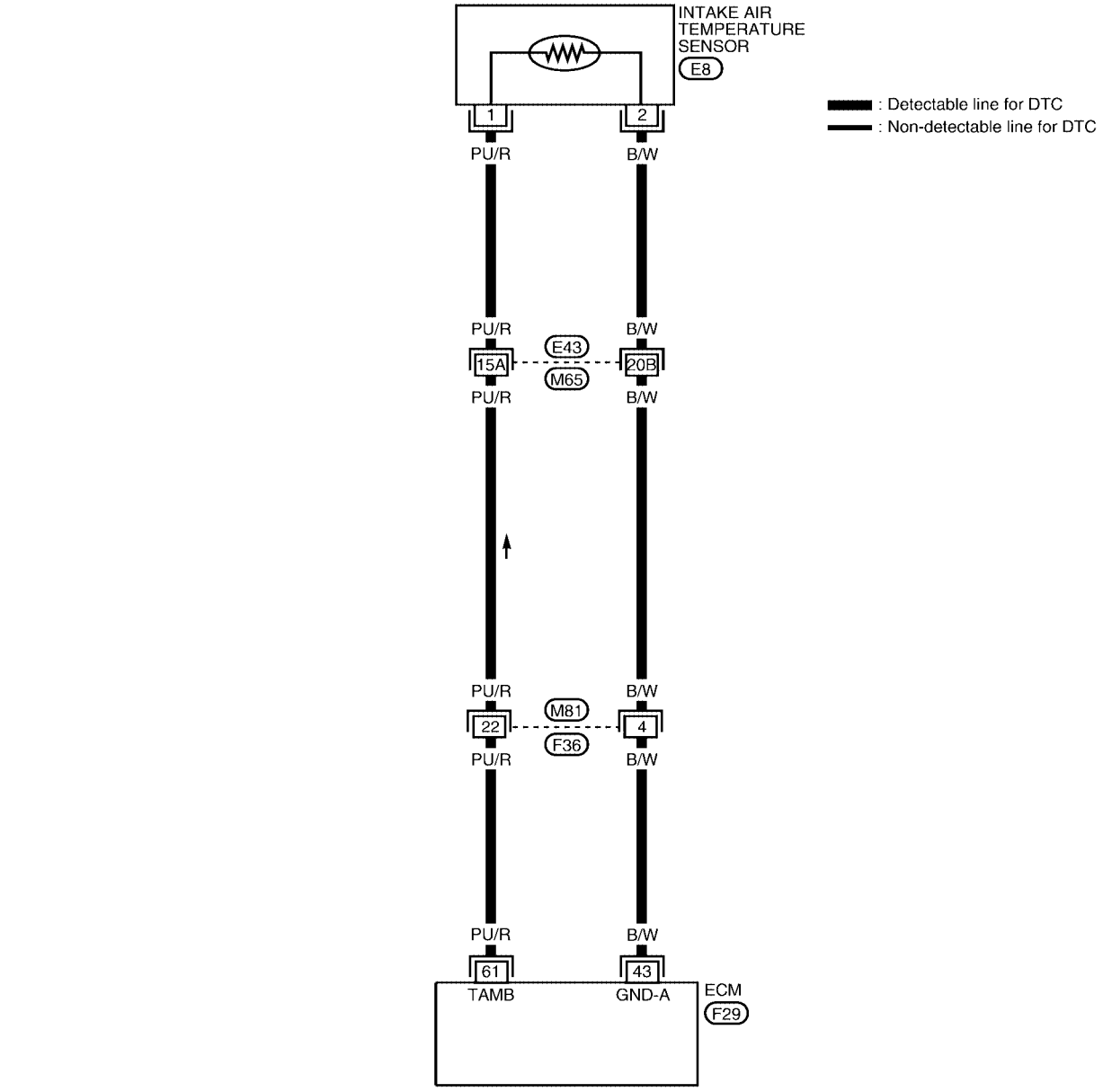
WITH GST

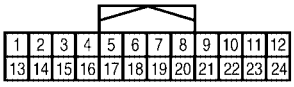
Follow the procedure “WITH CONSULT-II” above.

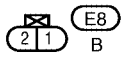
Wiring Diagram

UBS00D2R

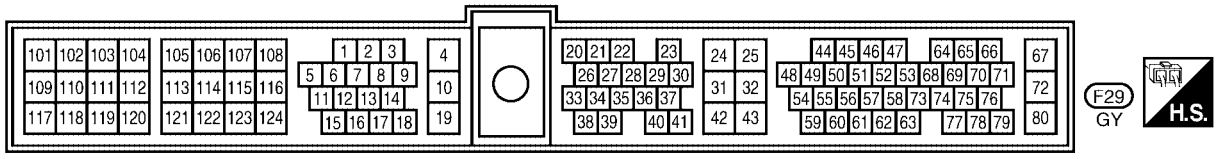
EC-IATS-01







Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)



BBWA1056E

Diagnostic Procedure

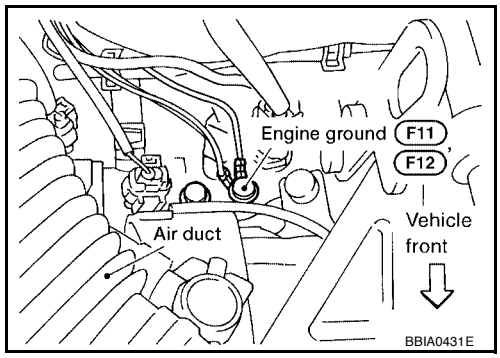
UBS00D2S

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

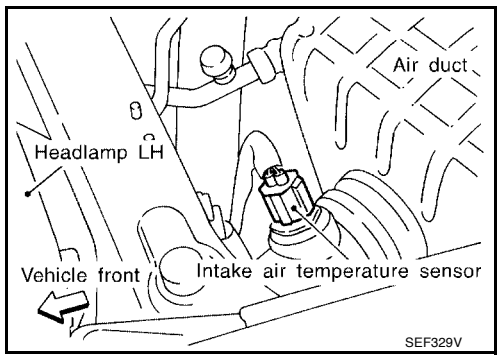
OK or NG

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



2. CHECK POWER SUPPLY

1. Disconnect intake air temperature (IAT) sensor harness connector.
2. Turn ignition switch ON.

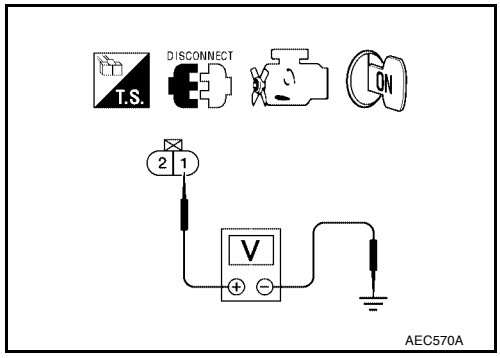


3. Check voltage between terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M81, F36
- Harness for open or short between ECM and intake air temperature sensor

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

4. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between intake air temperature sensor terminal 2 and ECM terminal 43. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

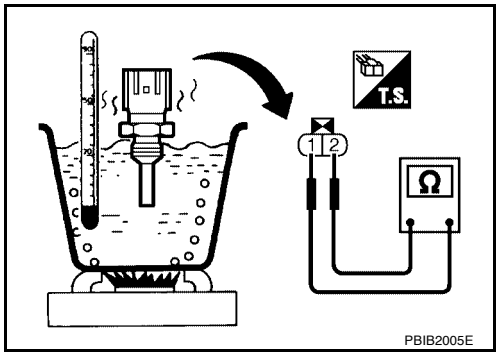
Check the following.

- Harness connectors E43, M65
- Harness connectors M81, F36
- Harness for open or short between ECM and intake air temperature sensor

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

6. CHECK INTAKE AIR TEMPERATURE SENSOR

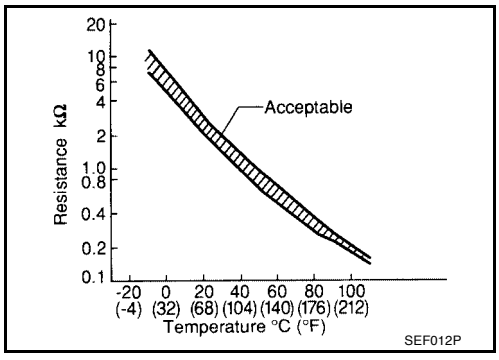
Check resistance between intake air temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
80 (176)	1.23	0.27 - 0.38

*: This data is reference value and is measured between ECM terminal 61 (Intake air temperature sensor) and ground.



OK or NG

OK >> GO TO 7.
NG >> Replace intake air temperature sensor.

7. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

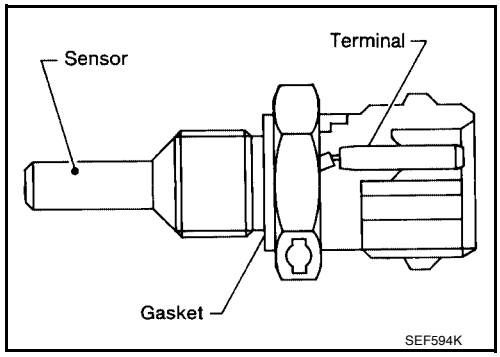
DTC P0117, P0118 ECT SENSOR

PFP:22630

Component Description

UBS00D2T

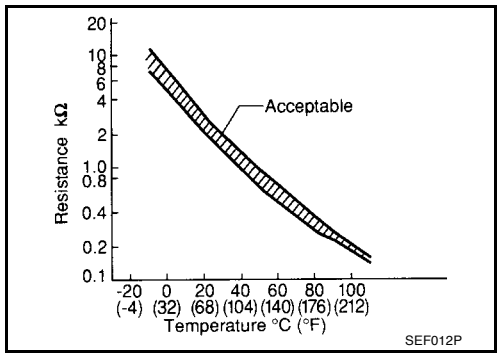
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

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

*: This data is reference value and is measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.



CAUTION:

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

CONSULT-II Reference Value in Data Monitor Mode

UBS00D2U

MONITOR ITEM	CONDITION	SPECIFICATION
COOLAN TEMP/S	● Engine: After warming up	More than 70°C (158°F)

On Board Diagnosis Logic

UBS00D2V

These self-diagnoses have the one trip detection logic.

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

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters in 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 to 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 to ON or START	40°C (104°F)
	More than approx. 4 minutes after ignition ON or STAR	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)

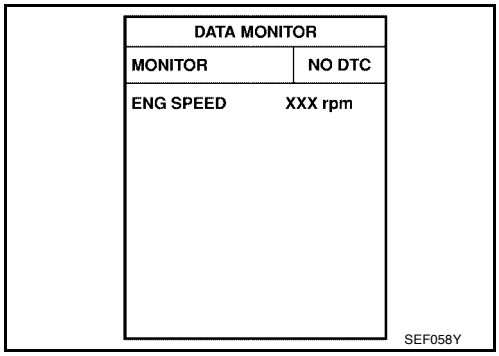
DTC Confirmation Procedure

UBS00D2W

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-160, "Diagnostic Procedure" .



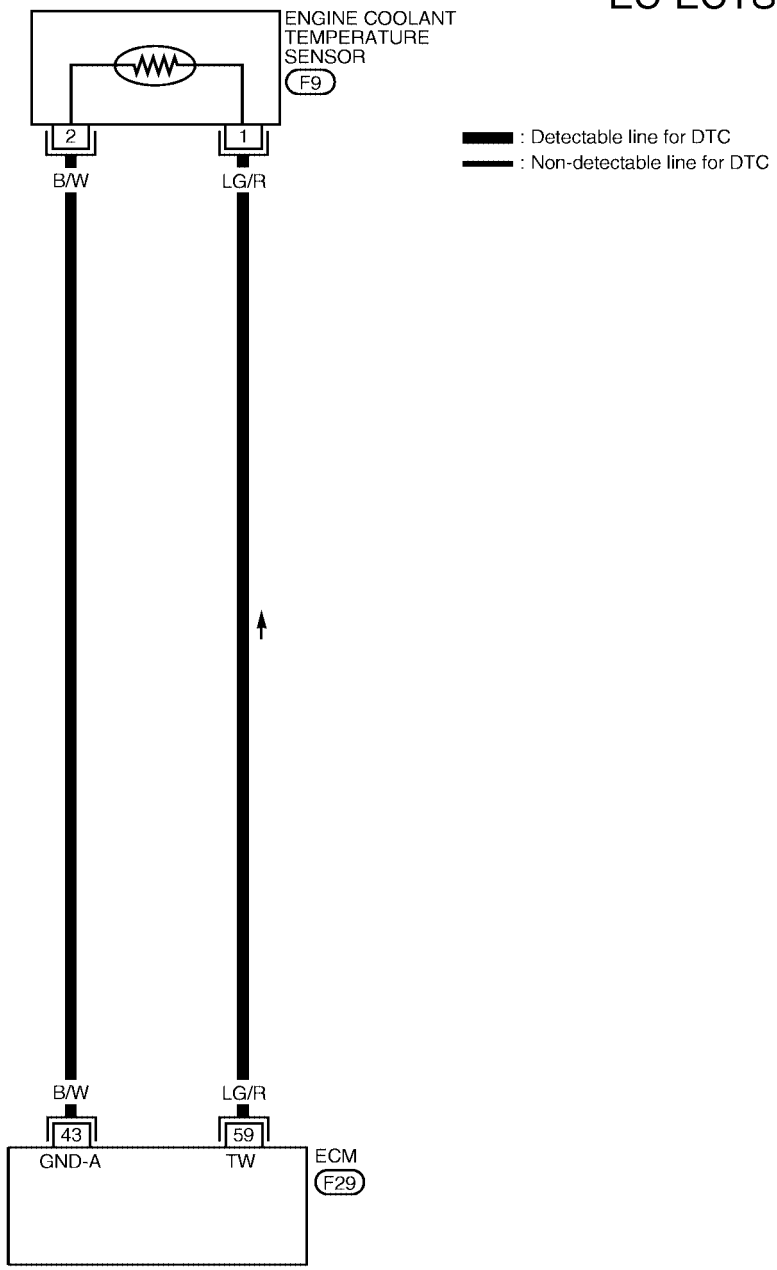
WITH GST

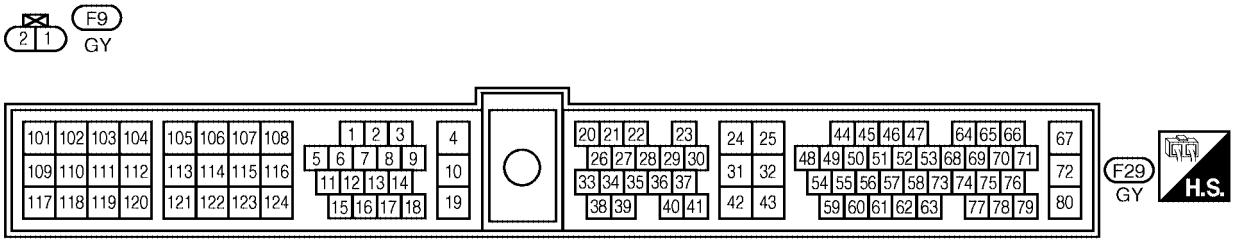
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00D2X

EC-ECTS-01





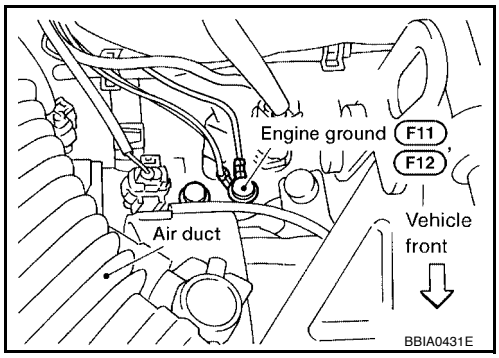
AEC984A

Diagnostic Procedure

UBS00D2Y

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

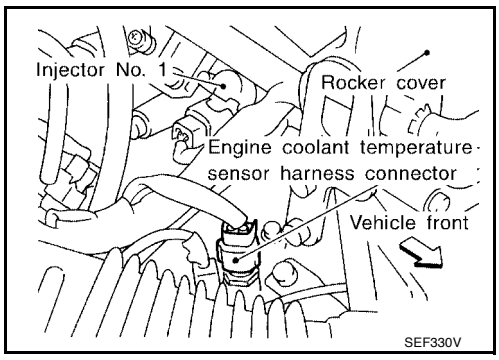


OK or NG

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

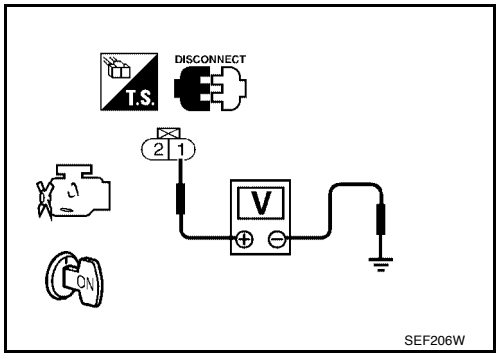
2. CHECK POWER SUPPLY

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



3. Check voltage between engine coolant temperature 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 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.

4. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between engine coolant temperature sensor terminal 2 and ECM terminal 43. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the 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.

6. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-161, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace engine coolant temperature sensor.

7. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

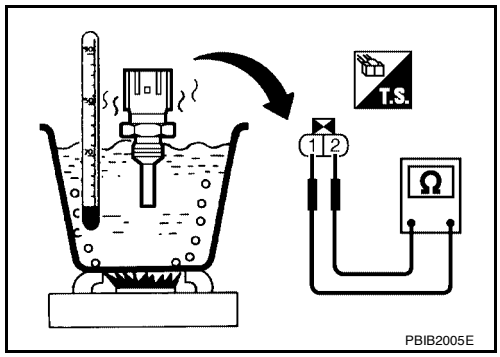
>> **INSPECTION END**

Component Inspection

UBS00D2Z

ENGINE COOLANT TEMPERATURE SENSOR

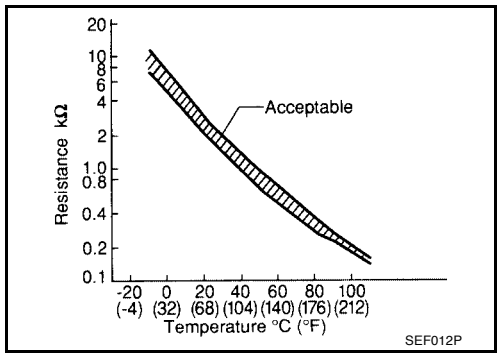
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

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

*: This data is reference value and is measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.



2. If NG, replace engine coolant temperature sensor.

DTC P0121 TP SENSOR

PFP:16119

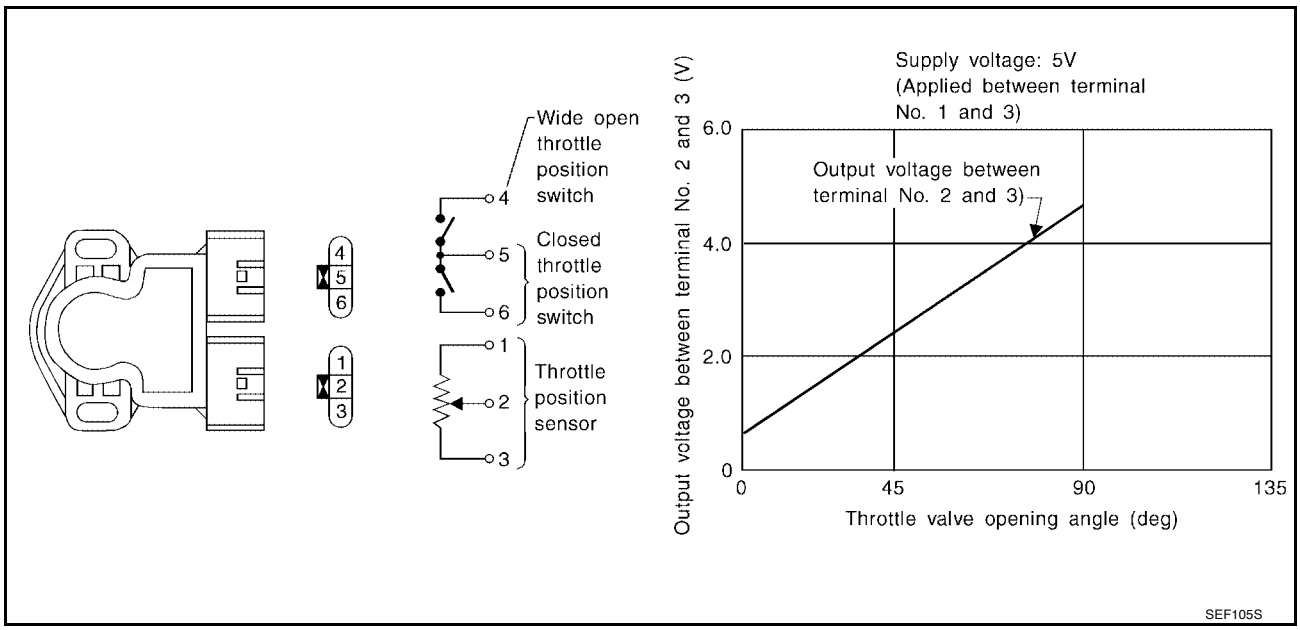
Component Description

UBS00D30

NOTE:
If DTC P0121 is displayed with DTC P0510, first perform trouble diagnosis for DTC P0510.
Refer to EC-413 .

The throttle position sensor responds to the accelerator pedal movement. This sensor is a type of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the ECM.

Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This sensor controls engine operation such as fuel cut. On the other hand, the “Wide open and closed throttle position switch”, which is built into the throttle position sensor unit, is not used for engine control.



CONSULT-II Reference Value in Data Monitor Mode

UBS00D31

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	● Ignition switch: ON (Engine stopped) ● Engine: After warming up	Throttle valve: Fully closed	0.2 - 0.8V
		Throttle valve: Fully opened	3.5 - 4.5V
ABSOL TH·P/S	● Ignition switch: ON (Engine stopped) ● Engine: After warming up	Throttle valve: Fully closed	0.0%
		Throttle valve: Fully opened	Approx. 80%

On Board Diagnosis Logic

UBS00D32

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible Cause
P0121	Throttle position sensor circuit range/performance problem	A)	A high voltage from the sensor is sent to ECM under light load driving condition.	● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● Throttle position sensor ● Fuel injector ● Camshaft position sensor ● Mass air flow sensor
		B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	● Harness or connectors (The throttle position sensor circuit is open or shorted.) ● throttle position sensor ● Intake air leaks

FAIL-SAFE MODE

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

Detected items	Engine operating condition in fail-safe mode	
Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
	Condition	Driving condition
	When engine is idling	Normal
	When accelerating	Poor acceleration

DTC Confirmation Procedure

UBS00D33

Perform PROCEDURE FOR MALFUNCTION A first. If the 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 5 seconds before conducting the next test.

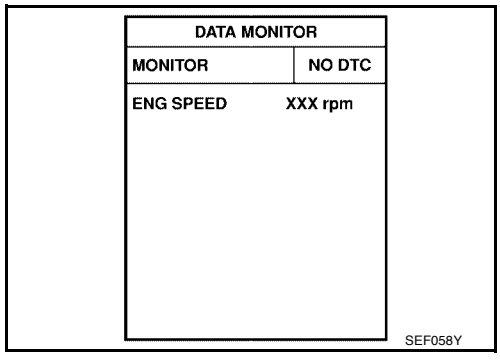
PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 10 seconds.
   If idle speed is over 1,100 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,100 rpm.

Shift lever	Suitable position
Accelerator pedal	Released
Vehicle speed	As slow as possible

4. If 1st trip DTC is detected, go to EC-166, "Diagnostic Procedure"
   .



With GST

Follow the procedure “With CONSULT-II”.

PROCEDURE FOR MALFUNCTION B

CAUTION:
Always drive vehicle at a safe speed.

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.

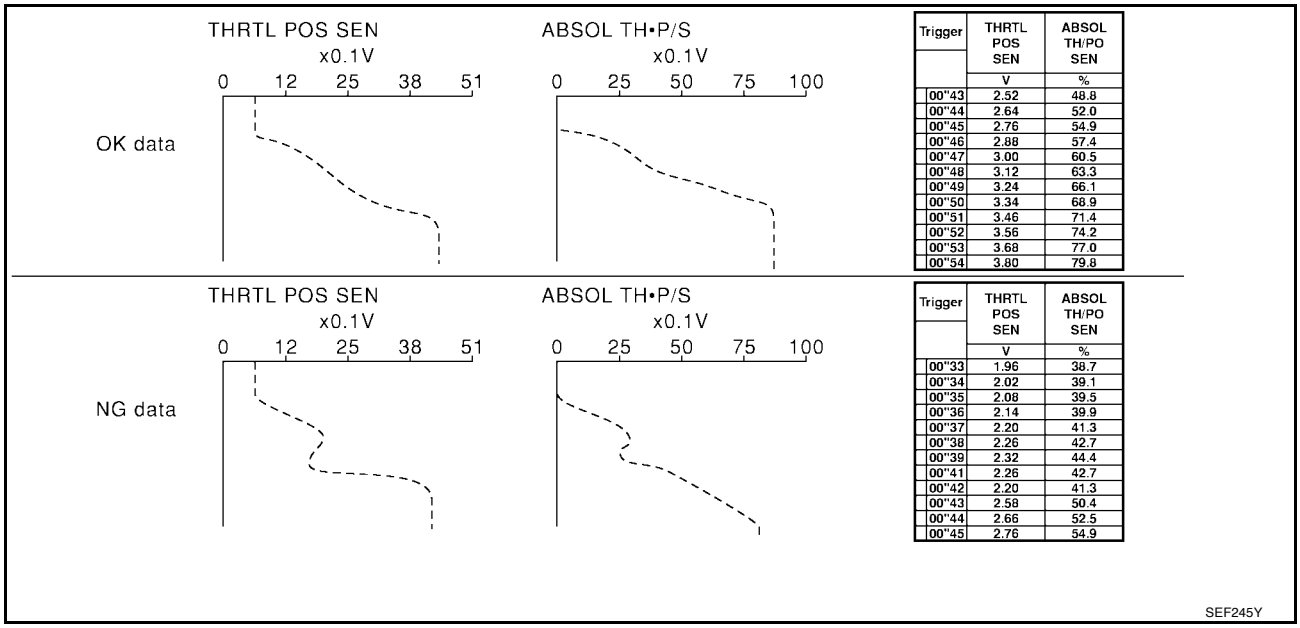
3. Turn ignition switch ON.
4. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II.
5. Select “THRTL POS SEN” and “ABSOL TH·P/S” in “DATA MONITOR” mode with CONSULT-II.
6. Press RECORD on CONSULT-II screen at the same time accelerator pedal is depressed.
7. Print out the recorded graph and check the following:

- The voltage rise is linear in response to accelerator pedal depression.
- The voltage when accelerator pedal is fully depressed is approximately 4V.

If NG, go to EC-166, "Diagnostic Procedure" .
If OK, go to following step.

DATA MONITOR	
MONITOR	NO DTC
THRTL POS SEN	XXX V
ABSOL TH-P/S	XXX %

SEF177Y



Trigger	THRTL POS SEN	ABSOL TH/PO SEN
	V	%
00"43	2.52	48.8
00"44	2.64	52.0
00"45	2.76	54.9
00"46	2.88	57.4
00"47	3.00	60.5
00"48	3.12	63.3
00"49	3.24	66.1
00"50	3.34	68.9
00"51	3.46	71.4
00"52	3.56	74.2
00"53	3.68	77.0
00"54	3.80	79.8

Trigger	THRTL POS SEN	ABSOL TH/PO SEN
	V	%
00"33	1.96	38.7
00"34	2.02	39.1
00"35	2.08	39.5
00"36	2.14	39.9
00"37	2.20	41.3
00"38	2.26	42.7
00"39	2.32	44.4
00"41	2.26	42.7
00"42	2.20	41.3
00"43	2.58	50.4
00"44	2.66	52.5
00"45	2.76	54.9

SEF245Y

8. Select “AUTO TRIG” in “DATA MONITOR” mode with CONSULT-II.
9. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
MAS A/F SE-B1	More than 3V
COOLAN TEMP/S	More than 70°C (158°F)
Shift lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C

SEF178Y

10. If 1st trip DTC is detected, go to EC-166, "Diagnostic Procedure" .

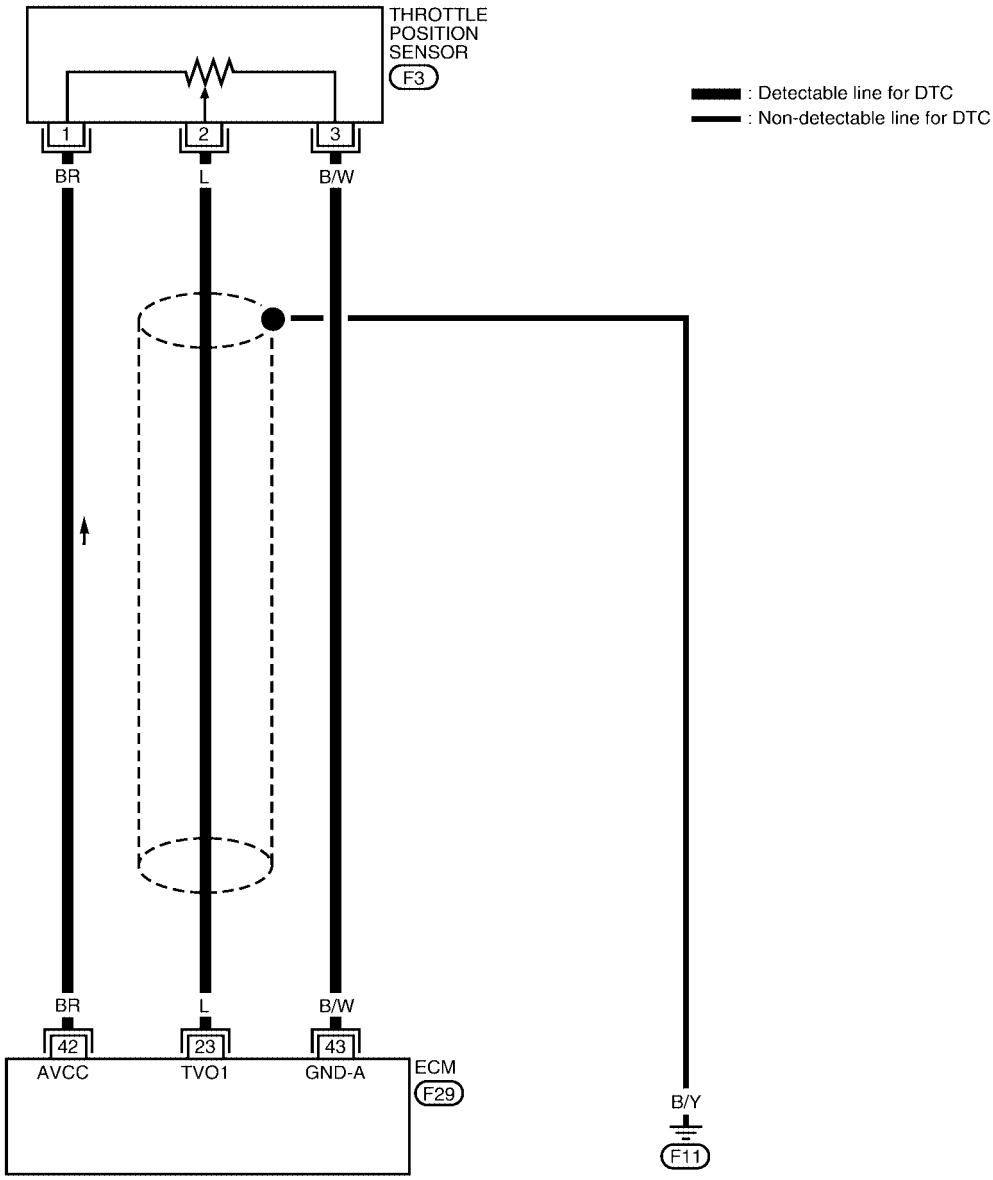
With GST

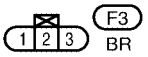
Follow the procedure “With CONSULT-II” above.

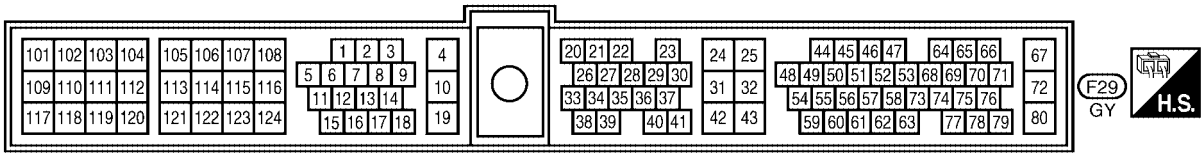
Wiring Diagram

UBS00D34

EC-TPS-01







BBWA0547E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	L	Throttle position sensor	**[Ignition switch: ON]** ● **Warm-up condition** ● Accelerator pedal is fully released	0.2 - 0.8V
			[Ignition switch: ON] ● Accelerator pedal is fully depressed	3.5 - 4.5V
42	BR	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
43	B/W	Sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00D35

1. INSPECTION START

Which malfunction A or B is duplicated?

A or B

Malfunction A>>GO TO 4.
Malfunction B>>GO TO 2.

2. ADJUST THROTTLE POSITION SENSOR

1. Check the following items. Refer to EC-74, "Basic Inspection" .

Items	Specifications
Ignition timing	M/T: 20° ± 5° BTDC (in Neutral position) A/T: 20° ± 5° BTDC (in P or N position)
Base idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF
Target idle speed	M/T: 800 ± 50 rpm (in Neutral position) A/T: 800 ± 50 rpm (in P or N position)

>> GO TO 3.

3. CHECK INTAKE SYSTEM

Check the following for connection.

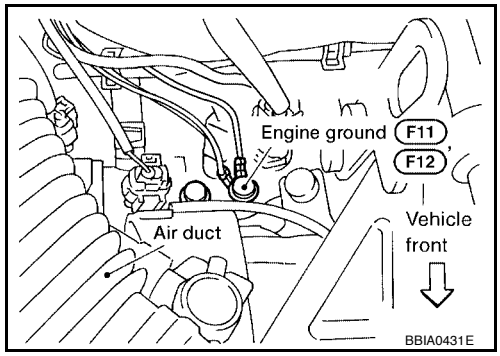
- Air duct
- Air cleaner
- Vacuum hoses
- Intake air passage between air duct and intake manifold

OK or NG

OK >> GO TO 4.
NG >> Reconnect the parts.

4. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

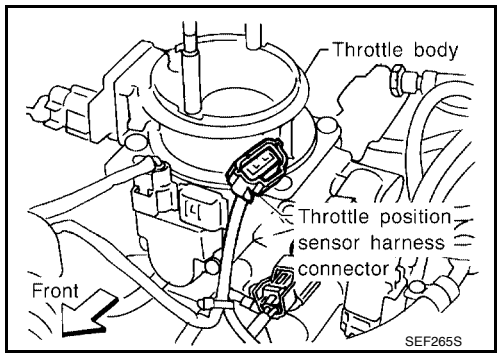


OK or NG

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

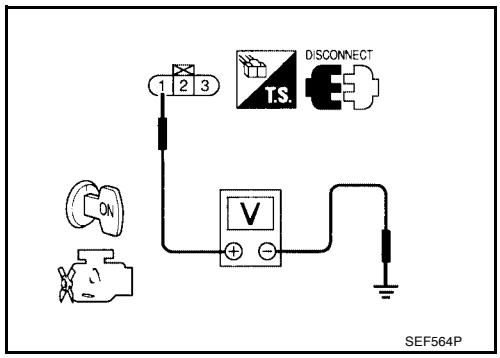
5. CHECK POWER SUPPLY

1. Disconnect throttle position sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between throttle position sensor terminal 1 and ground with CONSULT-II or tester.

   Voltage: Approximately 5V



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 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between throttle position sensor terminal 3 and ECM terminal 43.
   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 harness for open or short between ECM and throttle position sensor.

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

8. CHECK INPUT SIGNAL CIRCUIT

1. Check harness continuity between ECM terminal 23 and throttle position sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-169, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace throttle position sensor. To adjust it, perform EC-74, "Basic Inspection" .

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-169, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace mass air flow sensor.

11. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-281, "Component Inspection"

OK or NG

OK >> GO TO 12.
NG >> Replace distributor assembly with camshaft position sensor.

12. CHECK FUEL INJECTOR

Refer to EC-169, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace fuel injector.

13. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Component Inspection

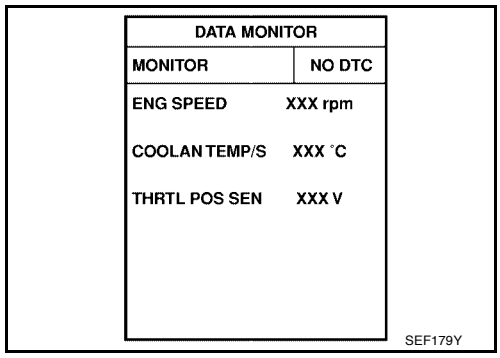
UBS00D36

THROTTLE POSITION SENSOR

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Stop engine and turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Check voltage of “THRTL POS SEN” under the following conditions.

NOTE:
Voltage measurement must be made with throttle position sensor installed in vehicle.



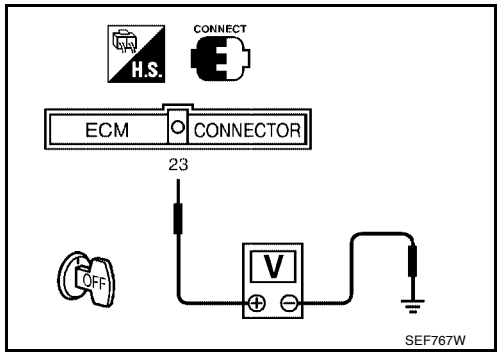
Throttle valve conditions	Voltage [V]
Completely closed	0.2 - 0.8 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.5 (b)

If NG, adjust closed throttle position switch. Refer to EC-74, "Basic Inspection" .

With GST

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Stop engine and turn ignition switch ON.
4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground under the following conditions.

NOTE:
Voltage measurement must be made with throttle position sensor installed in vehicle.

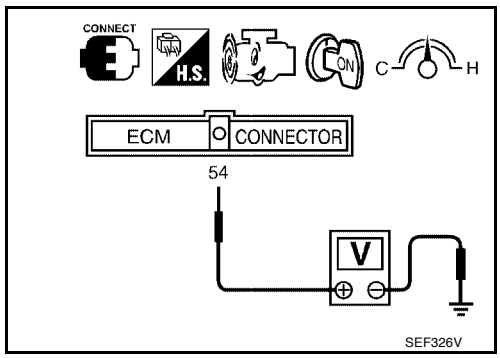


Throttle valve conditions	Voltage [V]
Completely closed	0.2 - 0.8 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.5 (b)

If NG, adjust closed throttle position switch. Refer to EC-74, "Basic Inspection" .

MASS AIR FLOW SENSOR

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (mass air flow sensor signal) and ground.



Conditions	Voltage [V]
Ignition switch ON (Engine stopped)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature)	0.9 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature)	1.9 - 2.3
Idle to about 4,000 rpm*	0.9 - 1.8 to Approx. 3.0

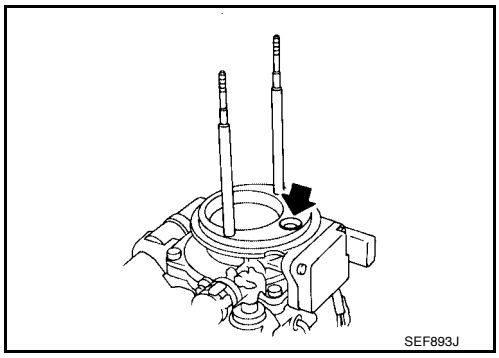
*: Make sure linear voltage rises as engine speed increase to about 4,000 rpm.

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

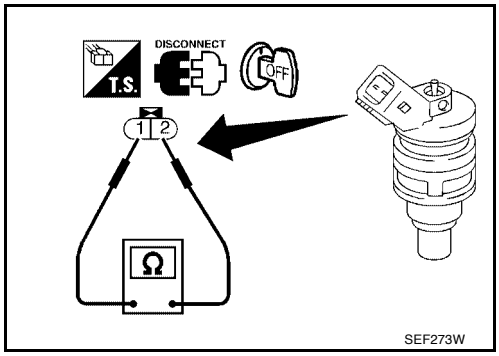
5. If NG, remove mass air flow sensor from intake manifold. Check hot wire for damage or dust.
6. If NG, clean or replace mass air flow sensor.



FUEL INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance : 7.4 - 10.9Ω [at 10 - 60°C (50 - 140°F)]



DTC P0122, P0123 TP SENSOR

PFP:16119

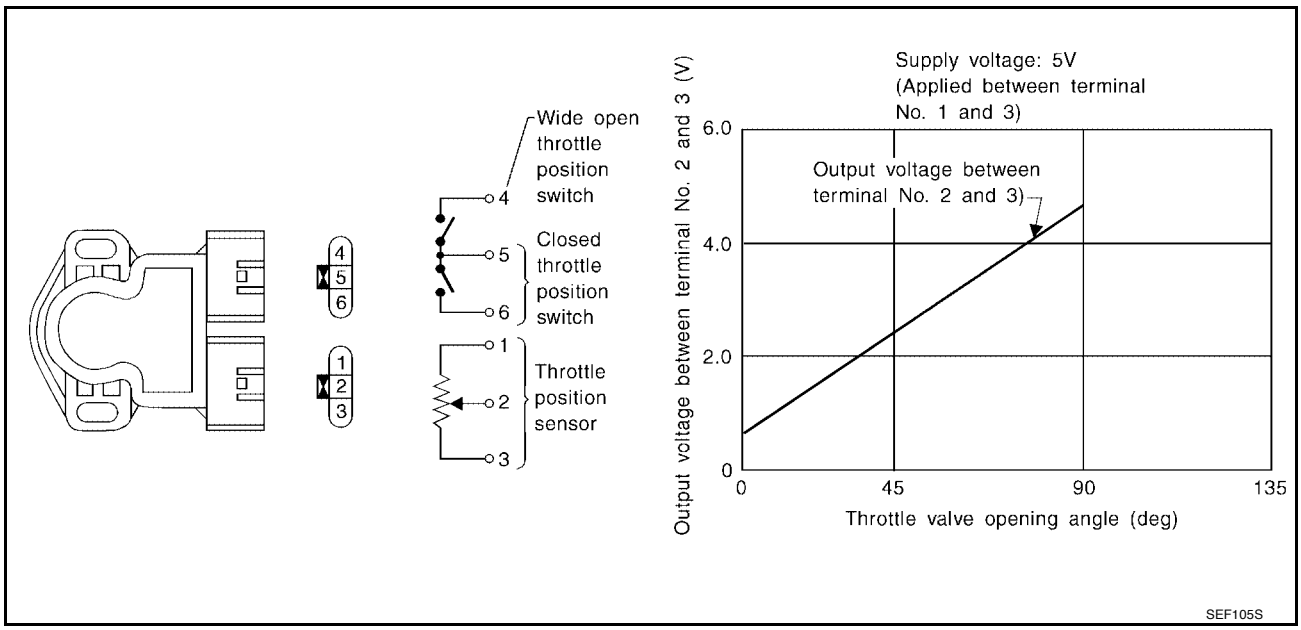
Component Description

UBS00D37

NOTE:
If DTC, P0122 or P0123 is displayed with DTC P0510, first perform trouble diagnosis for DTC P0510. Refer to EC-413 .

The throttle position sensor responds to the accelerator pedal movement. This sensor is a type of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the ECM.

Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This sensor controls engine operation such as fuel cut. On the other hand, the “Wide open and closed throttle position switch”, which is built into the throttle position sensor unit, is not used for engine control.



CONSULT-II Reference Value in Data Monitor Mode

UBS00D38

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	● Ignition switch: ON (Engine stopped) ● Engine: After warming up	Throttle valve: Fully closed	0.2 - 0.8V
		Throttle valve: Fully opened	3.5 - 4.5V
ABSOL TH·P/S	● Ignition switch: ON (Engine stopped) ● Engine: After warming up	Throttle valve: Fully closed	0.0%
		Throttle valve: Fully opened	Approx. 80%

On Board Diagnosis Logic

UBS00D39

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Check Items (Possible Cause)
P0122	Throttle position sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Throttle position sensor
P0123	Throttle position sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

FAIL-SAFE MODE

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

Detected items	Engine operating condition in fail-safe mode	
Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
	Condition	Driving condition
	When engine is idling	Normal
	When accelerating	Poor acceleration

DTC Confirmation Procedure

UBS00D3A

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

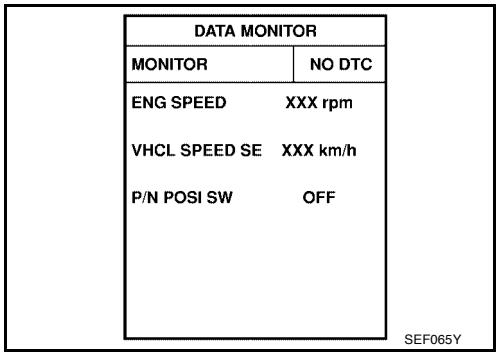
TESTING CONDITION:

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

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and maintain the following conditions for at least 5 consecutive seconds.

VHCL SPEED SE	More than 4 km/h (2 MPH)
Shift lever	Suitable position

3. If DTC is detected, go to EC-174, "Diagnostic Procedure" .



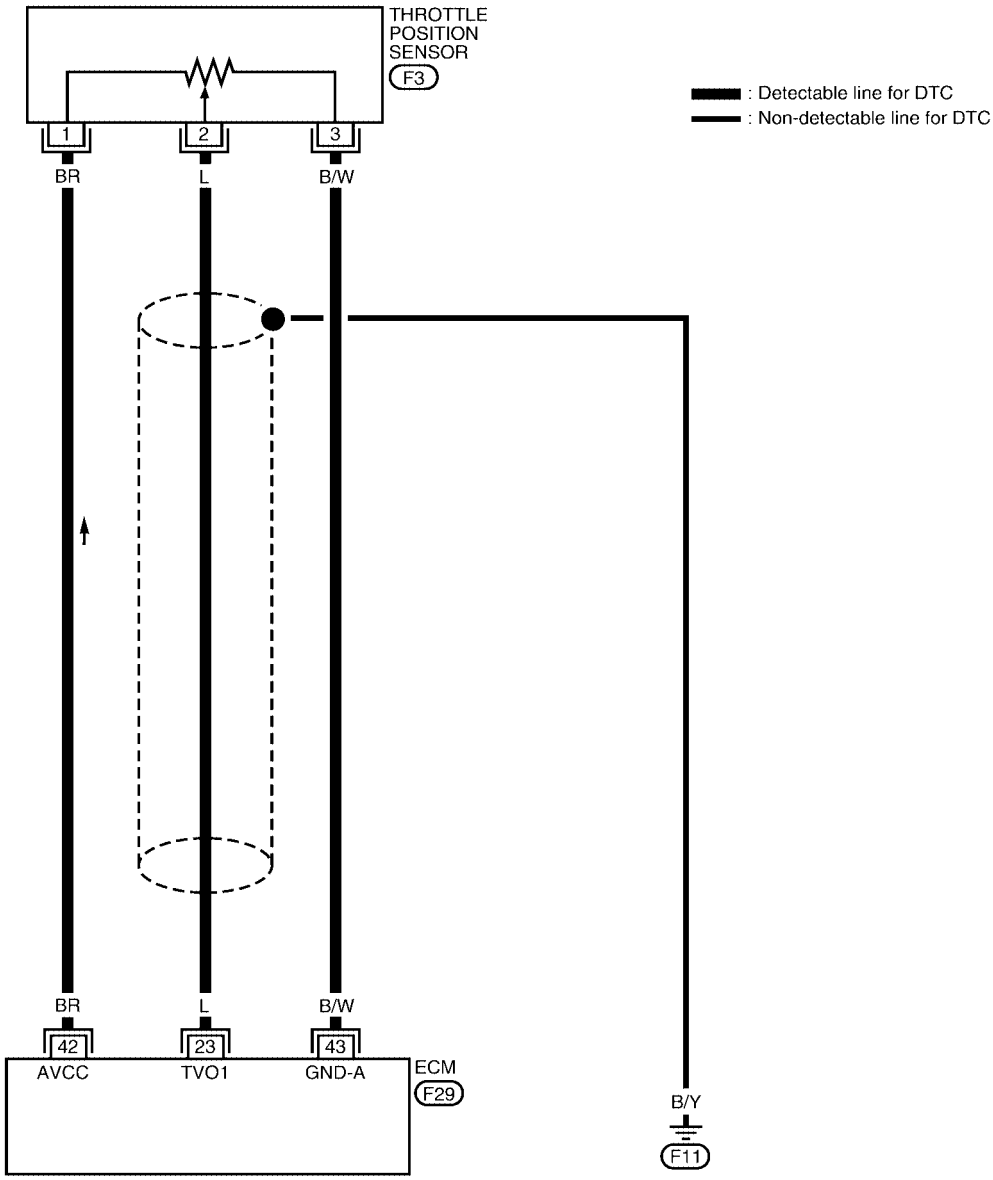
WITH GST

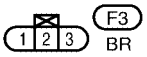
Follow the procedure “WITH CONSULT-II” above.

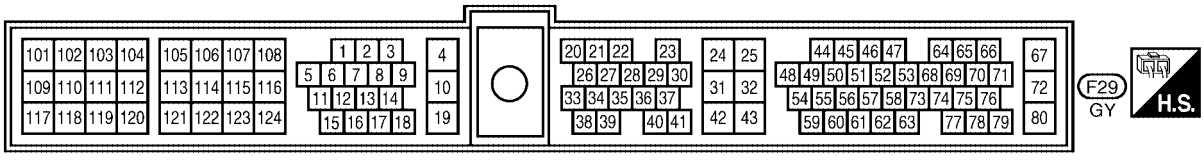
Wiring Diagram

UBS00D3B

EC-TPS-01







BBWA0547E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	L	Throttle position sensor	**[Ignition switch: ON]** ● **Warm-up condition** ● Accelerator pedal is fully released	0.2 - 0.8V
			[Ignition switch: ON] ● Accelerator pedal is fully depressed	3.5 - 4.5V
42	BR	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
43	B/W	Sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V

Diagnostic Procedure

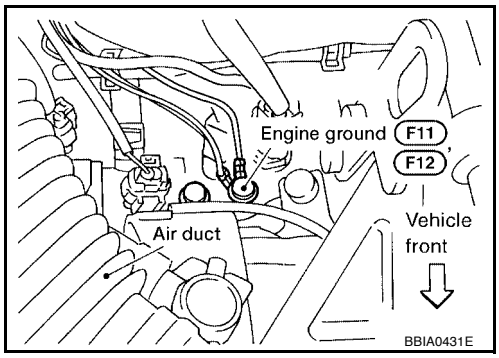
UBS00D3C

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

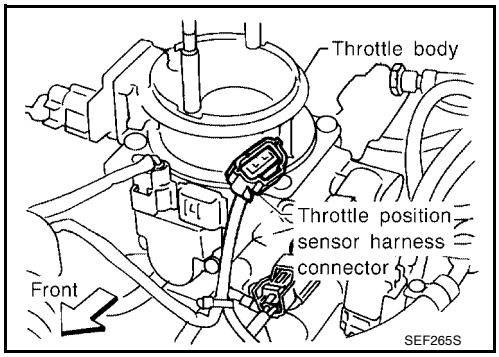
OK or NG

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



2. CHECK POWER SUPPLY

1. Disconnect throttle position sensor harness connector.
2. Turn ignition switch ON.

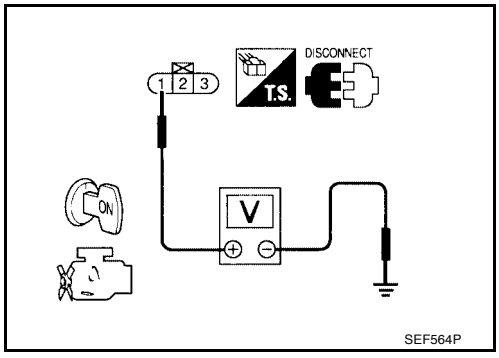


3. Check voltage between throttle position sensor terminal 1 and ground with CONSULT-II or tester.

Voltage : Approximately 5V

OK or NG

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



3. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between throttle position sensor terminal 3 and ECM terminal 43. 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 harness for open or short between ECM and throttle position sensor.

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

5. CHECK INPUT SIGNAL CIRCUIT

1. Check harness continuity between ECM terminal 23 and throttle position sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK THROTTLE POSITION SENSOR

Refer to EC-175, "Component Inspection"

OK or NG

OK >> GO TO 7.
NG >> Replace throttle position sensor. To adjust it, perform EC-74, "Basic Inspection" .

7. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00D3D

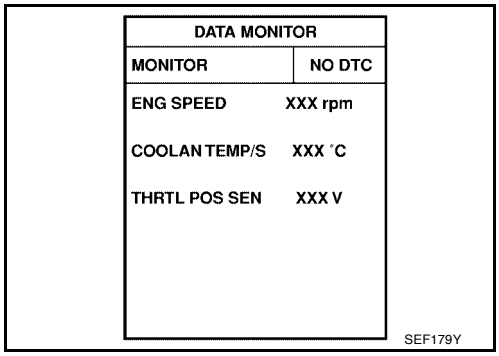
THROTTLE POSITION SENSOR

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Stop engine and turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.

5. Check voltage of “THRTL POS SEN” under the following conditions.

NOTE:
Voltage measurement must be made with throttle position sensor installed in vehicle.



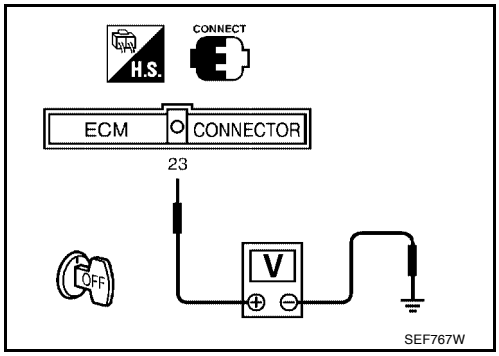
Throttle valve conditions	Voltage [V]
Completely closed	0.2 - 0.8 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.5 (b)

If NG, adjust closed throttle position switch. Refer to EC-74, "Basic Inspection" .

With GST

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Stop engine and turn ignition switch ON.
4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground under the following conditions.

NOTE:
Voltage measurement must be made with throttle position sensor installed in vehicle.



Throttle valve conditions	Voltage [V]
Completely closed	0.2 - 0.8 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.5 (b)

If NG, adjust closed throttle position switch. Refer to EC-74, "Basic Inspection" .

DTC P0125 ECT SENSOR

PFP:22630

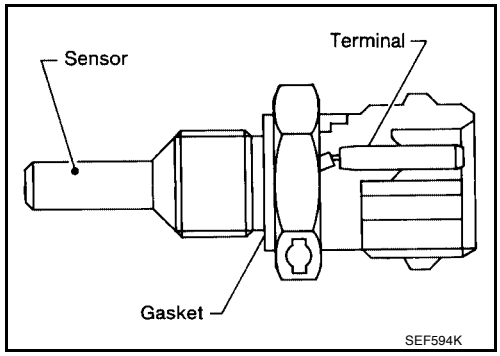
Component Description

UBS00D3E

NOTE:

If DTC P0125 is displayed with P0117 or P0118, first perform trouble diagnosis for DTC P0117 or P0118, EC-157 .

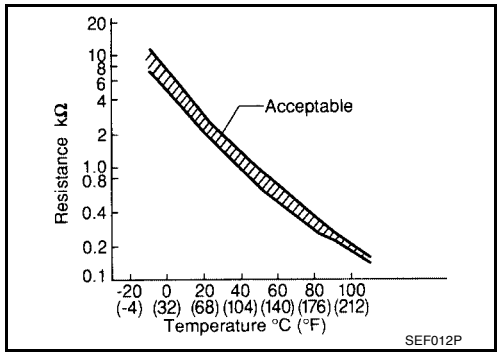
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

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

*: This data is reference value and is measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.



CAUTION:

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

On Board Diagnosis Logic

UBS00D3F

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125	Insufficient engine coolant temperature for closed loop fuel control	● Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. ● Engine coolant temperature is insufficient for closed loop fuel control.	● Harness or connectors (High resistance in the circuit) ● Engine coolant temperature sensor ● Thermostat

DTC Confirmation Procedure

UBS00D3G

CAUTION:

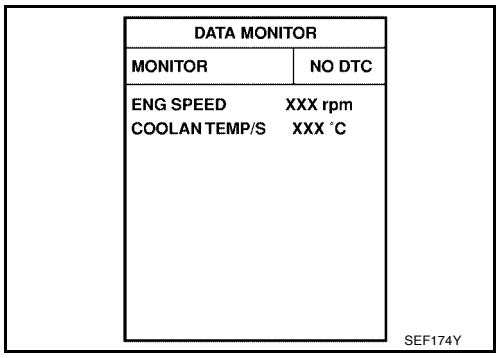
Be careful not to overheat engine.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 the 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-180, "Diagnostic Procedure"
   .



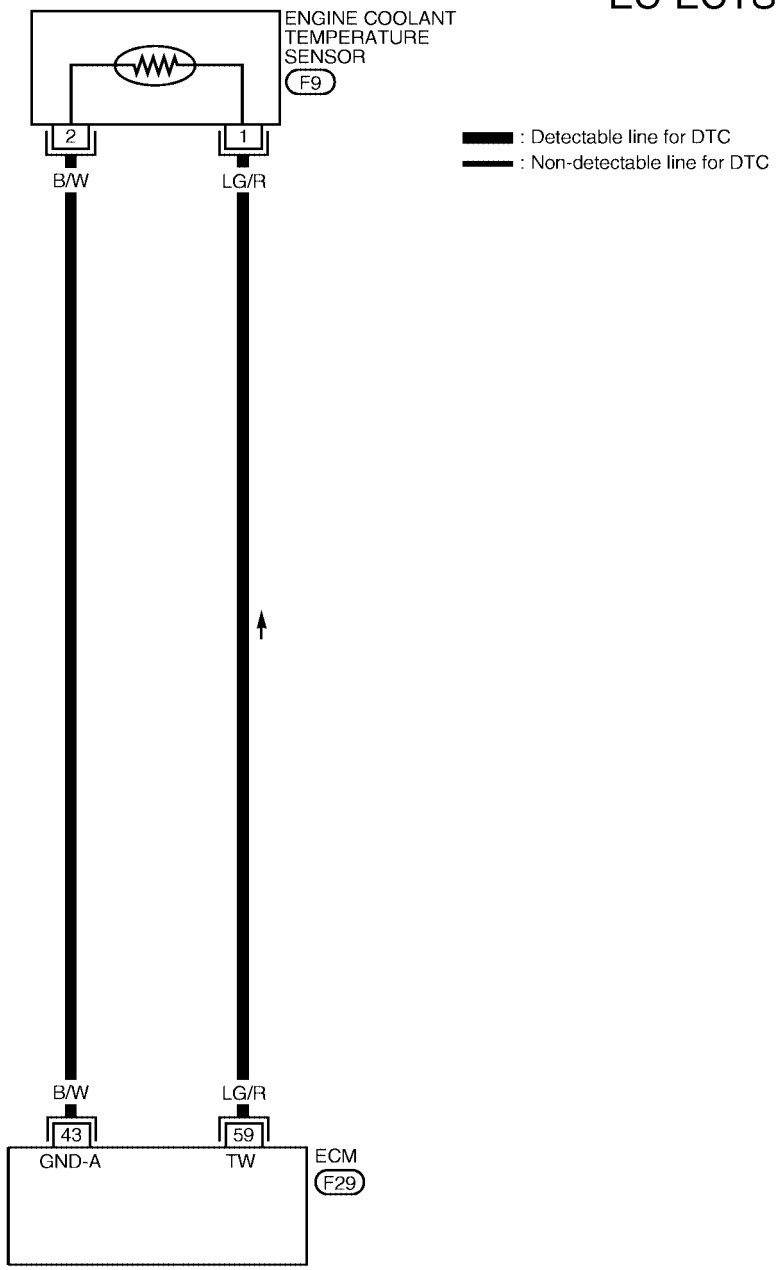
WITH GST

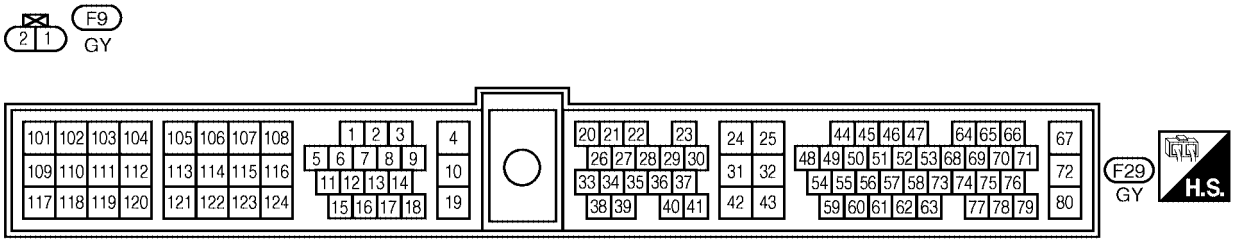
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00D3H

EC-ECTS-01





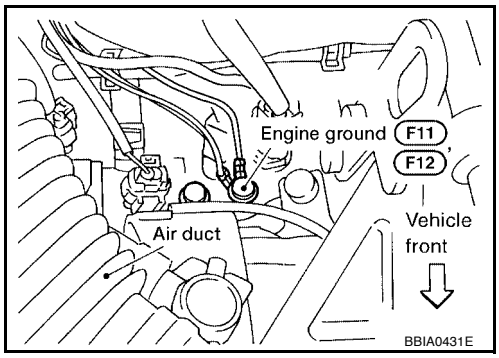
AEC984A

Diagnostic Procedure

UBS00D3I

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

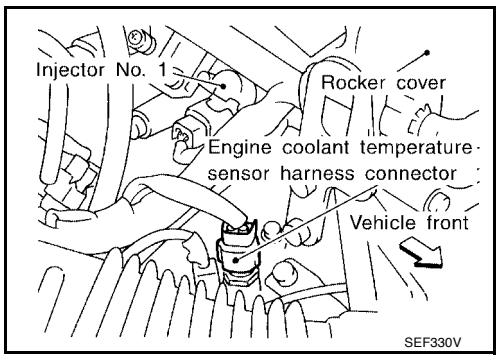


OK or NG

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

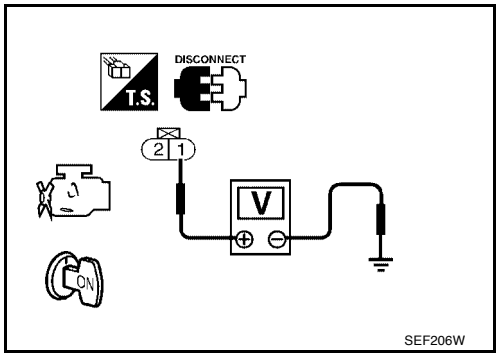
2. CHECK POWER SUPPLY

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



3. Check voltage between engine coolant temperature 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 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.

4. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between engine coolant temperature sensor terminal 2 and ECM terminal 43. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the 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.

6. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-181, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace engine coolant temperature sensor.

7. CHECK THERMOSTAT OPERATION

When the engine is cooled [lower than 76.5°C (170°F)], condition grasp lower radiator hose and confirm the engine coolant does not flow.

OK or NG

OK >> GO TO 8.
NG >> Repair or replace thermostat. Refer to CO-13, "THERMOSTAT" .

8. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

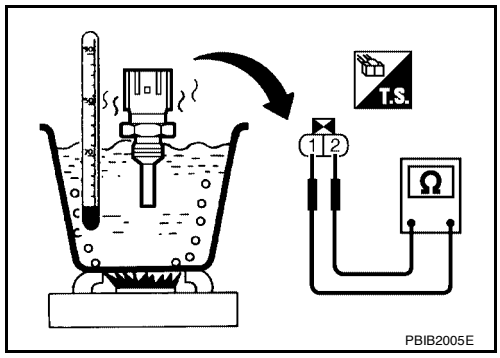
>> **INSPECTION END**

Component Inspection

UBS00D3J

ENGINE COOLANT TEMPERATURE SENSOR

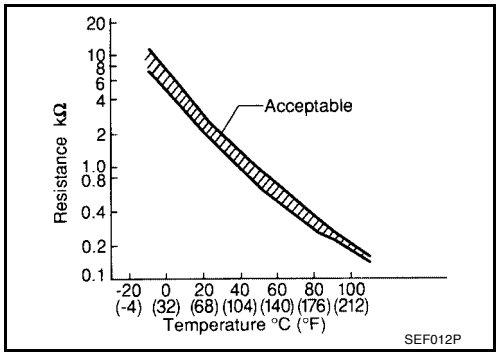
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

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

*: This data is reference value and is measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.



2. If NG, replace engine coolant temperature sensor.

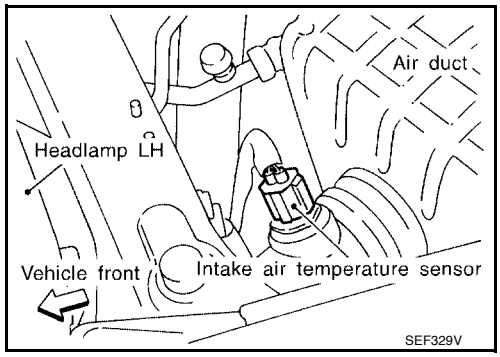
DTC P0127 IAT SENSOR

PFP:22630

Component Description

UBS00D3K

The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.

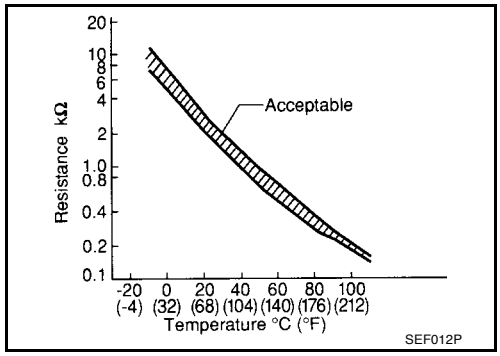


The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
80 (176)	1.23	0.27 - 0.38

*: This data is reference value and is measured between ECM terminal 61 (Intake air temperature sensor) and ground.



CAUTION:

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

On Board Diagnosis Logic

UBS00D3L

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	● Harness or connectors (The sensor circuit is open or shorted) ● Intake air temperature sensor

FAIL-SAFE MODE

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

Engine operating condition in fail-safe mode
The ECM functions on the assumption that the intake air temperature is 25°C (77°F).

DTC Confirmation Procedure

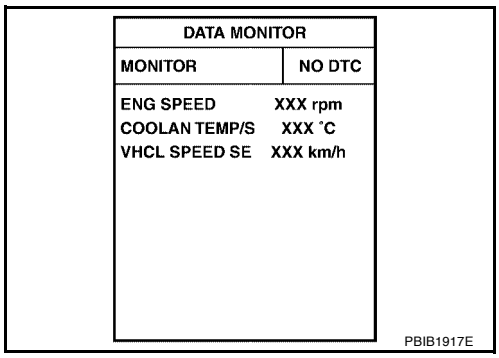
UBS00D3M

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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 more than 70 km/h (43 MPH) for 100 consecutive seconds.
6. If 1st trip DTC is detected, go to EC-186, "Diagnostic Procedure" .



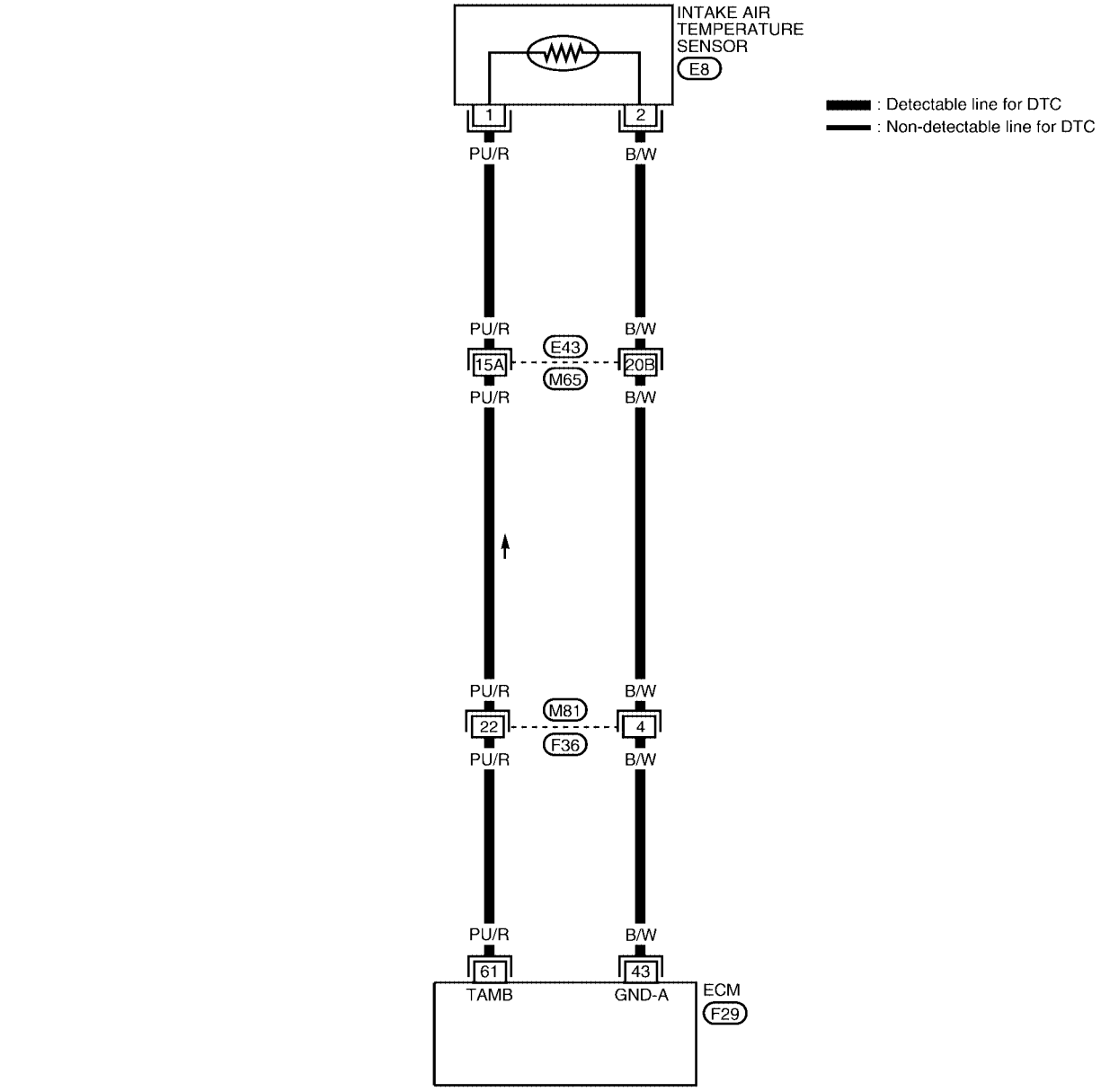
WITH GST

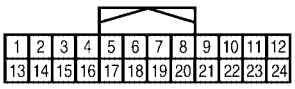
Follow the procedure “WITH CONSULT-II” above.

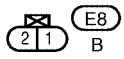
Wiring Diagram

UBS00D3N

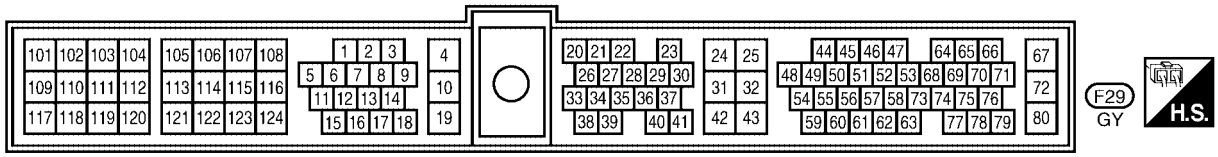
EC-IATS-01







Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)



BBWA1056E

Diagnostic Procedure

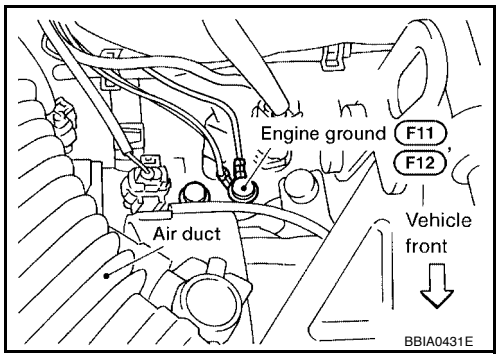
UBS00D3O

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

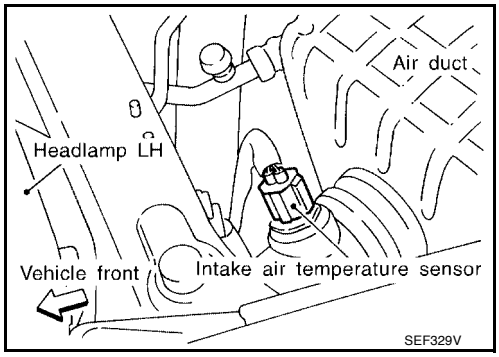
OK or NG

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



2. CHECK POWER SUPPLY

1. Disconnect intake air temperature (IAT) sensor harness connector.
2. Turn ignition switch ON.

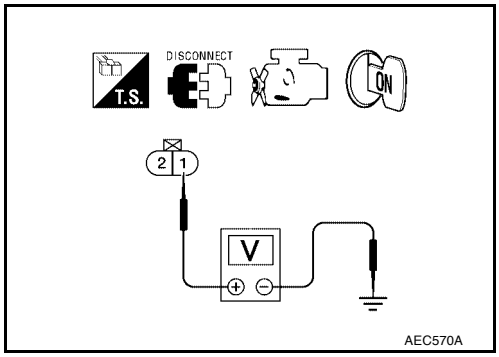


3. Check voltage between intake air temperature terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M81, F36
- Harness for open or short between ECM and intake air temperature sensor

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

4. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between intake air temperature sensor terminal 2 and ECM terminal 43. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M81, F36
- Harness for open or short between ECM and intake air temperature sensor

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

6. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-187, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace intake air temperature sensor.

7. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

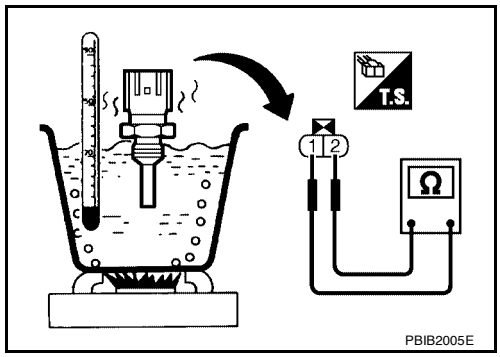
>> **INSPECTION END.**

Component Inspection

UBS00D3P

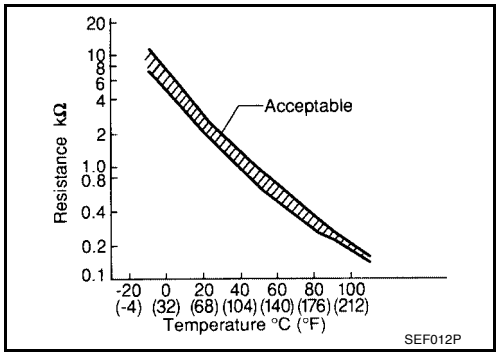
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between intake air temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38



2. If NG, replace intake air temperature sensor.

DTC P0128 THERMOSTAT FUNCTION

PFP:21200

On Board Diagnosis Logic

UBS00D3Q

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.
This is due to a leak in the seal or the thermostat stuck open.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	• Thermostat • Leakage from sealing portion of thermostat • Engine coolant temperature sensor

DTC Confirmation Procedure

UBS00D3R

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
TESTING CONDITION:

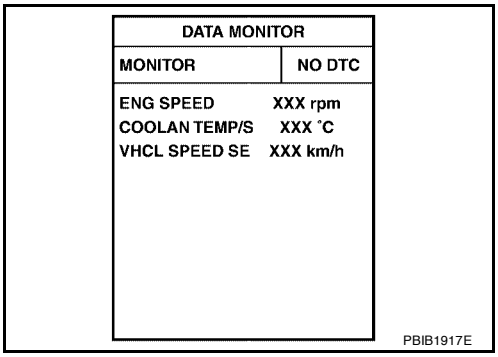
- **For best results, perform at ambient temperature of –10°C (14°F) or higher.**
- **For best results, perform at engine coolant temperature of –10°C (14°F) to 60°C (140°F).**

WITH CONSULT-II

1. Replace thermostat with new one. Refer to CO-13, "THERMOSTAT" . Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on.
2. Turn ignition switch ON.
3. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
4. Check that the “COOLAN TEMP/S” is above 60°C (140°F).
   If it is below 60°C (140°F), go to following step.
   If it is above 60°C (140°F), stop engine and cool down the engine to less than 60°C (140°F), then retry from step 1.
5. Drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE	80 - 120 km/h (50 - 75 MPH)

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



WITH GST

1. Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

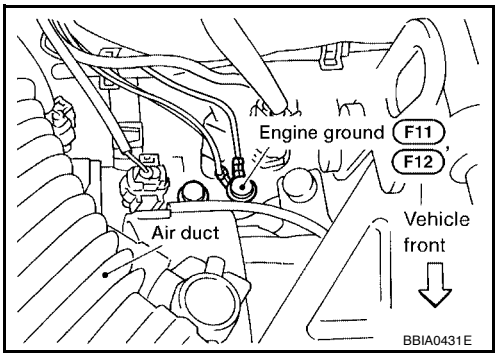
UBS00D3S

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

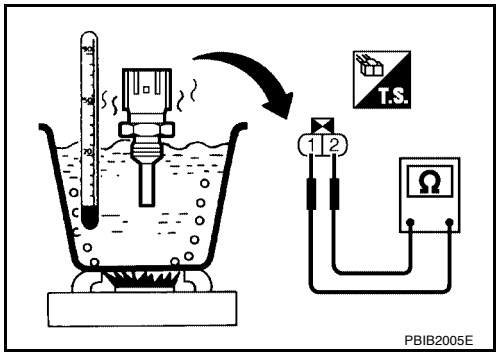
OK or NG

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



2. CHECK ENGINE COOLANT TEMPERATURE SENSOR

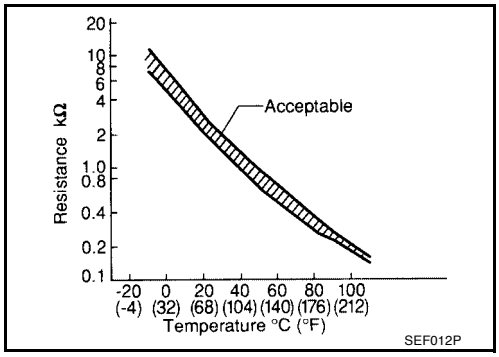
1. Remove engine coolant temperature sensor.
2. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

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

*: This data is reference value and is measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.



OK or NG

OK >> **INSPECTION END**

NG >> Replace engine coolant temperature sensor.

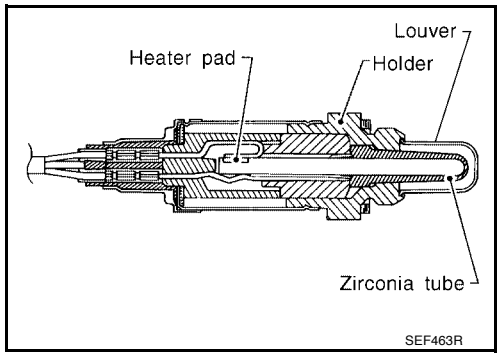
DTC P0132 HO2S1

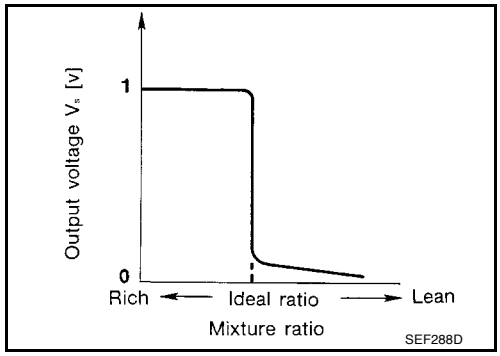
PFP:22690

Component Description

UBS00D3T

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





CONSULT-II Reference Value in Data Monitor Mode

UBS00D3U

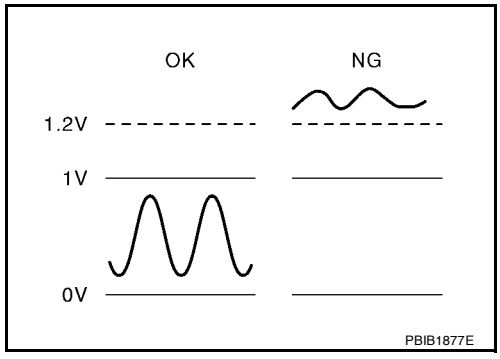
Specification data are reference values.

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

On Board Diagnosis Logic

UBS00D3V

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



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0132	Heated oxygen sensor 1 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 1

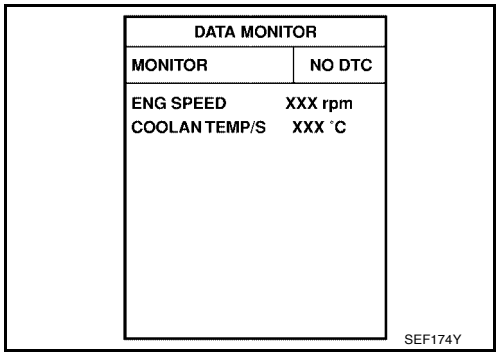
DTC Confirmation Procedure

UBS00D3W

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Restart engine and let it idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-194, "Diagnostic Procedure"
.



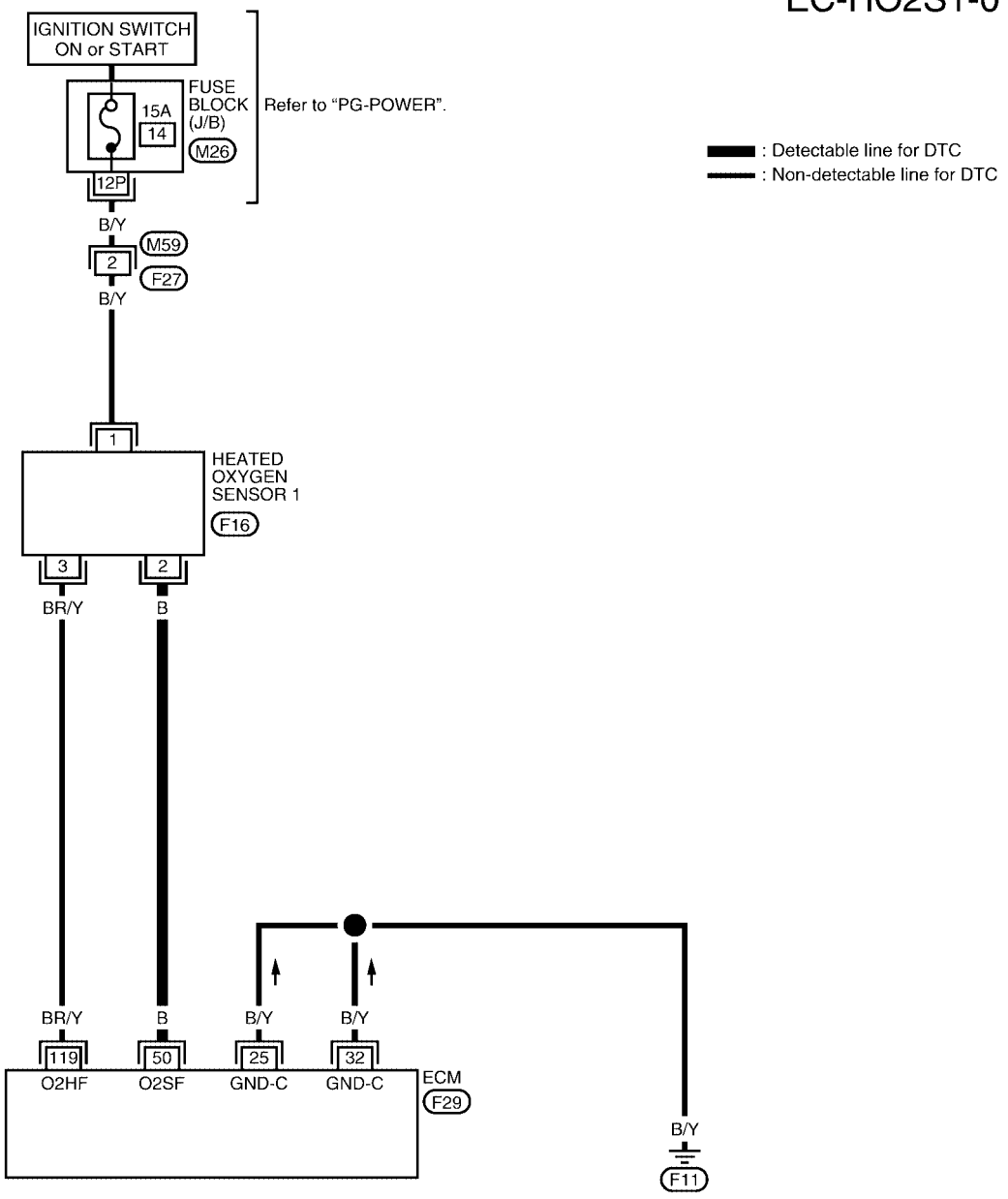
WITH GST

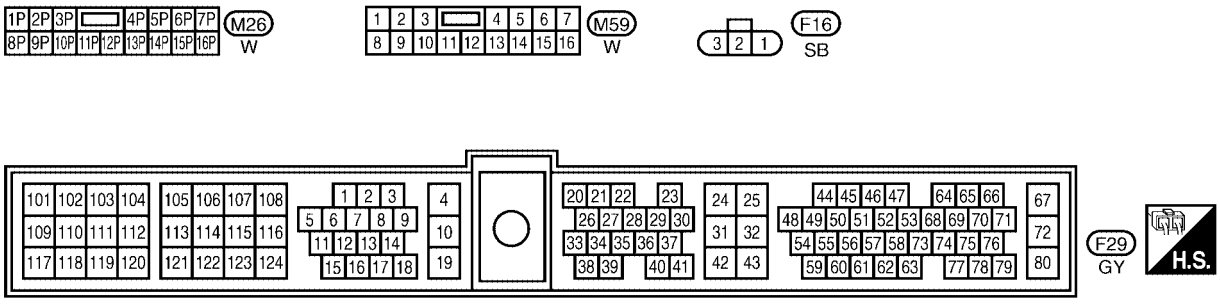
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00D3X

EC-HO2S1-01





BBWA0440E

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

CAUTION:

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

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

Diagnostic Procedure

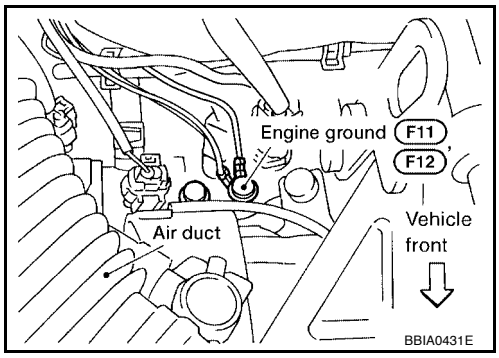
UBS00D3Y

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

OK or NG

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

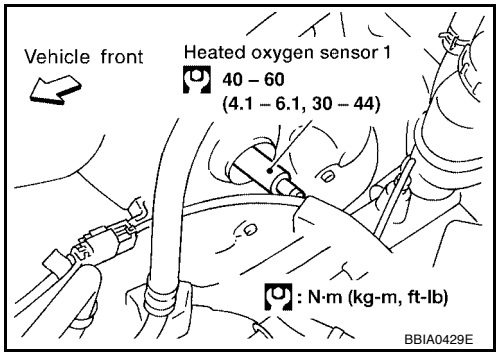


2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque : 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 3.

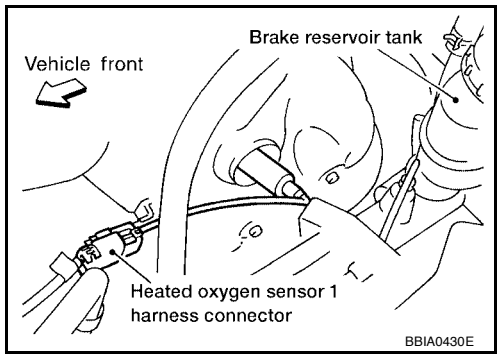


3. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect heated oxygen sensor 1 harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 50 and HO2S1 terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.
3. Check harness continuity between ECM terminal 50 or HO2S1 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



4. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HARNESS CONNECTOR

Check heated oxygen sensor 1 harness connector for water.
Water should not exist.

OK or NG

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

5. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-196, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Component Inspection

UBS00D3Z

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Select “MANU TRIG” in “DATA MONITOR” mode, and the trigger point is adjusted to 100%.
4. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)” in item selection.
5. Hold engine speed at 2,000 rpm under no load during the following steps.
6. Touch “START” 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

7. Check the following.

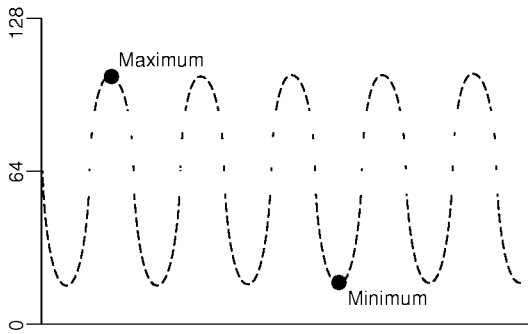
- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown below:
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds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

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

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

SEF217YA

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



SEF648Y

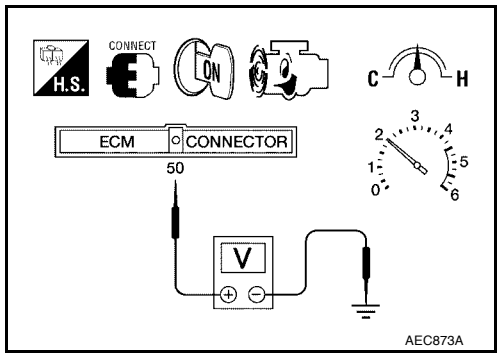
CAUTION:

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

Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 signal] and ground.
4. 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
- The maximum voltage is over 0.6V at least 1 time.
- The minimum voltage is below 0.3V at least 1 time.
- The voltage never exceeds 1.0V.



CAUTION:

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

Removal and Installation

UBS00D40

HEATED OXYGEN SENSOR 1

Refer to EM-13, "OUTER COMPONENT PARTS" .

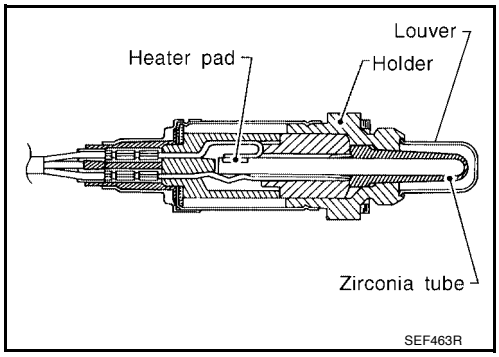
DTC P0133 HO2S1

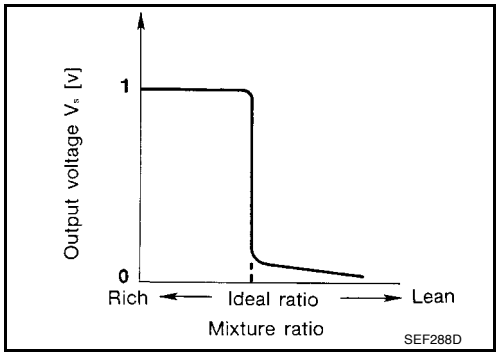
PFP:22690

Component Description

UBS00D41

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





CONSULT-II Reference Value in Data Monitor Mode

UBS00D42

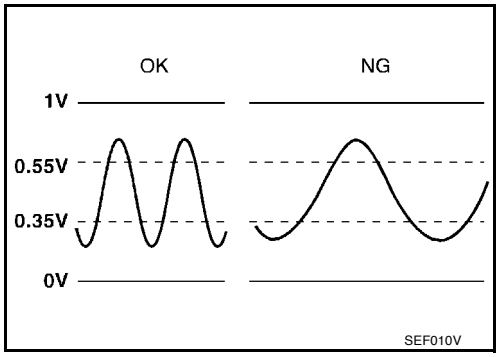
Specification data are reference values.

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

On Board Diagnosis Logic

UBS00D43

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



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

DTC Confirmation Procedure

UBS00D44

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 5 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” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.

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

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

SEF338Z

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

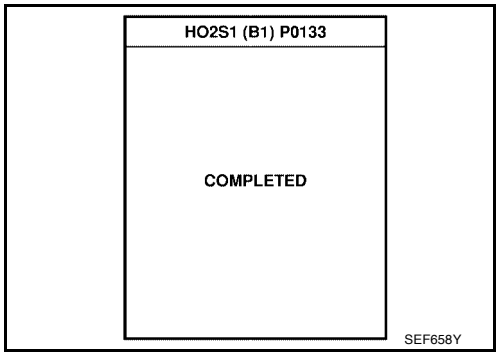
ENG SPEED	1,750 - 3,750 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	3.5 - 15.5 msec
Shift lever	Suitable position

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

SEF339Z

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-202, "Diagnostic Procedure" .



Overall Function Check

UBS00D45

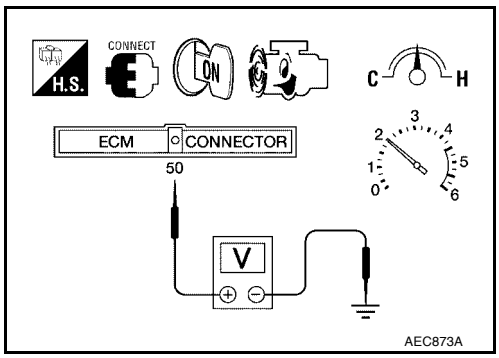
Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and 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

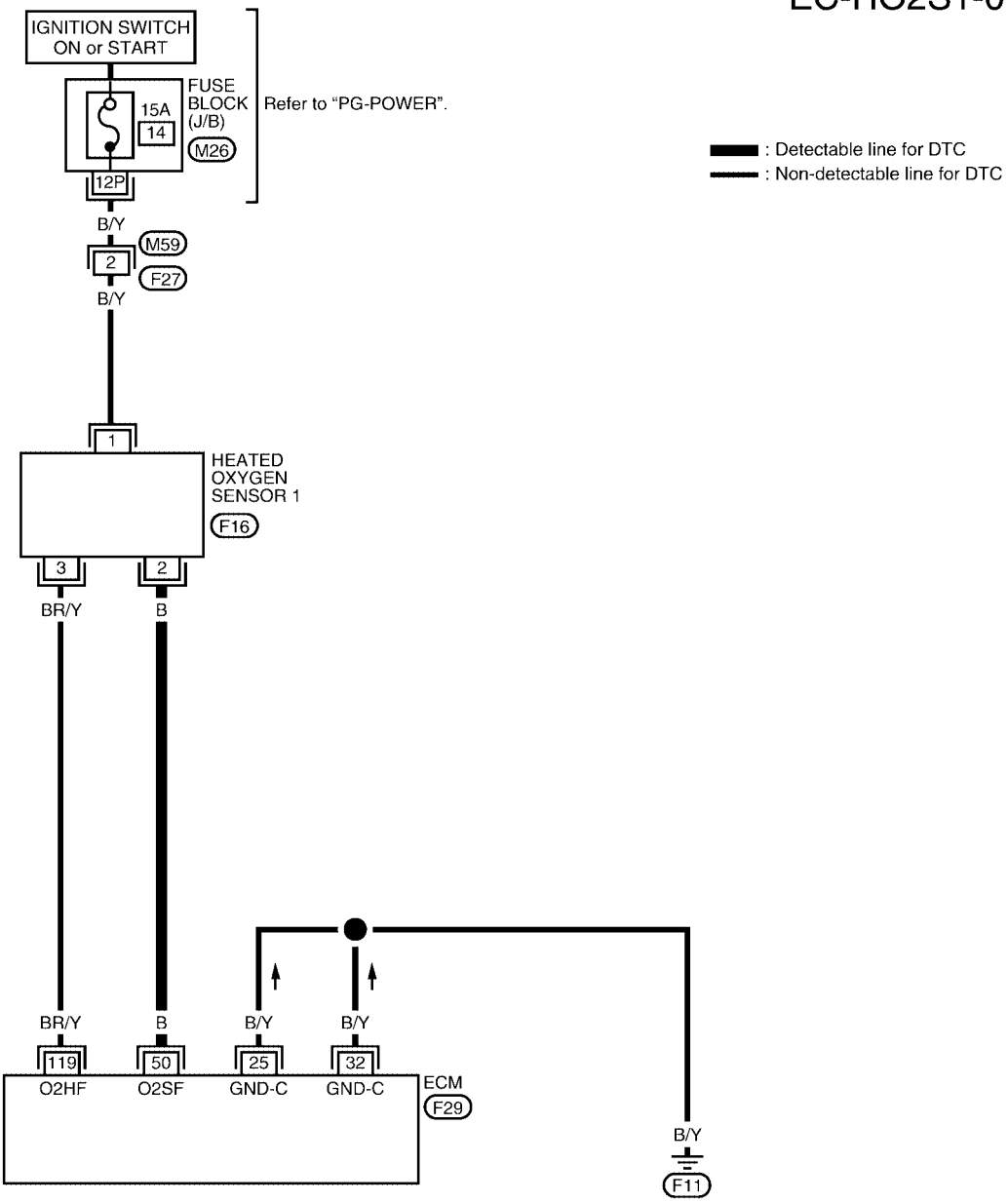
4. If NG, go to EC-202, "Diagnostic Procedure" .

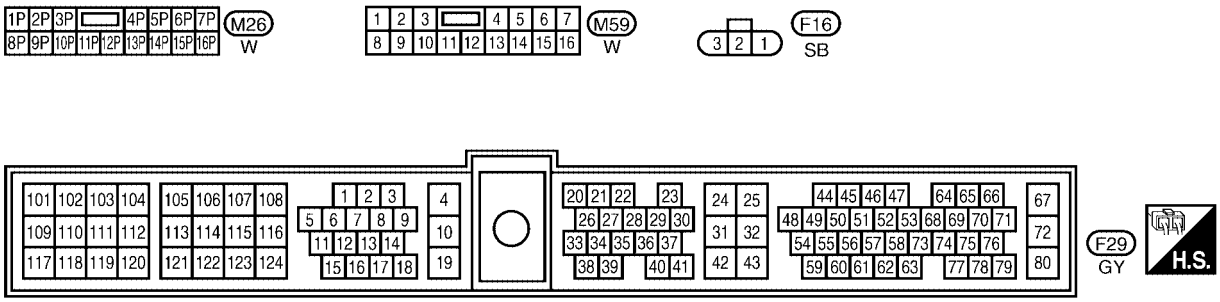


Wiring Diagram

UBS00D46

EC-HO2S1-01





BBWA0440E

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

CAUTION:

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

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

Diagnostic Procedure

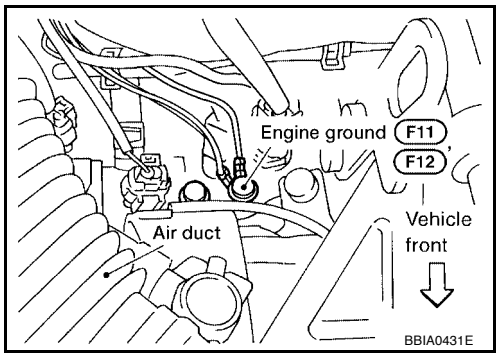
UBS00D47

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

OK or NG

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

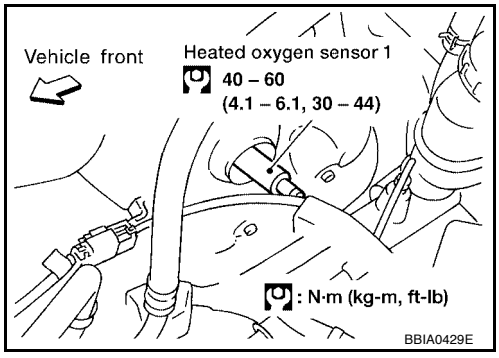


2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

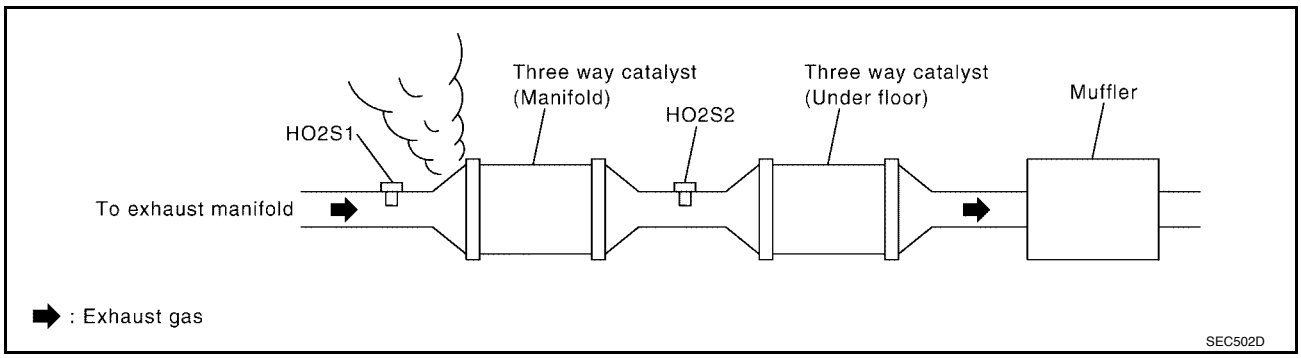
Tightening torque : 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 3.



3. CHECK FOR EXHAUST GAS LEAK

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



OK or NG

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

4. CHECK FOR INTAKE AIR LEAK

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

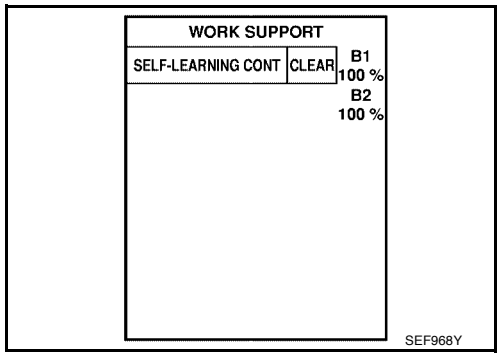
OK or NG

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 or P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-61, "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 P0172 detected?
   Is it difficult to start engine?

Yes or No

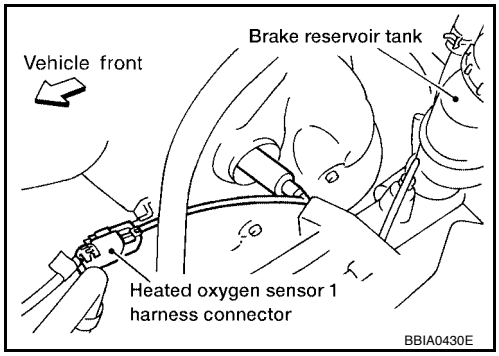
Yes >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-231 or EC-238 .
No >> GO TO 6.

6. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 50 and HO2S1 terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.
5. Check harness continuity between ECM terminal 50 or HO2S1 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



6. Also check harness for short to power.

OK or NG

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

7. CHECK MASS AIR FLOW SENSOR

Refer to EC-205, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace mass air flow sensor.

8. CHECK PCV VALVE

Refer to EC-205, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace PCV valve.

9. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-205, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace heated oxygen sensor 1.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Component Inspection

UBS00D48

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Select “MANU TRIG” in “DATA MONITOR” mode, and the trigger point is adjusted to 100%.
4. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)” in item selection.
5. Hold engine speed at 2,000 rpm under no load during the following steps.
6. Touch “START” 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

7. Check the following.

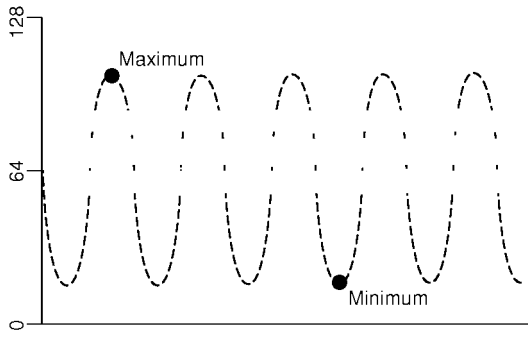
– “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds. 5 times (cycles) are counted as shown below:
– “HO2S1 (B1)” voltage goes above 0.6V at least once.
– “HO2S1 (B1)” voltage goes below 0.3V at least once.
– “HO2S1 (B1)” voltage never exceeds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

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

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

SEF217YA

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



SEF648Y

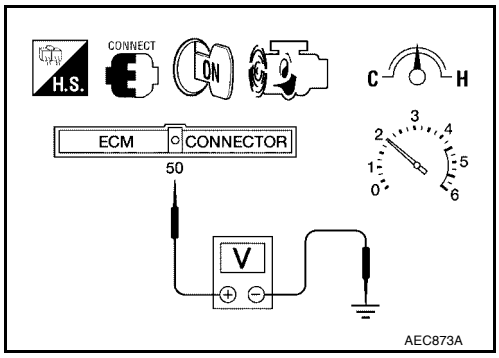
CAUTION:

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

Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 signal] and ground.
4. 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
- The maximum voltage is over 0.6V at least 1 time.
- The minimum voltage is below 0.3V at least 1 time.
- The voltage never exceeds 1.0V.



CAUTION:

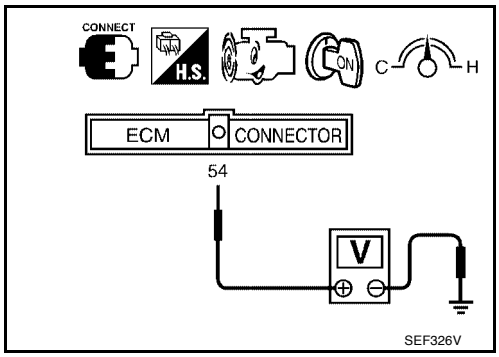
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12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

MASS AIR FLOW SENSOR

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.8
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	0.9 - 1.8 to Approx. 3.0

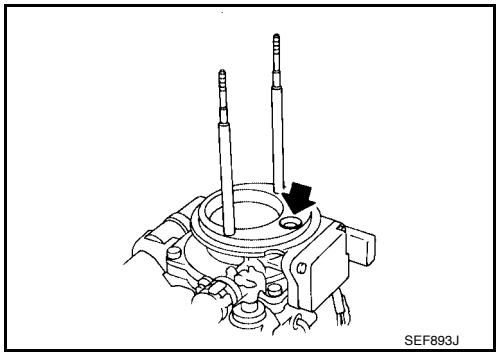
*: Make sure linear voltage rises as engine speed increase to about 4,000 rpm.



4. If the voltage is out of specification, proceed the following.

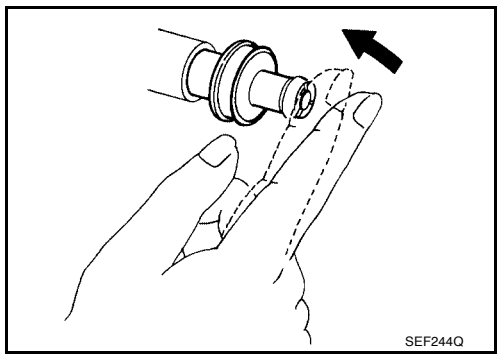
- Turn ignition switch OFF
- Disconnect mass air flow sensor harness connector and reconnect it again
- Perform steps 2 and 3 again

5. If NG, remove mass air flow sensor from intake manifold. Check hot wire for damage or dust.
6. If NG, clean or replace mass air flow sensor.



PCV VALVE

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



Removal and Installation

UBS00D49

HEATED OXYGEN SENSOR 1

Refer to EM-13, "OUTER COMPONENT PARTS" .

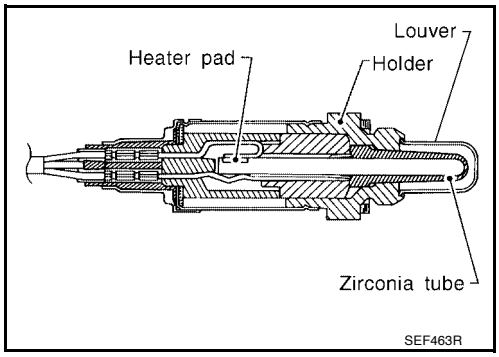
DTC P0134 HO2S1

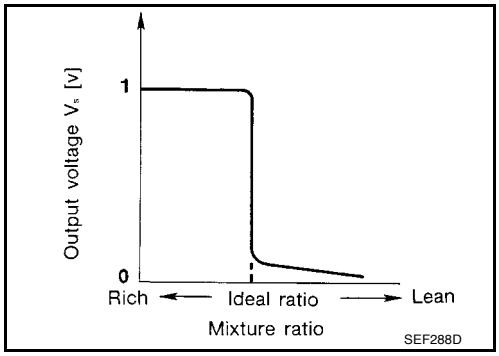
PFP:22690

Component Description

UBS00D4A

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





CONSULT-II Reference Value in Data Monitor Mode

UBS00D4B

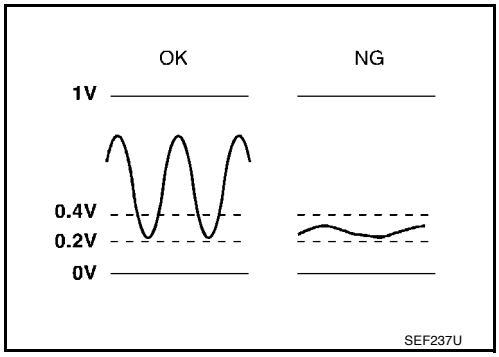
Specification data are reference values.

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

On Board Diagnosis Logic

UBS00D4C

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



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

DTC Confirmation Procedure

UBS00D4D

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 5 seconds before conducting the next test.

TESTING CONDITION:

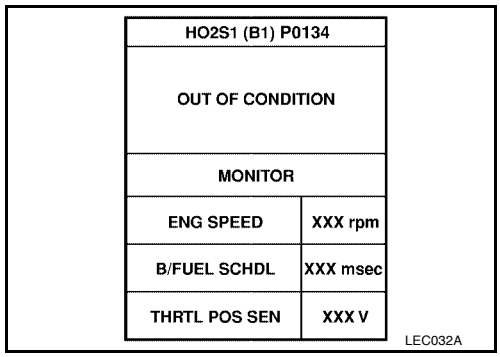
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

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

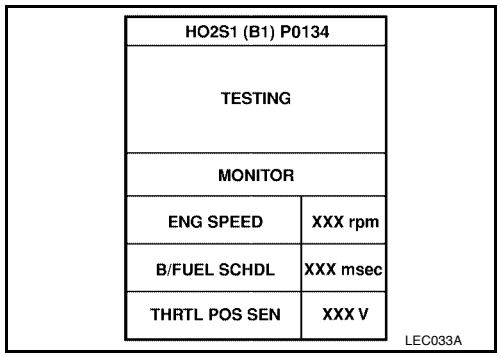
   NOTE:

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



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.)

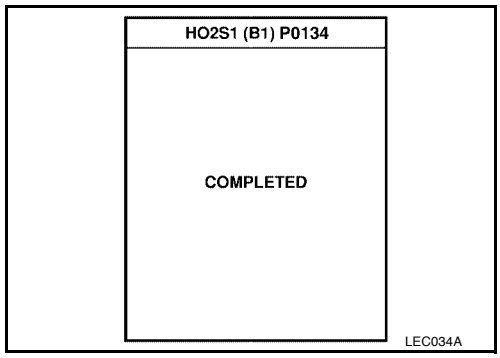
ENG SPEED	1,400 - 3,600 rpm
Vehicle speed	More than 64 km/h (40 MPH)
B/FUEL SCHDL	3.5 - 17 msec
Shift lever	Suitable position



   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-212, "Diagnostic Procedure" .

   During this test, P1148 may be displayed on CONSULT-II screen.



Overall Function Check

UBS00D4E

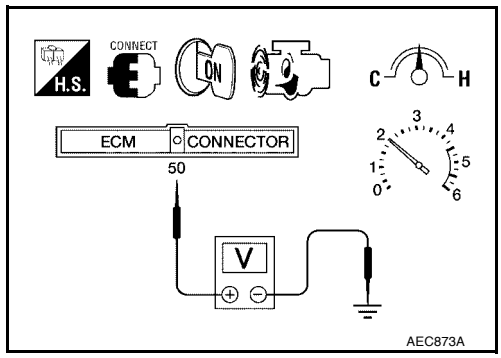
Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

– The voltage does not remain in the range of 0.2 to 0.4V.

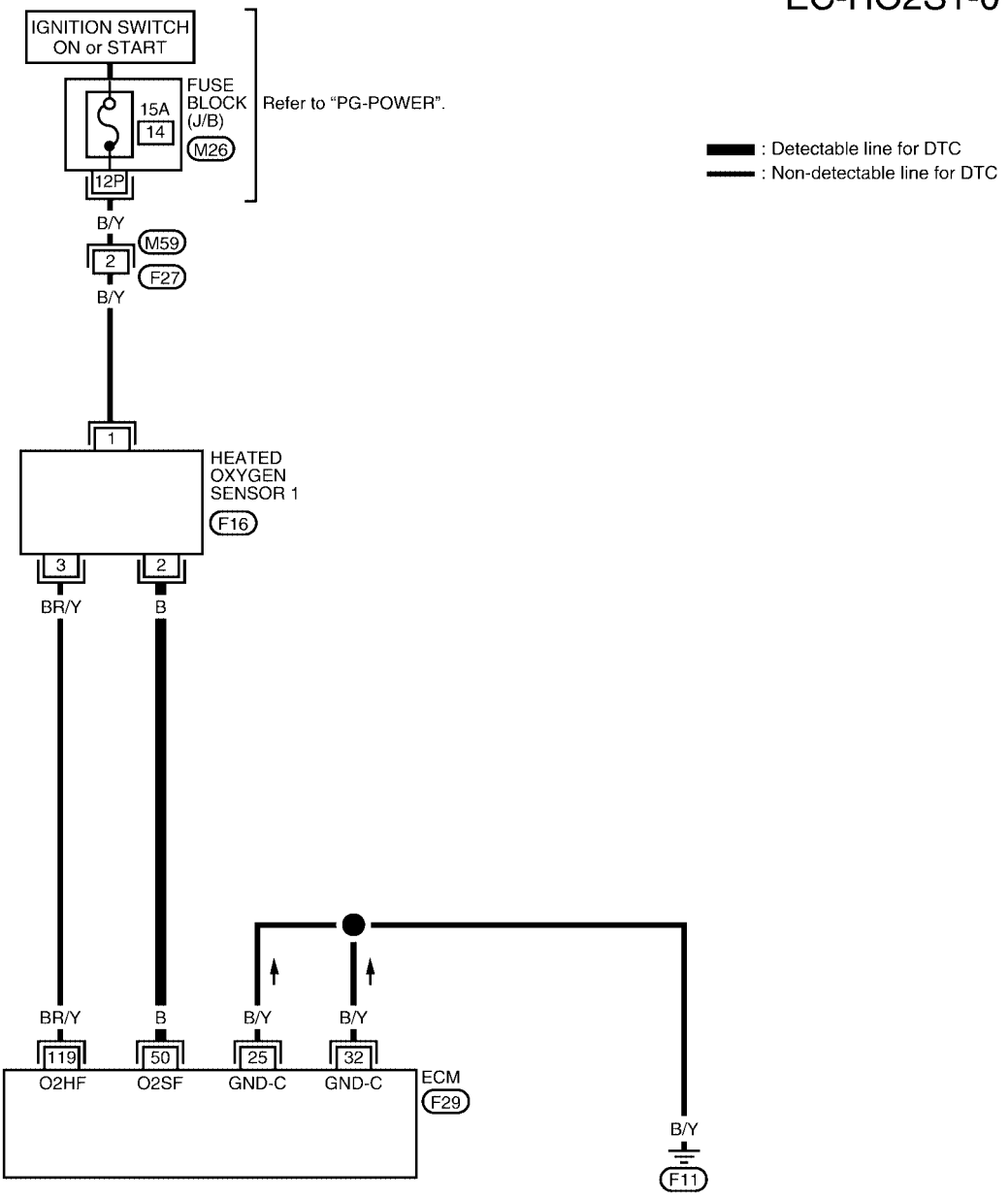
4. If NG, go to EC-212, "Diagnostic Procedure" .

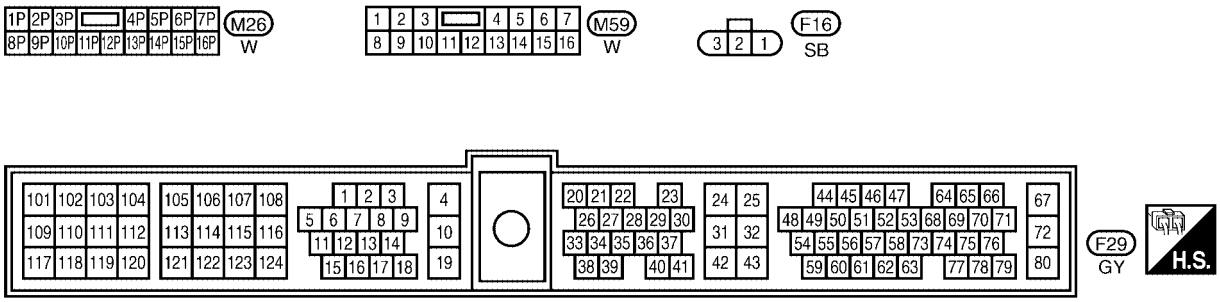


Wiring Diagram

UBS00D4F

EC-HO2S1-01





BBWA0440E

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

CAUTION:

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

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

Diagnostic Procedure

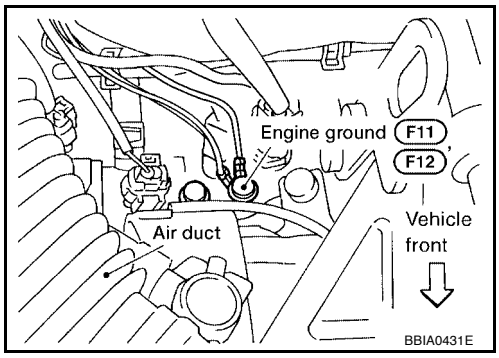
UBS00D4G

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

OK or NG

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



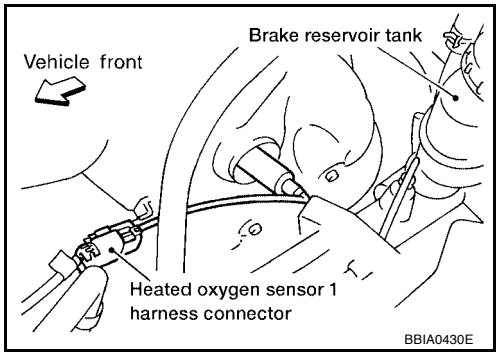
2. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect heated oxygen sensor 1 harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 50 and HO2S1 terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Check harness continuity between ECM terminal 50 or HO2S1 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



4. Also check harness for short to power.

OK or NG

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

3. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-213, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace heated oxygen sensor 1.

4. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Component Inspection

UBS00D4H

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Select “MANU TRIG” in “DATA MONITOR” mode, and the trigger point is adjusted to 100%.
4. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)” in Item Selection.
5. Hold engine speed at 2,000 rpm under no load during the following steps.
6. Touch “START” 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

7. Check the following.

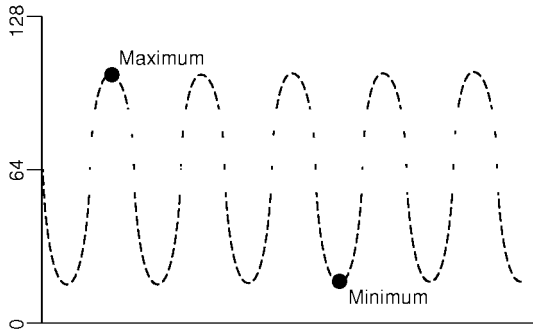
- “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds. 5 times (cycles) are counted as shown below:
- “HO2S1 (B1)” voltage goes above 0.6V at least once.
- “HO2S1 (B1)” voltage goes below 0.3V at least once.
- “HO2S1 (B1)” voltage never exceeds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

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

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

SEF217YA

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



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

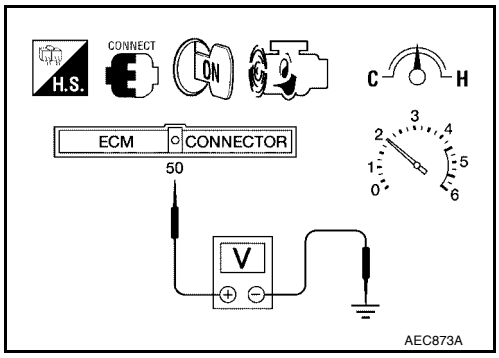
SEF648Y

CAUTION:

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

Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 signal] and ground.
4. 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
- The maximum voltage is over 0.6V at least 1 time.
- The minimum voltage is below 0.3V at least 1 time.
- The voltage never exceeds 1.0V.

CAUTION:

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

Removal and Installation

UBS00D4I

HEATED OXYGEN SENSOR 1

Refer to EM-13, "OUTER COMPONENT PARTS" .

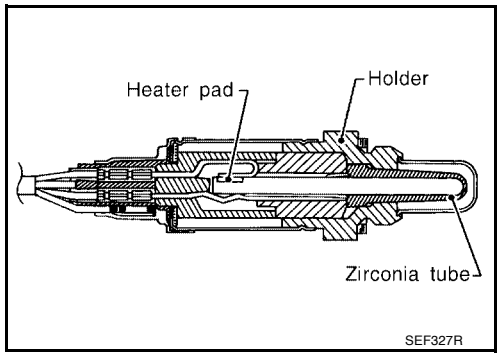
DTC P0138 HO2S2

PFP:226A0

Component Description

UBS00D4J

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00D4K

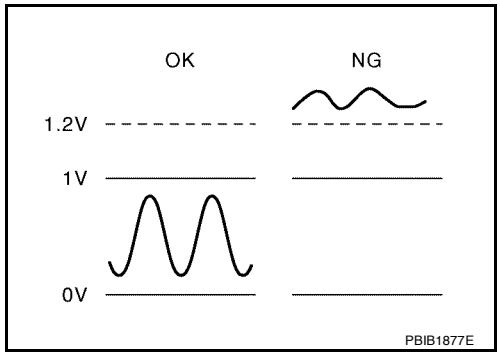
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm quickly.	LEAN ←→ RICH

On Board Diagnosis Logic

UBS00D4L

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether or not the voltage is too high during various driving conditions such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0138	Heated oxygen sensor 2 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2

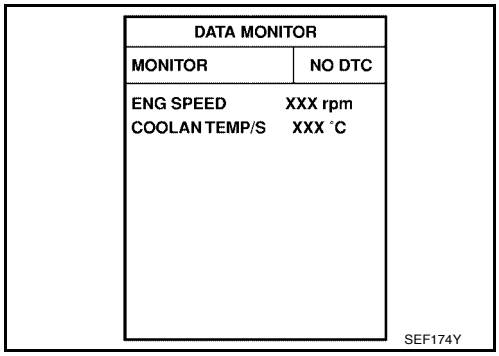
DTC Confirmation Procedure

UBS00D4M

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-218, "Diagnostic Procedure" .

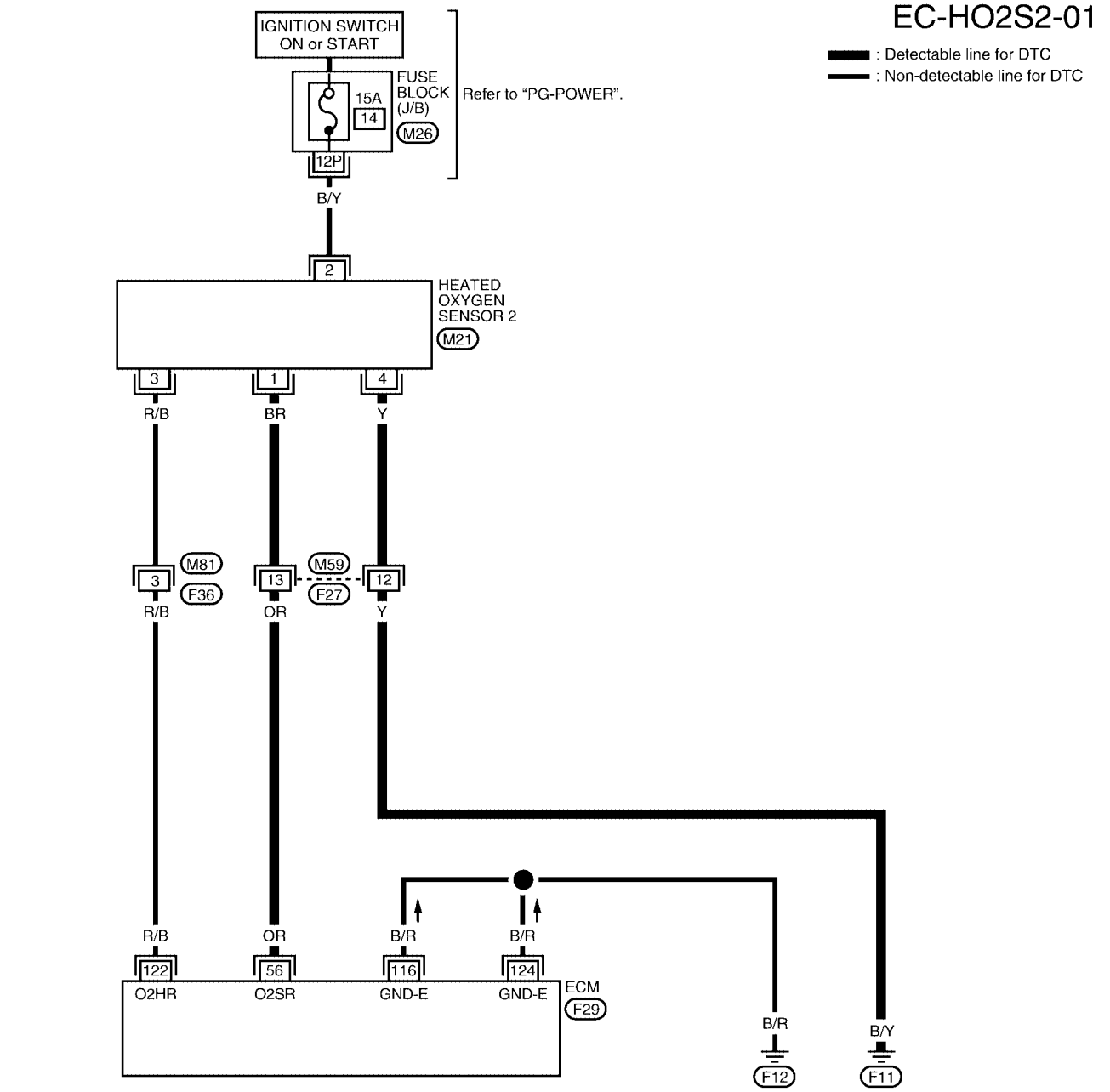


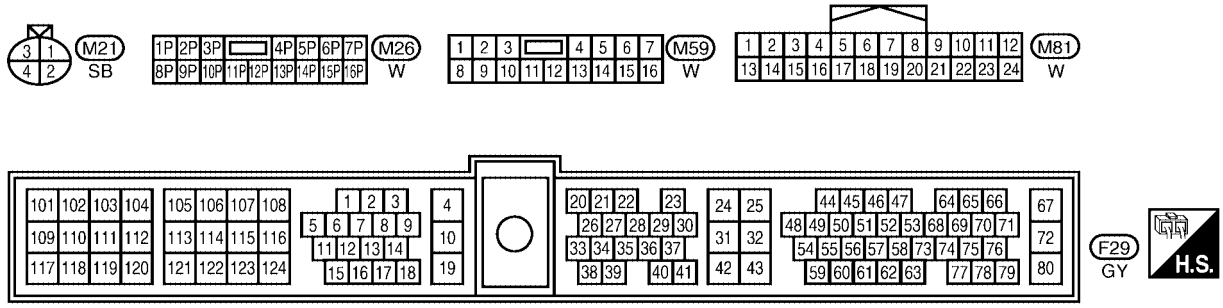
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00D4N





BBWA1057E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

Diagnostic Procedure

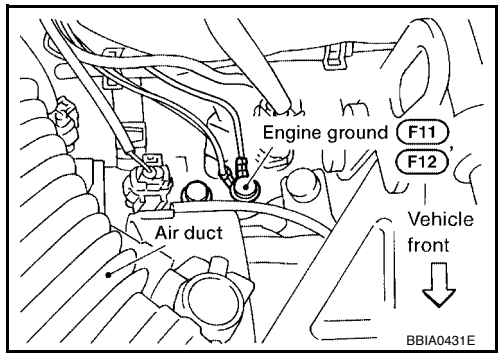
UBS00D4O

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

OK or NG

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



2. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect heated oxygen sensor 2 harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 56 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Check harness continuity between ECM terminal 56 or HO2S2 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

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

OK or NG

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

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- 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.

4. CHECK GROUND CIRCUIT

1. Check harness continuity between heated oxygen sensor 2 terminal 4 and ground. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between heated oxygen sensor 2 and ground

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

6. CHECK HARNESS CONNECTOR

Check heated oxygen sensor 2 harness connector for water.
Water should not exist.

OK or NG

OK >> GO TO 7.
NG >> Repair or replace harness connector.

7. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-219, "Component Inspection"

OK or NG

OK >> GO TO 8.
NG >> Replace heated oxygen sensor 2.

8. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Component Inspection

UBS00D4P

HATED OXYGEN SENSOR 2

With CONSULT-II

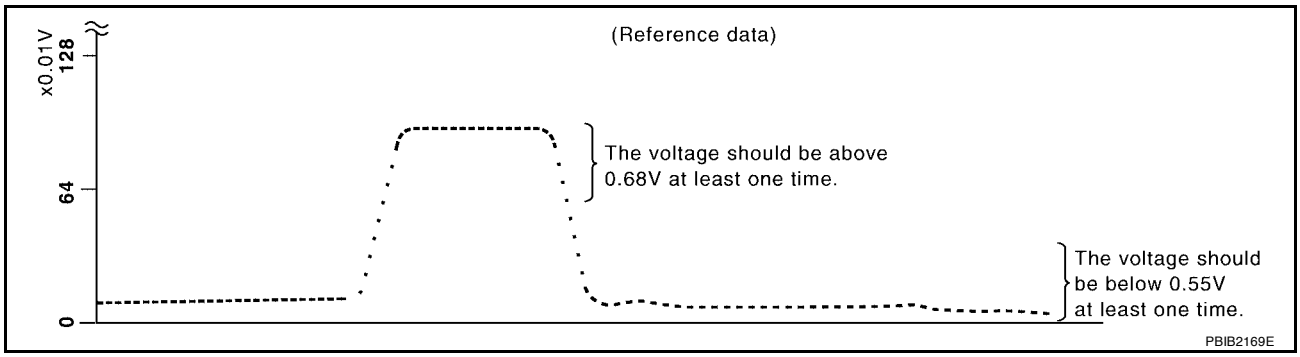
1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 5 seconds.
4. Start engine and keep engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.

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

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

SEF662Y

7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



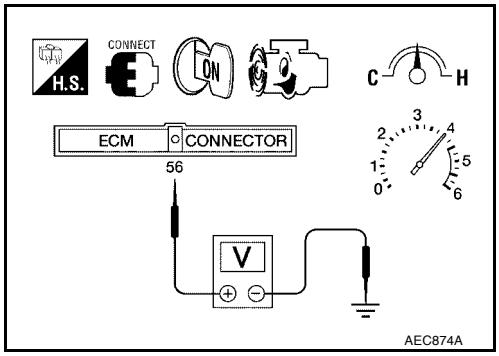
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.55V at least once when the “FUEL INJECTION” is −25%.

CAUTION:

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

Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 5 seconds.
4. Start engine and keep engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and ground.
7. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once.
   If the voltage is above 0.68V at step 4, step 5 is not necessary.
8. Check the voltage when revving up to 5,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
   The voltage should be below 0.55V at least once.



CAUTION:

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

Removal and Installation

UBS00D4Q

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

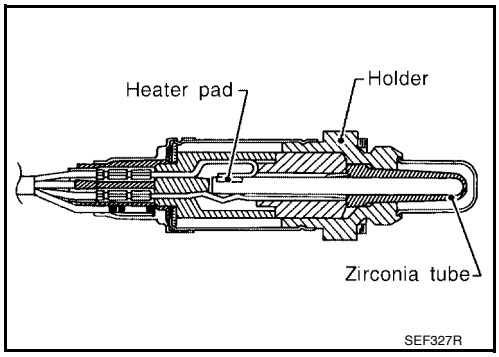
DTC P0139 HO2S2

PFP:226A0

Component Description

UBS00D4R

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00D4S

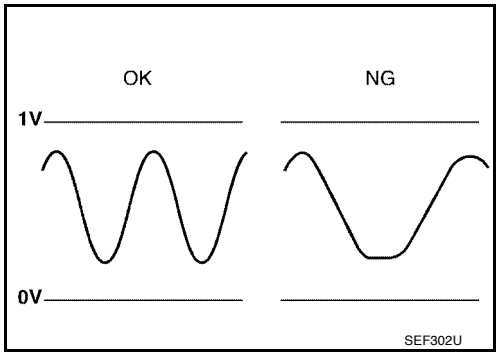
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm quickly.	LEAN ←→ RICH

On Board Diagnosis Logic

UBS00D4T

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during various driving conditions such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector ● Intake air leaks

DTC Confirmation Procedure

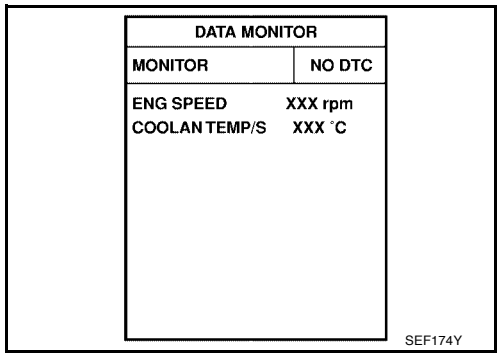
UBS00ELT

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.

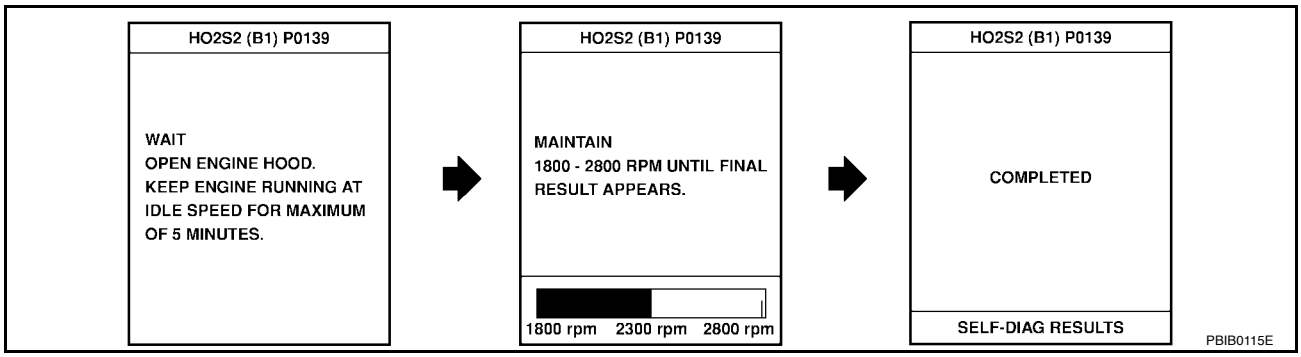
WITH CONSULT-II

TESTING CONDITION:
For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches to 70°C (158°F).



7. Select "HO2S2 (B1) P0139" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
8. Start engine and following the instruction of CONSULT-II.



9. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If "NG" is displayed, refer to EC-226, "Diagnostic Procedure" .
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Return to step 1.

Overall Function Check

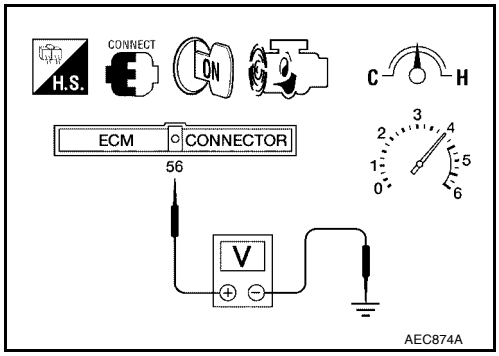
UBS00ELU

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

WITH GST

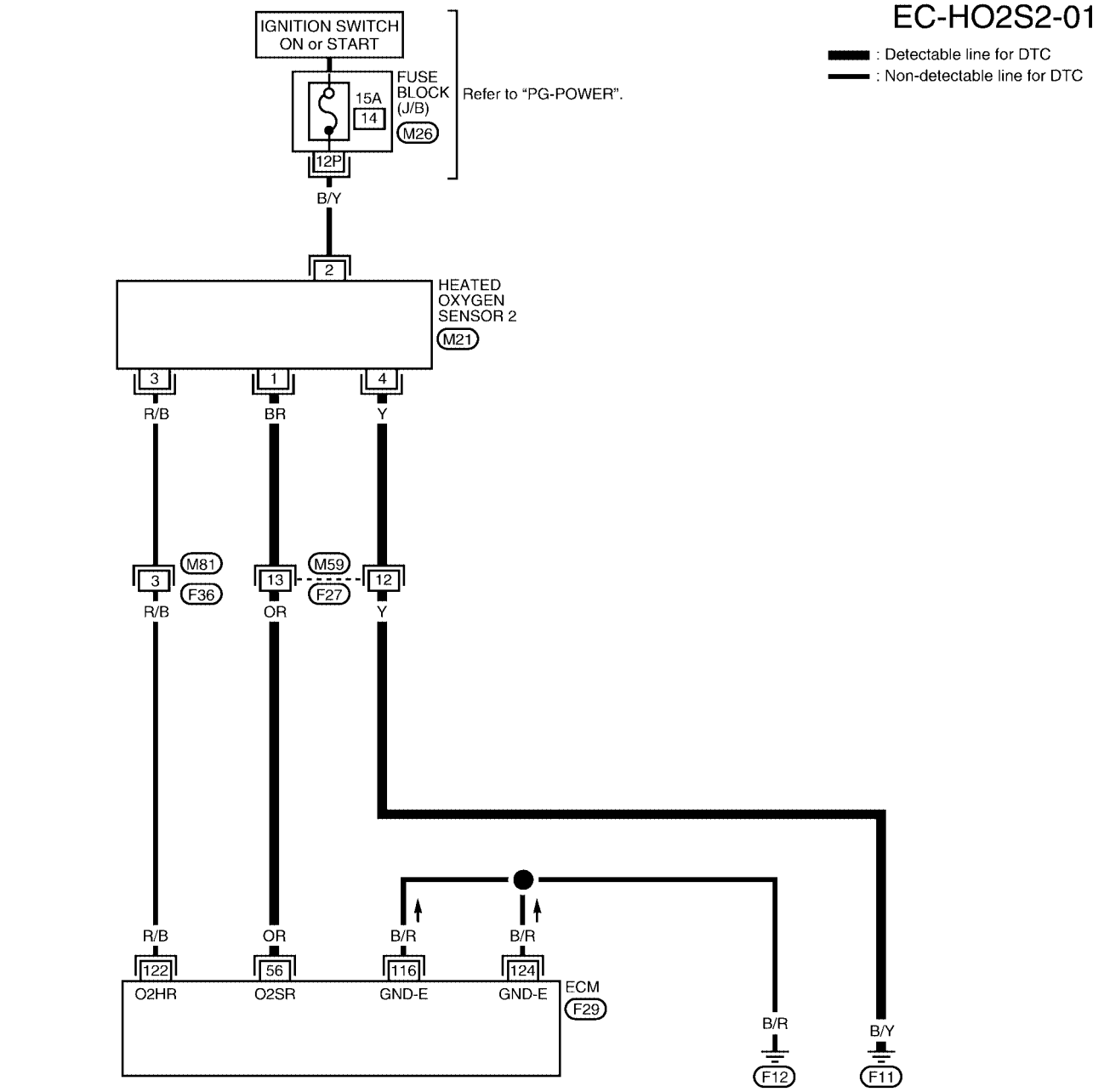
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.

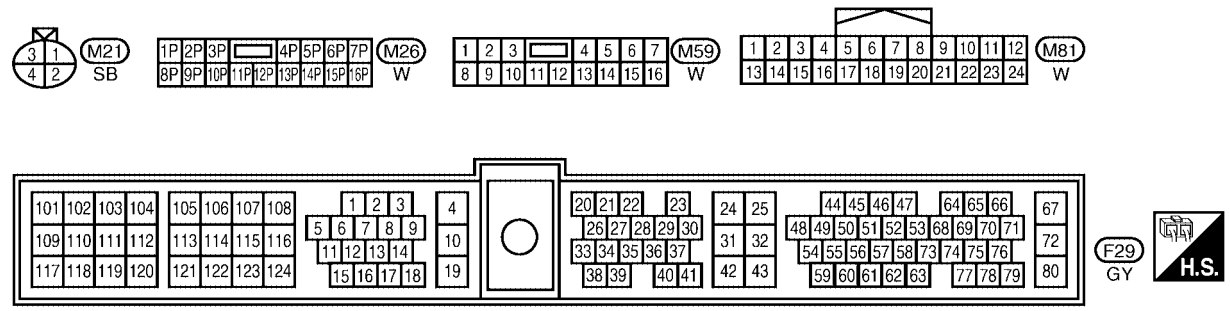
5. Set voltmeter probes between ECM terminal 56 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   A voltage change should be more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
   A voltage change should be more than 0.06V for 1 second during this procedure.
8. If NG, go to EC-226, "Diagnostic Procedure" .



Wiring Diagram

UBS00D4W





BBWA1057E

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

CAUTION:

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

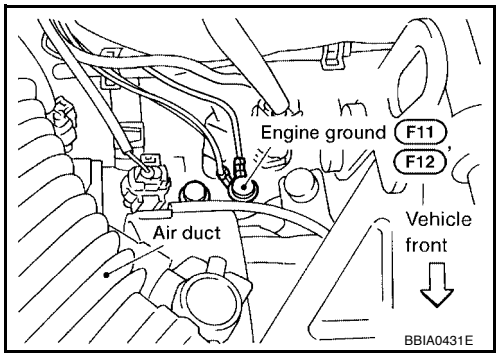
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

Diagnostic Procedure

UBS00D4X

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .



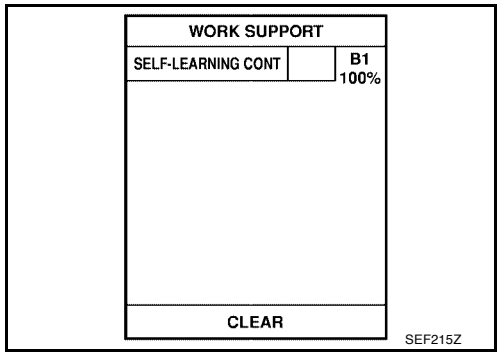
OK or NG

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

2. CLEAR THE SELF-LEARNING DATA

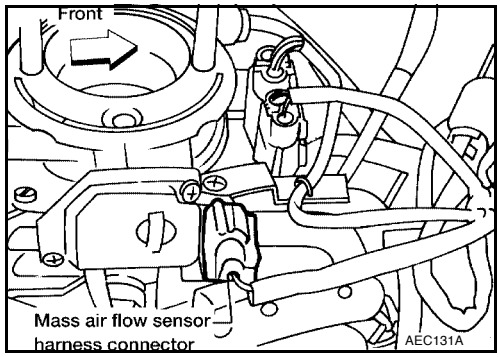
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch “OFF”.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-61, "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 P0172 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-231 or EC-238 .
No >> GO TO 3.

3. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect heated oxygen sensor 2 harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 56 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Check harness continuity between ECM terminal 56 or HO2S2 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not 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 M59, F27
- 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.

5. CHECK GROUND CIRCUIT

1. Check harness continuity between heated oxygen sensor 2 terminal 4 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to power.

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between heated oxygen sensor 2 and ground

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

7. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-228, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace heated oxygen sensor 2.

8. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Component Inspection

UBS00D4Y

HEATED OXYGEN SENSOR 2

With CONSULT-II

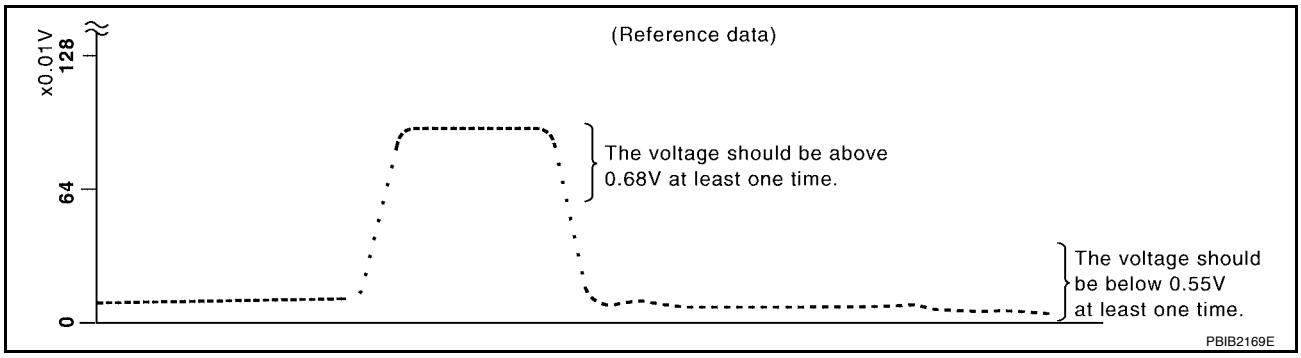
1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 5 seconds.
4. Start engine and keep engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.

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

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

SEF662Y

7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



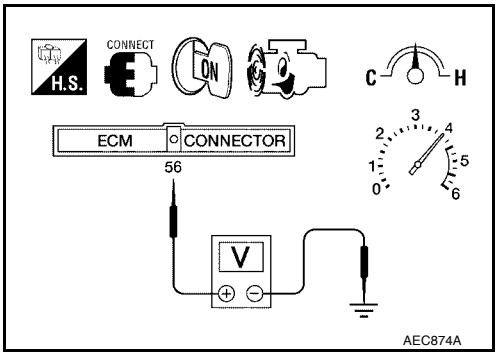
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.55V at least once when the “FUEL INJECTION” is –25%.

CAUTION:

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

Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 5 seconds.
4. Start engine and keep engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and ground.
7. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once.
   If the voltage is above 0.68V at step 4, step 5 is not necessary.
8. Check the voltage when revving up to 5,000 rpm under no load. Or keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
   The voltage should be below 0.55V at least once.



CAUTION:

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

Removal and Installation

UBS00D4Z

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

UBS00D50

With the Air-Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171	Fuel injection system too lean	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	● Intake air leaks ● Heated oxygen sensor 1 ● Fuel injector ● Exhaust gas leaks ● Incorrect fuel pressure ● Lack of fuel ● Mass air flow sensor ● Incorrect PCV hose connection

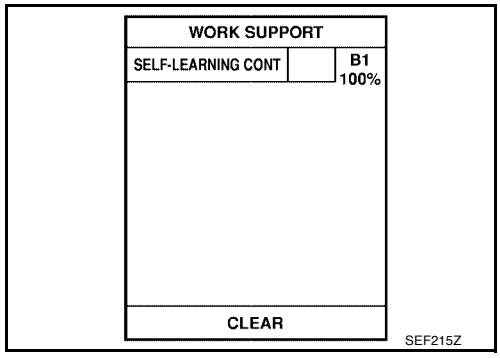
DTC Confirmation Procedure

UBS00D51

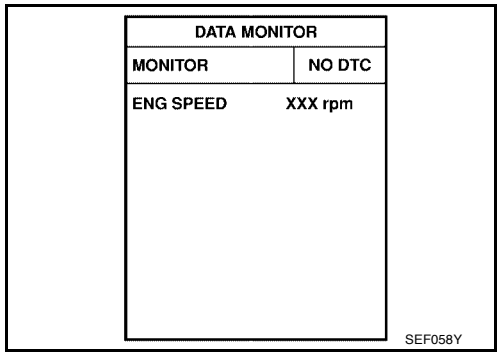
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 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.

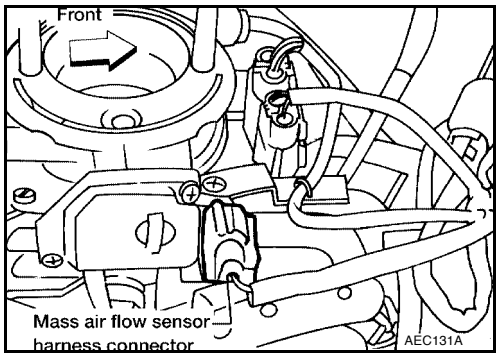


6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-234, "Diagnostic Procedure" .
7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-234, "Diagnostic Procedure" . If engine does not start, visually check for exhaust and intake air leak.



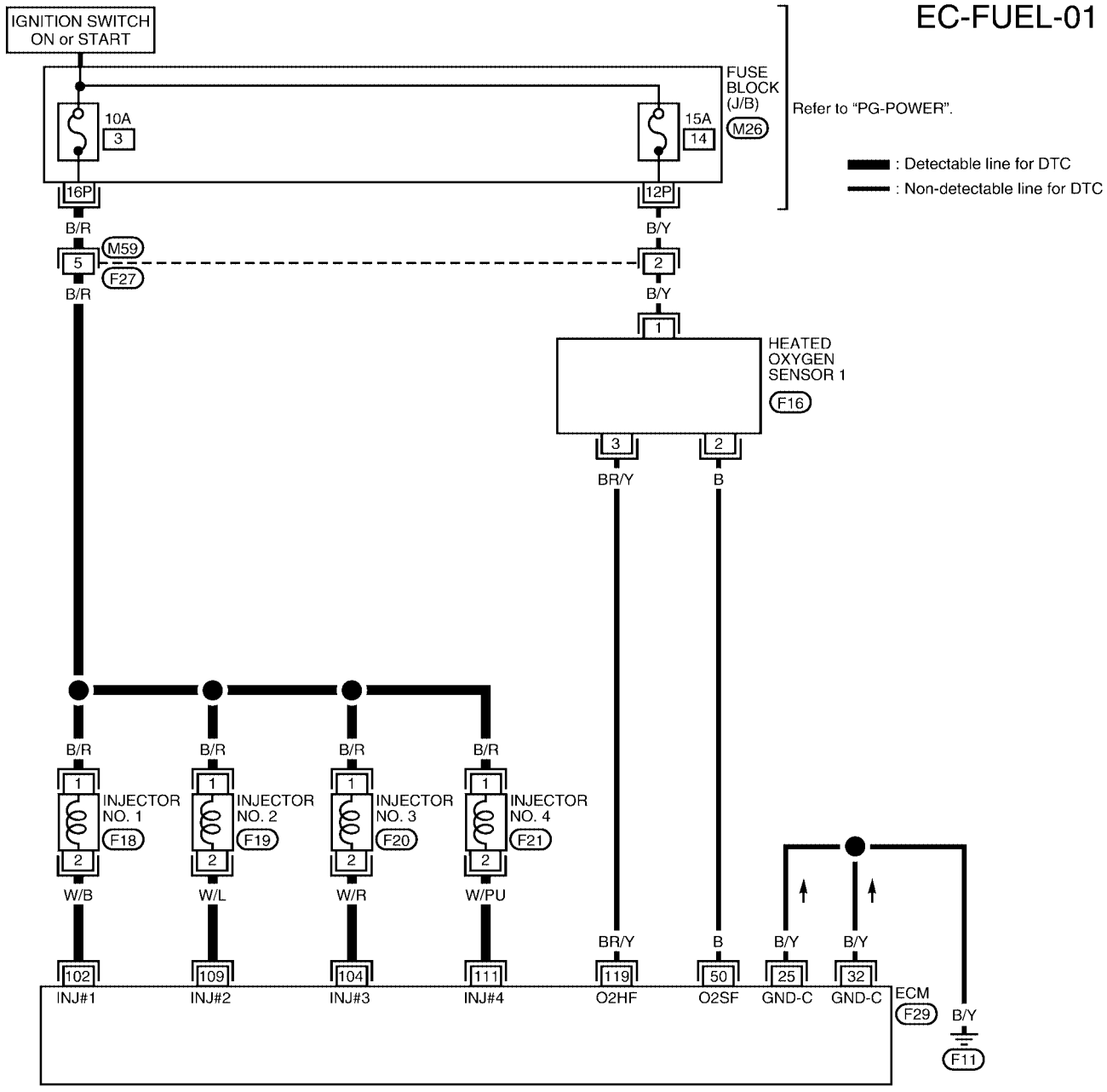
WITH GST

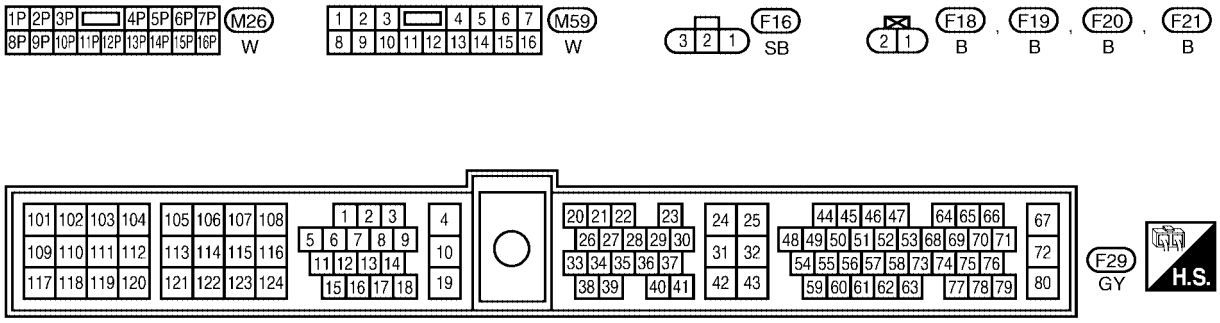
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select “MODE 3” with GST. Make sure DTC P0102 is detected.
6. Select “MODE 4” with GST and erase the DTC P0102.
7. Start engine again and run it for at least 10 minutes at idle speed.
8. Select “MODE 7” with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-234, "Diagnostic Procedure" .
9. If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal. If engine starts, go to EC-234, "Diagnostic Procedure" . If engine does not start, visually check for exhaust and intake air leak visually.



Wiring Diagram

UBS00D52





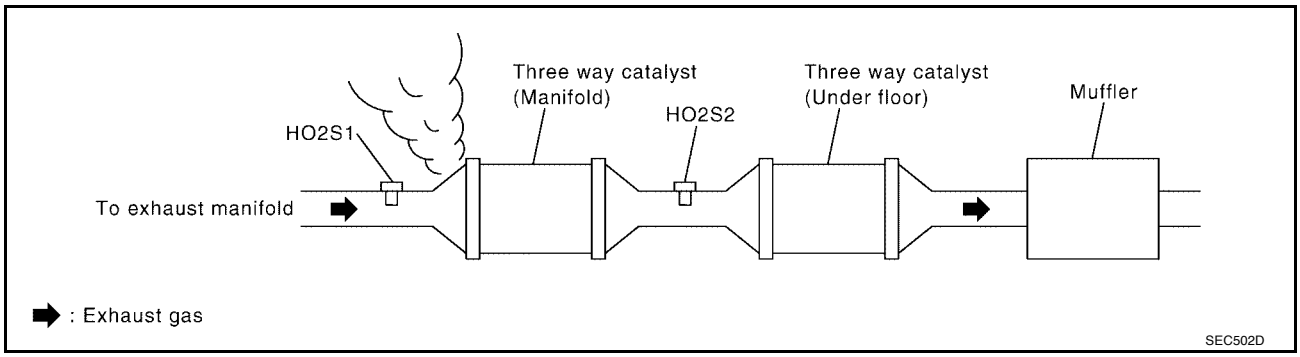
BBWA0441E

Diagnostic Procedure

UBS00D53

1. CHECK EXHAUST GAS LEAK

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



OK or NG

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

2. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Listen for an intake air leak between the mass air flow sensor and the intake manifold.
2. Check PCV hose connection.

OK or NG

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

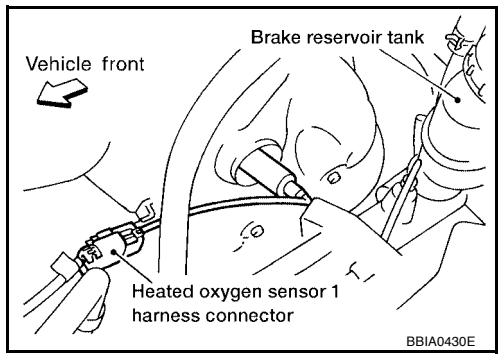
3. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal 50 and HO2S1 terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Check harness continuity between ECM terminal 50 or HO2S1 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



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

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-46, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure.

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-554 .)
- Fuel pressure regulator (Refer to EC-48 .)
- Fuel lines (Refer to MA-18, "Changing Fuel Filter" .)
- Fuel filter for clogging

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

Refer to EC-237, "Component Inspection"

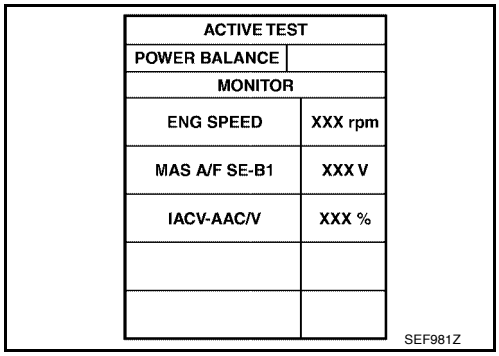
OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-146, "DTC P0102, P0103 MAF SENSOR" .

7. CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Install all parts removed.
2. Start engine.
3. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
4. Make sure that each circuit produces a momentary engine speed drop.

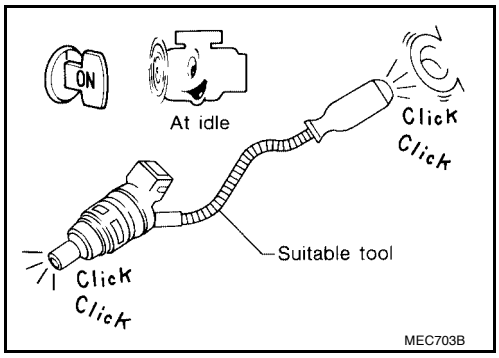


Without CONSULT-II

1. Install all parts removed.
2. Start engine.
3. Listen to each injector operating sound.
   Clicking noise should be heard.

OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for injector, refer to EC-545, "INJECTOR CIRCUIT" .



8. REMOVE INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.
3. Remove injector with fuel tube assembly.
   Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors should remain connected.

>> GO TO 9.

9. CHECK INJECTOR

Refer to EC-237, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace injectors from which fuel does not spray out. Always replace O-ring with new one.

10. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END.**

Component Inspection

UBS00D54

MASS AIR FLOW SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

at idling	**: 0.9 - 5.8 g·m/sec**
at 2,500 rpm	**: 7.5 - 13.2 g·m/sec**

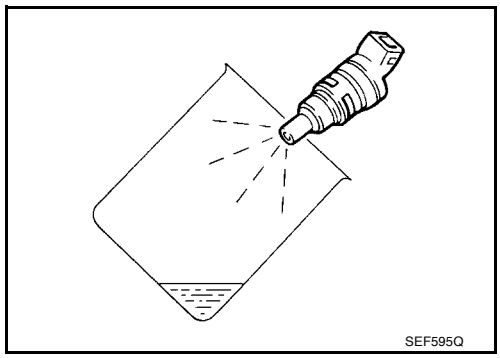
With GST

1. Start engine and warm it up to normal operating temperature.
2. Check mass air flow sensor signal in “MODE 1” with GST.

at idling	**: 0.9 - 5.8 g·m/sec**
at 2,500 rpm	**: 7.5 - 13.2 g·m/sec**

INJECTOR

1. Disconnect all ignition coil harness connectors.
2. Place pans or saucers under each injector.
3. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.
   Fuel should be sprayed evenly for each cylinder.



DTC P0172 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

UBS00D55

With the Air-Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172	Fuel injection system too rich	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	● Heated oxygen sensor 1 ● Fuel injector ● Exhaust gas leaks ● Incorrect fuel pressure ● Mass air flow sensor

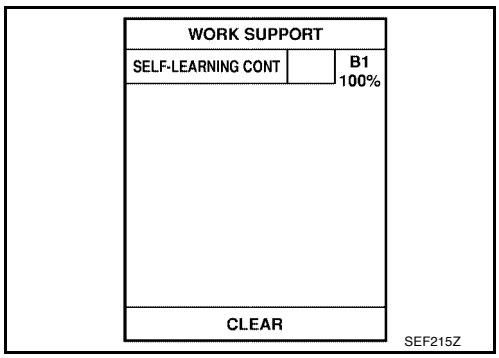
DTC Confirmation Procedure

UBS00D56

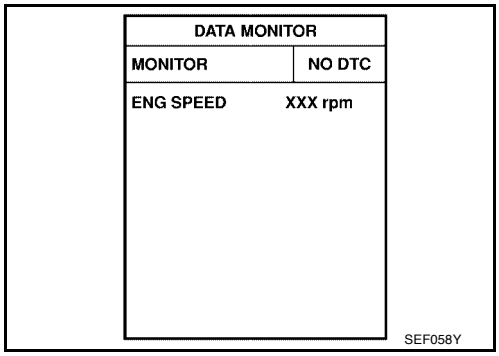
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 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.

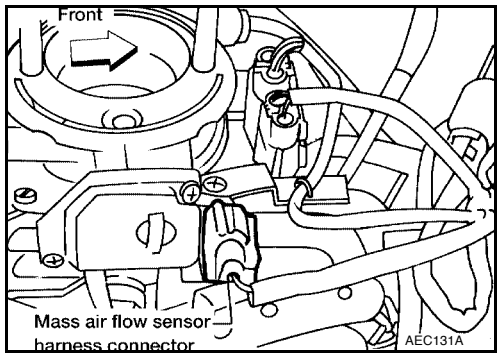


6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-241, "Diagnostic Procedure" .
7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-241, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.



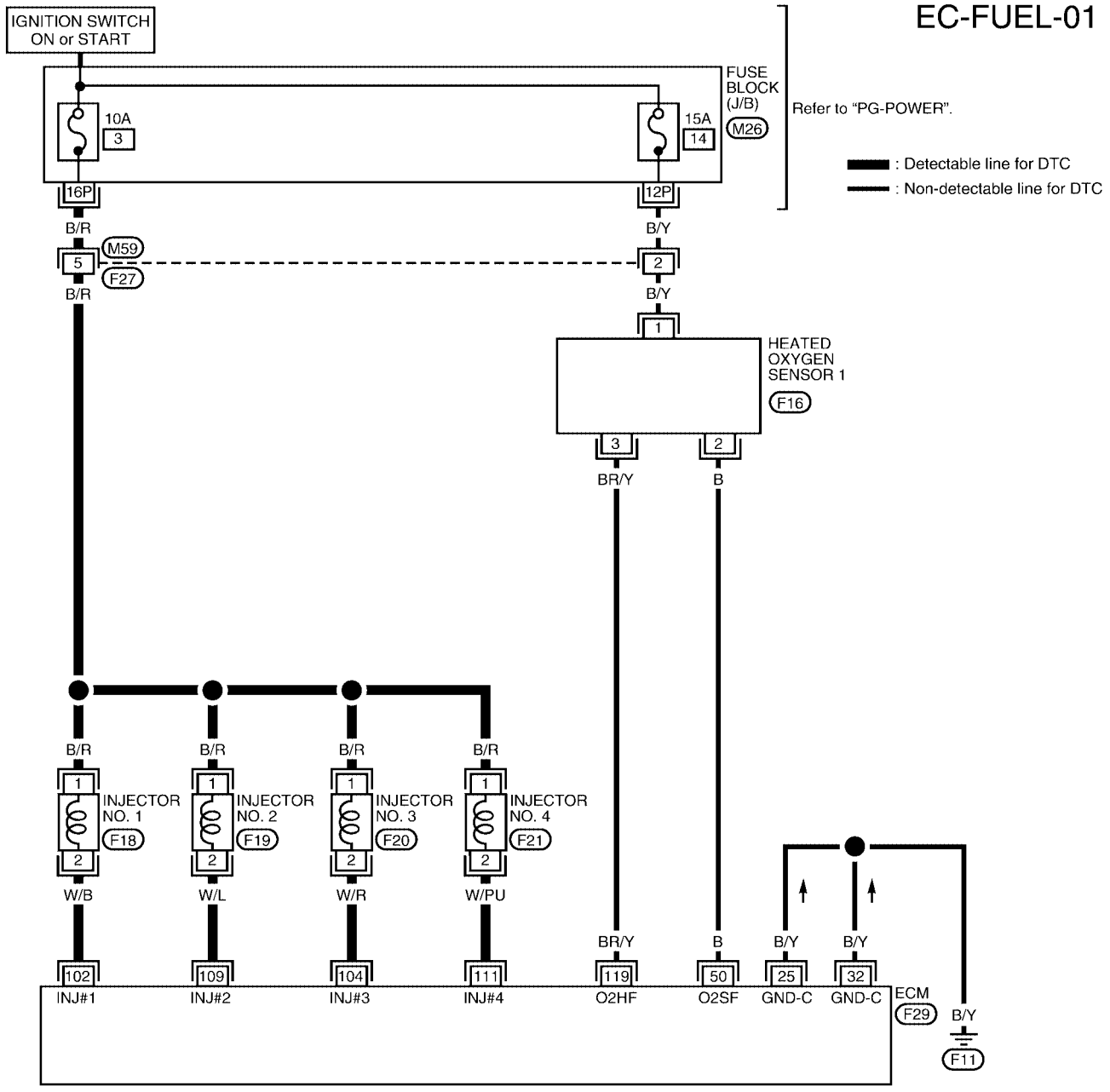
WITH GST

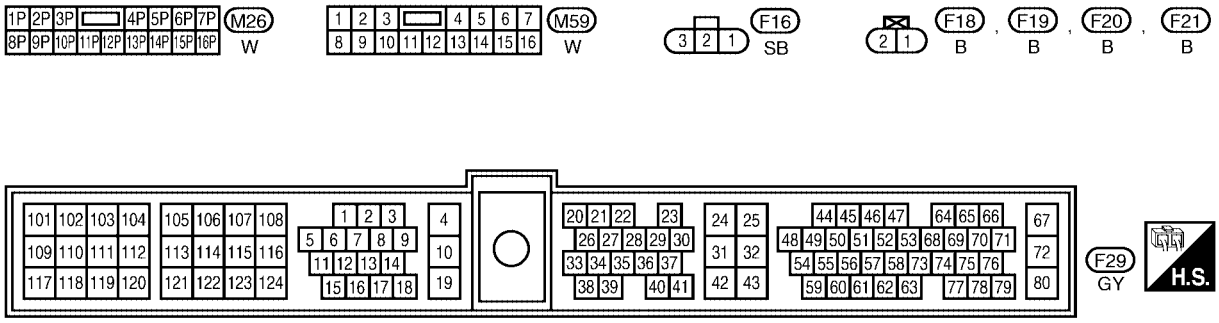
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select “MODE 3” with GST. Make sure DTC P0102 is detected.
6. Select “MODE 4” with GST and erase the DTC P0102.
7. Start engine again and run it for at least 10 minutes at idle speed.
8. Select “MODE 7” with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-241, "Diagnostic Procedure" .
9. If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal.
    If engine starts, go to EC-241, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.



Wiring Diagram

UBS00D57





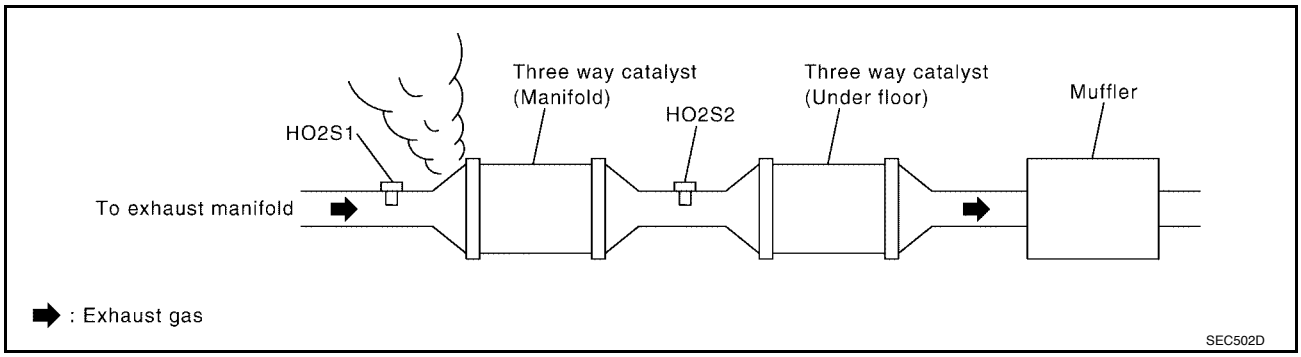
BBWA0441E

Diagnostic Procedure

UBS00D58

1. CHECK FOR EXHAUST GAS LEAK

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



OK or NG

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

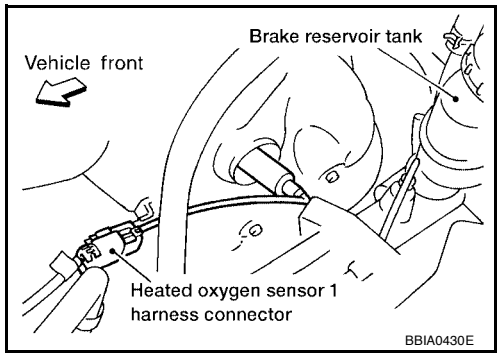
2. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal 50 and HO2S1 terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Check harness continuity between ECM terminal 50 or HO2S1 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



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

OK or NG

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

3. CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-46, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure.

At idling

When fuel pressure regulator valve vacuum hose is connected.	**Approximately 235 kPa (2.4 kg/cm^2 , 34 psi)**
When fuel pressure regulator valve vacuum hose is disconnected.	**Approximately 294 kPa (3.0 kg/cm^2 , 43 psi)**

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-554 .)
- Fuel pressure regulator (Refer to EC-48 .)

>> Repair or replace.

5. CHECK MASS AIR FLOW SENSOR

Refer to EC-243, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-146, "DTC P0102, P0103 MAF SENSOR" .

6. CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Install all parts removed.
2. Start engine.
3. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
4. 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
IACV-AAC/V	XXX %

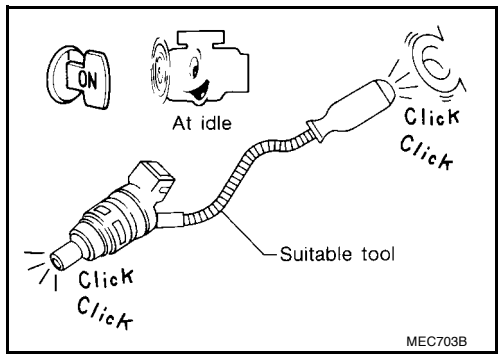
SEF981Z

Without CONSULT-II

1. Install all parts removed.
2. Start engine.
3. Listen to each injector operating sound.
   Clicking noise should be heard.

OK or NG

OK >> GO TO 7.
NG >> Perform trouble diagnosis for injectors, EC-545, "INJECTOR CIRCUIT" .



7. REMOVE INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.
3. Remove injector assembly.
   Keep fuel hose and all injectors connected to injector gallery.

>> GO TO 8.

8. CHECK INJECTOR

Refer to EC-243, "Component Inspection" .

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

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Component Inspection

UBS00D59

MASS AIR FLOW SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

at idling	**: 0.9 - 5.8 g·m/sec**
at 2,500 rpm	**: 7.5 - 13.2 g·m/sec**

With GST

1. Start engine and warm it up to normal operating temperature.
2. Check mass air flow sensor signal in “MODE 1” with GST.

at idling	**: 0.9 - 5.8 g·m/sec**
at 2,500 rpm	**: 7.5 - 13.2 g·m/sec**

INJECTOR

1. Disconnect all injector harness connectors.
2. Disconnect all ignition coil harness connectors.
3. Prepare pans or saucers under each injectors.
4. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

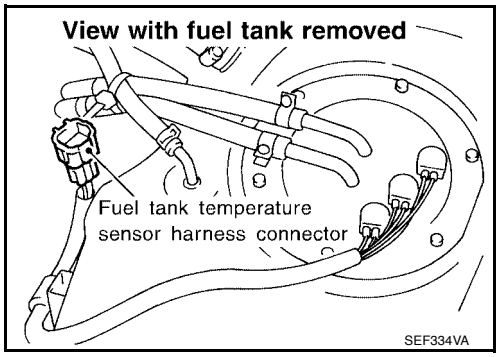
DTC P0181 FTT SENSOR

PFP:22630

Component Description

UBS00D5A

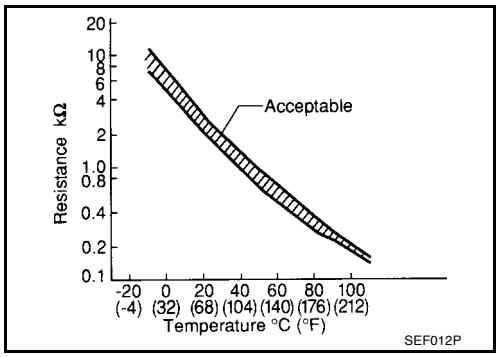
The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical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



<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: This data is reference value and is measured between ECM terminal 60 (Fuel tank temperature sensor) and ground.



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

On Board Diagnosis Logic

UBS00D5B

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0181	Fuel tank temperature sensor circuit range/ performance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	● Harness or connectors (The sensor circuit is open or shorted) ● Fuel tank temperature sensor

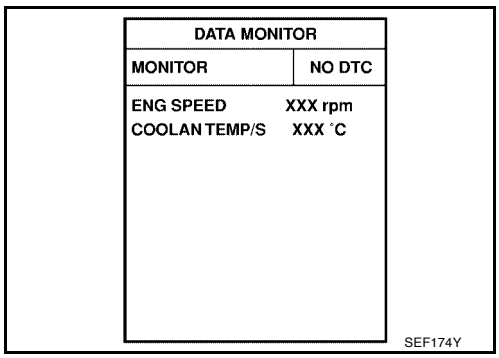
DTC Confirmation Procedure

UBS00D5C

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 EC-247, "Diagnostic Procedure"
   .
   If 1st trip DTC is not detected, go to following step.
4. Check “COOLAN TEMP/S” indication.
   If the indication is less than 60°C (140°F), the result will be OK.
   If the indication is above 60°C (140°F), go to the following step.
5. Cool engine down until “COOLAN TEMP/S” indication decreases to less than 60°C (140°F).
6. Wait at least 10 seconds.
7. If 1st trip DTC is detected, go to EC-247, "Diagnostic Procedure" .

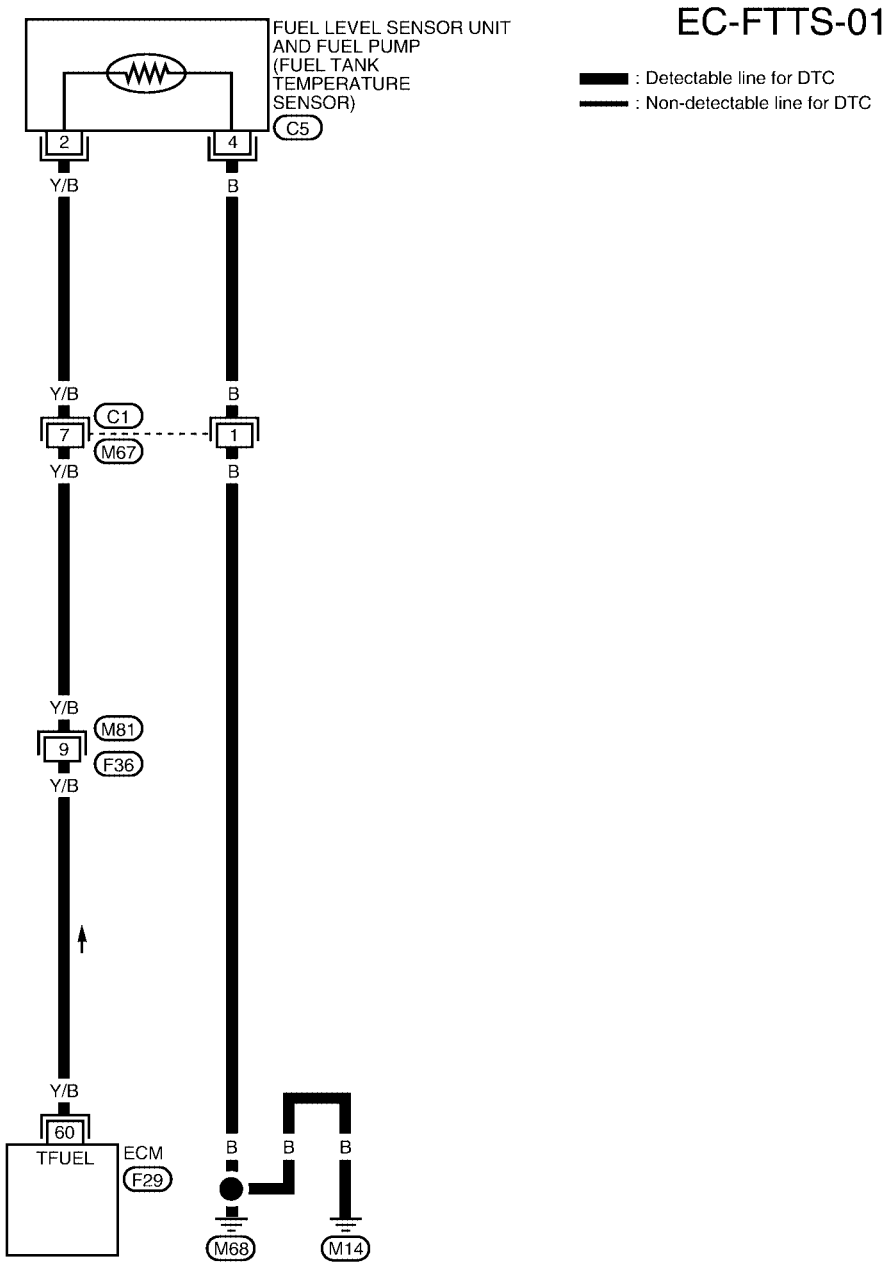


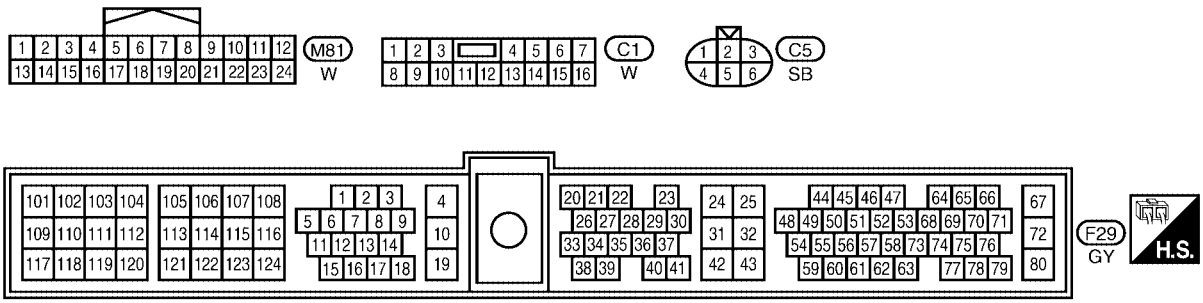
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00D5D





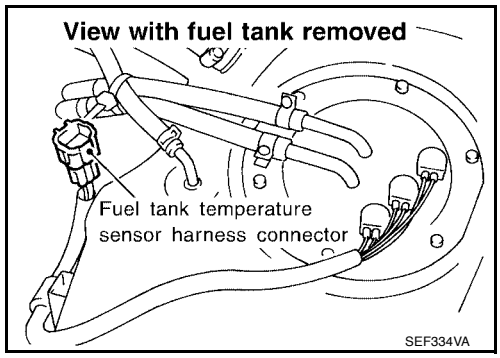
BBWA1059E

Diagnostic Procedure

UBS00D5E

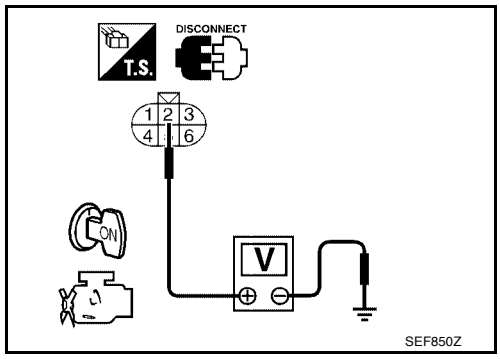
1. CHECK POWER SUPPLY

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 2 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 C1, M67
- Harness connectors M81, F36
- Harness for open or short between ECM and fuel tank temperature sensor

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

3. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between “fuel level sensor unit and fuel pump” 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 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, M67
- Harness for open or short between ECM and ground

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

5. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-248, "Component Inspection"

OK or NG

OK >> GO TO 6.
NG >> Replace fuel tank temperature sensor.

6. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

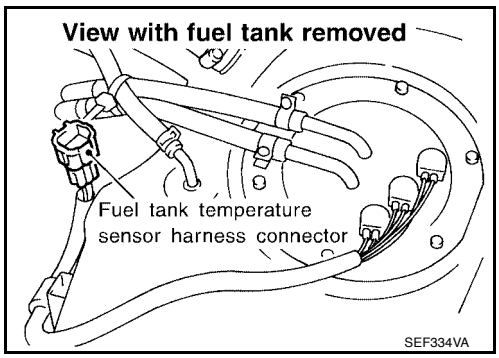
>> **INSPECTION END**.

Component Inspection

UBS00D5F

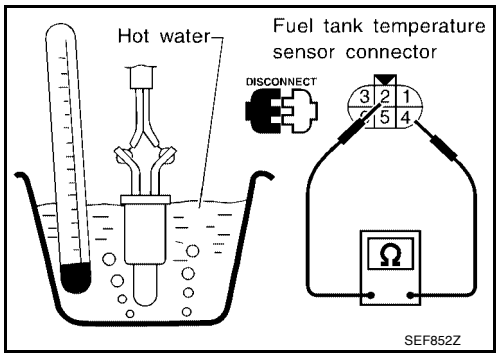
FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.



2. Check resistance 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

UBS00D5G

FUEL TANK TEMPERATURE SENSOR

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

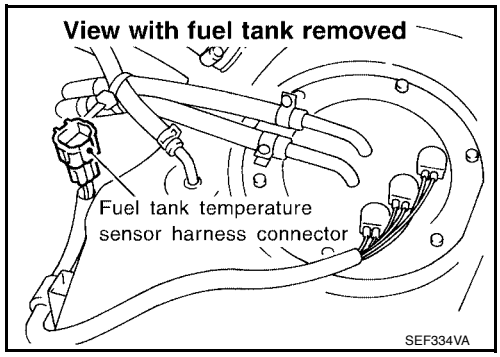
DTC P0182, P0183 FTT SENSOR

PFP:22630

Component Description

UBS00D5H

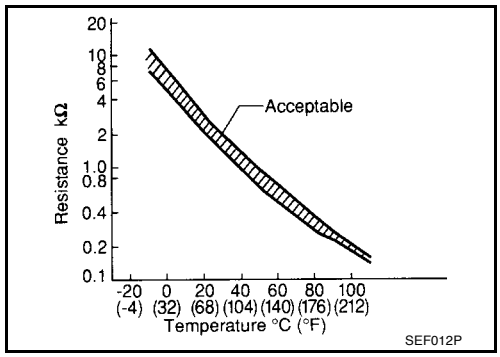
The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical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



<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: This data is reference value and is measured between ECM terminal 60 (Fuel tank temperature sensor) and ground.



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

On Board Diagnosis Logic

UBS00D5I

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Fuel tank temperature sensor
P0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

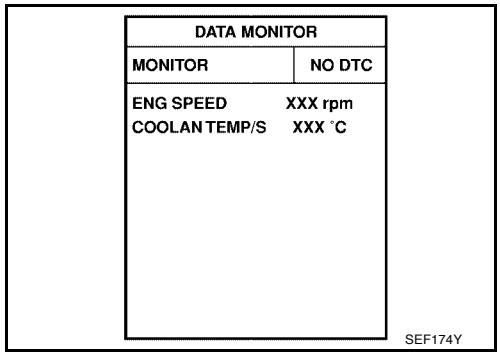
DTC Confirmation Procedure

UBS00D5J

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-251, "Diagnostic Procedure"
.

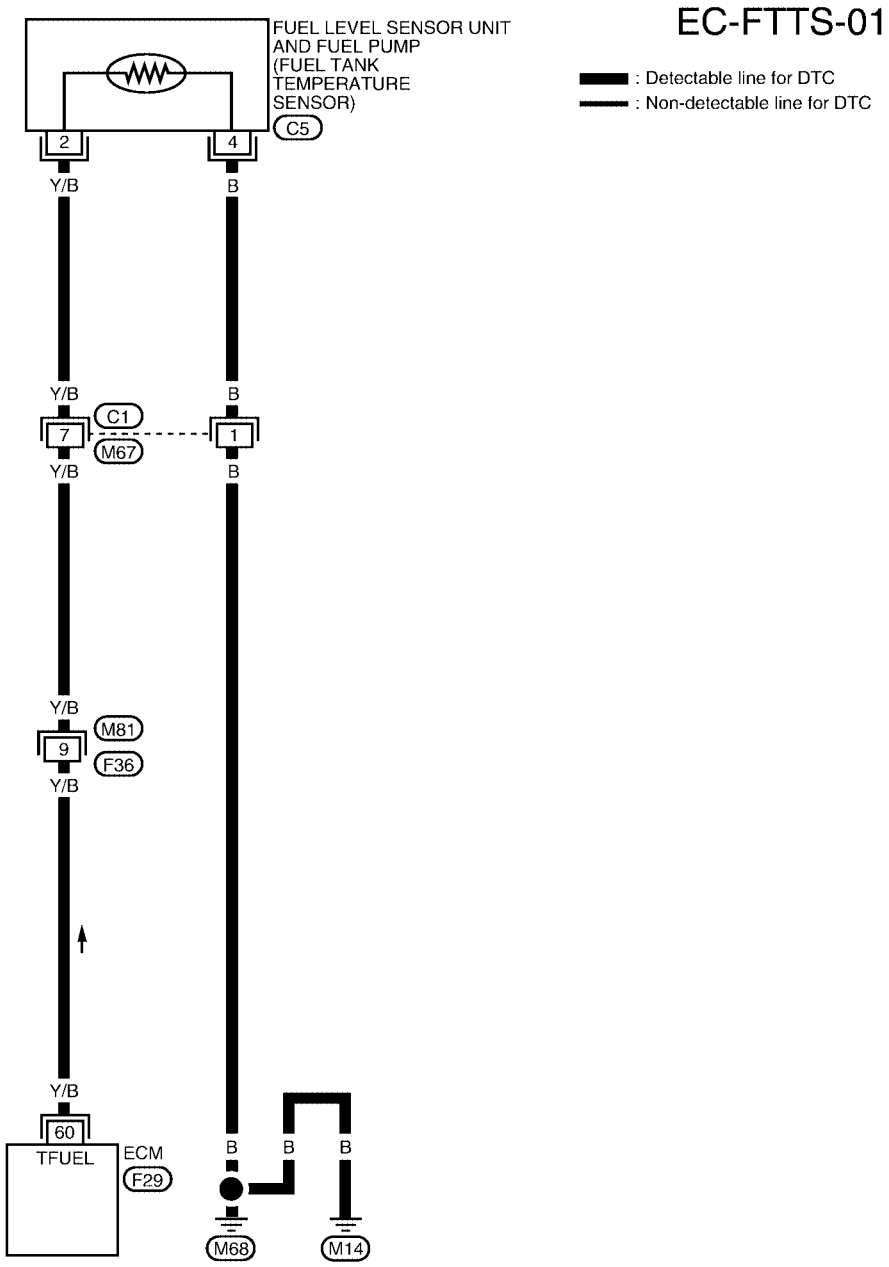


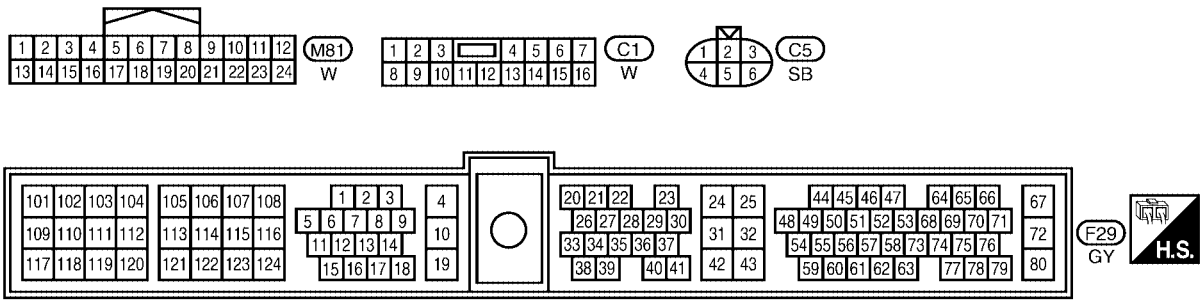
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00D5K





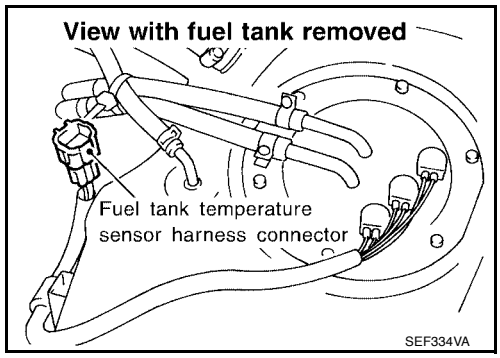
BBWA1059E

Diagnostic Procedure

UBS00D5L

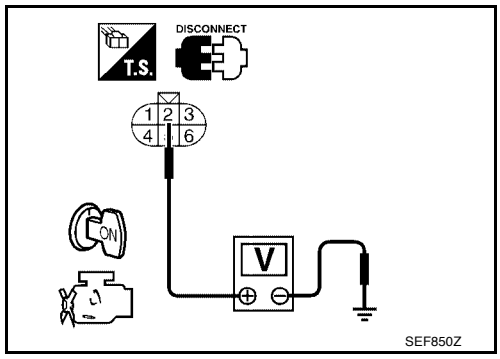
1. CHECK POWER SUPPLY

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 2 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 C1, M67
- Harness connectors M81, F36
- Harness for open or short between ECM and fuel tank temperature sensor

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

3. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between “fuel level sensor unit and fuel pump” 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 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, M67
- Harness for open or short between ECM and ground

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

5. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-252, "Component inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace fuel tank temperature sensor.

6. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

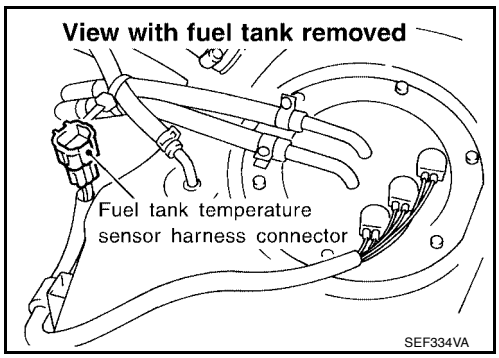
>> **INSPECTION END**.

Component inspection

UBS00D5M

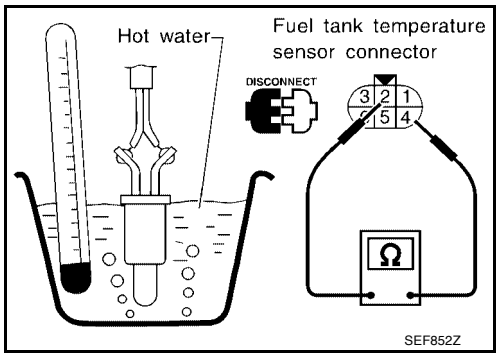
FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.



2. Check resistance 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

UBS00D5N

FUEL TANK TEMPERATURE SENSOR

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

PFP:00019

On Board Diagnosis Logic

UBS00D5O

This self-diagnosis has the one trip detection logic.
This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0217	Engine coolant over temperature condition	Engine coolant temperature is excessively high under normal engine speed.	● Cooling fan ● Thermostat ● Improper ignition timing ● Engine coolant temperature sensor ● Blocked radiator ● Blocked front end (Improper fitting of nose mask) ● Crushed vehicle frontal area (Vehicle frontal is collided but not repaired) ● Blocked air passage by improper installation of front fog lamp or fog lamps ● Improper mixture ratio of coolant ● Damaged bumper For more information, refer to EC-255, "Main 11 Causes of Overheating" .

CAUTION:
When a malfunction is indicated, be sure to replace the coolant. Refer to MA-16 , “Changing Engine Coolant”. Also, replace the engine oil. Refer to MA-20 , “Changing Engine Oil”.

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "ANTI-FREEZE COOLANT MIXTURE RATIO" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

UBS00D5P

Use this procedure to check the overall function of the coolant over temperature enrichment protection check, a DTC might not be confirmed.

WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high-pressure fluid escaping from the radiator.
Wrap a thick cloth around the 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.

1. Check the coolant level and mixture ratio (using coolant tester) in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level and mixture ratio.
   - If the coolant level in the reservoir and/or radiator is below the proper range, go to EC-254, "Diagnostic Procedure" .
   - If the coolant mixture ratio is out of the range of 45 to 55%, replace the coolant in the following procedure MA-16 , “Changing Engine Coolant”.

a. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant from a kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "ANTI-FREEZE COOLANT MIXTURE RATIO" .

b. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

c. After checking or replacing coolant, go to step 3 below.

2. Ask the customer if engine coolant has been added. If it has been added, go to EC-254, "Diagnostic Procedure" . After repair, go to the next step.
3. Start engine and let it idle.
4. Make sure that A/C switch is “OFF” and air conditioner is not operating. If NG, check air conditioner circuit. Refer to MTC-22, "TROUBLE DIAGNOSIS" . After repair, go to the next step.

5. Start engine and make sure that cooling fan operates.
Be careful not to overheat engine.
If NG, check cooling fan. Refer to CO-16, "COOLING FAN (CRANKSHAFT DRIVEN)" . After repair, go to the next step.
6. Check for blocked coolant passage.

a. Warm up engine to normal operating temperature, then grasp radiator upper hose and lower hose and make sure that coolant flows.
If NG, go to EC-254, "Diagnostic Procedure" . After repair, go to the next step.
Be extremely careful not to touch any moving or adjacent parts.

7. Check for blocked radiator air passage.

a. When aftermarket fog lamps have been installed, check for damaged fans and clogging in the condenser and radiator.

b. Check the front end for clogging caused by insects or debris.

c. Check for improper fitting of front-end cover, damaged radiator grille or bumper, damaged vehicle front.
If NG, take appropriate action and then go to the next step.

8. Check function of ECT sensor.
Refer to EC-256, "Component Inspection" .
If NG, replace ECT sensor and go to the next step.
9. Check ignition timing. Refer to EC-74, "Basic Inspection" .
Make sure that ignition timing is 20°±5° at idle.
If NG, adjust ignition timing and then recheck.

Diagnostic Procedure

UBS00D5Q

1. CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION

Start engine and make sure that cooling fan (crankshaft driven) operates.

OK or NG

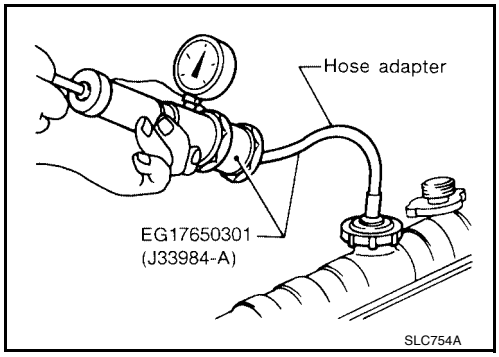
OK >> GO TO 2.
NG >> Check cooling fan (crankshaft driven). Refer to CO-16, "COOLING FAN (CRANKSHAFT DRIVEN)" .

2. 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 3.
NG >> Check the following for leak.
- Hose
- Radiator
- Water pump
Refer to CO-10, "WATER PUMP" .

3. CHECK RADIATOR CAP

Refer to EC-256, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace radiator cap.

4. CHECK THERMOSTAT

Refer to EC-256, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace thermostat.

5. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-256, "Component Inspection" .

OK or NG

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

6. CHECK MAIN 11 CAUSES

If the cause cannot be isolated, go to EC-255, "Main 11 Causes of Overheating" .

>> **INSPECTION END**

Perform FINAL CHECK by the following procedure after repair is completed.

1. Warm up engine. Run the vehicle for at least 20 minutes. Pay attention to engine coolant temperature gauge on the instrument panel. If the reading shows an abnormally high temperature, another part may be malfunctioning.
2. Stop vehicle and let engine idle. Check the intake and exhaust systems for leaks by listening for noise or visually inspecting the components.
3. Allow engine to cool and visually check for oil and coolant leaks. Then, perform “Overall Function Check”.

Main 11 Causes of Overheating

UBS00D5R

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-12, "RECOMMENDED FLUIDS AND LUBRICANTS" .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-16 , “Changing Engine Coolant”.
	4	● Radiator cap	● Pressure tester	78 - 98 kPa (0.8 - 1.0 kg/cm^2 , 11 - 14 psi) 59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See CO-8, "System Check" .
ON*2	5	● Coolant leaks	● Visual	No leaks	See CO-8, "System Check" .
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-13, "THERMOSTAT" and CO-14, "RADIATOR" .
OFF	7	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	8	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See MA-16 , “Changing Engine Coolant”.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF*4	9	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See CO-7, "COOLING SYSTEM" .
OFF	10	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-32, "CYLINDER HEAD" .
	11	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-48, "CYLINDER BLOCK" .

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to CO-6, "OVERHEATING CAUSE ANALYSIS" .

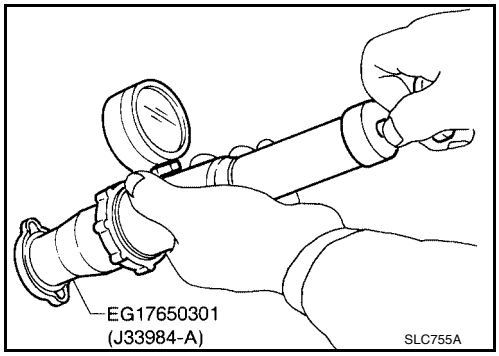
Component Inspection

UBS00D5S

RADIATOR CAP

Apply pressure to cap with a tester.

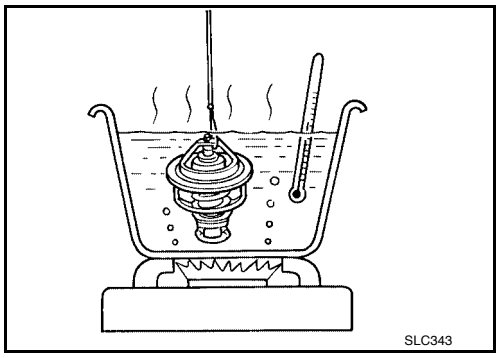
Radiator cap relief pressure : **78 - 98 kPa (0.8 - 1.0 kg/cm^2 , 11 - 14 psi)**



THERMOSTAT

1. Check valve seating condition at normal room temperatures.
It should seat tightly.
2. Check valve opening temperature and valve lift.

Valve opening temperature : **76.5°C (170°F) [standard]**
Valve lift : **More than 8 mm/90°C (0.31 in/194°F)**

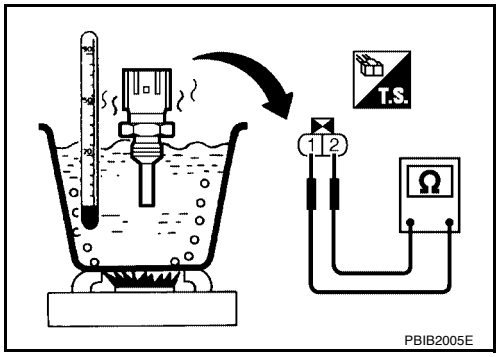


3. Check if valve is closed at 5°C (41°F) below valve opening temperature.

For details, refer to CO-13, "THERMOSTAT" .

ENGINE COOLANT TEMPERATURE SENSOR

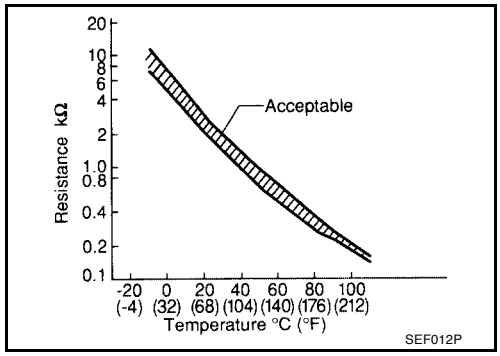
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

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

*: This data is reference value and is measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.



2. If NG, replace engine coolant temperature sensor.

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

PFP:00020

On Board Diagnosis Logic

UBS00D5T

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, the ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (OBD)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	● Improper spark plug ● Insufficient compression ● Incorrect fuel pressure ● The injector circuit is open or shorted ● Fuel injector ● Intake air leak ● The ignition secondary circuit is open or shorted ● Lack of fuel ● Drive plate/Fly wheel ● Heated oxygen sensor 1 ● Incorrect distributor rotor ● EGR valve ● Incorrect PCV hose connection
P0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	

DTC Confirmation Procedure

UBS00ELV

CAUTION:

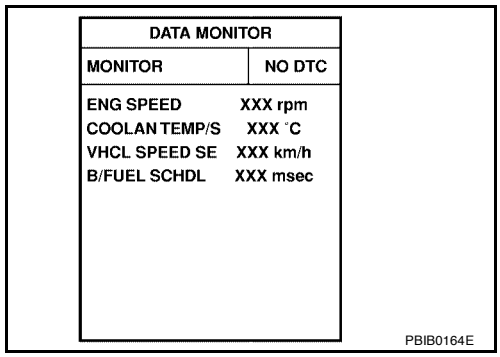
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

NOTE:

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

WITH CONSULT-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. Restart engine and let it idle for about 15 minutes.
5. If 1st trip DTC is detected, go to EC-259, "Diagnostic Procedure".



NOTE:

If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
   Hold the accelerator pedal as steady as possible.

   The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the feaze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

WITH GST

Follow the procedure WITH CONSULT-II above.

Diagnostic Procedure

UBS00D5V

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 (manifold) and muffler for dents.

OK or NG

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

3. CHECK EGR FUNCTION

Perform DTC Confirmation Procedure for DTC P1402 EGR FUNCTION (OPEN).
Refer to EC-465 .

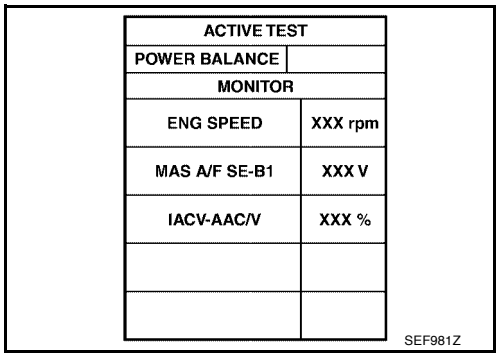
OK or NG

OK >> GO TO 4.
NG >> Repair EGR system.

4. 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?

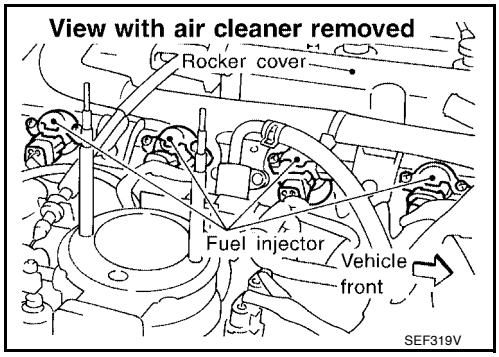


Without CONSULT-II

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 5.
No >> GO TO 8.

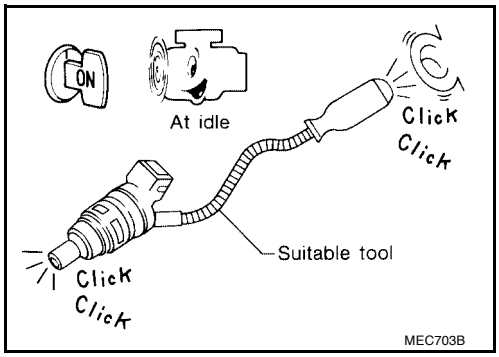


5. CHECK INJECTOR

Does each injector make an operating sound at idle?

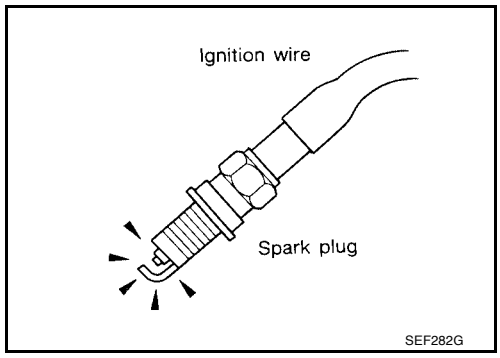
Yes or No

Yes >> GO TO 6.
No >> Check injector(s) and circuit(s). Refer to EC-545, "INJECTOR CIRCUIT" .



6. CHECK IGNITION SPARK

1. Turn ignition switch OFF.
2. Remove ignition wire assembly from rocker cover.
3. Connect a known-good spark plug to the ignition wire.
4. Disconnect all injector harness connector.
5. Place end of spark plug against a suitable ground and crank engine.
6. Check for spark.



OK or NG

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

7. CHECK IGNITION WIRES

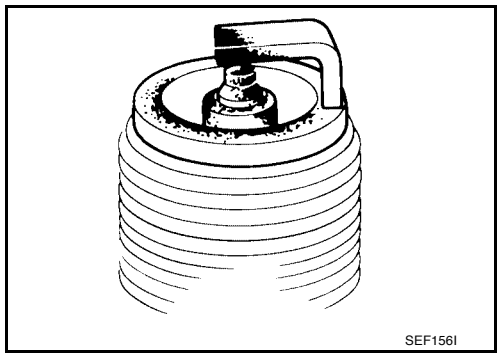
Refer to EC-263, "Component Inspection" .

OK or NG

OK >> Check distributor rotor head for incorrect parts. Check ignition coil, power transistor and their circuits. Refer to EC-538, "IGNITION SIGNAL" .
NG >> Replace.

8. CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.



OK or NG

OK >> GO TO 9.
NG >> Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to “ENGINE MAINTENANCE”, MA-15 .

9. CHECK COMPRESSION PRESSURE

Check compression pressure.
Refer to EM-32, "CHECKING COMPRESSION PRESSURE" .

Standard	**: 1,226 kPa (12.5 kg/cm^2 , 178 psi)/300 rpm**
Minimum	**: 1,030 kPa (10.5 kg/cm^2 , 149 psi)/300 rpm**
Difference between each cylinder	**: 98 kPa (1.0 kg/cm^2 , 14 psi)/300 rpm**

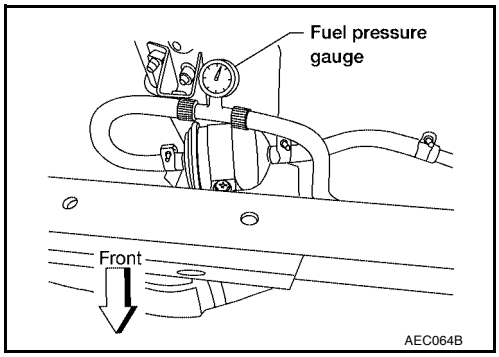
OK or NG

OK >> GO TO 10.
NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10. CHECK FUEL PRESSURE

1. Install any parts removed.
2. Release fuel pressure to zero. Refer to EC-46, "FUEL PRESSURE RELEASE" .
3. Install fuel pressure gauge and check fuel pressure.
   Refer to EC-47, "FUEL PRESSURE CHECK" .

At idle : Approx. 235 kPa (2.4 kg/cm^2 , 34 psi)



OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-554, "FUEL PUMP CIRCUIT" .)
- Fuel pressure regulator (Refer to EC-48, "Fuel Pressure Regulator Check" .)
- Fuel lines (Refer to MA-18, "Checking Fuel Lines").
- Fuel filter for clogging

>> Repair or replace.

12. CHECK IGNITION TIMING

1. Check the following items. Refer to EC-74, "Basic Inspection" .

Items	Specifications
Ignition timing	M/T: 20° ± 5° BTDC (in Neutral position) A/T: 20° ± 5° BTDC (in P or N position)
Base idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF
Target idle speed	M/T: 800 ± 50 rpm (in Neutral position) A/T: 800 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 13.
NG >> Adjust ignition timing.

13. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-263, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace heated oxygen sensor 1.

14. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

at idling	**: 0.9 - 5.8 g·m/sec**
at 2,500 rpm	**: 7.5 - 13.2 g·m/sec**

With GST

Check mass air flow sensor signal in “MODE 1” with GST.

at idling	**: 0.9 - 5.8 g·m/sec**
at 2,500 rpm	**: 7.5 - 13.2 g·m/sec**

OK or NG

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

15. CHECK CONNECTORS

Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground.
Refer to EC-146, "DTC P0102, P0103 MAF SENSOR" .

OK or NG

NG >> Repair or replace it.

16. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-84, "Symptom Matrix Chart" .

OK or NG

OK >> GO TO 17.
NG >> Repair or replace.

17. 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-61, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 18.

18. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Component Inspection

UBS00D5W

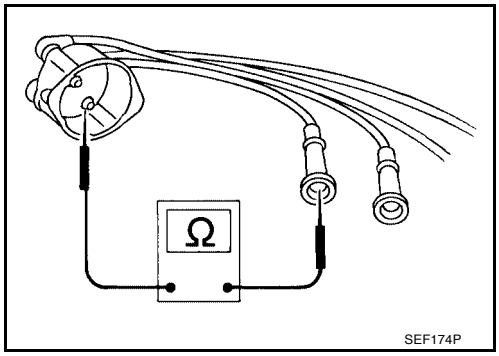
IGNITION WIRES

1. Inspect wires for cracks, damage, burned terminals and for improper fit.

2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.

Resistance **: 13.6 - 18.4 kΩ/m (4.15 - 5.61 kΩ/ft) at 25°C (77°F)**

If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.



Removal and Installation

UBS00D5X

INJECTOR

Refer to EM-13, "OUTER COMPONENT PARTS" .

SPARK PLUGS

Refer to EM-13, "OUTER COMPONENT PARTS" .

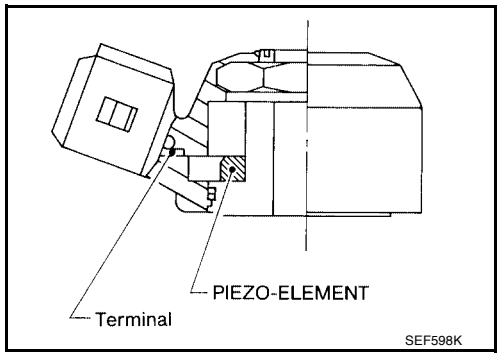
DTC P0327, P0328 KS

PFP:22060

Component Description

UBS00D5Y

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.



On Board Diagnosis Logic

UBS00D5Z

This self-diagnosis has the one trip detection logic.
The MIL will not light up for these diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Knock sensor
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

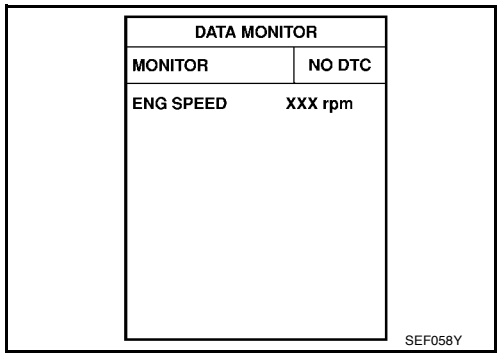
UBS00D60

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 DTC is detected, go to EC-267, "Diagnostic Procedure" .



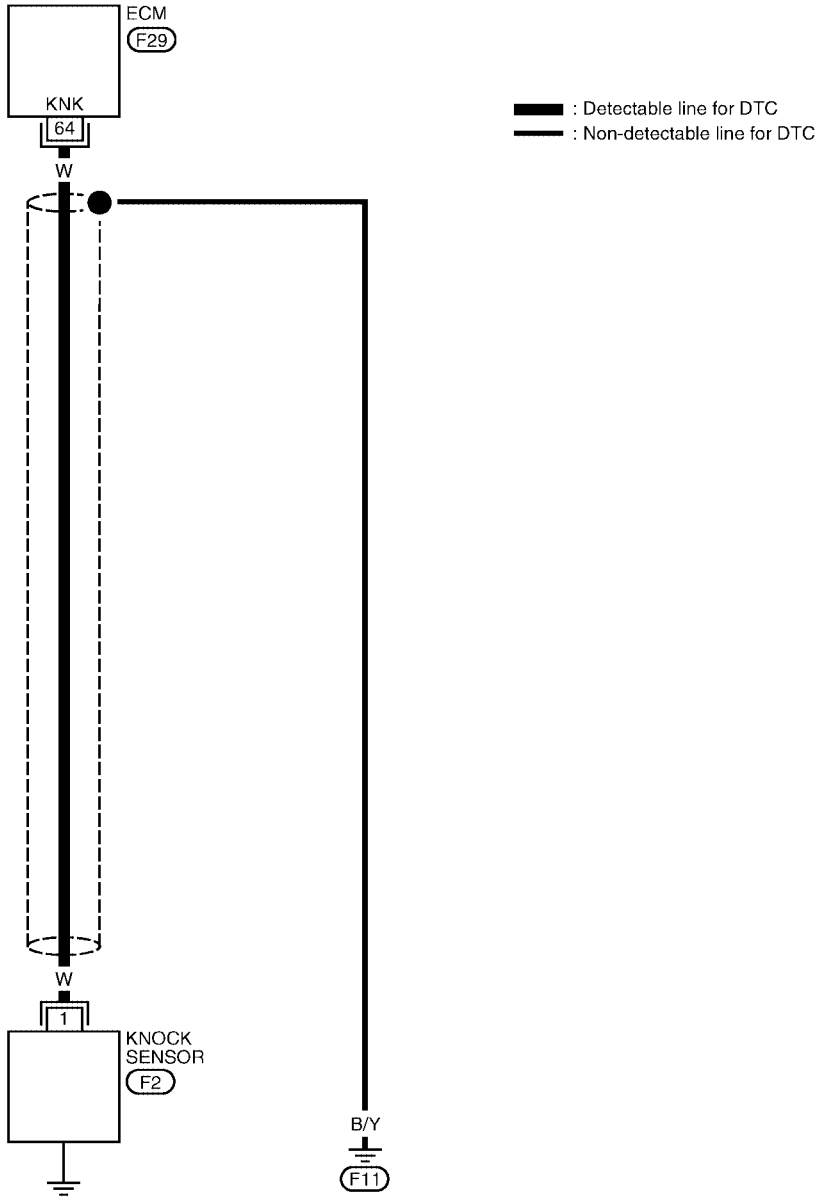
WITH GST

Follow the procedure “WITH CONSULT-II” above.

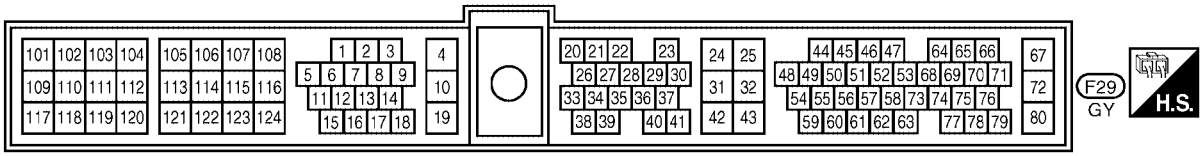
Wiring Diagram

UBS00D61

EC-KS-01







BBWA0549E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
64	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.4V

Diagnostic Procedure

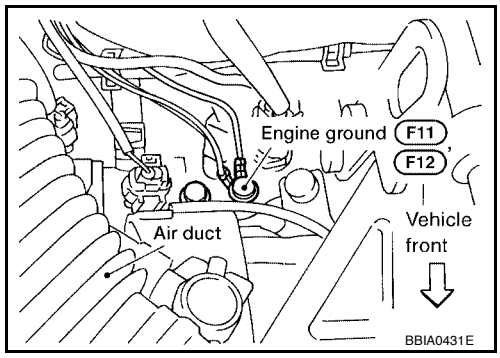
UBS00D62

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

OK or NG

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



2. CHECK INPUT SIGNAL CIRCUIT

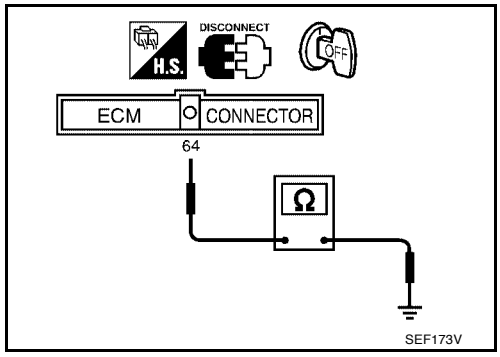
1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 64 and ground.
   Refer to Wiring Diagram.

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

   Resistance : Approximately 500 - 620 kΩ
   [at 25°C (77°F)]
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 harness for open or short between knock sensor and ECM.

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 KNOCK SENSOR

Refer to EC-268, "Component Inspection" .

OK or NG

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

5. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END.**

Component Inspection

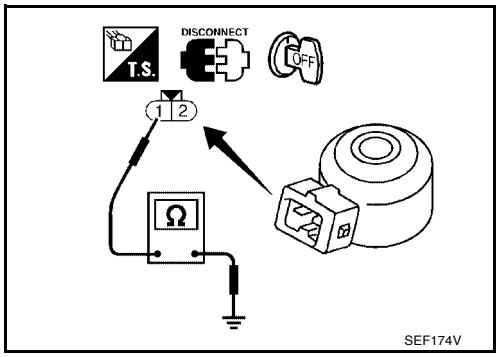
UBS00D63

KNOCK SENSOR

Use an ohmmeter which can measure more than 10 MΩ.

1. Disconnect knock sensor harness connector.
2. Check resistance between terminal 1 and ground.

Resistance : 500 - 620 kΩ [at 25°C (77°F)]



CAUTION:

Discard any knock sensors that have been dropped or physically damaged. Use only new ones.

Removal and Installation

UBS00D64

KNOCK SENSOR

Refer to EM-13, "OUTER COMPONENT PARTS" .

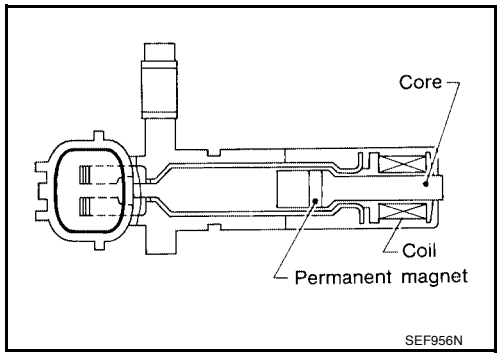
DTC P0335 CKP SENSOR (OBD)

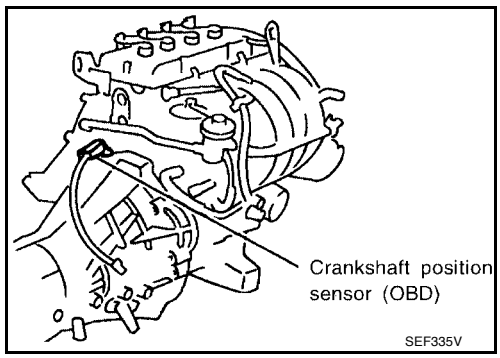
PFP:23731

Component Description

UBS00D65

The crankshaft position sensor (OBD) is located on the transaxle housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
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.
This sensor is not directly used to control the engine system. It is used only for the on board diagnosis.





CONSULT-II Reference Value in Data Monitor Mode

UBS00EMC

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with tachometer indication.	Almost the same speed as the value tachometer indication.

On Board Diagnosis Logic

UBS00D66

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (OBD) circuit	● The crankshaft position sensor (OBD) signal is not detected by the ECM during the first few seconds of engine cranking. ● The proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running. ● The crankshaft position sensor (OBD) signal is not in the normal pattern during engine running.	● Harness or connectors (The crankshaft position sensor (OBD) circuit is open) ● Crankshaft position sensor (OBD) ● Dead battery

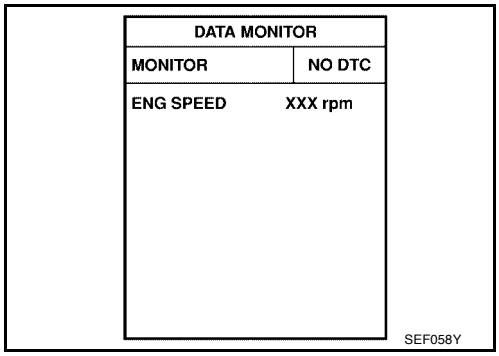
DTC Confirmation Procedure

UBS00D67

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 run it for at least 15 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-272, "Diagnostic Procedure" .



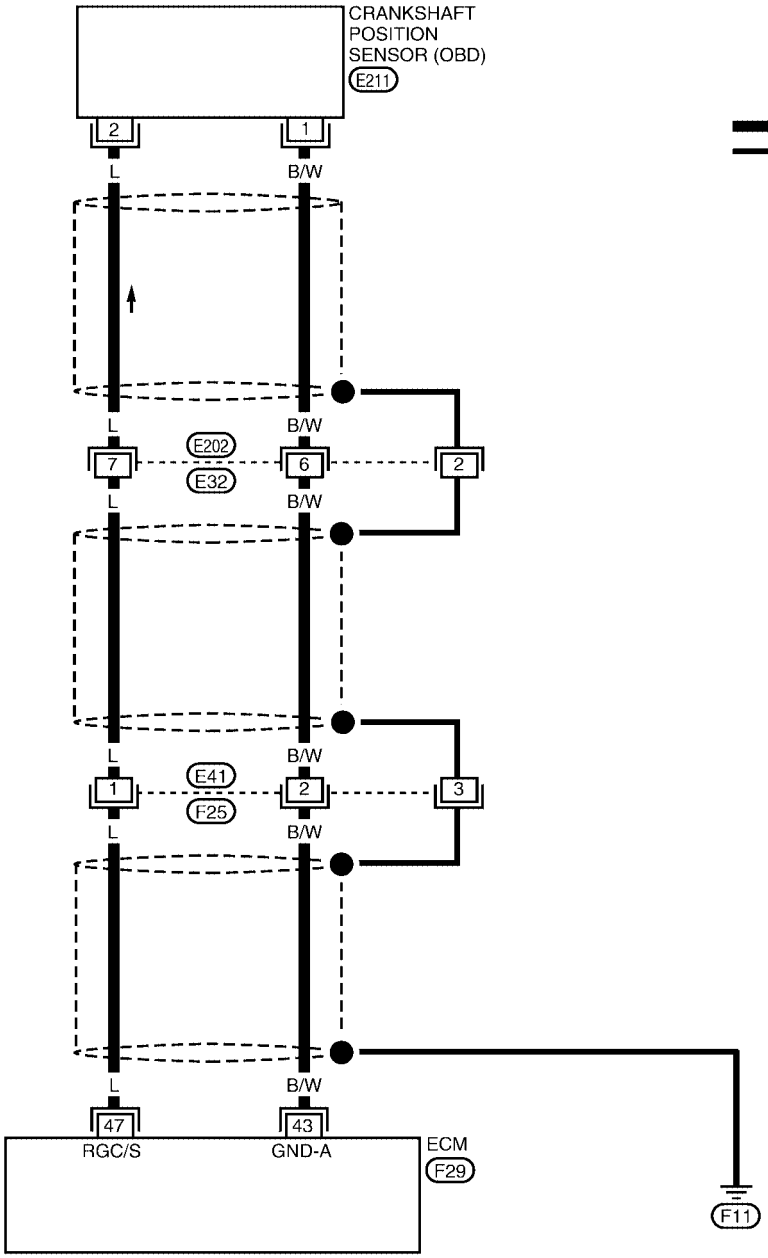
WITH GST

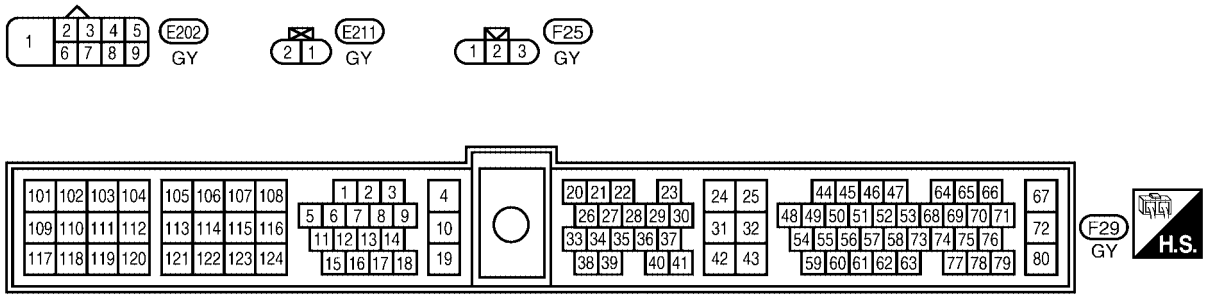
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00D68

EC-CKPS-01



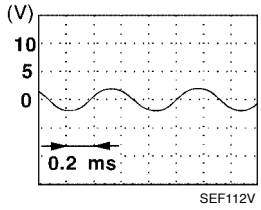
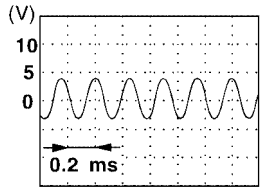


BBWA0548E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	Approximately 0V★  SEF112V
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 0V★  SEF113V

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

Diagnostic Procedure

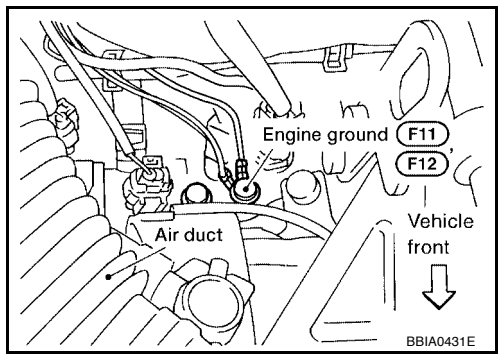
UBS00D69

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

OK or NG

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



BBIA0431E

2. CHECK INPUT SIGNAL CIRCUIT

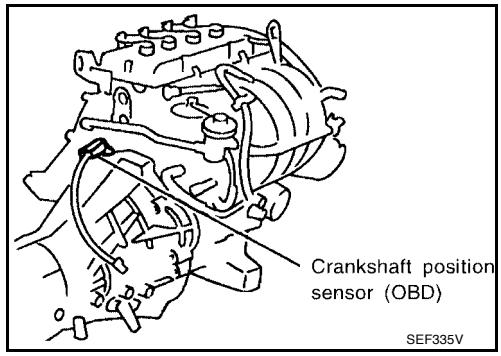
1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.
2. Disconnect ECM harness connector.
3. Check continuity between ECM terminal 47 and crankshaft position sensor (OBD) terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

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

OK or NG

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



SEF335V

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E202, E32
- Harness connectors E41, F25
- Harness for open or short between crankshaft position sensor (OBD) and ECM

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

4. CHECK GROUND CIRCUIT

1. Check harness continuity between crankshaft position sensor (OBD) terminal 1 and ECM terminal 43. Refer to wiring diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E202, E32
- Harness connectors E41, F25
- Harness for open or short between crankshaft position sensor (OBD) and ECM

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

6. CHECK SHIELD CIRCUIT

1. Disconnect harness connectors E202, E32.
2. Check harness continuity between harness connector E32 terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E41, F25
- Harness for open or short between harness connector E32 and ground

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

8. CHECK CRANKSHAFT POSITION SENSOR (OBD)

Refer to EC-274, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace crankshaft position sensor (OBD).

9. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

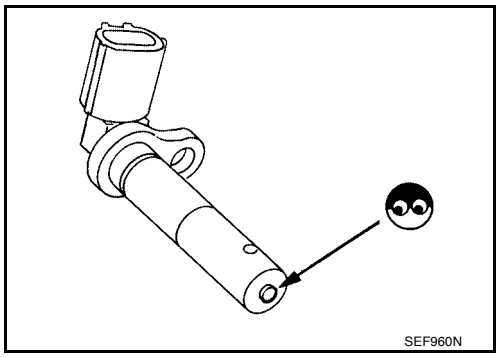
>> **INSPECTION END**.

Component Inspection

UBS00D6A

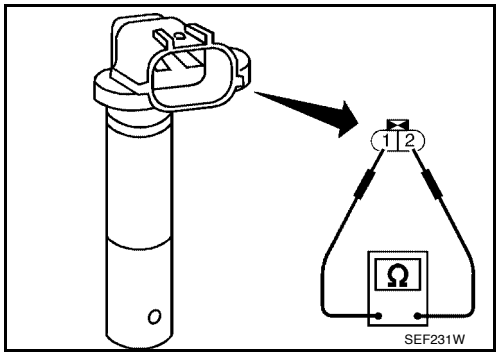
CRANKSHAFT POSITION SENSOR

1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Resistance : Approximately 512 - 632Ω [at 20°C (68°F)]



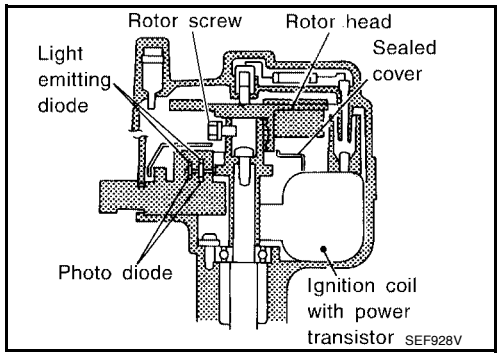
DTC P0340 CMP SENSOR

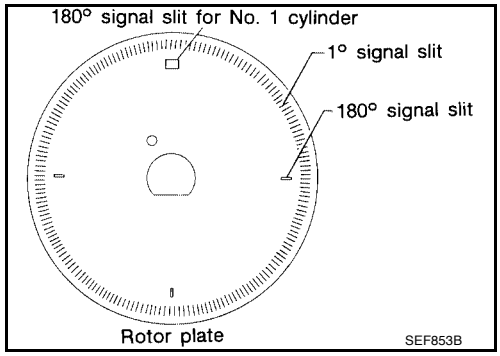
PFP:22100

Component Description

UBS00D6B

The camshaft position sensor is a basic component of the engine control system. It monitors engine speed and piston position. These input signals to the engine control system are used to control fuel injection, ignition timing and other functions.
The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° (POS) signal and 4 slits for a 180° (REF) signal. The wave-forming circuit consists of Light Emitting Diodes (LED) and photo diodes.
The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into on-off signals by the wave-forming circuit and sent to the ECM.
The distributor is not repairable and must be replaced as an assembly except distributor cap and rotor head.





CONSULT-II Reference Value in Data Monitor Mode

UBS00ELW

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	● Run engine and compare the CONSULT-II value with tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

UBS00D6C

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible Cause
P0340	Camshaft position sensor circuit	A)	Either 1° or 180° signal is not sent to ECM for the first few seconds during engine cranking.	● Harness or connectors (The camshaft position sensor circuit is open or shorted.) ● Camshaft position sensor ● Starter motor (Refer to SC-9 .) ● Starting system circuit (Refer to SC-9 .) ● Dead (Weak) battery
		B)	Either 1° or 180° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed.	
		C)	The relation between 1° and 180° signal is not in the normal range during the specified engine speed.	

DTC Confirmation Procedure

UBS00D6D

Perform Procedure for malfunction A first. If 1st trip DTC cannot be confirmed, perform Procedure for malfunction B and C.

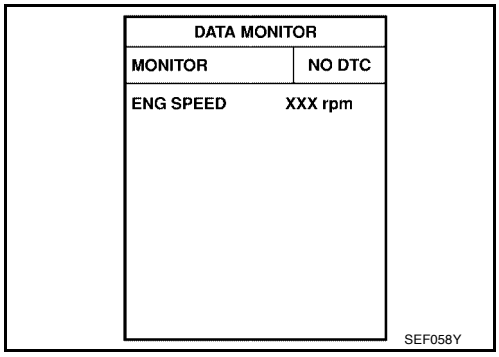
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V.

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Crank engine for at least 2 seconds.
4. If 1st trip DTC is detected, go to EC-279, "Diagnostic Procedure" .

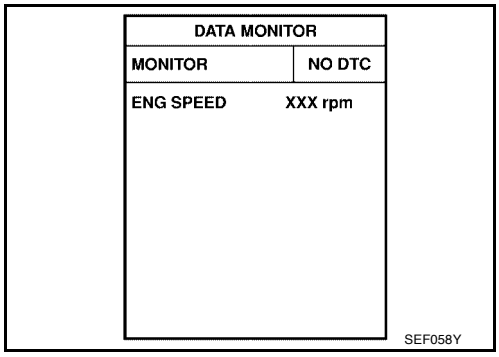


With GST
Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B AND C

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and run it for at least 2 seconds at idle speed.
4. If 1st trip DTC is detected, go to EC-279, "Diagnostic Procedure" .

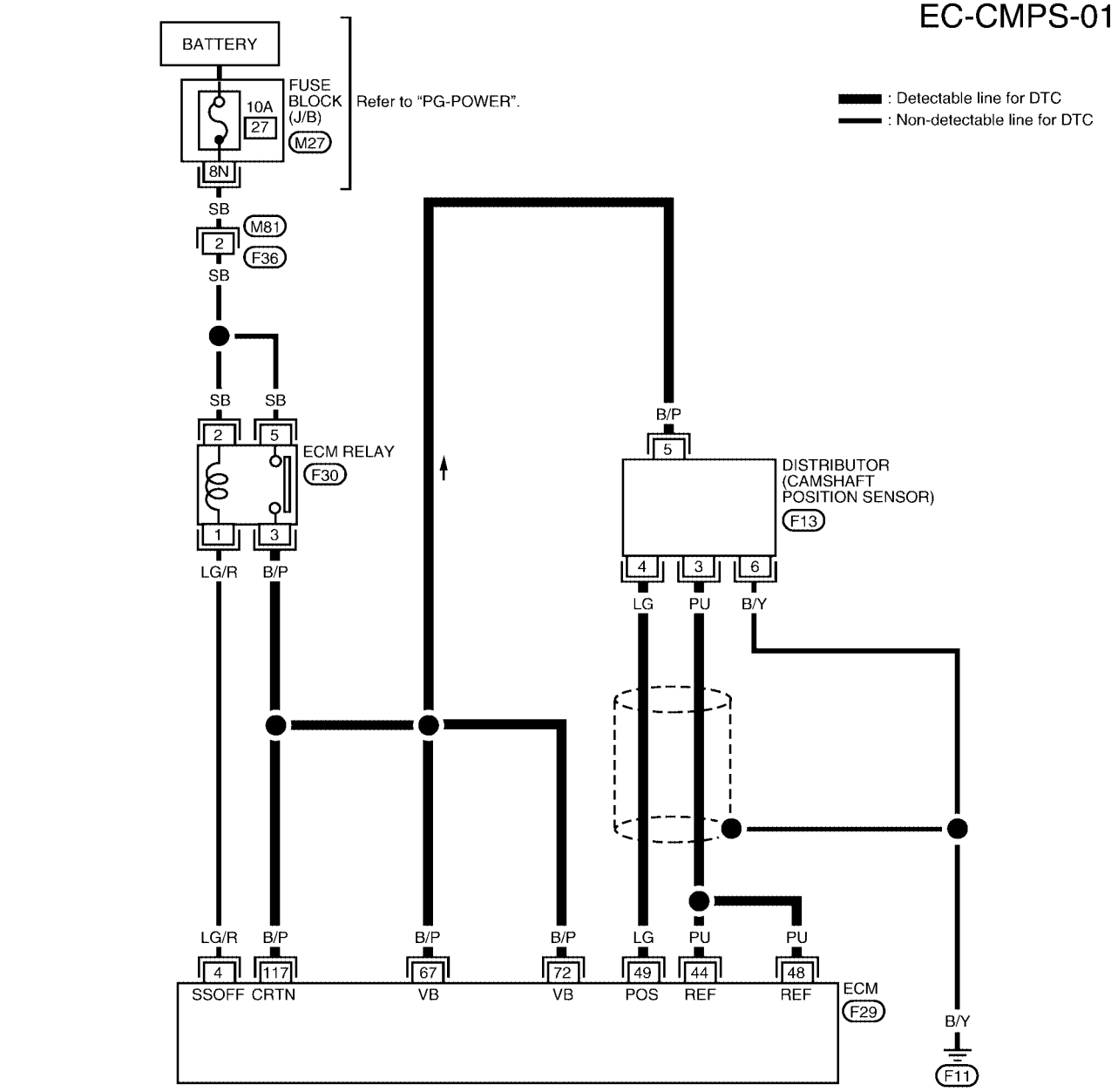


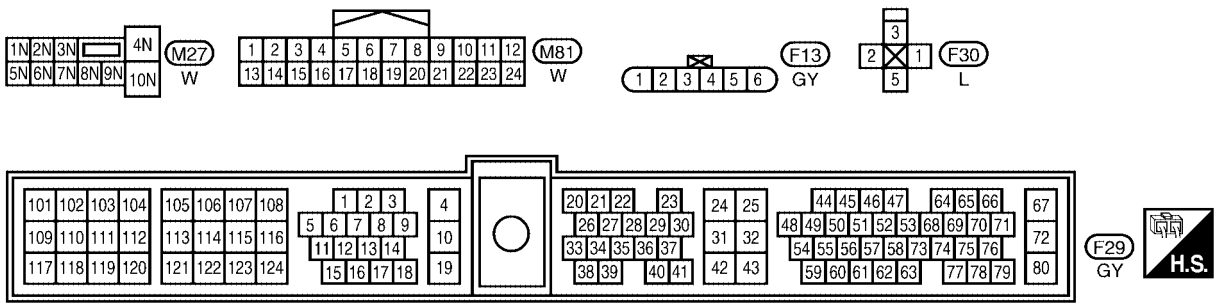
With GST
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00D6E

EC-CMPS-01



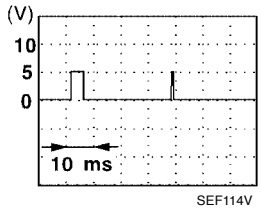
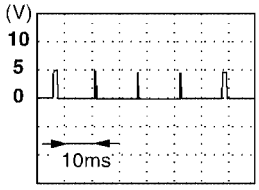
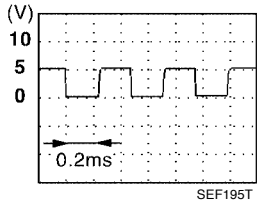
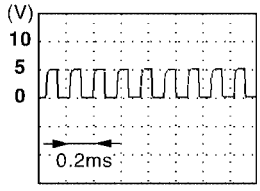


BBWA1060E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	LG/R	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
44 48	PU PU	Camshaft position sensor (Reference signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0.2 - 0.5V★  SEF114V
			[Engine is running] ● Engine speed is 2,000 rpm	0 - 0.5V★  SEF200T
49	LG	Camshaft position sensor (Position signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	Approximately 2.6V★  SEF195T
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5 - 2.6V★  SEF196T
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

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

Diagnostic Procedure

UBS00D6F

1. CHECK STARTING SYSTEM

Does the engine turn over?
(Does the starter motor operate?)

Yes or No

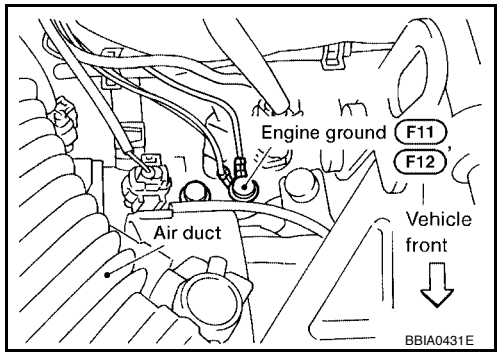
Yes >> GO TO 2.
No >> Check starting system. Refer to SC-9, "STARTING SYSTEM" .

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

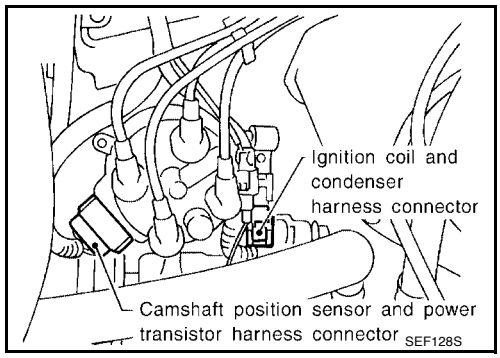
OK or NG

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



3. CHECK POWER SUPPLY

1. Disconnect camshaft position (CMP) sensor harness connector.
2. Turn ignition switch ON.

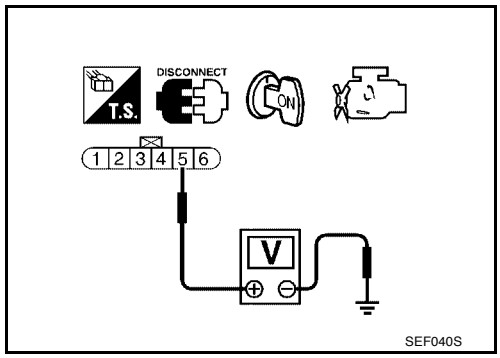


3. Check voltage between camshaft position (CMP) sensor terminal 5 and ground with CONSULT-II or tester.

Voltage : Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between camshaft position sensor and ECM relay
- Harness for open or short between camshaft position sensor and ECM

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

5. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following;
   CMP sensor terminal 4 and ECM terminal 49,
   CMP sensor terminal 3 and ECM terminals 44, 48.
   Refer to Wiring Diagram.

   Continuity should exist.

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

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK GROUND CIRCUIT

1. Check harness continuity between CMP sensor terminal 6 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

2. 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 CAMSHAFT POSITION SENSOR

Refer to EC-281, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace camshaft position sensor.

8. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

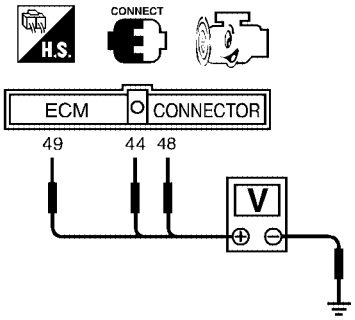
Component Inspection

UBS00D6G

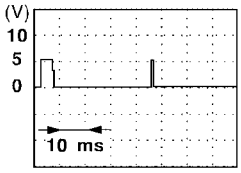
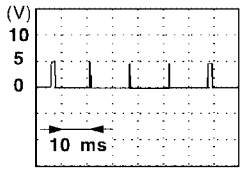
CAMSHAFT POSITION SENSOR

1. Reconnect all harness connector disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 49 and engine ground, ECM terminals 44, 48 and ground.

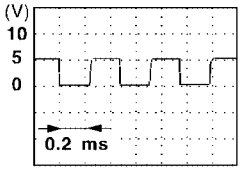
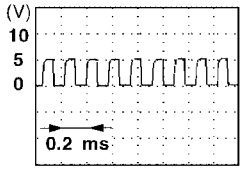
NOTE:
The pulse cycle changes depending on rpm at idle.



Terminals 44, 48 and engine ground

Condition	Idle	2,000 rpm
Voltage	0.2 - 0.5V	0 - 0.5V
Pulse signal		

Terminal 49 and engine ground

Condition	Idle	2,000 rpm
Voltage	Approximately 2.6V	Approximately 2.5 - 2.6V
Pulse signal		

LEC035A

Removal and Installation

UBS00D6H

CAMSHAFT POSITION SENSOR

Refer to EM-13, "OUTER COMPONENT PARTS"

DTC P0400 EGR FUNCTION

PFP:14710

Description

UBS00D6I

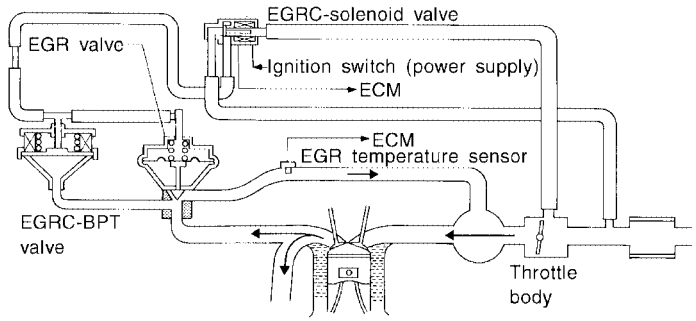
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Intake air temperature sensor	Intake air temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Vehicle speed sensor	Vehicle speed		

This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC solenoid valve. When the ECM detects any of the following conditions, current flows through the solenoid valve is cut. This causes the vacuum to be discharged into the atmosphere. The EGR valve remains closed.

- Low engine coolant temperature
- Engine stopped
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- High engine speed
- Wide open throttle
- Mass air flow sensor malfunction
- Low intake air temperature

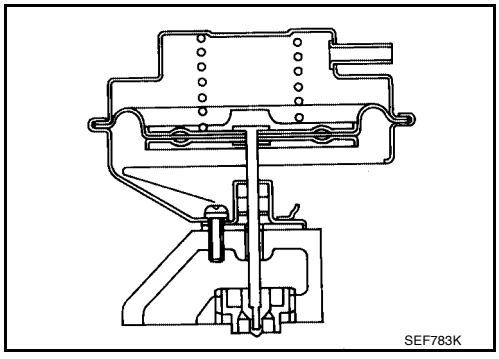
EGR and vacuum



COMPONENT DESCRIPTION

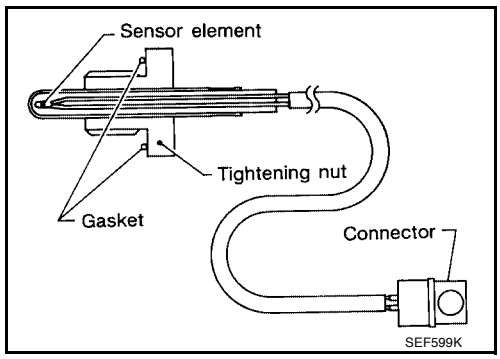
Exhaust Gas Recirculation (EGR) Valve

The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.



EGR temperature sensor

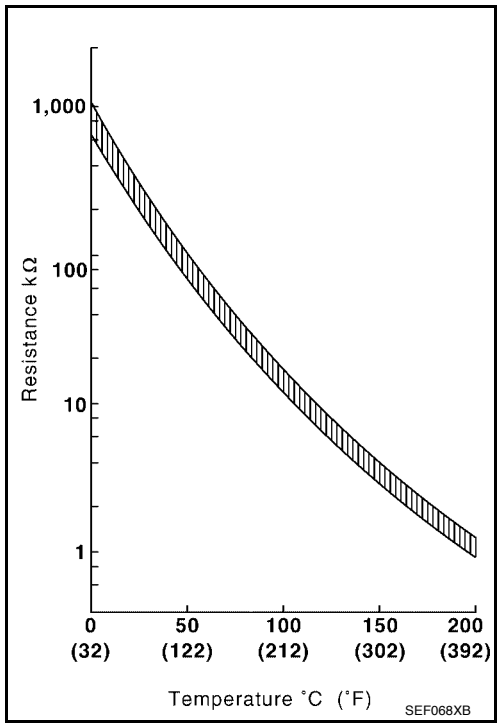
The EGR temperature sensor detects temperature changes in the EGR passageway. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passageway changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases. This sensor is not used to control the engine system.
It is used only for the on board diagnosis.



<Reference data>

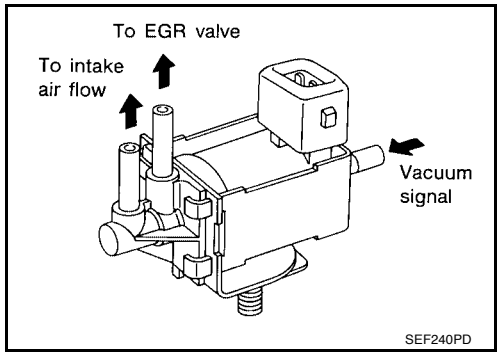
EGR temperature °C (°F)	Voltage* V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

*: This data is reference value and is measured between ECM terminal 63 (EGR temperature sensor) and ground.
When EGR system is operating.
Voltage: 0 - 1.5V



EGRC Solenoid Valve

The EGRC solenoid valve responds to signals from the ECM. When the ECM sends an OFF signal, the vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve.
When the ECM sends an ON signal, a plunger will then move to cut the vacuum signal from the intake manifold collector to the EGR valve.



CONSULT-II Reference Value in Data Monitor Mode

UBS00ELX

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EGR TEMP SEN	● Engine: After warming up	Less than 4.5V

MONITOR ITEM	CONDITION		SPECIFICATION
EGRC SOL/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	OFF
		Engine speed: Revving engine from idle to 3,000 rpm quickly.	ON

On Board Diagnosis Logic

UBS00D6J

If the absence of EGR flow is detected by EGR temperature sensor under the condition that calls for EGR, a low-flow malfunction is diagnosed.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0400	EGR function (close)	● No EGR flow is detected under conditions that call for EGR.	● Harness or connectors (The EGRC solenoid valve circuit is open or short) ● EGR valve stuck closed ● EGRC-BPT valve ● Vacuum hose ● EGRC solenoid valve ● EGR passage clogged ● EGR temperature sensor and circuit ● Exhaust gas leaks

DTC Confirmation Procedure

UBS00D6K

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

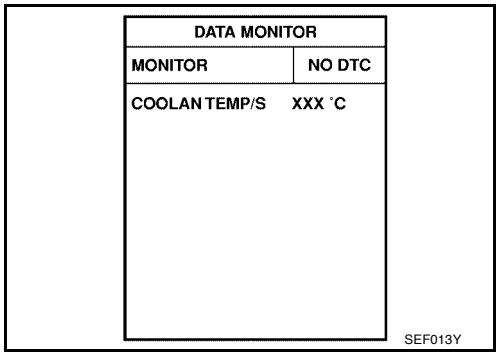
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- P0400 will not be displayed at “SELF-DIAG RESULTS” mode with CONSULT-II even though DTC work support test result is “NG”.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Check “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II and confirm it is within the range listed below.

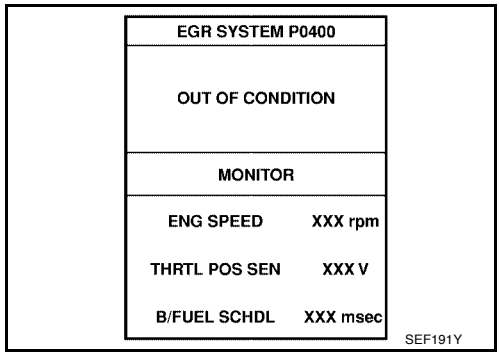
   COOLAN TEMP/S : Less than 40°C (104°F)

   If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

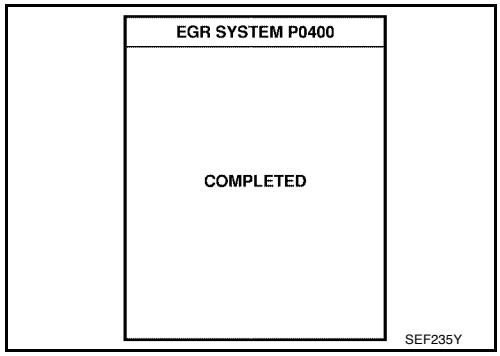


3. Start engine and let it idle monitoring “COOLAN TEMP/S” value. When the “COOLAN TEMP/S” value reaches 70°C (158°F), immediately go to the next step.
4. Select “EGR SYSTEM P0400” of “EGR SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.

5. Touch “START”.

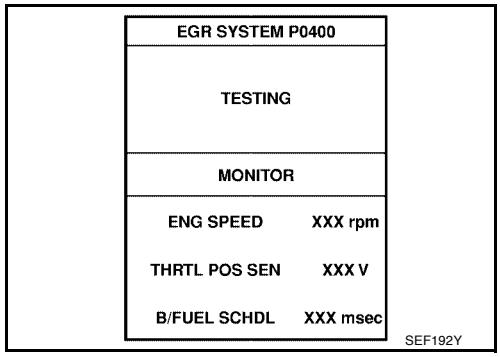


6. Accelerate vehicle to a speed of 40 km/h (25 MPH) once and then stop vehicle with engine running.
   If “COMPLETED” appears on CONSULT-II screen, go to step 9.
   If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.
7. Check the output voltage of “THRTL POS SEN” (at closed throttle position) and note it.



8. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions until “TESTING” changes to “COMPLETED”. (It will take approximately 30 seconds or more.)

ENG SPEED	2,000 - 2,800 rpm
Vehicle speed	10 km/h (6 MPH) or more
B/FUEL SCHDL	7.0 - 10.0 msec
THRTL POS SEN	(X + 0.23) – (X + 0.74) V X = Voltage value measured at step 7
Shift lever	Suitable position



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

9. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-288, "Diagnostic Procedure" .

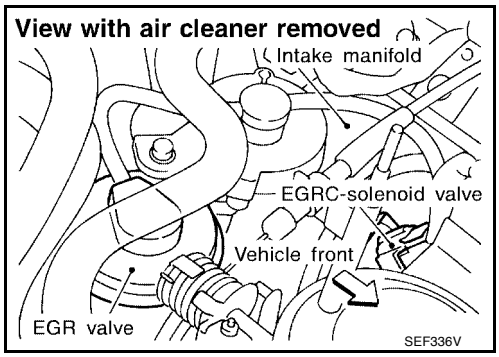
Overall Function Check

UBS00D6L

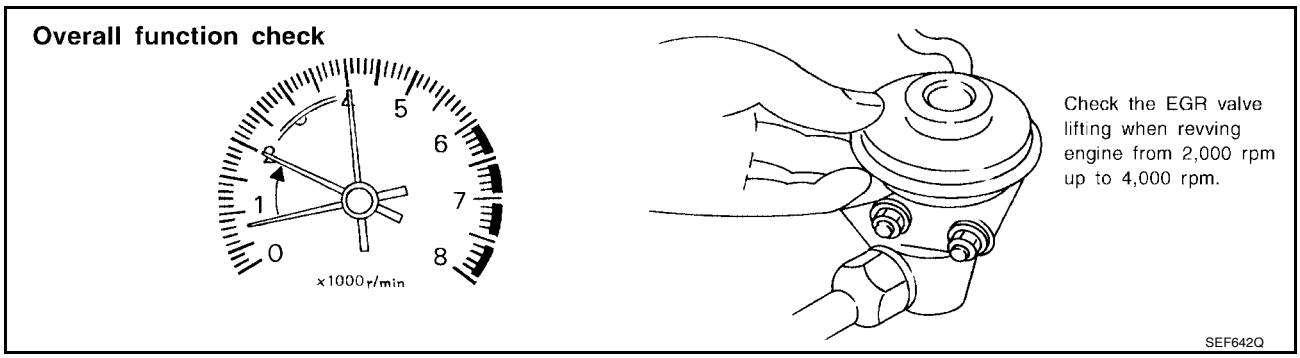
Use this procedure to check the overall EGR function. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Disconnect EGRC solenoid valve harness connector. (The 1st trip DTC for EGRC solenoid valve will be displayed, however, ignore it.)



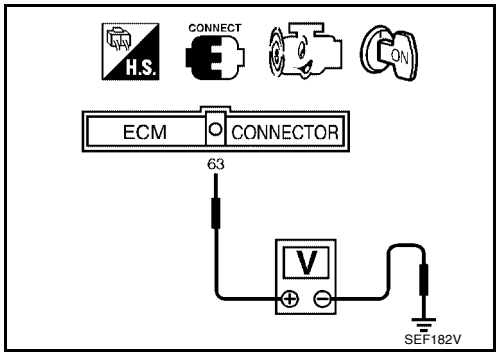
3. Check the EGR valve lifting when revving engine from 2,000 rpm to 4,000 rpm quickly under no load using the following methods.



EGR valve should lift up and down without sticking.

If NG, go to EC-288, "Diagnostic Procedure" .
If OK, go to the next step.

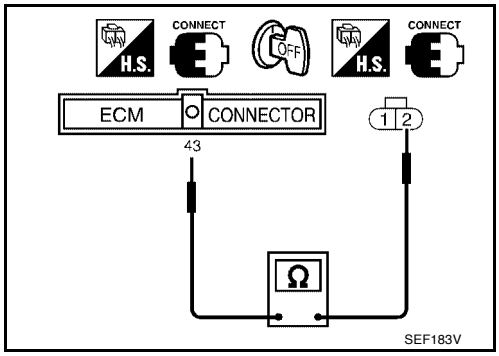
4. Check voltage between ECM terminal 63 (EGR temperature sensor signal) and ground at idle speed.
   Less than 4.5V should exist.
   If NG, go to next step.
5. Turn ignition switch OFF.



6. Check harness continuity between EGR temperature sensor harness connector terminal 2 and ECM terminal 43.

   Continuity should exist.

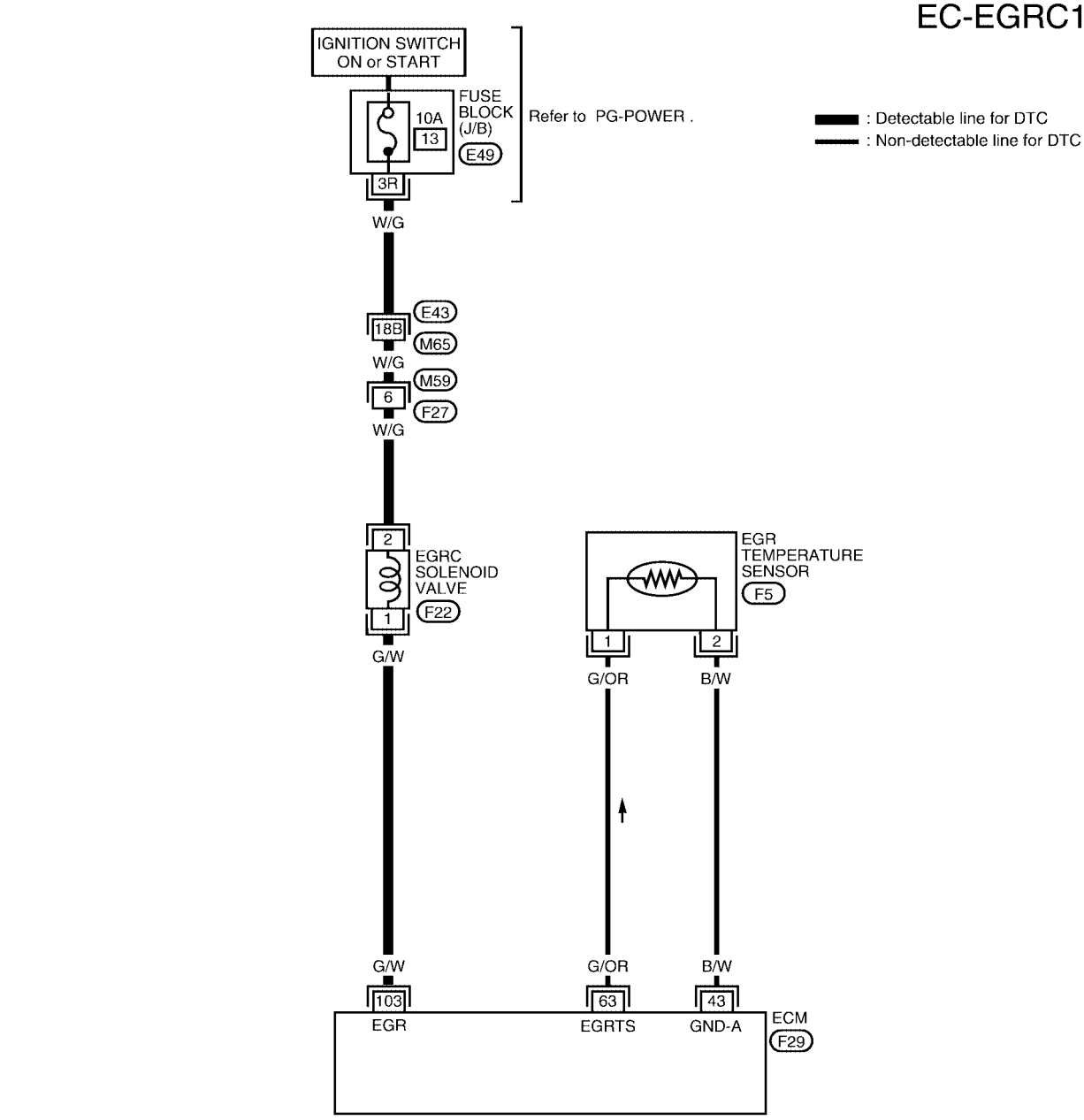
7. Check “EGR TEMPERATURE SENSOR”. Refer to EC-291, "Component Inspection" .

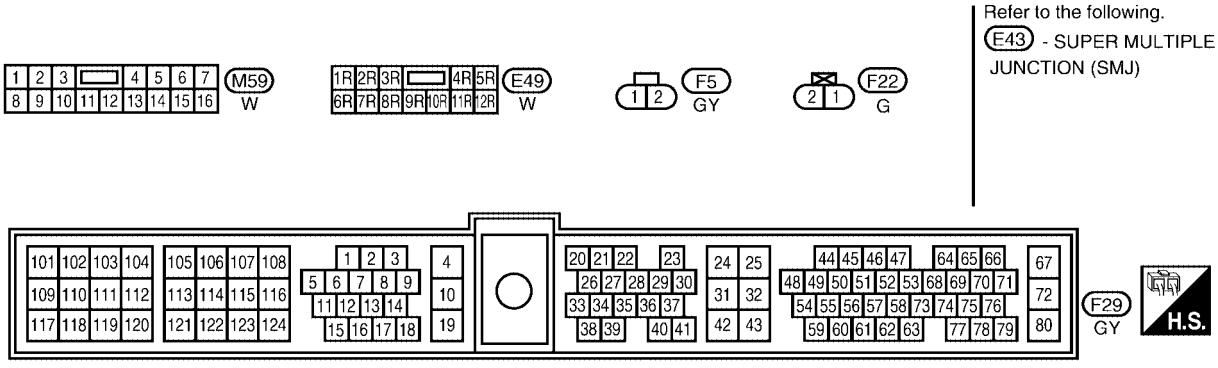


Wiring Diagram

UBS00D6M

EC-EGRC1-01





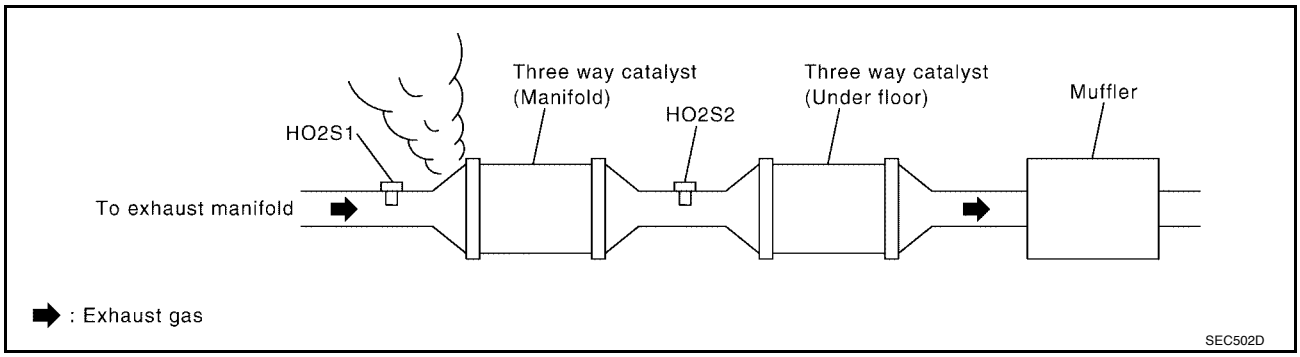
BBWA0453E

Diagnostic Procedure

UBS00D6N

1. CHECK EXHAUST SYSTEM

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



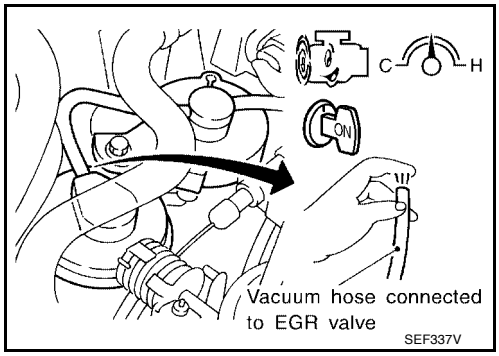
OK or NG

OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> Repair or replace exhaust system.

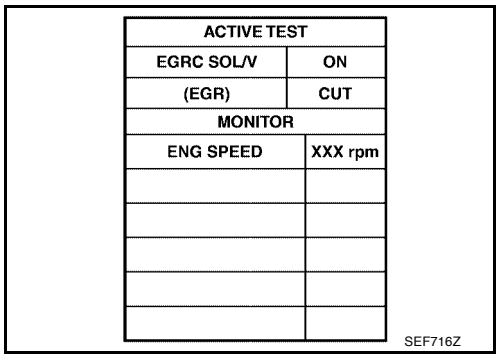
2. CHECK VACUUM SOURCE TO EGR VALVE

With CONSULT-II

1. Warm engine up to normal operating temperature.
2. Disconnect vacuum hose to EGR valve.
3. Check for vacuum existence at idle.
   Vacuum should not exist at idle.



4. Select “EGRC SOLENOID VALVE” in “ACTIVE TEST” mode with CONSULT-II and turn the solenoid valve OFF.
5. Check for vacuum existence when revving engine from 2,000 rpm up to 4,000 rpm.
   Vacuum should exist when revving engine.



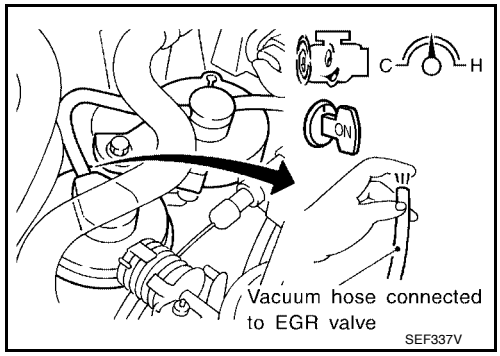
OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

3. CHECK VACUUM SOURCE TO EGR VALVE

Without CONSULT-II

1. Warm engine up to normal operating temperature.
2. Disconnect vacuum hose to EGR valve.
3. Check for vacuum existence at idle.
   Vacuum should not exist at idle.
4. Disconnect EGRC solenoid valve harness connector. (The 1st trip DTC for EGRC solenoid valve will be displayed, but ignore it.)
5. Check for vacuum existence when revving engine from 2,000 rpm up to 4,000 rpm.
   Vacuum should exist when revving engine.



OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK EGR VALVE

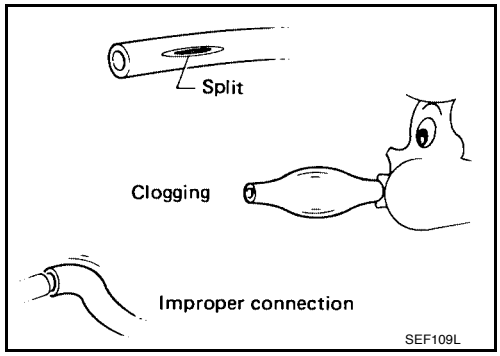
Refer to EC-291, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Repair or replace EGR valve.

5. CHECK VACUUM HOSE

1. Turn ignition switch OFF.
2. Check vacuum hose for clogging, cracks or improper connection.



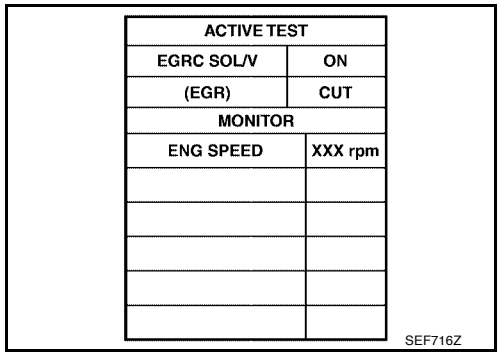
OK or NG

OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> Repair or replace vacuum hose.

6. CHECK EGRC SOLENOID VALVE OPERATION

With CONSULT-II

1. Turn ignition switch ON.
2. Turn EGRC solenoid valve “ON” and “OFF” in “ACTIVE TEST” mode with CONSULT-II and check operating sound.
   Clicking noise should be heard.



OK or NG

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

7. CHECK EGRC SOLENOID VALVE OPERATION

Without CONSULT-II

Check operating sound of the solenoid valve when disconnecting and reconnecting EGRC solenoid valve harness connector. (The DTC or the 1st trip DTC for the EGRC solenoid valve will be displayed, however, ignore it.)

Clicking noise should be heard.

OK or NG

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

8. CHECK EGRC SOLENOID VALVE CIRCUIT

1. Turn ignition switch “OFF”.
2. Check the following.

- Harness connectors E43, M65
- Harness connectors M59, F27
- 10A fuse
- Harness for open or short between fuse and EGRC solenoid valve
- Harness for open or short between ECM and EGRC solenoid valve

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 EGRC SOLENOID VALVE

Refer to EC-297, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace EGRC solenoid valve.

10. CHECK EGRC-BPT VALVE

Refer to EC-291, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace EGRC-BPT valve.

11. CHECK EGR TEMPERATURE SENSOR

Refer to EC-291, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace EGR temperature sensor.

12. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

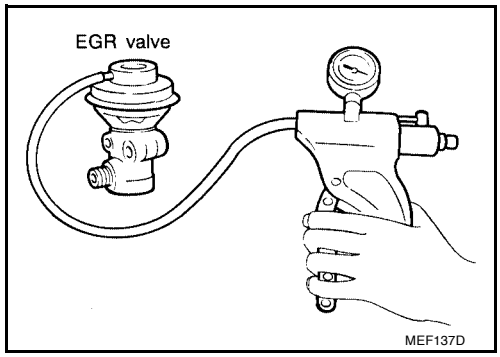
>> **INSPECTION END.**

Component Inspection

UBS00D6O

EGR VALVE

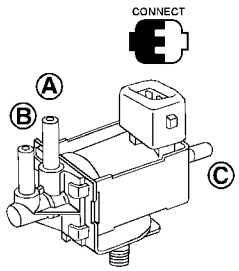
- Apply vacuum to EGR vacuum port with a hand vacuum pump.
  EGR valve spring should lift.
- Check for sticking.



EGRC SOLENOID VALVE

With CONSULT-II

Check air passage continuity.
Perform “EGRC SOLENOID VALVE” in “ACTIVE TEST” mode.



ACTIVE TEST	
EGRC SOL/V	ON
(EGR)	CUT
MONITOR	
ENG SPEED	XXX rpm

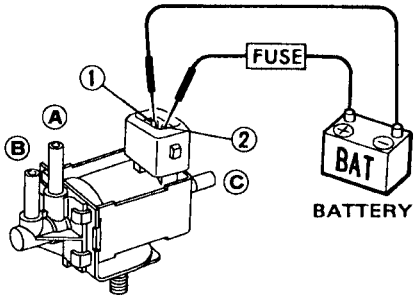
Condition EGRC SOLENOID VALVE	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
ON	Yes	No
OFF	No	Yes

Operation takes less than 1 second.

LEC036A

Without CONSULT-II

Check air passage continuity shown in the figure.



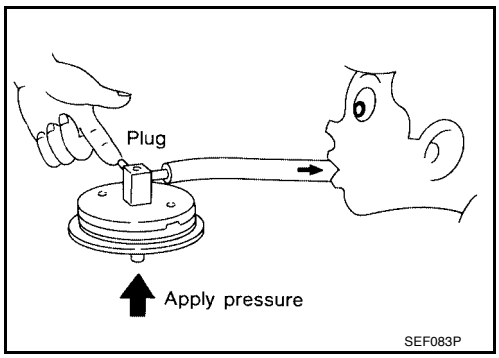
Condition	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

Operation takes less than 1 second.

LEC037A

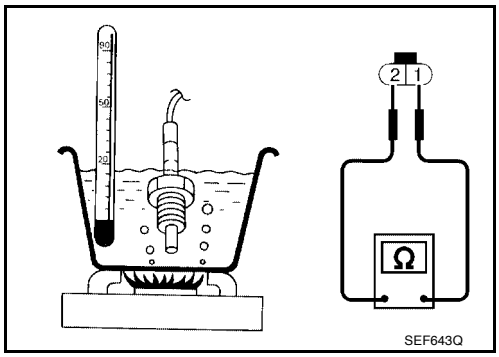
EGRC-BPT VALVE

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH_2O, 3.94 inH_2O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.



EGR TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect EGR temperature sensor harness connector.
3. Check resistance between EGR temperature sensor terminals 1 and 2 as shown in the figure.

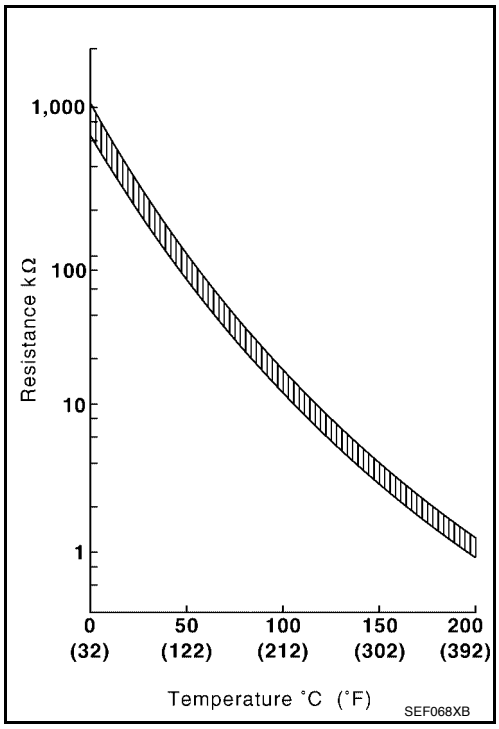


<Reference data>

EGR temperature °C (°F)	Voltage [V]*	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

*: This data reference value and is measured between ECM terminal 63 (EGR temperature sensor) and ground.

4. If NG, replace EGR temperature sensor.



Removal and Installation

UBS00D6P

EGR VALVE

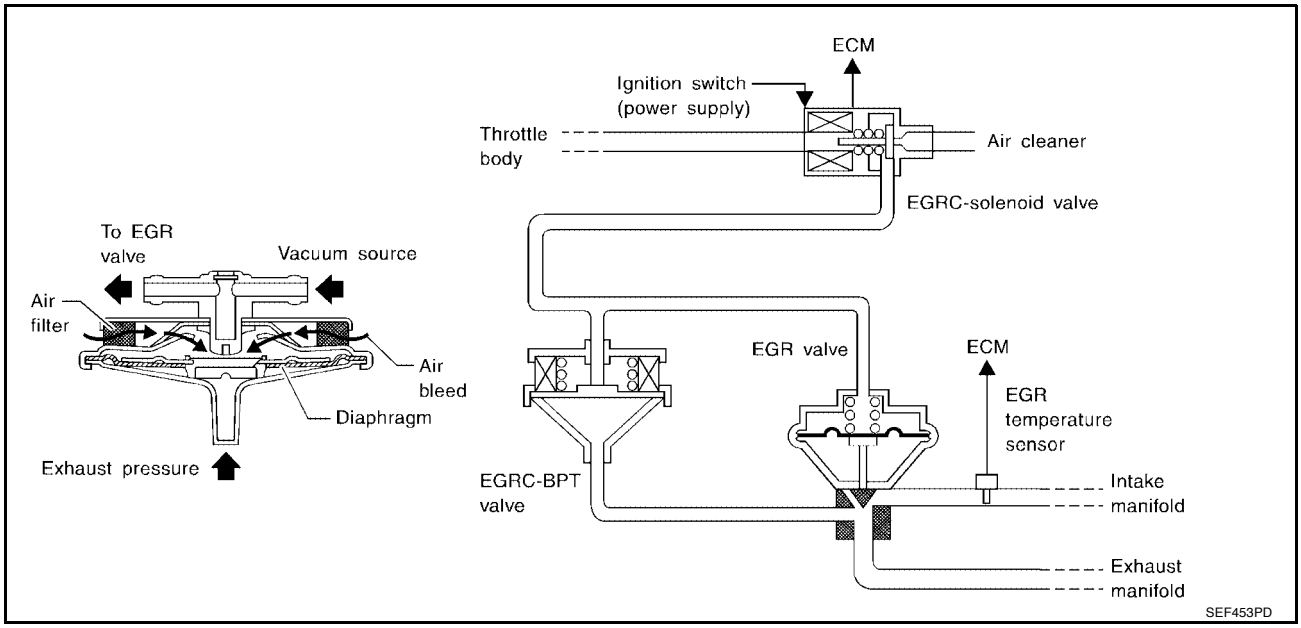
Refer to EM-13, "OUTER COMPONENT PARTS" .

DTC P0402 EGRC-BPT VALVE FUNCTION

PFP:14741

Description

UBS00D6Q



SYSTEM DESCRIPTION

The EGRC-BPT valve monitors exhaust pressure to activate the diaphragm, controlling throttle body vacuum applied to the EGR valve. In other words, recirculated exhaust gas is controlled in response to positioning of the EGR valve or to engine operation.

On Board Diagnosis Logic

UBS00D6R

If too much EGR flow exists due to an EGRC-BPT valve malfunction, off idle engine roughness will increase. If the roughness is large, then the vacuum to the EGR valve is interrupted through the EGRC solenoid valve. If the engine roughness is reduced at that time, the EGRC-BPT valve malfunction is indicated.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0402	EGRC-BPT valve function	● The EGRC-BPT valve does not operate properly.	● EGRC-BPT valve ● EGR valve ● Loose or disconnected rubber tube ● Blocked rubber tube ● Camshaft position sensor ● Blocked exhaust system ● Orifice ● Mass air flow sensor ● EGRC solenoid valve

DTC Confirmation Procedure

UBS00D6S

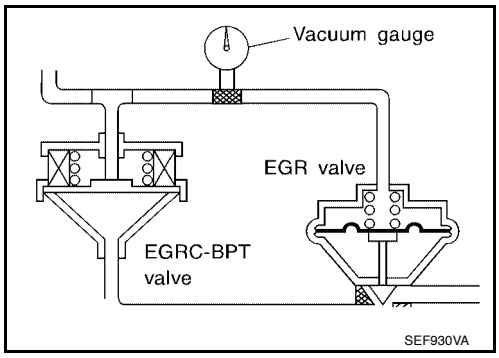
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

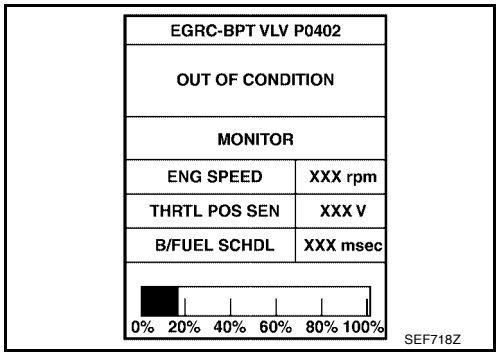
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

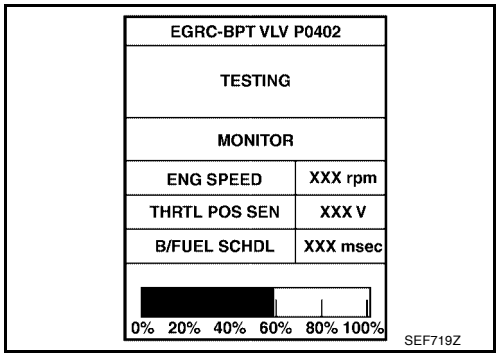
1. Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
2. Start engine and warm it up to normal operating temperature.
3. Stop engine and wait at least 5 seconds.
4. Turn ignition switch ON and select “EGRC-BPT VLV P0402” of “EGR SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
5. Start engine and let it idle.



6. Touch “START”.
7. Check the output voltage of “THRTL POS SEN” (at closed throttle position) and note it.



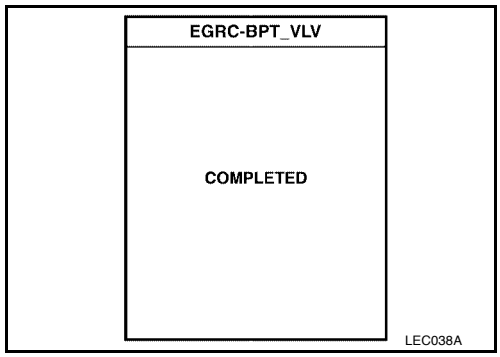
8. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen and the bar chart may increase. Maintain the conditions many times until “COMPLETED” appears.



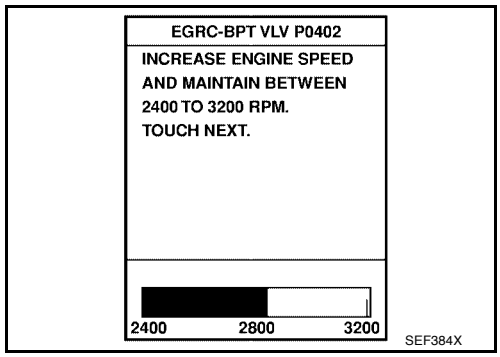
Shift lever	Suitable position
ENG SPEED	1,400 - 2,000 rpm (M/T) 1,400 - 1,800 rpm (A/T)
Vehicle speed	30 - 100 km/h (19 - 62 MPH) (M/T) 30 - 55 km/h (19 - 34 MPH) (A/T)
B/FUEL SCHDL	5 - 7.5 msec (M/T) 5.5 - 8.0 msec (A/T)
THRTL POS SEN	(X – (X + 0.88) V X = Voltage value measured at step 7

NOTE:

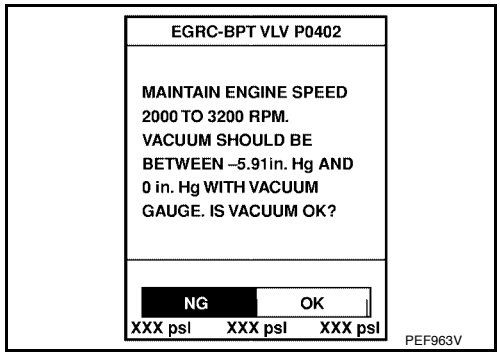
- **The bar chart on CONSULT-II screen indicates the status of this test. However, the test may be finished before the bar chart becomes full scale.**
- **If the bar chart indication does not continue to progress, completely release accelerator pedal once and try to meet the conditions again.**
- **If "TESTING" does not appear on CONSULT-II screen, retry from step 2.**



9. If CONSULT-II instructs to carry out Overall Function Check, go to next step. If "NG" is displayed, refer to EC-296, "Diagnostic Procedure" .
10. Open engine hood.
11. Raise engine speed to 2,400 to 3,200 rpm under no-load and hold it. Then touch "NEXT" on CONSULT-II screen.



12. Check vacuum gauge while keeping engine speed at 2,400 to 3,200 rpm.
    Vacuum should be 0 to −20 kPa (0 to −150 mmHg, 0 to −5.91 inHg).
    If NG, go to EC-296, "Diagnostic Procedure" .
    If OK, touch "YES" on the CONSULT-II screen.
13. Check the EGR valve lifting when revving from 2,000 rpm to 4,000 rpm quickly under no load.
    EGR valve should lift up, and go down without sticking when the engine is returned to idle.
    If NG, check EGR valve.
    If OK, touch "YES" or the CONSULT-II screen.



14. Check the rubber tube between intake manifold collector, EGRC solenoid valve, EGR valve and EGRC-BPT valve for cracks, blockages or twisting.
    If NG, repair or replace.
    If OK, touch "YES" on the CONSULT-II screen.

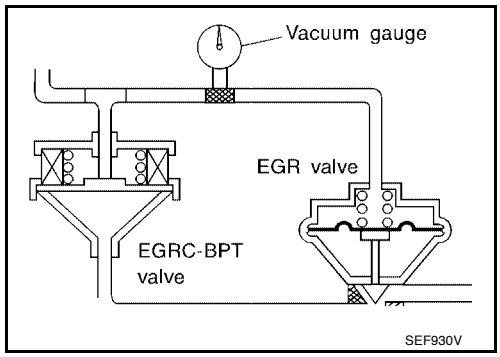
Overall Function Check

UBS00D6T

Use this procedure to check the overall function of the EGRC-BPT valve. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
2. Lift up vehicle.
3. Start engine and shift to 1st (M/T) or D (A/T) position.
4. Check vacuum gauge while keeping engine speed at 2,400 to 3,200 rpm.
   Vacuum should be 0 to −20 kPa (0 to −150 mmHg, 0 to −5.91 inHg).
   If NG, go to EC-296, "Diagnostic Procedure" .
   If OK, go to next step.



5. Check the EGR valve lifting when revving from 2,000 rpm to 4,000 rpm quickly under no load.
   EGR valve should lift up, and go down without sticking when the engine is returned to idle.
6. Check rubber tube between intake manifold collector, EGRC solenoid valve, EGR valve and EGRC-BPT valve for misconnection, cracks or blockages.
7. If NG, go to EC-296, "Diagnostic Procedure" .

Diagnostic Procedure

UBS00D6U

1. CHECK HOSE

Check vacuum hose for clogging and improper connection.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace vacuum hose.

2. CHECK EXHAUST SYSTEM

Check exhaust system for collapse.

OK or NG

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

3. CHECK ORIFICE

Check if orifice is installed in vacuum hose between EGRC-BPT valve and EGRC solenoid valve.

OK or NG

OK >> GO TO 4.
NG >> Replace vacuum hose.

4. CHECK EGRC-BPT VALVE

Refer to EC-297, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace EGRC-BPT valve.

5. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-297, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace camshaft position sensor.

6. CHECK MASS AIR FLOW SENSOR

Refer to EC-297, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace mass air flow sensor.

7. CHECK EGRC SOLENOID VALVE

Refer to EC-297, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace EGRC solenoid valve.

8. CHECK EGR VALVE

Refer to EC-297, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace EGR valve.

9. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

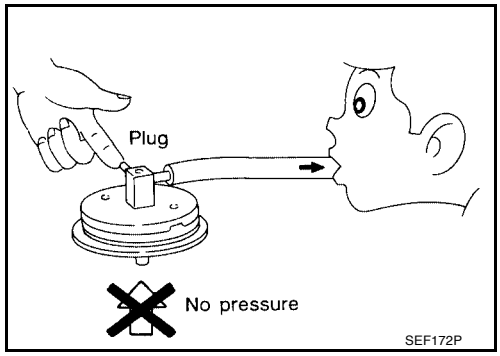
>> **INSPECTION END**.

Component Inspection

UBS00D6V

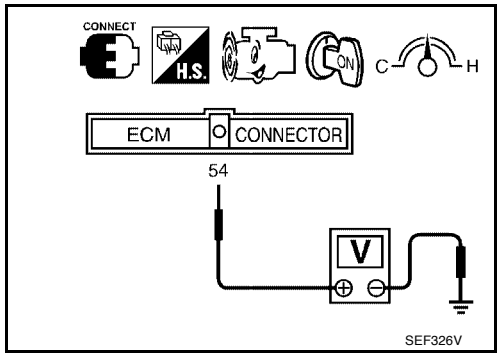
EGRC-BPT VALVE

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check leakage without applying any pressure from under EGR-BPT valve.
   Leakage should exist.



MASS AIR FLOW SENSOR

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (mass air flow sensor signal) and ground.



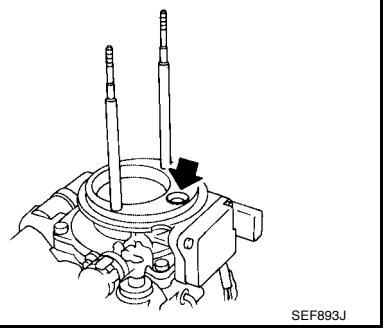
Condition	Voltage V
Ignition switch ON (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 185
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.9 - 2.3
Idle to about 4,000 rpm*	1.3 - 1.7 to Approx. 3.0

*: Make sure linear voltage rises as engine speed increase 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

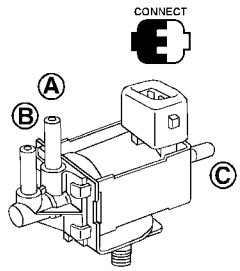
5. If NG, remove mass air flow sensor from intake manifold. Check hot wire for damage or dust.
6. If NG, clean or replace mass air flow sensor.


SEF893J

EGRC SOLENOID VALVE

With CONSULT-II

Check air passage continuity.
Perform “EGRC SOLENOID VALVE” in “ACTIVE TEST” mode.



ACTIVE TEST	
EGRC SOL/V	ON
(EGR)	CUT
MONITOR	
ENG SPEED	XXX rpm

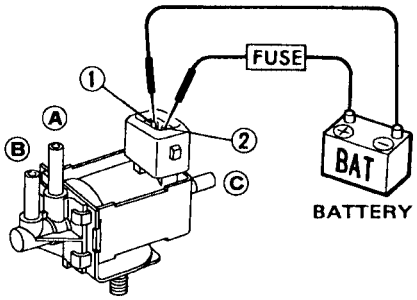
Condition EGRC SOLENOID VALVE	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
ON	Yes	No
OFF	No	Yes

Operation takes less than 1 second.

LEC036A

Without CONSULT-II

Check air passage continuity shown in the figure.



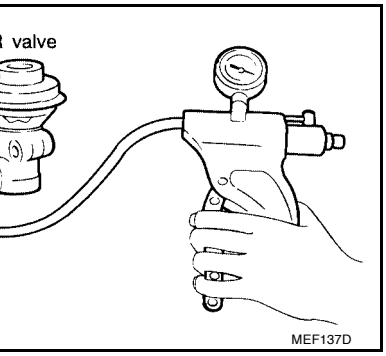
Condition	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

Operation takes less than 1 second.

LEC037A

EGR VALVE

- Apply vacuum to EGR vacuum port with a hand vacuum pump. **EGR valve spring should lift.**
- Check for sticking.



MEF137D

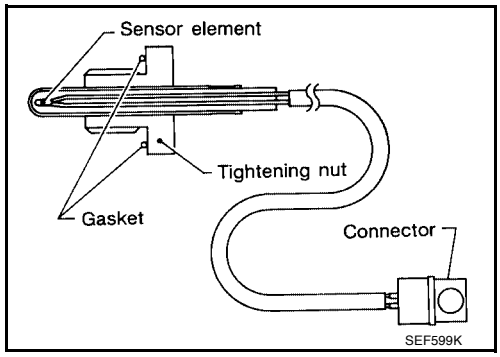
DTC P0405, P0406 EGRT SENSOR

PFP:14710

Component Description

UBS00D6W

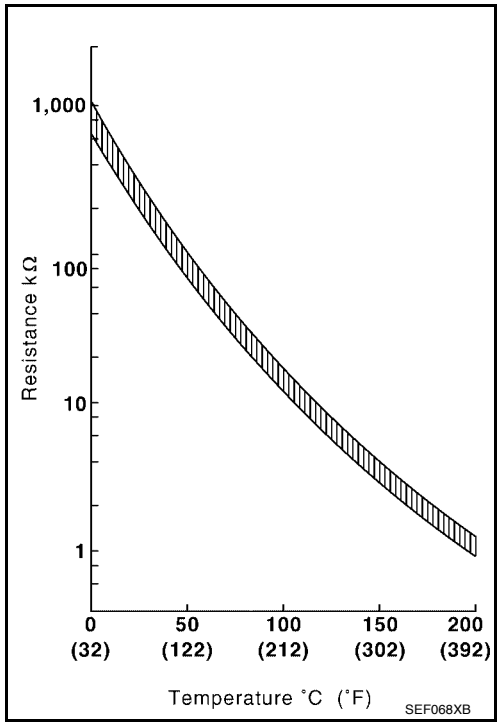
The EGR temperature sensor detects temperature changes in the EGR passageway. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passageway changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases. This sensor is not used to control the engine system.
It is used only for the on board diagnosis.



<Reference data>

EGR temperature °C (°F)	Voltage* V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

*: This data is reference value and is measured between ECM terminal 63 (EGR temperature sensor) and ground.
When EGR system is operating.
Voltage: 0 - 1.5V



On Board Diagnosis Logic

UBS00D6X

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0405	EGR temperature sensor circuit low input	An excessively low voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is low.	● Harness or connectors (The EGR temperature sensor circuit is shorted.) ● EGR temperature sensor ● Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve
P0406	EGR temperature sensor circuit high input	An excessively high voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is high.	● Harness or connectors (The EGR temperature sensor circuit is open.) ● EGR temperature sensor ● Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve

DTC Confirmation Procedure

UBS00D6Y

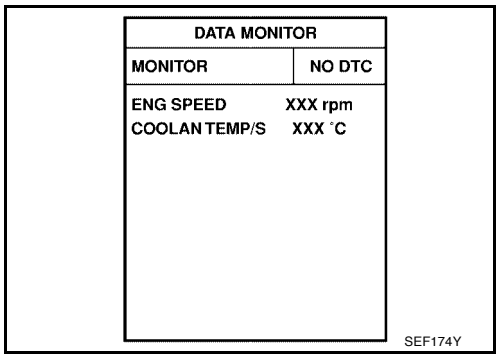
Perform PROCEDURE FOR P0405 first. If 1st trip DTC cannot be confirmed, perform PROCEDURE FOR P0406.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR P0405

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Verify that engine coolant temperature is less than 50°C (122°F).
   If the engine coolant temperature is above the range, cool the engine down.
4. Start engine and let it idle for at least 8 seconds.
5. If 1st trip DTC is detected, go to EC-303, "Diagnostic Procedure" .



With GST

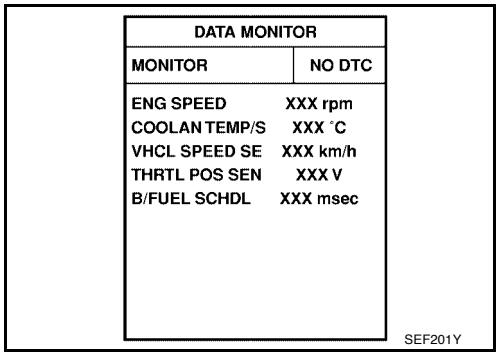
Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR P0406

CAUTION:
Always drive vehicle at a safe speed.
TESTING CONDITION:
Always perform the test at a temperature above 5°C (41°F).

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Confirm that EGR valve is not lifting.
   If the result is NG, perform trouble diagnosis for DTC P1402. Refer to EC-463 .
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Read “EGR TEMP SEN” at about 1,500 rpm while holding the EGR valve in full open position by hand.
   Voltage should decrease to less than 1.5V.
   If the result is NG, go to EC-303, "Diagnostic Procedure" .
   If the result is OK, go to following step.
5. Turn ignition switch OFF and wait at least 5 seconds.
6. Turn ignition switch ON.
7. Check the output voltage of “THRTL POS SEN” (at closed throttle position) and note it.
8. Start engine and maintain the following conditions for at least 5 consecutive seconds.



ENG SPEED	2,000 - 2,800 rpm
VHCL SPEED SE	10 km/h (6 MPH) or more
B/FUEL SCHDL	7 - 10.5 msec
THRTL POS SEN	(X + 0.23) – (X + 0.74) V X = Voltage value measured at step 7
Shift lever	Suitable position

9. If 1st trip DTC is detected, go to EC-303, "Diagnostic Procedure" .

Overall Function Check

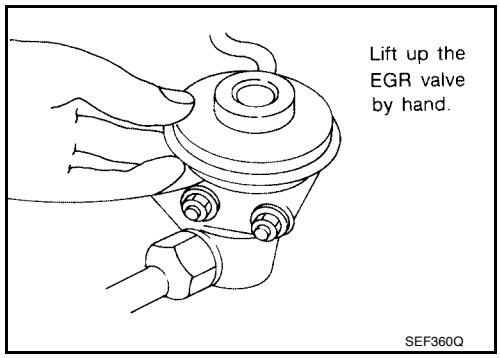
UBS00D6Z

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

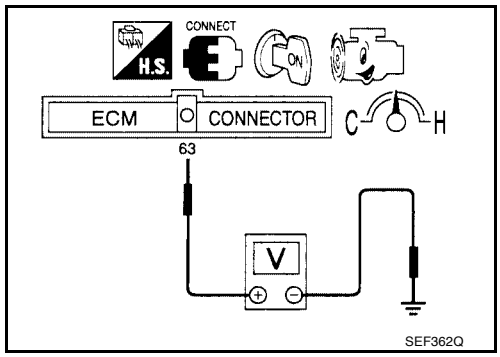
PROCEDURE FOR P0406

With GST

1. Start engine and warm it up to normal operating temperature.
2. Run engine at idle for at least 2 minutes.
3. Confirm that EGR valve is not lifting.
   If NG, perform trouble diagnosis for DTC P1402.
   Refer to EC-463 .



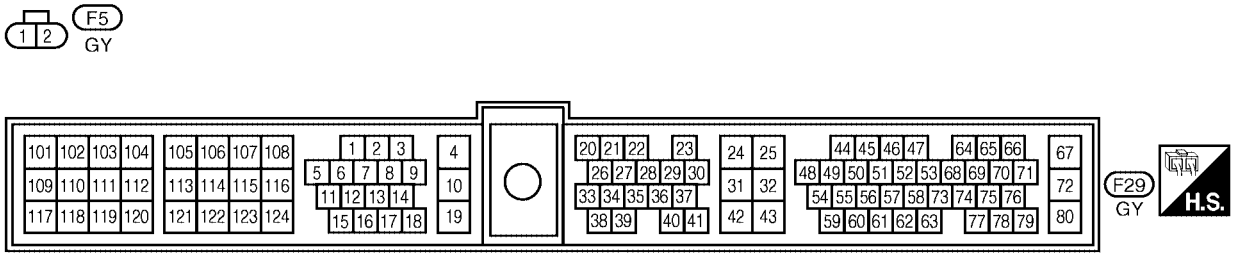
4. Check voltage between ECM terminal 63 (EGR temperature sensor signal) and ground at about 1,500 rpm with EGR valve lifted up to the full position by hand.
   Voltage should decrease to less than 1.0V.
5. If NG, go to EC-303, "Diagnostic Procedure" .
   If OK, perform trouble diagnoses for DTC P0400 and P1400. Refer to EC-282 , EC-457 .



Wiring Diagram

UBS00D70





AEC006B

Diagnostic Procedure

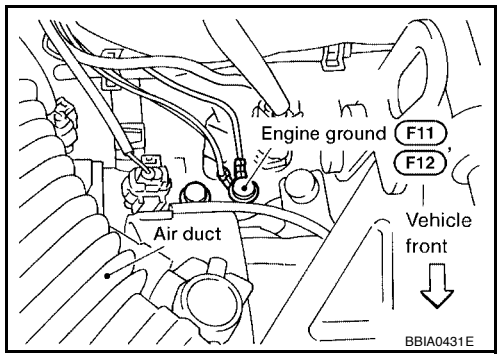
UBS00D71

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

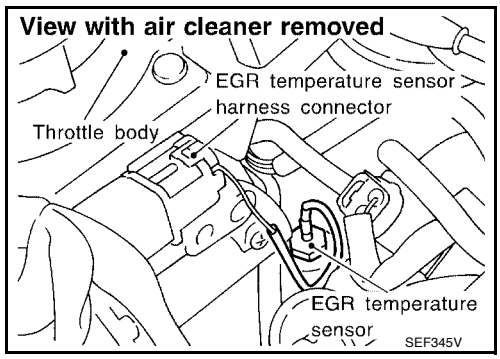
OK or NG

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



2. CHECK POWER SUPPLY

1. Disconnect EGR temperature sensor harness connector.
2. Turn ignition switch ON.

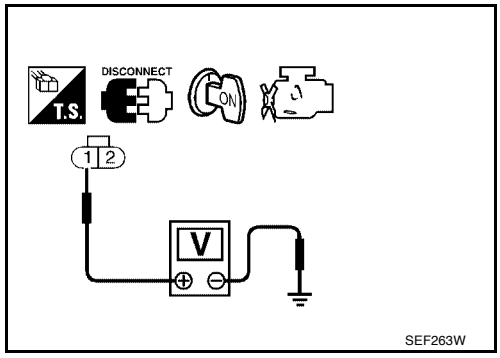


3. Check voltage between terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

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



3. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EGR temperature sensor terminal 2 and ECM terminal 43.
   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 harness for open or short between EGR temperature sensor and ECM.

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

5. CHECK EGR TEMPERATURE SENSOR

Refer to EC-304, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace EGR temperature sensor.

6. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

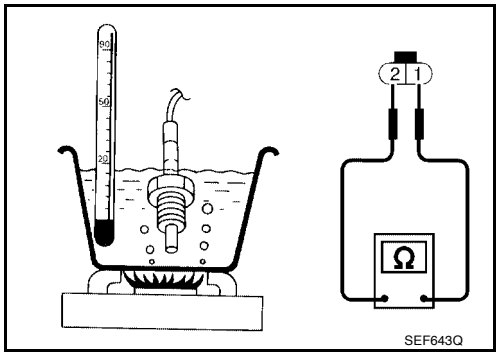
>> **INSPECTION END**

Component Inspection

UBS00D72

EGR TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect EGR temperature sensor harness connector.
3. Check resistance between EGR temperature sensor terminals 1 and 2 as shown in the figure.

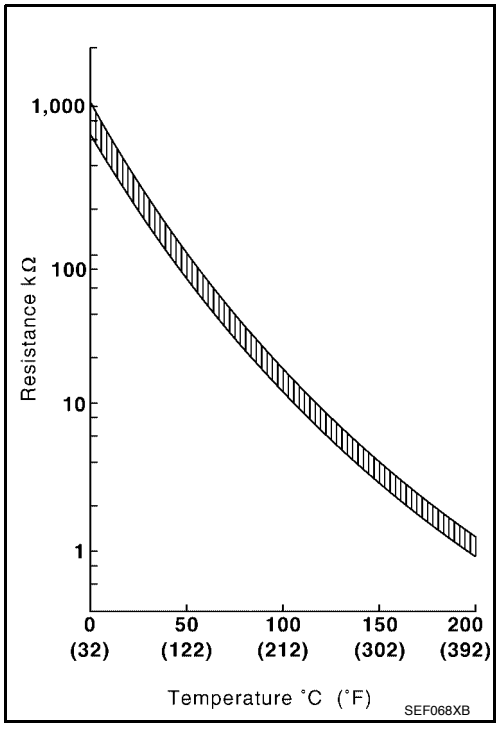


<Reference data>

EGR temperature °C (°F)	Voltage [V]*	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

*: This data reference value and is measured between ECM terminal 63 (EGR temperature sensor) and ground.

4. If NG, replace EGR temperature sensor.



Removal and Installation

UBS00D73

EGR TEMPERATURE SENSOR

Refer to EM-13, "OUTER COMPONENT PARTS"

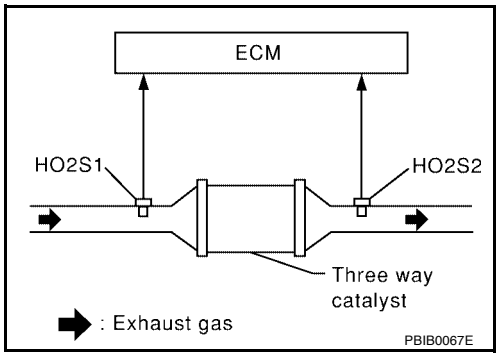
DTC P0420 THREE WAY CATALYST FUNCTION

PFP:20905

On Board Diagnosis Logic

UBS00D74

The ECM monitors the switching frequency ratio of heated oxygen sensor 1 and 2.
A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of heated oxygen sensors 1 and 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0420	Catalyst system efficiency below threshold	● Three way catalyst (manifold) does not operate properly. ● Three way catalyst (manifold) does not have enough oxygen storage capacity.	● Three way catalyst (manifold) ● Exhaust tube ● Intake air leaks ● Fuel injector ● Injector leaks ● Spark plug ● Improper ignition timing

DTC Confirmation Procedure

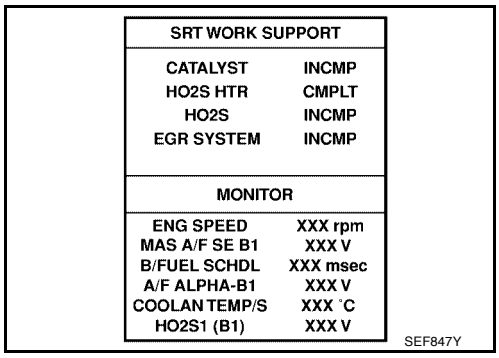
UBS00D75

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
TESTING CONDITION:

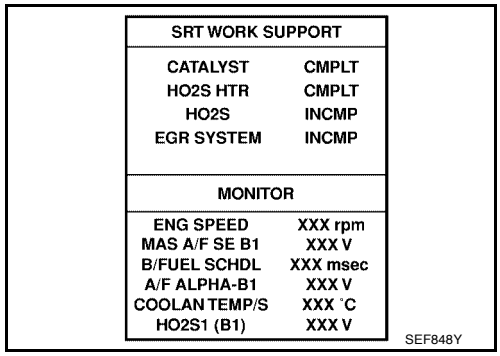
- **Open engine hood before conducting following procedure.**
- **Do not hold engine speed more than specified minutes below.**

With CONSULT-II

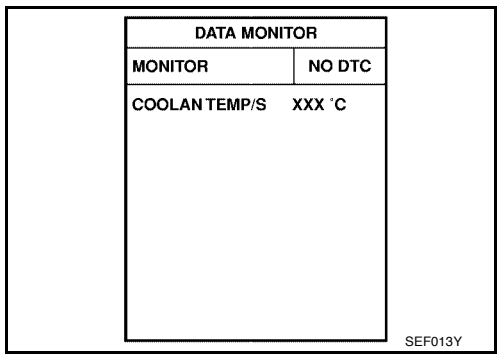
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
6. 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 9
7. Wait 5 seconds at idle.



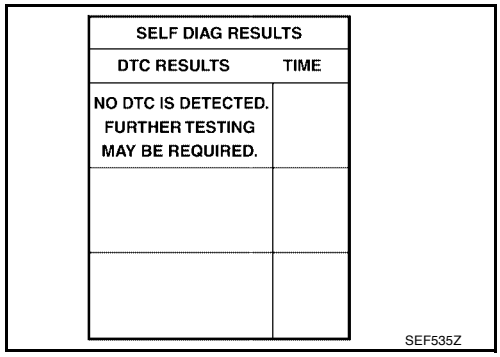
8. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).
   If not “CMPLT”, perform the following.
a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).



b. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
c. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-II.
d. When “COOLAN TEMP/S” indication reaches to 70°C (158°F), go to step 3.



9. Select “SELF-DIAG RESULTS” mode with CONSULT-II.
10. Confirm that the 1st trip DTC is not detected.
    If the 1st trip DTC is detected, go to EC-308, "Diagnostic Procedure" .



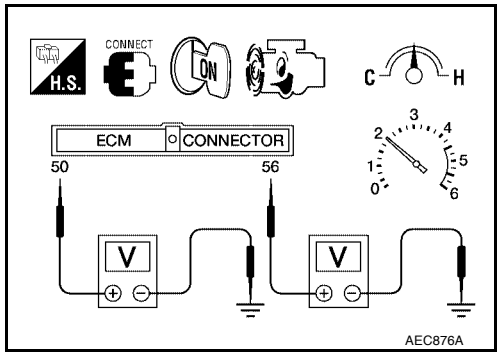
Overall Function Check

UBS00D76

Use this procedure to check the overall function of the three way catalyst. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeters probes between ECM terminals 50 (Heated oxygen sensor 1 signal), 56 (Heated oxygen sensor 2 signal) and ground.
6. Keep engine speed at 2,000 rpm constant under no load.
7. Make sure that the voltage switching frequency (high & low) between ECM terminal 56 and ground is much less than that of ECM terminal 50 and ground.
   Switching frequency ratio = A/B
   A: Heated oxygen sensor 2 voltage switching frequency
   B: Heated oxygen sensor 1 voltage switching frequency
   This ratio should be less than 0.75.
   If the ratio is greater than above, it means three way catalyst (manifold) does not operate properly.
   Go to EC-308, "Diagnostic Procedure" .



NOTE:
If the voltage at terminal 50 does not switch periodically more than 5 times within 10 seconds at step 4, perform trouble diagnosis for DTC P0133 first. (See EC-198 .)

Diagnostic Procedure

UBS00D77

1. CHECK EXHAUST SYSTEM

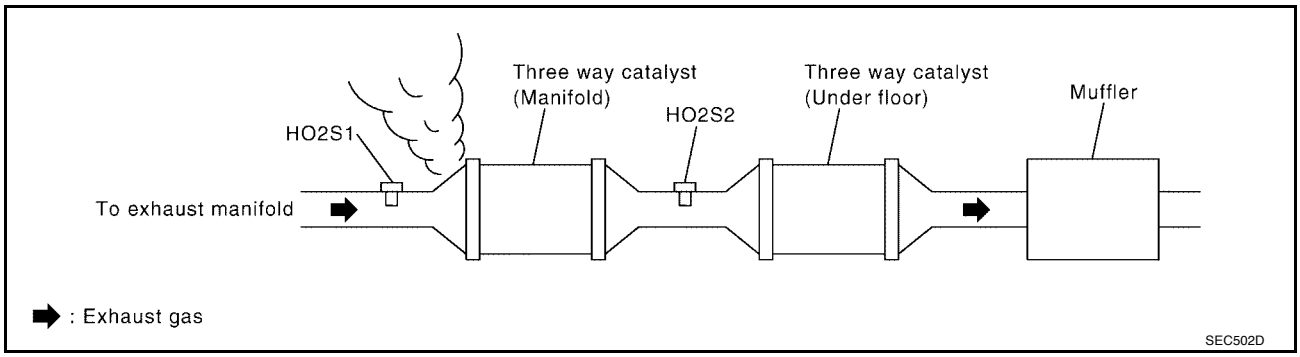
Visually check exhaust tubes and muffler for dent.

OK or NG

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

2. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before 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

1. Check the following items. Refer to EC-74, "Basic Inspection" .

Items	Specifications
Ignition timing	M/T: 20° ± 5° BTDC (in Neutral position) A/T: 20° ± 5° BTDC (in P or N position)
Base idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF
Target idle speed	M/T: 800 ± 50 rpm (in Neutral position) A/T: 800 ± 50 rpm (in P or N position)

OK or NG

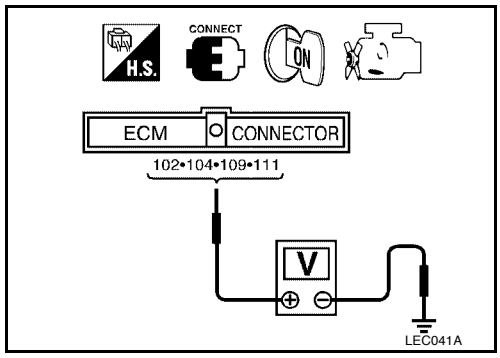
OK >> GO TO 5.
NG >> Adjust ignition timing.

5. CHECK INJECTORS

1. Refer to Wiring Diagram for Injectors, EC-546 .
2. Stop engine and then turn ignition switch ON.
3. Check voltage between ECM terminals 102, 104, 109 and 111 and ground with CONSULT-II or tester.
   Battery voltage should exist.

OK or NG

OK >> GO TO 6.
NG >> Perform EC-308, "Diagnostic Procedure" .

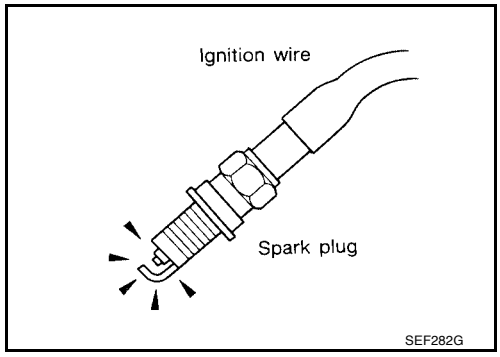


6. CHECK IGNITION SPARK

1. Turn ignition switch OFF.
2. Remove ignition wire assembly from rocker cover.
3. Connect a known good spark plug to the ignition wire.
4. Disconnect all injector harness connector
5. Place end of spark plug against a suitable ground and crank engine.
6. Check for spark.

OK or NG

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



7. CHECK IGNITION WIRES

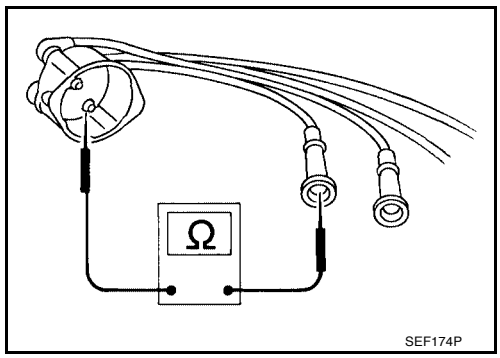
1. Inspect wires for cracks, damage, burned terminals and for improper fit.
2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.

   Resistance : 13.6 - 18.4 kΩ/m (4.15 - 5.61 kΩ/ft) [at 25°C (77°F)]

   If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.

OK or NG

OK >> Check ignition coil, power transistor and their circuits. Refer to EC-538, "IGNITION SIGNAL" .
NG >> Replace.



8. CHECK INJECTOR

1. Turn ignition switch OFF.
2. Remove injector assembly.
   Keep fuel hose and all injectors connected to injector gallery.
3. Reconnect all injector harness connectors.
4. Disconnect camshaft position sensor harness connector.
5. Turn ignition switch “ON”.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)>>GO TO 9.
NG (Drips.)>>Replace the injector(s) from which fuel is dripping.

9. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Trouble is fixed.>>**INSPECTION END**.
Trouble is not fixed.>>Replace three way catalyst (manifold).

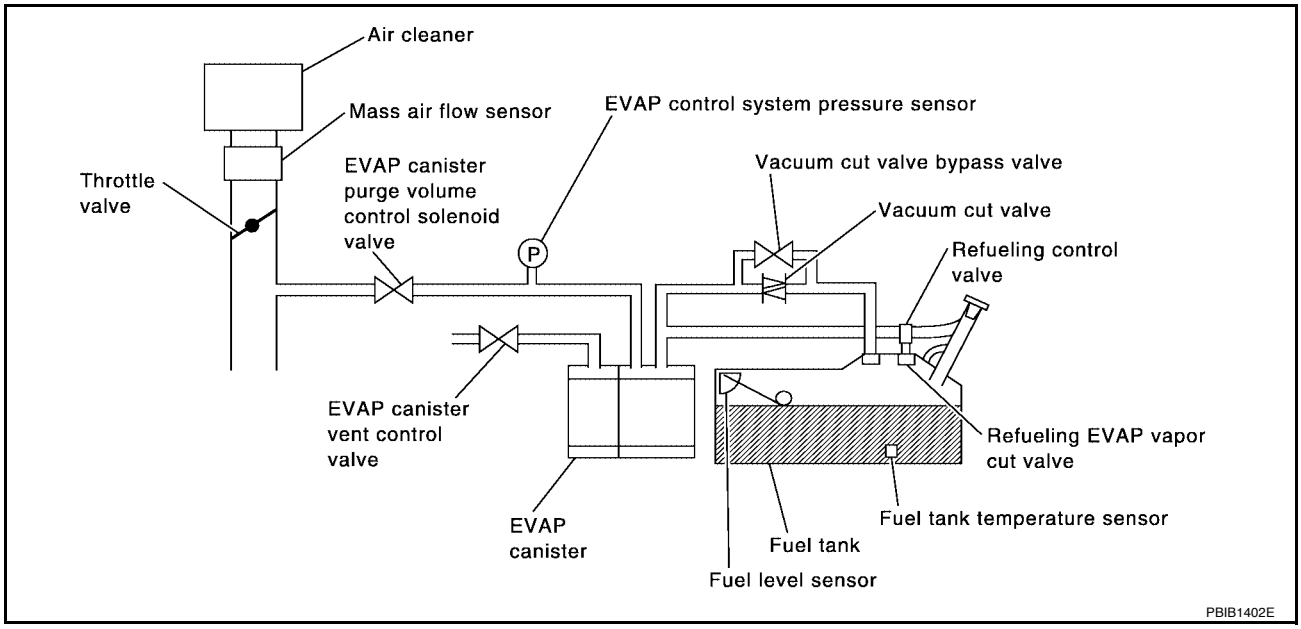
DTC P0441 EVAP CONTROL SYSTEM

PFP:14950

System Description

UBS00D78

NOTE:
If DTC P0441 is displayed with DTC P0510, perform trouble diagnosis for DTC P0510 first. Refer to EC-413 .



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. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

UBS00D79

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a fault is determined.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0441	EVAP control system incorrect purge flow	EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	● 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 ● Closed throttle position switch ● Blocked purge port ● EVAP canister vent control valve

DTC Confirmation Procedure

UBS00D7A

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 5 seconds before conducting the next test.

TESTING CONDITION:

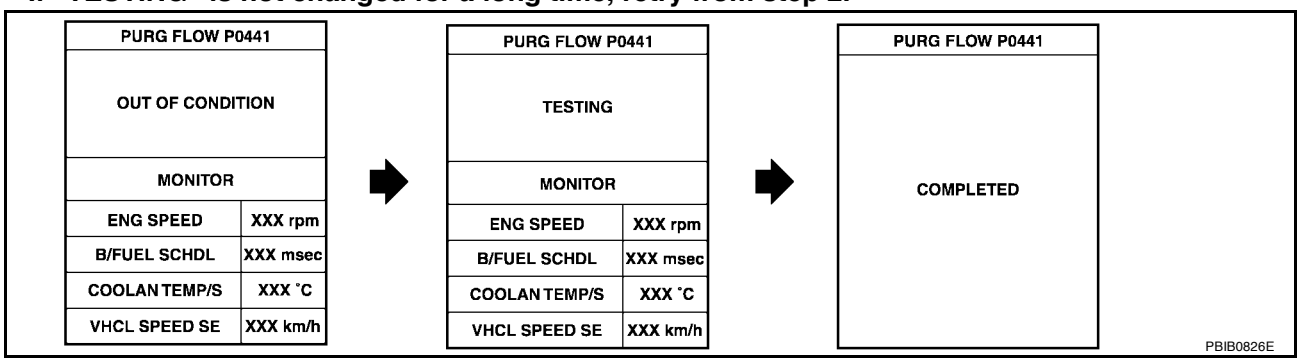
- **For best results perform test at a temperature of 5°C (41°F) or more.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Start engine and let it idle for at least 60 seconds.
4. Select “PURG FLOW P0441” of “EVAP 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 30 seconds.)

Shift lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,750 rpm
Engine coolant temperature	More than 70°C (158°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 EC-313, "Diagnostic Procedure" .

Overall Function Check

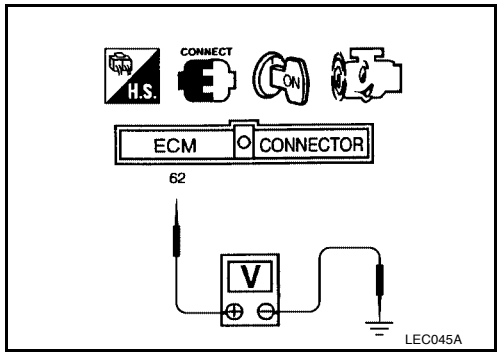
UBS00D7B

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 and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 5 seconds.
4. Start engine and wait at least 60 seconds.

5. Set voltmeter probes to ECM terminals 62 (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
Head lamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Shift lever	Any position other than N or P

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 EC-313, "Diagnostic Procedure" .

Diagnostic Procedure

UBS00D7C

1. CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

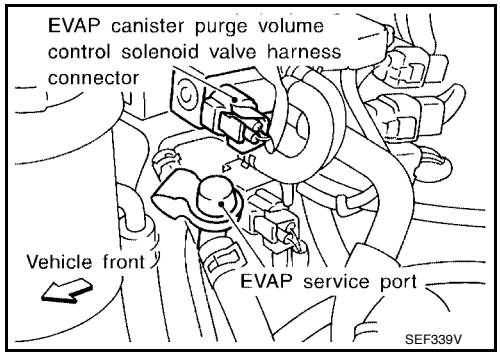
OK or NG

OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> Replace EVAP canister.

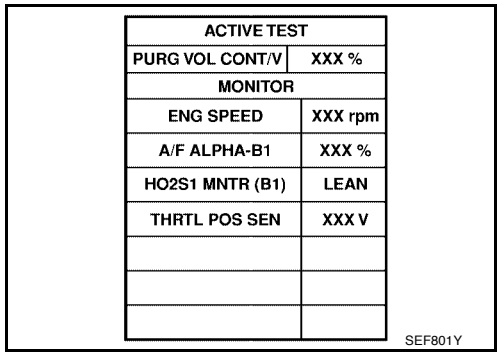
2. CHECK PURGE FLOW

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.



PURG VOL CONT/V	Vacuum
100%	Should exist.
0%	Should not exist.

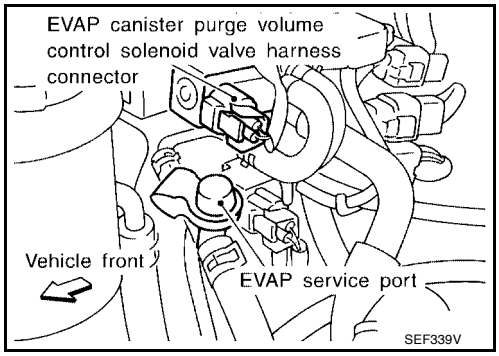
OK or NG

OK >> GO TO 8.
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 60 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 8.
NG >> GO TO 4.

4. CHECK EVAP PURGE LINE

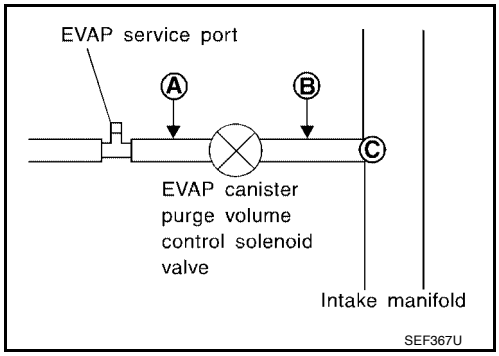
Check EVAP purge line for improper connection or disconnection.
Refer to EC-571, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 5.
NG >> Repair it.

5. CHECK EVAP PURGE HOSE AND PURGE PORT

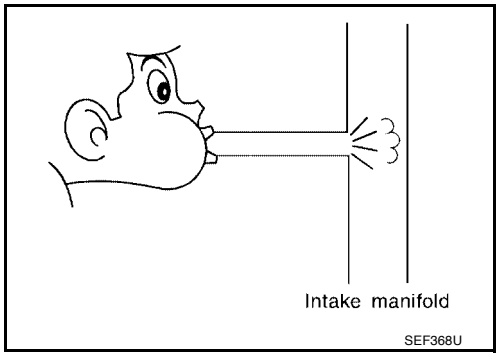
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B** .
2. Blow air into each hose and EVAP purge port **C** .



3. Check that air flows freely.

OK or NG

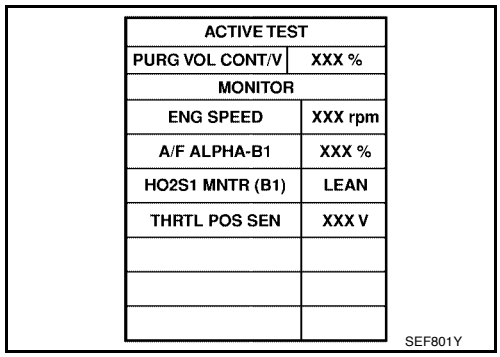
OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> Repair or clean hoses and/or purge port.



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.



OK or NG

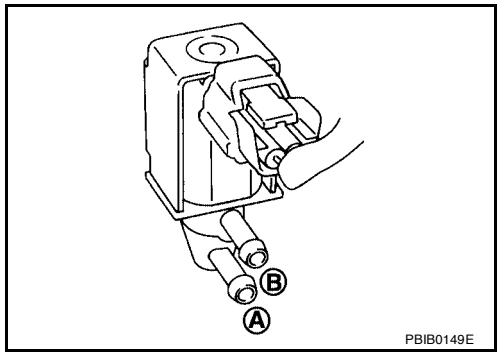
OK >> GO TO 8.
NG >> GO TO 7.

7. CHECK 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.

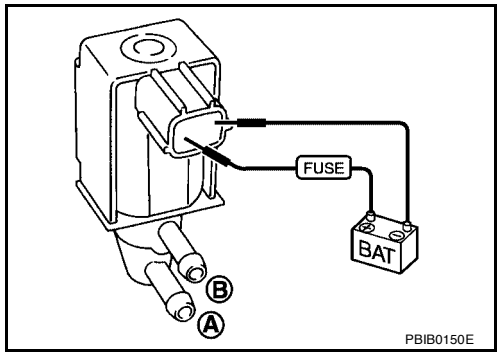
Condition (PURG VOL CONT/V valve)	Air passage continuity between A and B
100%	Yes
0%	No



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



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

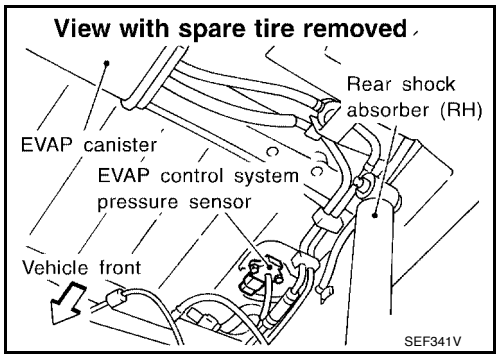
OK >> GO TO 9.
NG >> Repair it.

9. CHECK 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 AND CIRCUIT

Refer to DTC Confirmation Procedure for DTC P0452, EC-345 and DTC P0453, EC-352 .

OK or NG

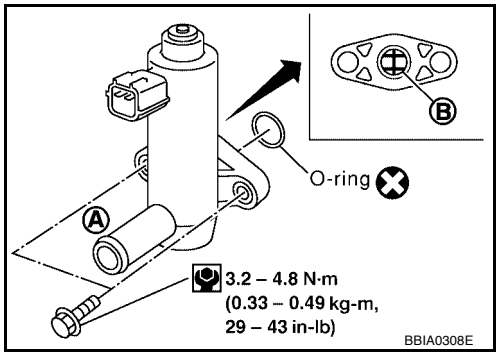
OK (With CONSULT-II)>>GO TO 11.
OK (Without CONSULT-II)>>GO TO 12.
NG >> Replace EVAP control system pressure sensor.

11. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

OK or NG

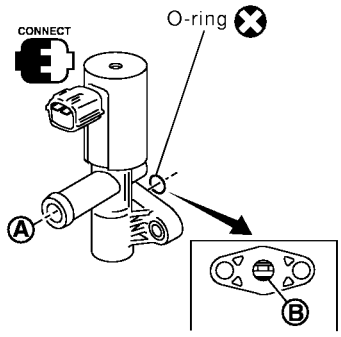
OK >> GO TO 12.
NG >> Replace EVAP canister vent control valve.



12. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

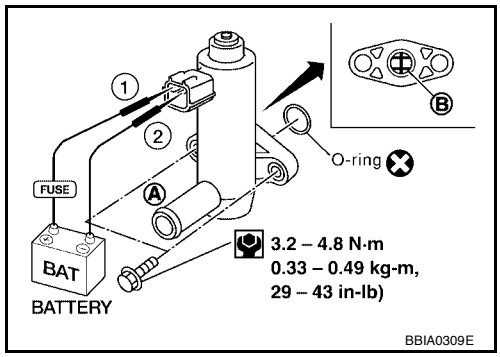
SEF803Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



BBIA0309E

OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 12 again.

OK or NG

OK (With Consult-II)>>GO TO 14.
OK (Without Consult-II)>>GO TO 15.
NG >> Replace EVAP canister vent control valve.

14. CHECK THROTTLE POSITION SWITCH

With CONSULT-II

1. Install all removed parts.
2. Start engine and warm it up to normal operation temperature.
3. Turn ignition switch OFF.
4. Turn ignition switch ON.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Check indication of “CLSD THL/P SW” under the following conditions.
   Measurement must be made with throttle position switch installed in vehicle.

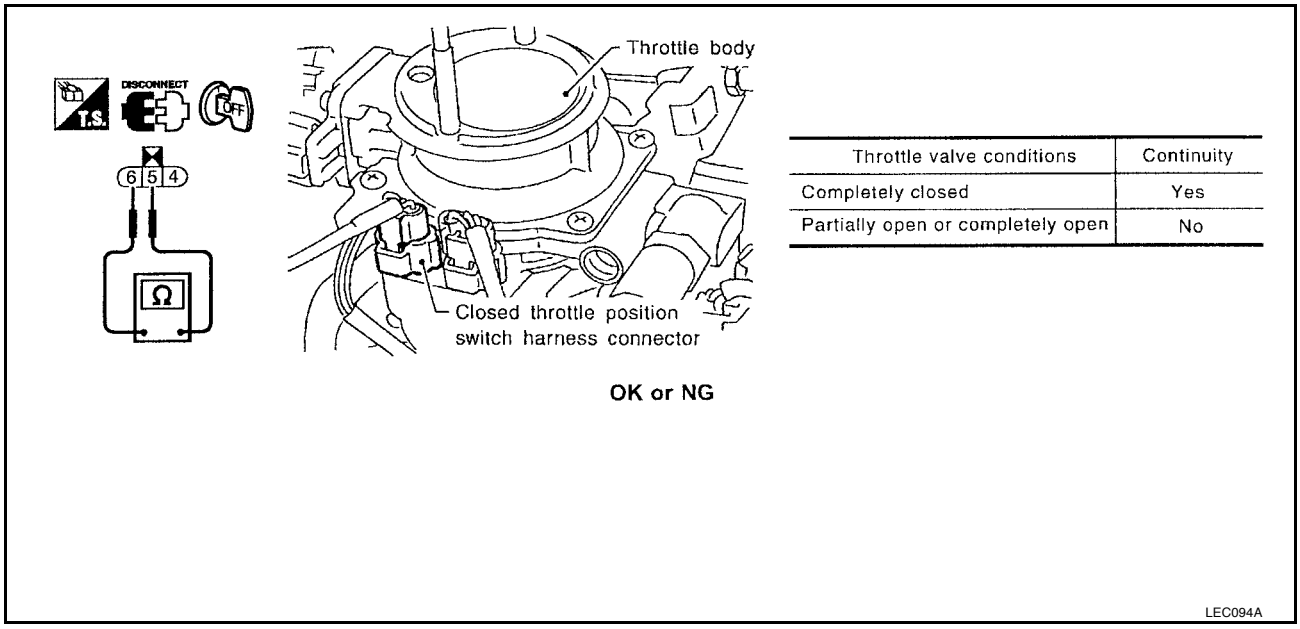
Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

OK or NG

OK >> GO TO 17.
NG >> GO TO 16.

15. CHECK THROTTLE POSITION SWITCH

1. Install all removed parts.
2. Start engine and warm it up to normal operation temperature.
3. Turn ignition switch OFF.
4. Disconnect closed throttle position switch harness connector.
5. Check continuity between closed throttle position switch terminals 5 and 6 under the following conditions.
   Resistance measurement must be made with throttle position switch installed in vehicle.



Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No

OK or NG

LEC094A

OK or NG

OK >> GO TO 17.
NG >> GO TO 16.

16. ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to EC-74, "Basic Inspection" .

Items	Specifications
Ignition timing	M/T: 20° ± 5° BTDC (in Neutral position) A/T: 20° ± 5° BTDC (in P or N position
Base idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF
Target idle speed	M/T: 800 ± 50 rpm (in Neutral position) A/T: 800 ± 50 rpm (in P or N position)

Is it possible to adjust closed throttle position switch?

Yes or No

Yes >> GO TO 17.
No >> Replace throttle position switch.

17. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to EC-571, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 18.
NG >> Replace it.

18. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 19.

19. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0442 EVAP CONTROL SYSTEM

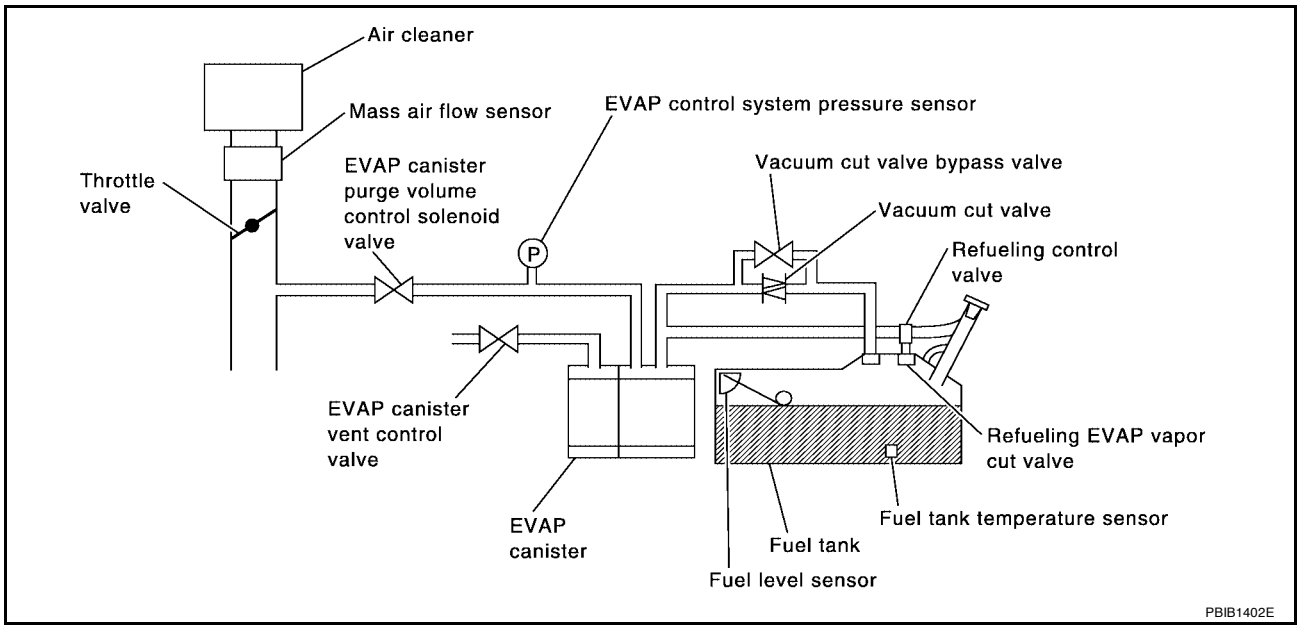
PFP:14950

On Board Diagnosis Logic

UBS00D7D

NOTE:
If DTC P0442 is displayed with DTC P1448, first perform trouble diagnosis for DTC P1448.
Refer to EC-487 .

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.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	● 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 ● 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

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.**

DTC Confirmation Procedure

UBS00D7E

NOTE:

- **If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. Refer to EC-487 .**
- **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 5 seconds before conducting the next test.

WITH CONSULT-II

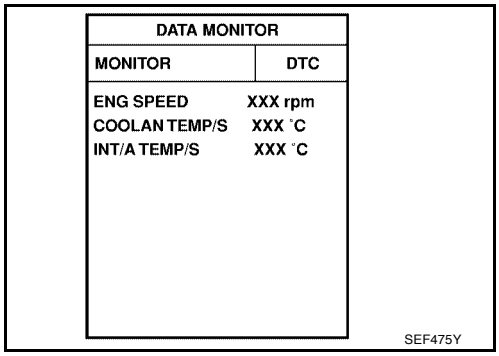
TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**

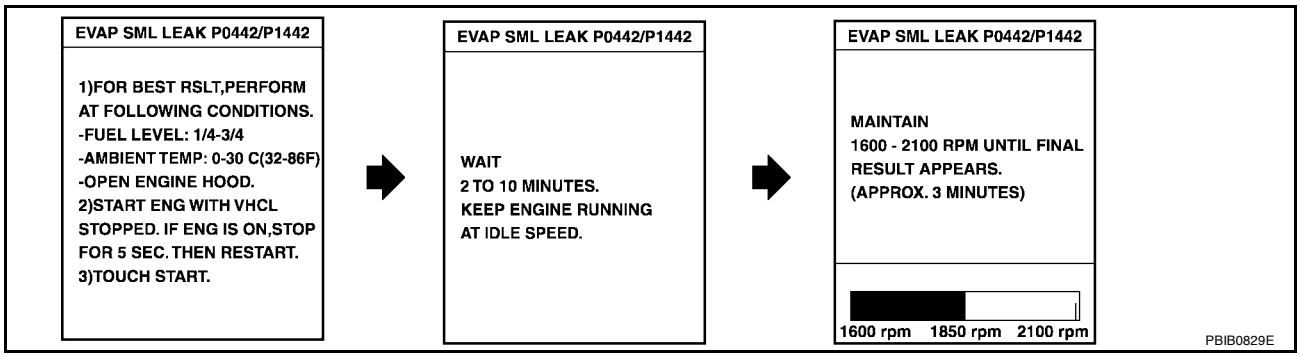
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
4. Check 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)

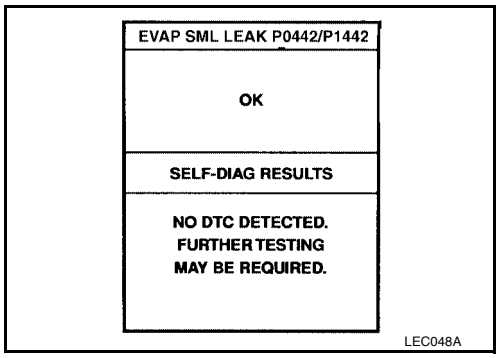


5. Select “EVAP SML LEAK P0442/P1442” of “EVAP SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II. Follow the instruction displayed.



NOTE:
- **If the engine cannot be maintained within the range on CONSULT-II screen, go to EC-74, "Basic Inspection" .**

6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-323, "Diagnostic Procedure" .



WITH GST

1. Start engine.
2. Drive vehicle according to EC-58, "Driving Pattern" .

   NOTE:
   Be sure to read the explanation of EC-58, "Driving Pattern" before driving vehicle.
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 5 seconds.
6. Start engine.
   It is not necessary to cool engine down before driving.
7. Drive vehicle again according to the EC-58, "Driving Pattern" .
8. Stop vehicle.
9. Select “MODE 3” with GST.

- If P0441 is displayed on the screen, go to EC-323, "Diagnostic Procedure" .

- If P0442 is displayed on the screen, go to EC-323, "Diagnostic Procedure" .
- If P0441 and P0442 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 5.

Diagnostic Procedure

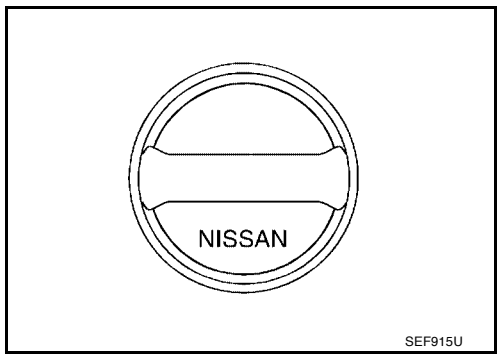
UBS00D7F

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 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

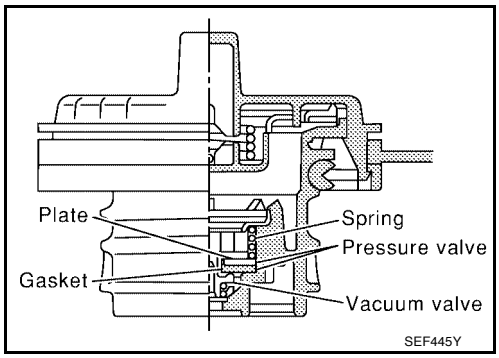
Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

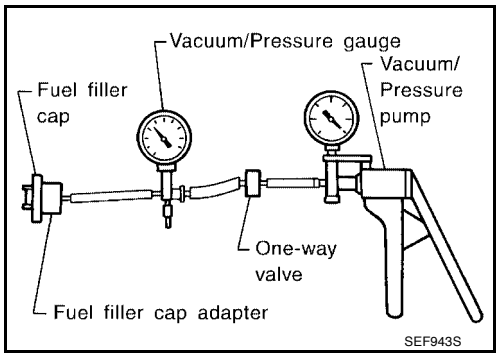
4. CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

1. Wipe clean valve housing.



2. Check valve opening pressure and vacuum.

Pressure : 16.0 - 20.0 kPa
(0.163 - 0.204 kg/cm^2 , 2.32 - 2.90 psi)
Vacuum : −6.0 to −3.5 kPa
(−0.061 to −0.036 kg/cm^2 , −0.87 to −0.51 psi)



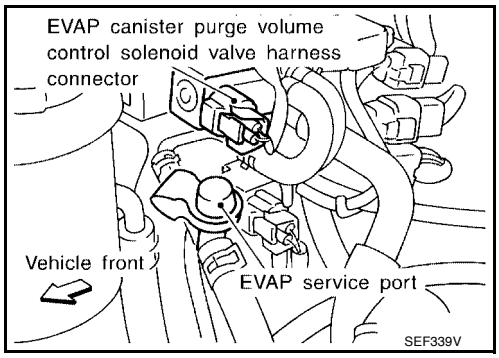
CAUTION:
Use only a genuine NISSAN fuel filler cap as a replacement.
If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

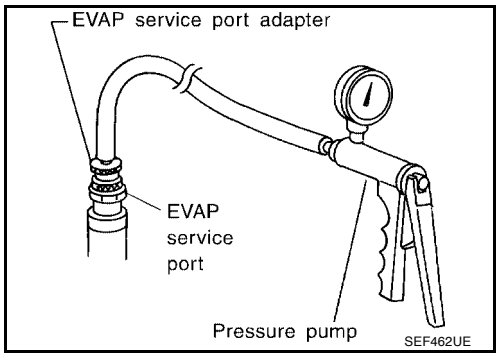
5. INSTALL PRESSURE PUMP

1. Install the EVAP service port adapter and the pressure pump securely to EVAP service port.



NOTE:
- **Improper installation of service port may cause leaking.**

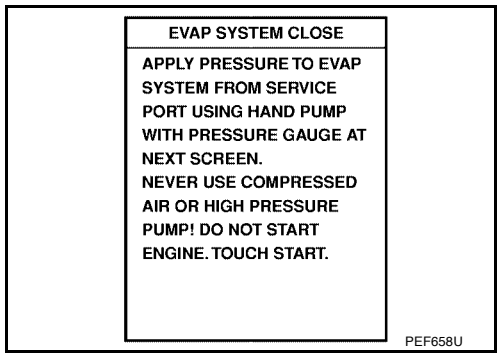
With CONSULT-II>>GO TO 6.
Without CONSULT-II>>GO TO 7.



6. CHECK FOR EVAP LEAK

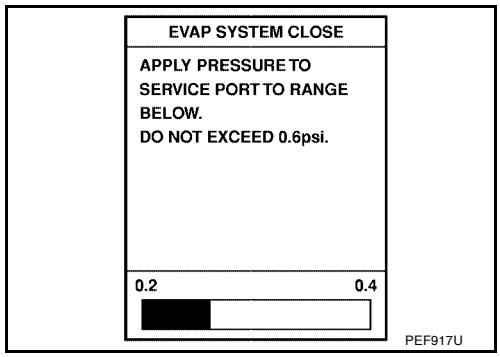
With CONSULT-II

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 bar graph.

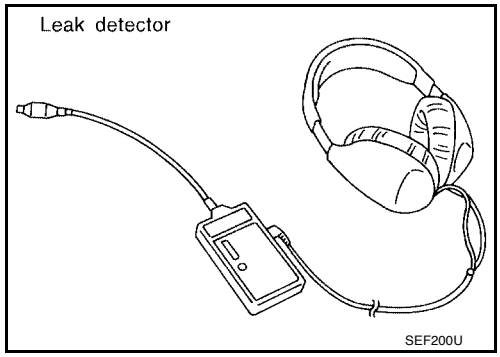
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the leak portion. For the leak detector, refer to instruction manual for more details.
   Refer to EC-571, "EVAPORATIVE EMISSION LINE DRAWING"
   .

OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

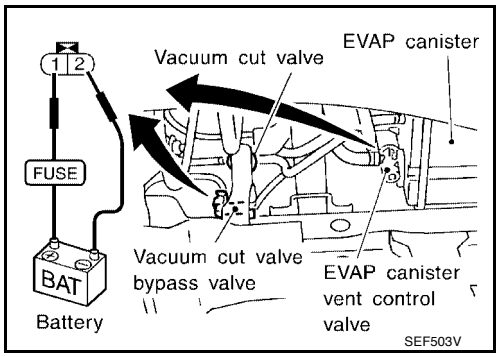


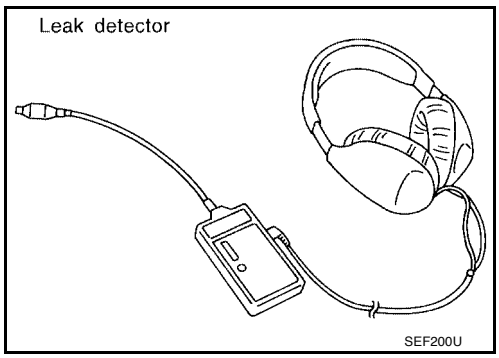
7. CHECK FOR EVAP LEAK

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 12 volts until the end of test.) Shown in the above figure.
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).

   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 leak. For the leak detector, refer to EC-571, "EVAPORATIVE EMISSION LINE DRAWING" .





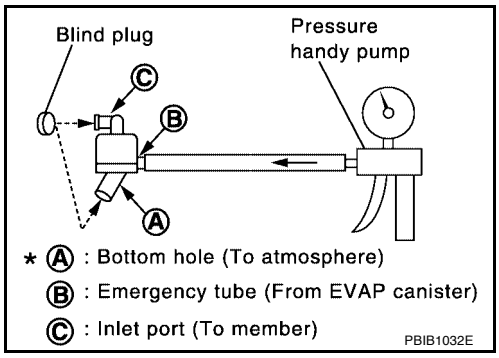
OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK 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.

- **Do not disassemble water separator.**



OK or NG

OK >> GO TO 9.
NG >> Replace water separator.

9. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

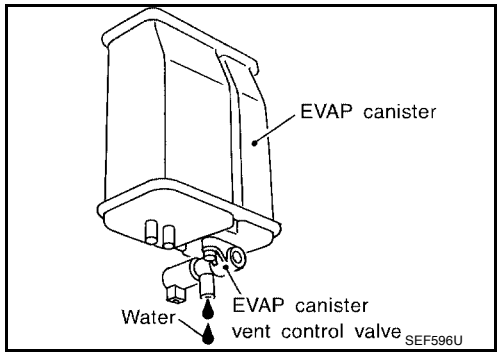
Refer to EC-488, "DTC Confirmation Procedure" .

OK or NG

OK >> GO TO 10.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connectors.

10. CHECK IF EVAP CANISTER IS 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 11.
No (With CONSULT-II)>>GO TO 13.
No (Without CONSULT-II)>>GO TO 14.

11. CHECK EVAP CANISTER

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 (With CONSULT-II)>>GO TO 13.
OK (Without CONSULT-II)>>GO TO 14.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

1. Visually check the EVAP canister for damage.
2. Check hose connection between EVAP canister and water separator for clogging and poor connection.

>> Repair hose or replace EVAP canister.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

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%.
5. Check vacuum hose for vacuum when engine up to 2,000 rpm.

Vacuum should exist.

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 17.
NG >> GO TO 15.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

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 60 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-30, "Vacuum Hose Drawing" .

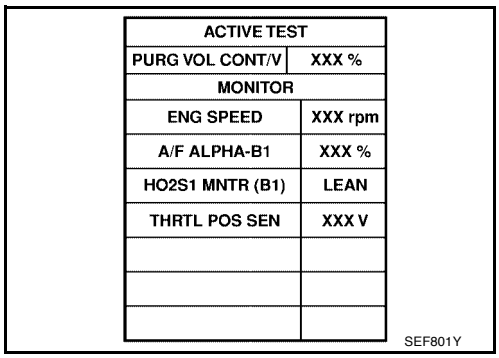
OK or NG

OK (With CONSULT-II)>>GO TO 16.
OK (Without CONSULT-II)>>GO TO 17.
NG >> Repair or reconnect the hose.

16. 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

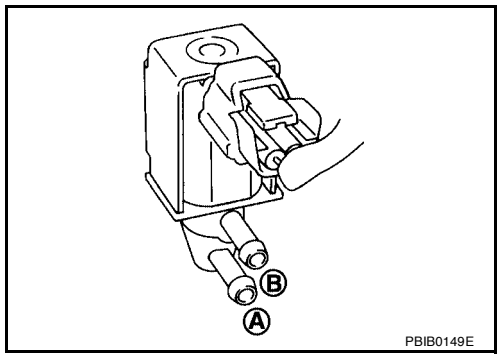
OK >> GO TO 18.
NG >> GO TO 17.

17. CHECK 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.

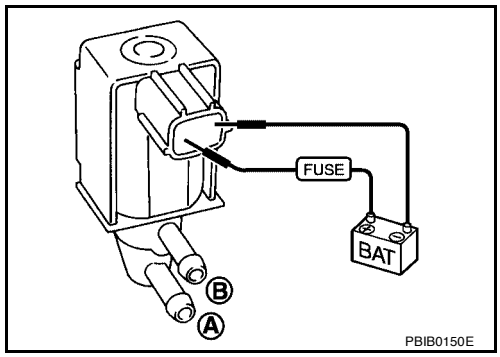
Condition (PURG VOL CONT/V valve)	Air passage continuity between A and B
100%	Yes
0%	No



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

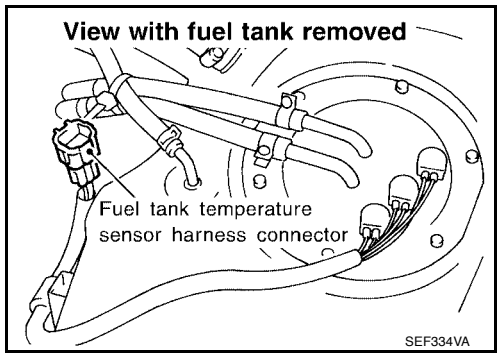


OK or NG

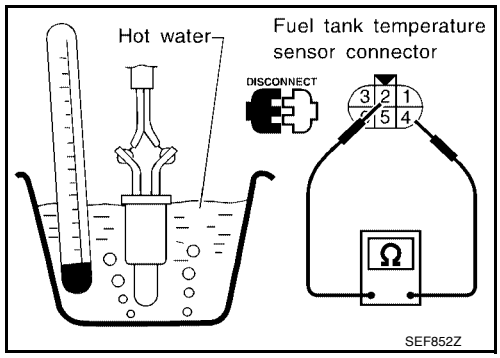
OK >> GO TO 18.
NG >> Replace EVAP canister purge volume control solenoid valve.

18. CHECK FUEL TANK TEMPERATURE SENSOR

Check resistance 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



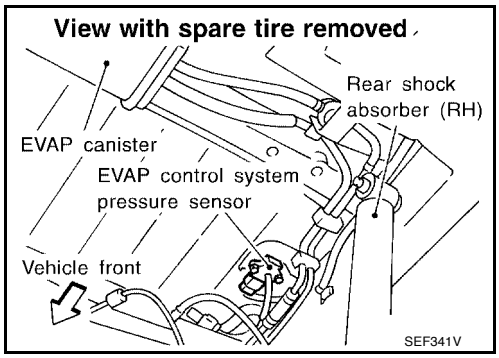
OK or NG

OK >> GO TO 19.
NG >> Replace fuel tank temperature sensor.

19. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

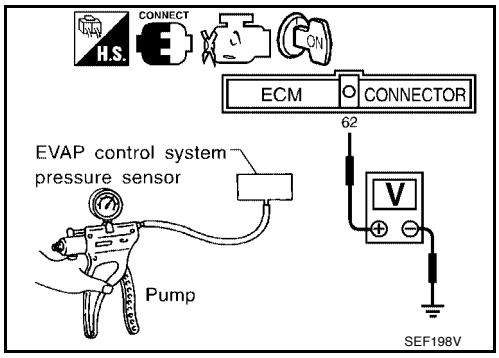
1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.56 inHg) of pressure.**



4. Check output voltage between ECM terminal 62 and ground.

Applied vacuum kPa (mmHg, inHg)	Voltage [V]
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value



CAUTION:
Discard any EVAP control system pressure 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.

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-571, "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-576, "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

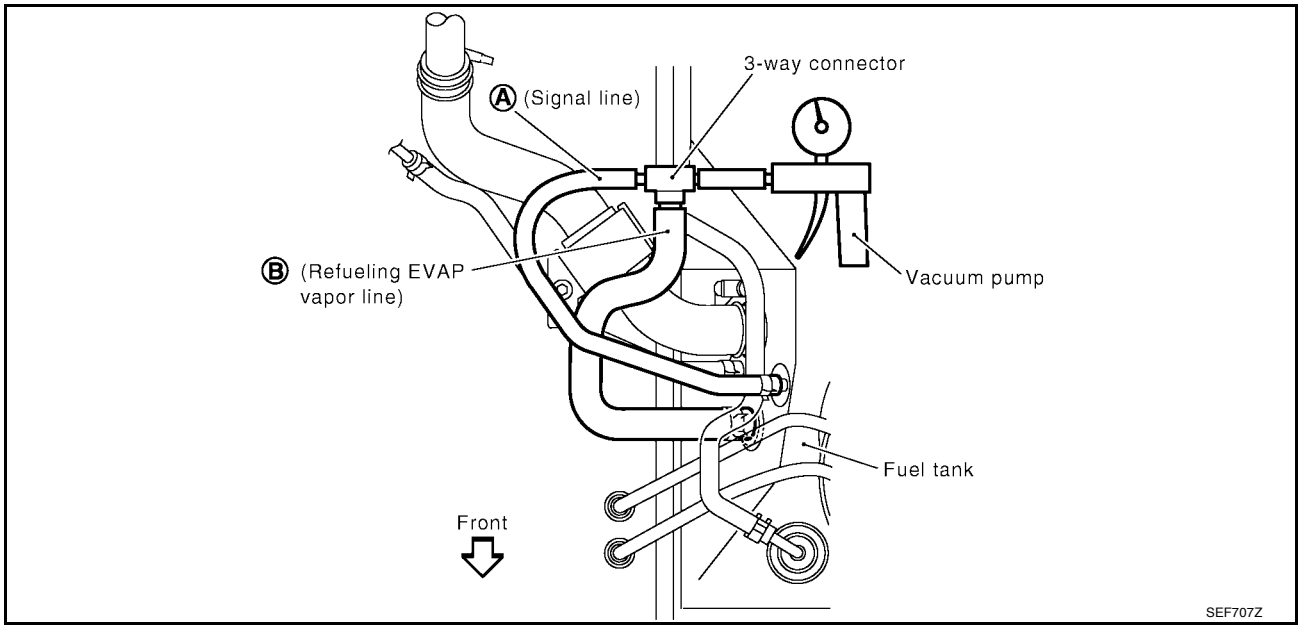
Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 24.
NG >> Repair or replace hoses, tubes or filler neck tube.

24. CHECK REFUELING CONTROL VALVE

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.



OK or NG

OK >> GO TO 25.
NG >> Replace refueling control valve with fuel tank.

25. CHECK FUEL LEVEL SENSOR

1. Remove fuel level sensor assembly. Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .
2. Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 26.
NG >> Replace fuel level sensor.

26. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.DI-18, "FUEL LEVEL SENSOR UNIT CHECK"

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

UBS00D7G

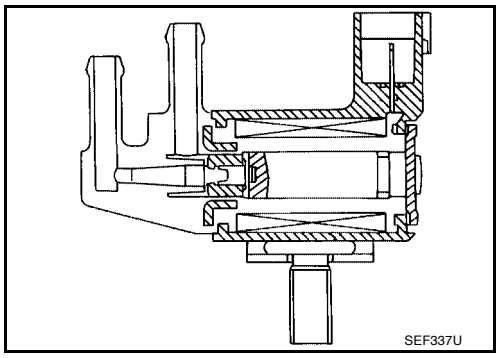
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	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		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	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

UBS00D7H

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

On Board Diagnosis Logic

UBS00D7I

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	● Harness or connectors (The sensor circuit is open or shorted.) ● EVAP canister purge volume control solenoid valve
P0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	● Harness or connectors (The sensor circuit is shorted.) ● EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

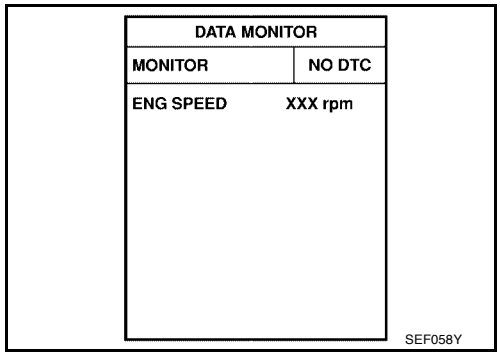
UBS00D7J

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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

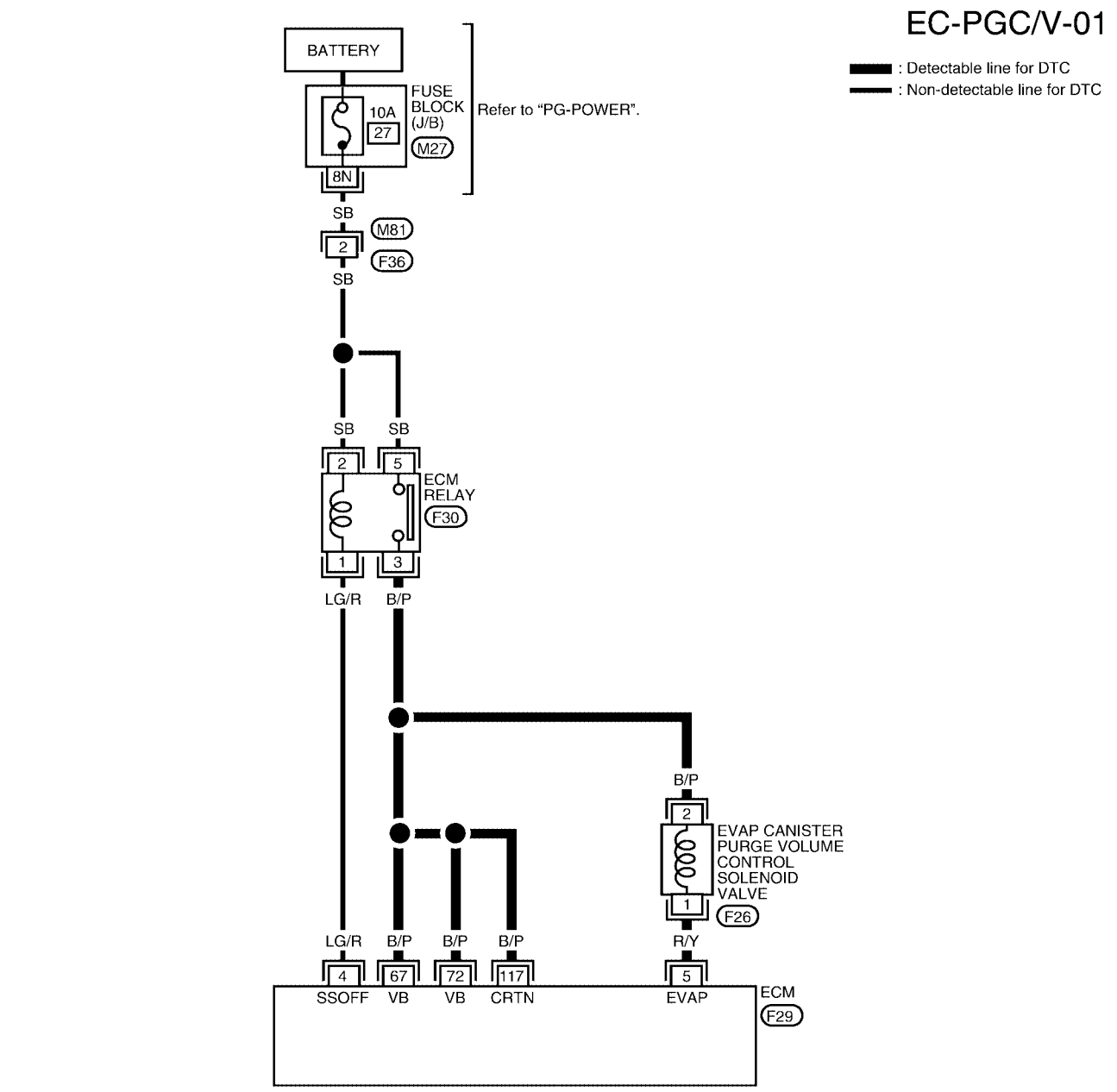
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 13 seconds.
4. If 1st trip DTC is detected, go to EC-336, "Diagnostic Procedure" .

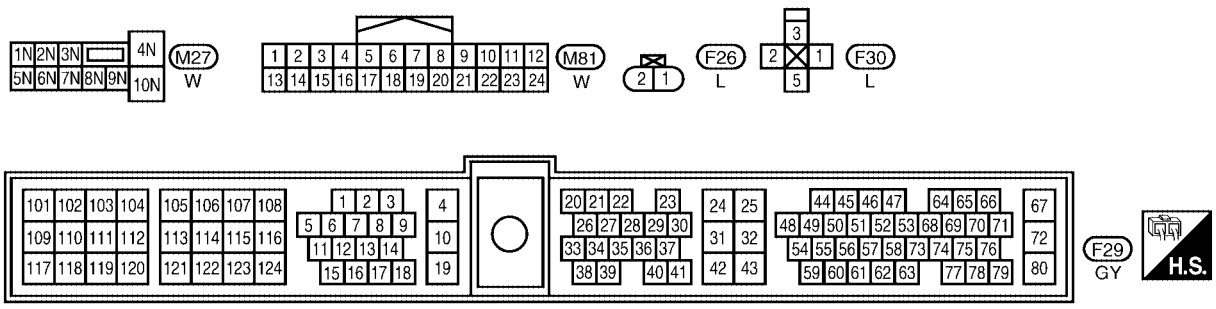


WITH GST
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00D7K



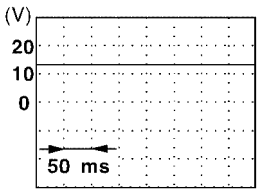
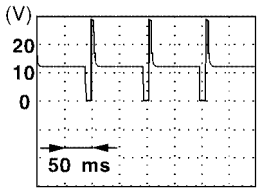


BBWA1061E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	LG/R	ECM relay (Self-shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  SEF109V
			[Engine is running] ● Engine speed is 2,000 rpm (More than 200 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★  SEF110V
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

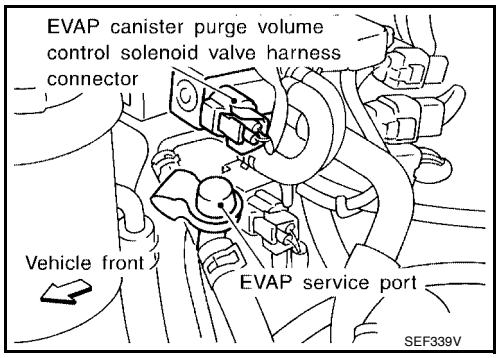
★:Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00D7L

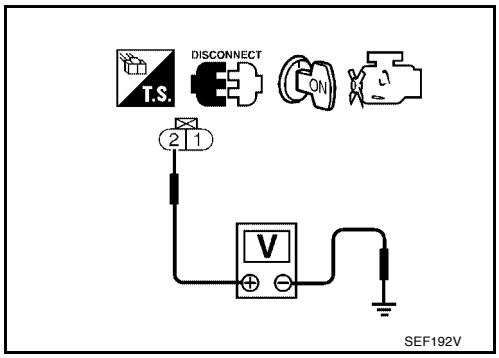
1. CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between EVAP canister purge volume control solenoid valve terminal 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 for open or short between EVAP canister purge volume control solenoid valve and ECM relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

3. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 5 and EVAP canister purge volume control solenoid valve terminal 1.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also, check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

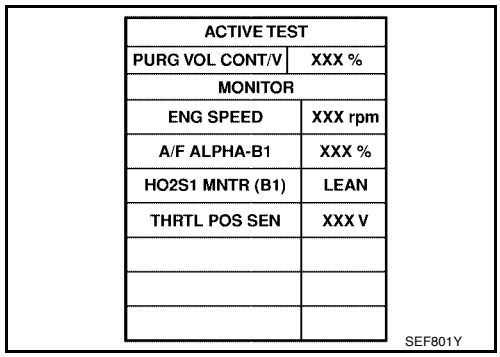
Check the harness for open or short between EVAP canister purge volume control solenoid valve and ECM.

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

5. 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

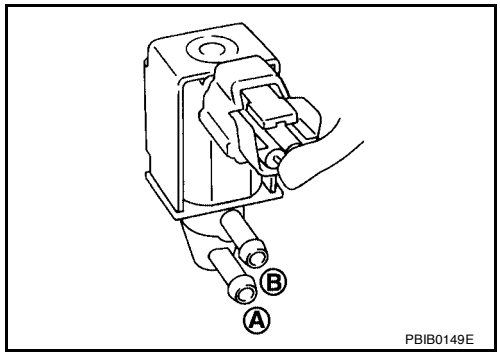
OK >> GO TO 7.
NG >> GO TO 6.

6. CHECK 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.

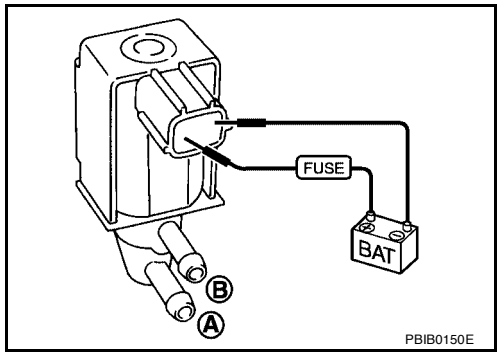
Condition (PURG VOL CONT/V valve)	Air passage continuity between A and B
100%	Yes
0%	No



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



OK or NG

OK >> GO TO 7.
NG >> Replace EVAP canister purge volume control solenoid valve.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

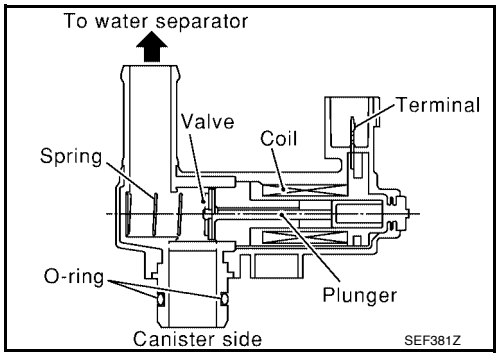
DTC P0447 EVAP CANISTER VENT CONTROL VALVE

PFP:14935

Component Description

UBS00D7M

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid (the EVAP canister vent control 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

UBS00D7N

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00D7O

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447	EVAP canister vent control valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	● Harness or connectors (The valve circuit is open or shorted.) ● EVAP canister vent control valve

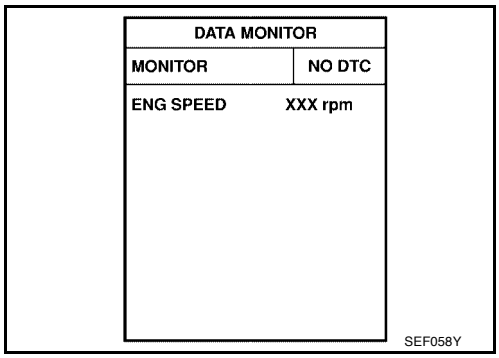
DTC Confirmation Procedure

UBS00D7P

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 seconds.
4. If 1st trip DTC is detected, go to EC-340, "Diagnostic Procedure" .

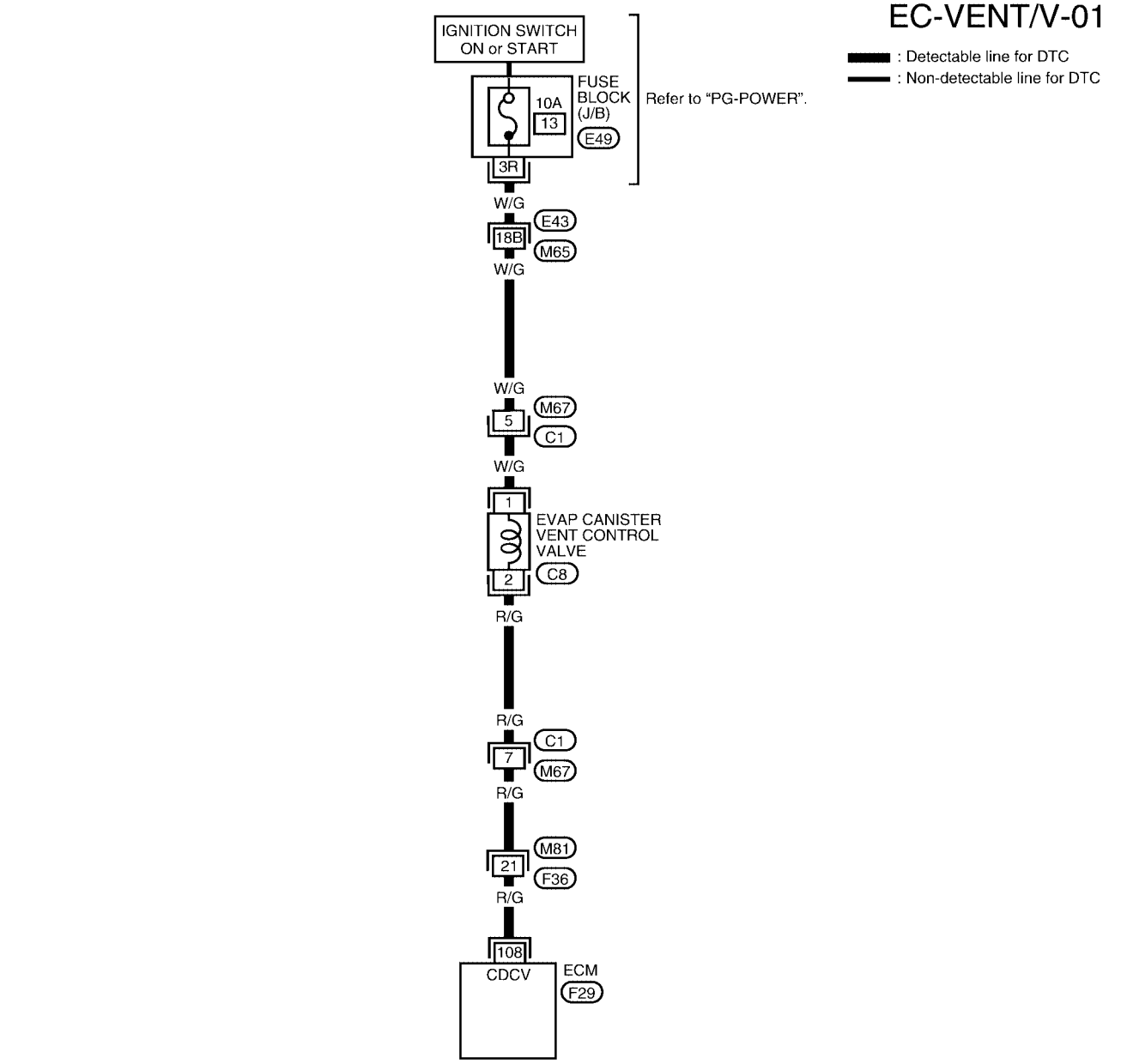


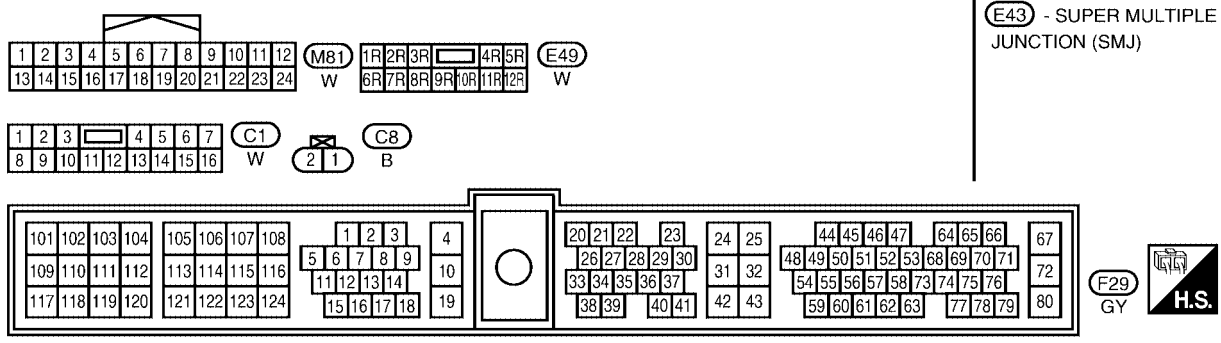
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00D7Q





Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)

BBWA1062E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00D7R

1. INSPECTION START

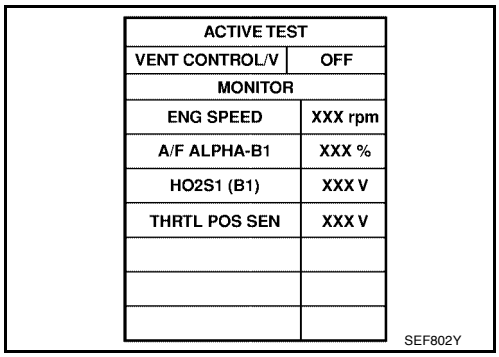
Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK CIRCUIT

1. Turn ignition switch ON.
2. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
3. Make sure that ratcheting sound is heard from the vent control valve.

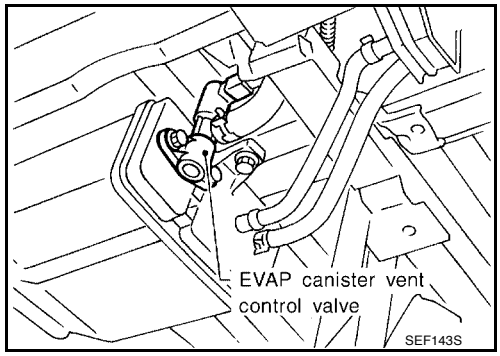


OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

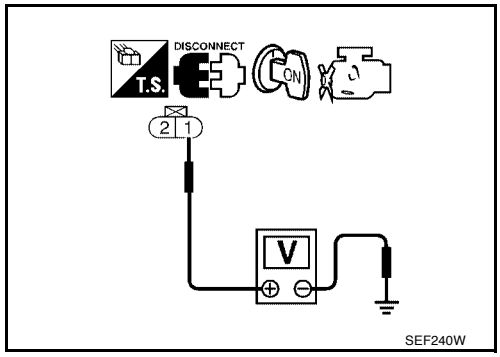
3. CHECK POWER SUPPLY

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 E43, M65
- Harness connectors M67, C1
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between EVAP canister vent control valve and fuse

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

5. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 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

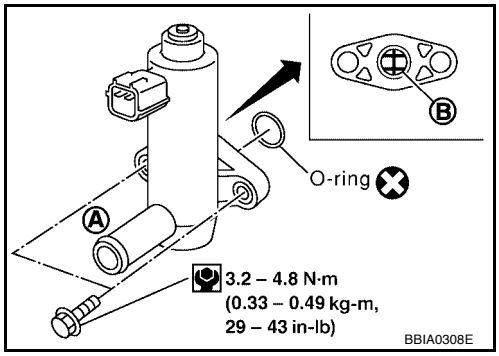
Check the following.

- Harness connectors C1, M67
- Harness connectors M81, F36
- 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 EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



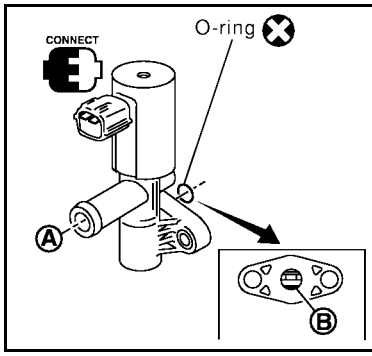
OK or NG

OK >> GO TO 8.
NG >> Replace EVAP canister vent control valve.

8. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

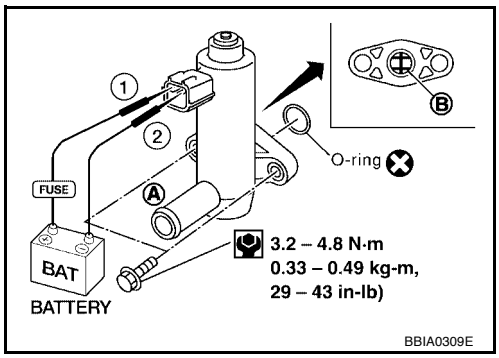
SEF803Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



OK or NG

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

9. CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 8 again.

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP canister vent control valve.

10. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

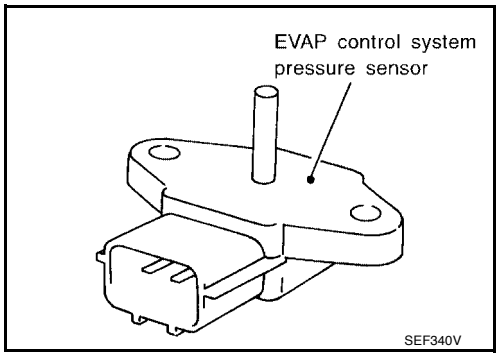
DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

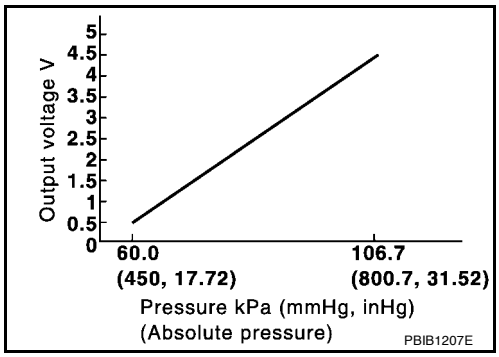
PFP:25085

Component Description

UBS00D7S

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

UBS00D7T

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	1.8 - 4.8V

On Board Diagnosis Logic

UBS00D7U

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● EVAP control system pressure sensor

DTC Confirmation Procedure

UBS00D7V

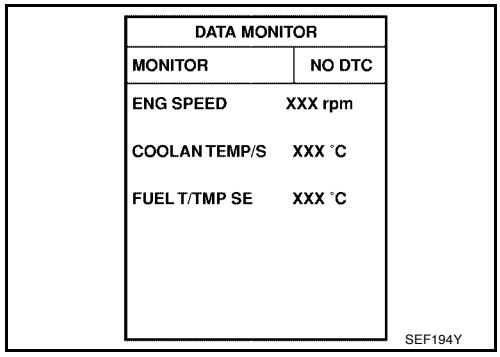
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Always perform test at a temperature above 5°C (41°F).**
- **Before performing the following procedure, confirm battery voltage is more than 11V at idle.**

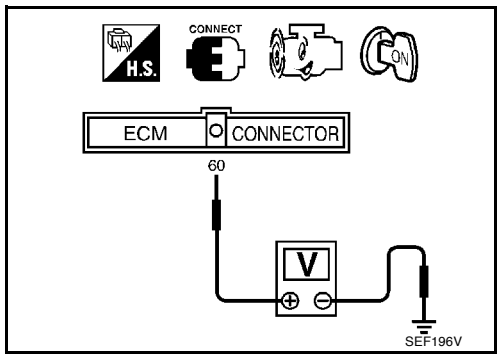
WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “FUEL T/TMP 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-347, "Diagnostic Procedure"
.



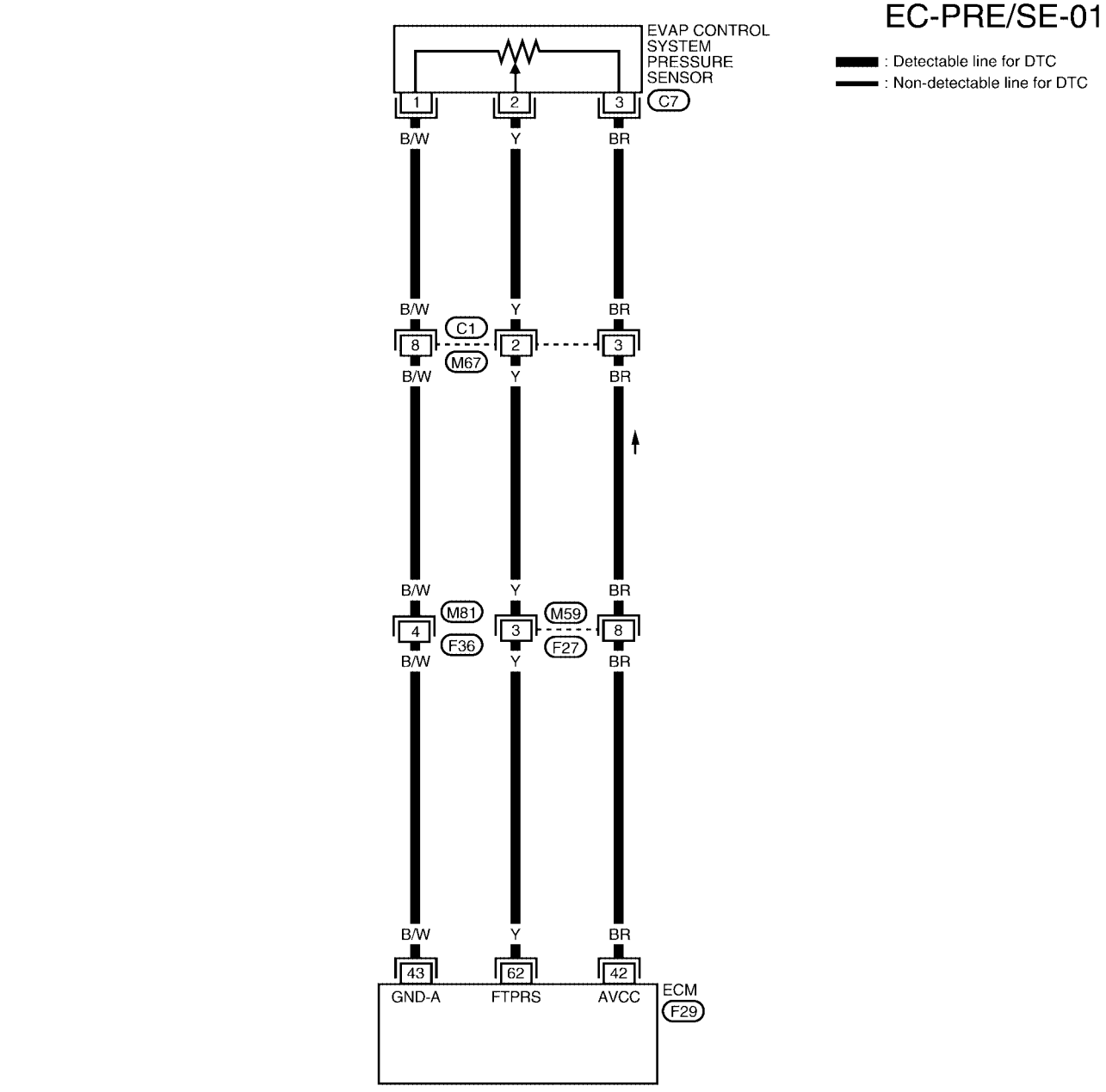
WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 60 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 5 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-347, "Diagnostic Procedure"
.



Wiring Diagram

UBS00D7W



BBWA1063E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	BR	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
43	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
62	Y	EVAP control system pressure sensor	**[Ignition switch: ON]**	1.8 - 4.8V

Diagnostic Procedure

UBS00D7X

1. CHECK RUBBER TUBE CONNECTED TO THE SENSOR

Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.

OK or NG

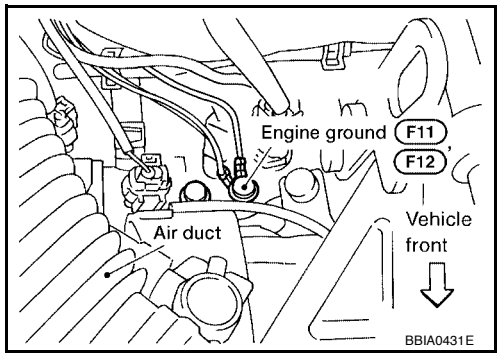
OK >> GO TO 2.
NG >> Reconnect, repair or replace.

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

OK or NG

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

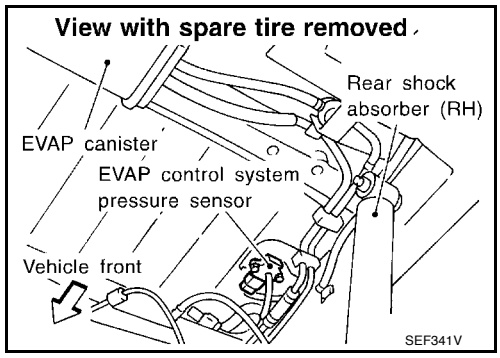


3. CHECK HARNESS CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.
   Water should not exist.

OK or NG

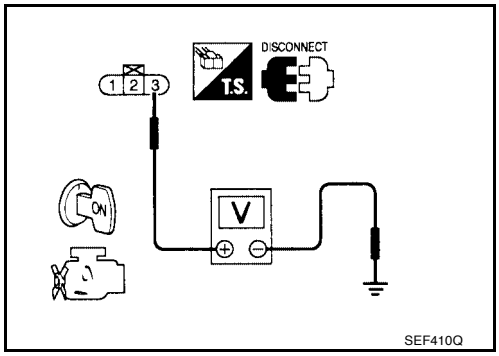
OK >> GO TO 4.
NG >> Repair or replace harness connector.



4. CHECK POWER SUPPLY

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 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 C1, M67
- Harness connectors M59, F27
- Harness for open or short between EVAP control system pressure sensor and ECM

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

6. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 43.
   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 C1, M67
- Harness connectors M81, F36
- Harness for open or short between EVAP control system pressure sensor and ECM

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

8. CHECK INPUT SIGNAL CIRCUIT

1. Check harness continuity between ECM terminal 62 and EVAP control system pressure sensor terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, M67
- Harness connectors M59, F27
- Harness for open or short between EVAP control system pressure sensor and ECM

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

10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

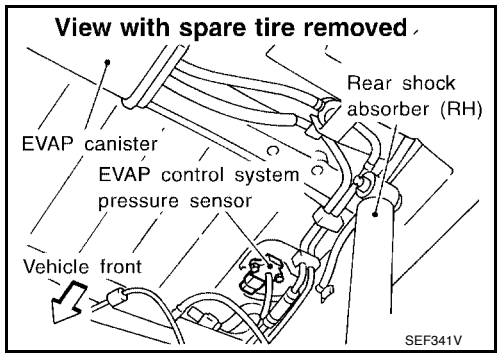
OK >> GO TO 11.
NG >> Repair it.

11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

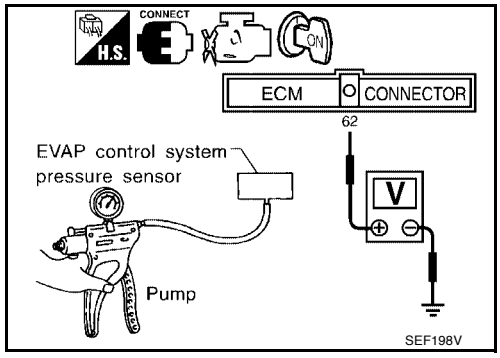
CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.56 inHg) of pressure.**



4. Check output voltage between ECM terminal 62 and ground.

Applied vacuum kPa (mmHg, inHg)	Voltage [V]
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value



CAUTION:

Discard any EVAP control system pressure 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.

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP control system pressure sensor.

12. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

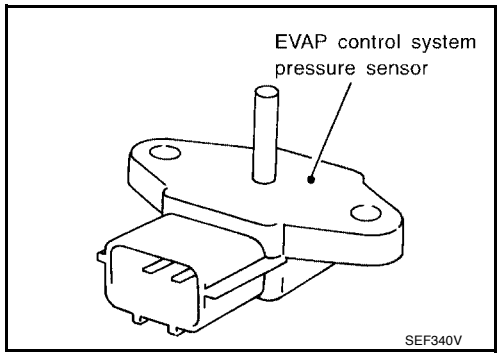
DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

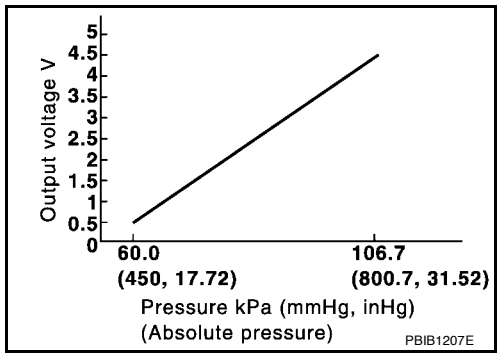
PFP:25085

Component Description

UBS00D7Y

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

UBS00D7Z

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	1.8 - 4.8V

On Board Diagnosis Logic

UBS00D80

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453	EVAP control system pressure sensor high input	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● EVAP control system pressure sensor ● Rubber hose to EVAP control system pressure is clogged, vent, kinked, disconnected or improper connection. ● EVAP canister vent control valve ● EVAP canister purge volume control solenoid valve ● EVAP canister ● Water separator

DTC Confirmation Procedure

UBS00D81

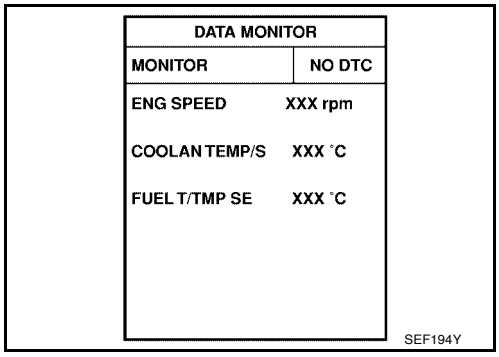
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Always perform test at a temperature above 5°C (41°F).**
- **Before performing the following procedure, confirm battery voltage is more than 11V at idle.**

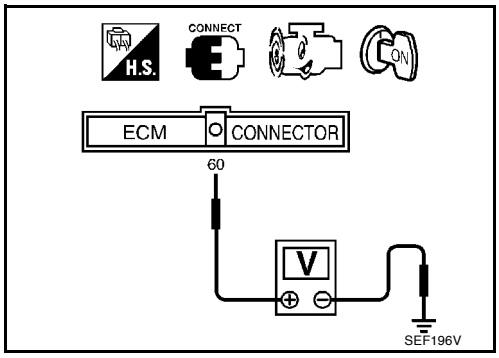
WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “FUEL T/TMP SE” is more than 0°C (32°F).
6. Wait at least 10 seconds.
7. If 1st trip DTC is detected, go to EC-354, "Diagnostic Procedure"
.



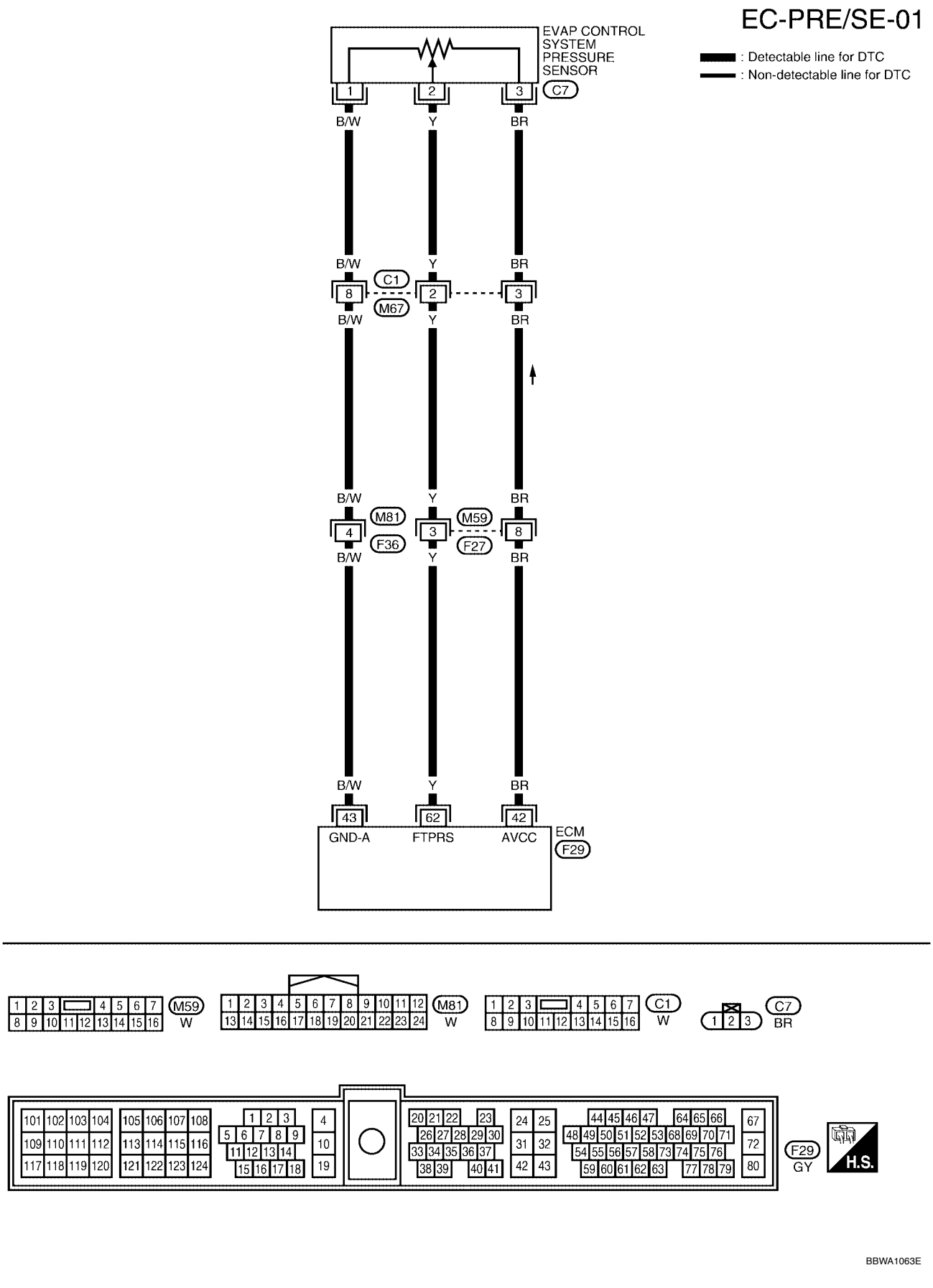
WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 60 (Fuel tank temperature sensor signal) and ground is less than 4.8V.
3. Turn ignition switch OFF and wait at least 5 seconds.
4. Wait at least 10 seconds.
5. Select “MODE 7” with GST.
6. If 1st trip DTC is detected, go to EC-354, "Diagnostic Procedure"
.



Wiring Diagram

UBS00D82



BBWA1063E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	BR	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
43	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
62	Y	EVAP control system pressure sensor	**[Ignition switch: ON]**	1.8 - 4.8V

Diagnostic Procedure

UBS00D83

1. CHECK RUBBER TUBE CONNECTED TO THE SENSOR

Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.

OK or NG

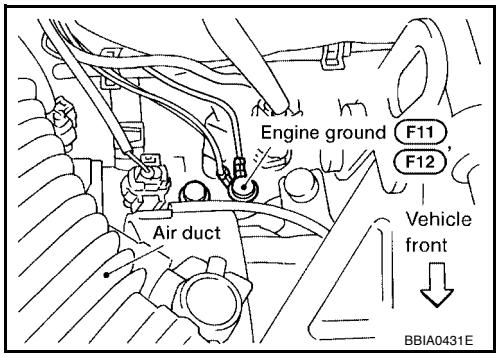
OK >> GO TO 2.
NG >> Reconnect, repair or replace.

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

OK or NG

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

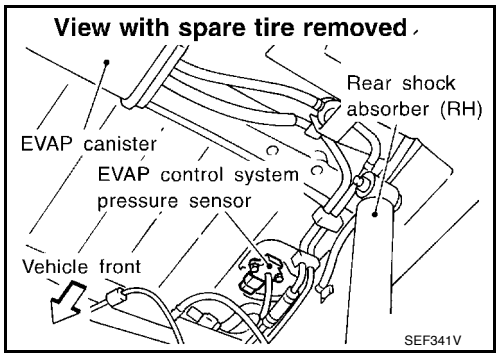


3. CHECK HARNESS CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.
   Water should not exist.

OK or NG

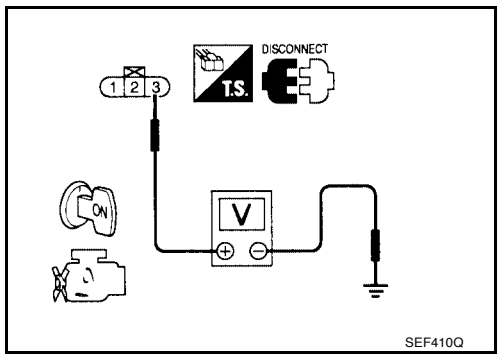
OK >> GO TO 4.
NG >> Repair or replace harness connector.



4. CHECK POWER SUPPLY

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 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 C1, M67
- Harness connectors M59, F27
- Harness for open or short between EVAP control system pressure sensor and ECM

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

6. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 43.
   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 C1, M67
- Harness connectors M81, F36
- Harness for open or short between EVAP control system pressure sensor and ECM

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

8. CHECK INPUT SIGNAL CIRCUIT

1. Check harness continuity between ECM terminal 62 and EVAP control system pressure sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

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

OK or NG

OK (With CONSULT-II)>>GO TO 10.
OK (Without CONSULT-II)>>GO TO 11.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

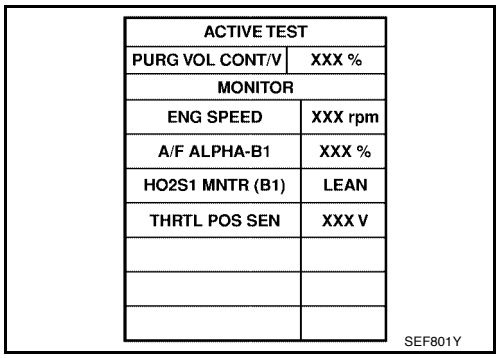
- Harness connectors C1, M67
- Harness connectors M59, F27
- Harness for open or short between EVAP control system pressure sensor and ECM

>> 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.



OK or NG

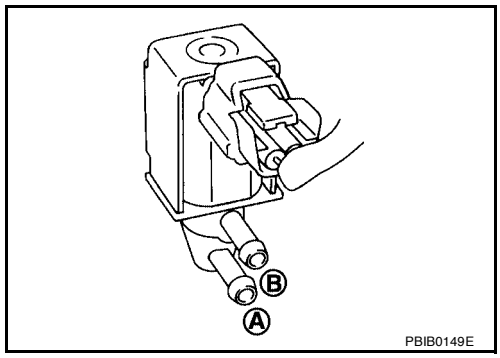
OK >> GO TO 12.
NG >> GO TO 11.

11. CHECK 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.

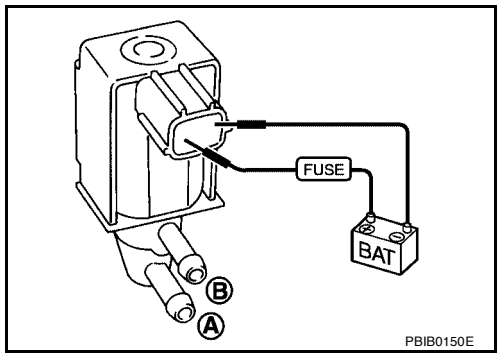
Condition (PURG VOL CONT/V valve)	Air passage continuity between A and B
100%	Yes
0%	No



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



OK or NG

OK >> GO TO 12.
NG >> Replace EVAP canister purge volume control solenoid valve.

12. 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

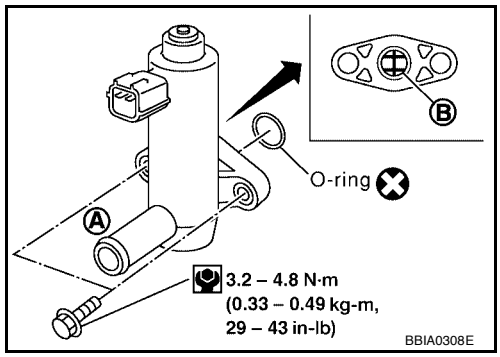
OK >> GO TO 13.
NG >> Repair it.

13. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

OK or NG

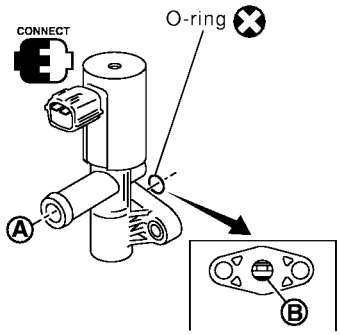
OK >> GO TO 14.
NG >> Replace EVAP canister vent control valve.



14. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

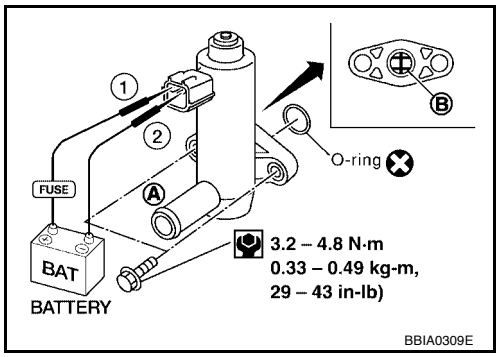
SEF803Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



BBIA0309E

OK or NG

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

15. CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 13 again.

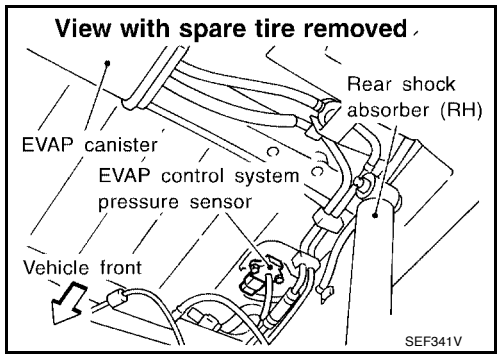
OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister vent control valve.

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

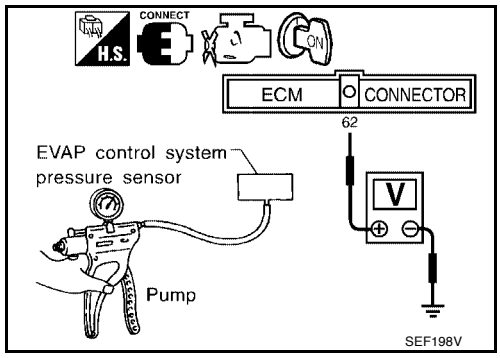
1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.56 inHg) of pressure.**



4. Check output voltage between ECM terminal 62 and ground.

Applied vacuum kPa (mmHg, inHg)	Voltage [V]
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value



CAUTION:
Discard any EVAP control system pressure 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.

OK or NG

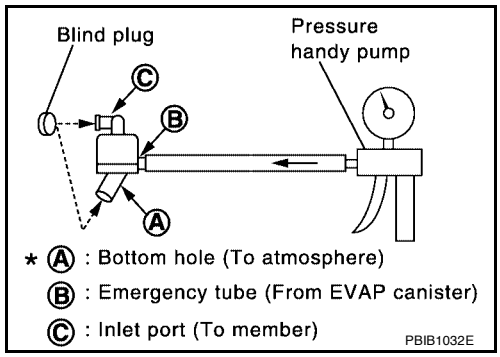
OK >> GO TO 17.
NG >> Replace EVAP control system pressure sensor.

17. CHECK RUBBER TUBE FOR CLOGGING

Check obstructed water separator and rubber tube to EVAP canister vent control valve and clean the rubber tube using air blower.
Check 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.

- **Do not disassemble water separator.**

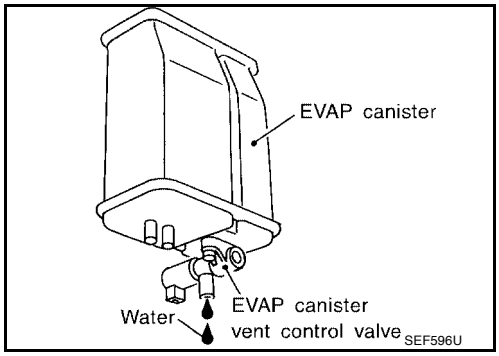


OK or NG

OK >> GO TO 18.
NG >> Clean, repair or replace rubber tube and/or water separator.

18. 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 19.
No >> GO TO 21.

19. CHECK EVAP CANISTER

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 21.
NG >> GO TO 20.

20. DETECT MALFUNCTIONING PART

Check the following.

1. Visually check the EVAP canister for damage.
2. Check hose connection between EVAP canister and water separator for clogging and poor connection.

>> Repair hose or replace EVAP canister or water separator.

21. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

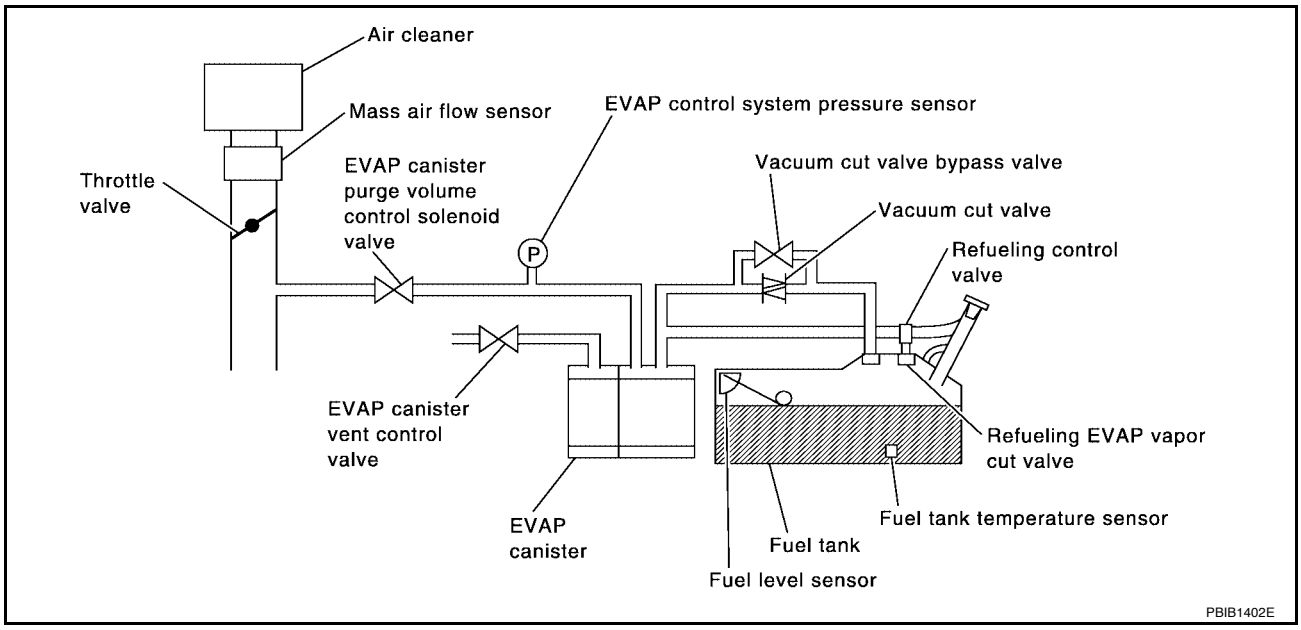
DTC P0455 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS00D84

NOTE:
If DTC P0455 is displayed with DTC P1448, first perform trouble diagnosis for DTC P1448.
Refer to EC-487 .
This diagnosis detects a very large leak (fuel filler cap fell off etc.) in the EVAP system between the fuel tank and the EVAP canister purge volume control solenoid valve.



DTC No.	Trouble diagnosis name	DTC detecting condition	Check Items (Possible Cause)
P0455	EVAP control system gross leak detected.	● EVAP control system has a very large leak such as fuel filler cap tell off. ● EVAP control system does not operate properly.	● 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 ● 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

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.**

DTC Confirmation Procedure

UBS00D85

CAUTION:

Never remove fuel filter cap during the DTC confirmation procedure.

NOTE:

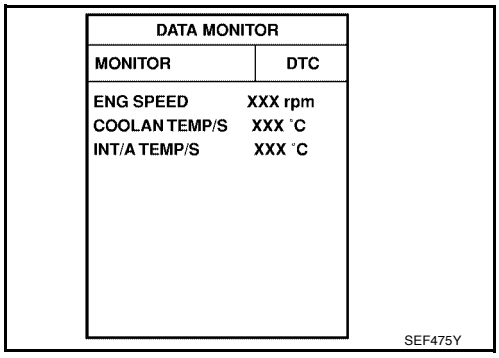
- **If DTC P0455 is displayed with DTC P1448, first perform trouble diagnosis for DTC P1448. Refer to EC-487 .**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

TESTING CONDITION:

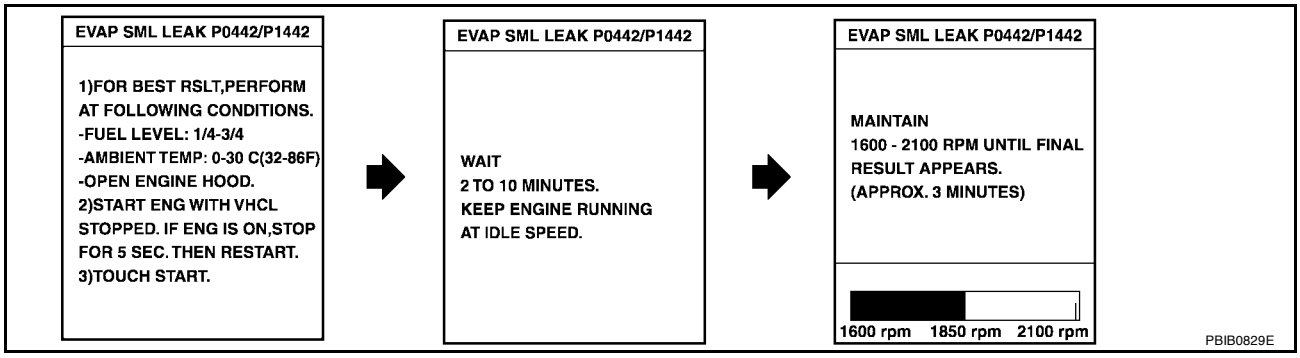
- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedure.**

WITH CONSULT-II

1. Tighten fuel filter cap securely until ratcheting sound is heard.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 5 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)



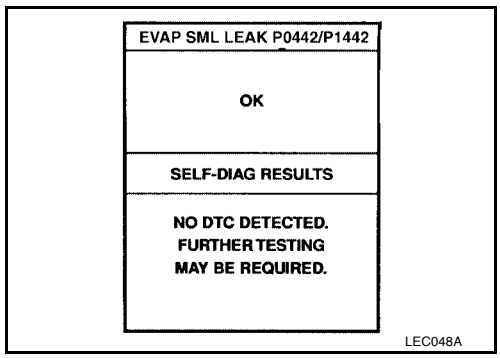
6. Select "EVAP SML LEAK P0442/P1442" of "EVAP SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.



NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-74, "Basic Inspection" .

7. Make sure that “OK” is displayed.
If “NG” is displayed, select “SELF-DIAG RESULTS” mode with CONSULT-II and make sure that “EVAP GROSS LEAK [P0455]” is displayed. If it is displayed, refer to EC-363, "Diagnostic Procedure" .
If P0442 is displayed, perform “Diagnostic Procedure” for DTC P0442, EC-323 .



LEC048A

WITH GST

NOTE:

- Be sure to read the explanation of EC-58, "Driving Pattern" before driving vehicle.
- It is better that the fuel level is low.

1. Start engine.
2. Drive vehicle according to EC-58, "Driving Pattern" .
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 5 seconds.
6. Start engine.
It is not necessary to cool engine down before driving.
7. Drive vehicle again according to the EC-58, "Driving Pattern" .
8. Stop vehicle.
9. Select “MODE 3” with GST.

- If P0455 is displayed on the screen, go to EC-363, "Diagnostic Procedure" .
- If P0442 is displayed on the screen, go to EC-323, "Diagnostic Procedure" .
- If P0441 is displayed on the screen, go to EC-313, "Diagnostic Procedure" .
- If P0441, P0442 and P0455 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

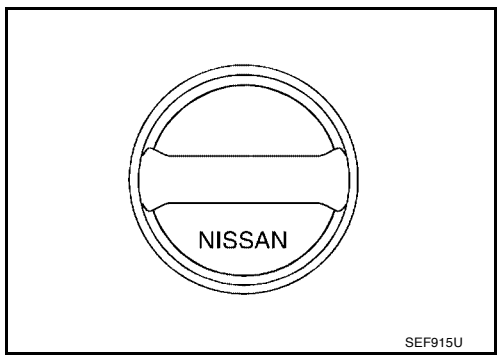
UBS00D86

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.



SEF915U

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

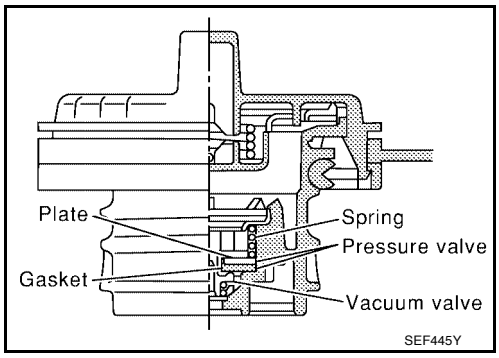
Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 6.
NG >> GO TO 4.

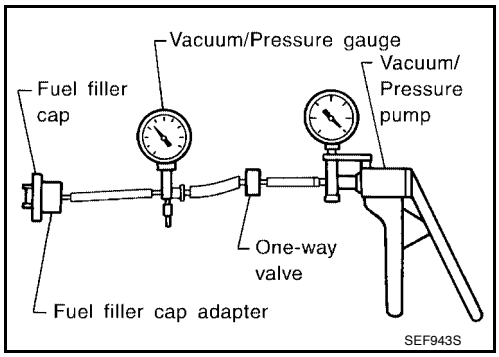
4. CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

1. Wipe clean valve housing.



2. Check valve opening pressure and vacuum.

Pressure : 16.0 - 20.0 kPa
(0.163 - 0.204 kg/cm^2 , 2.32 - 2.90 psi)
Vacuum : −6.0 to −3.5 kPa
(−0.061 to −0.036 kg/cm^2 , −0.87 to −0.51 psi)



CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

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 or improper connection or disconnection.
Refer to EC-571, "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

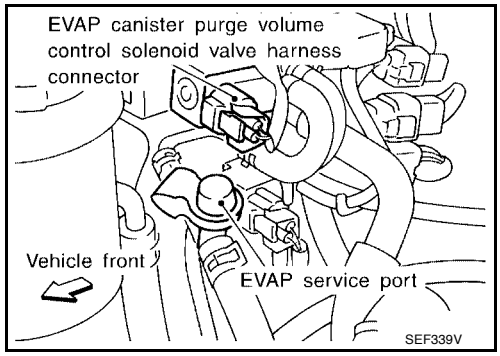
Refer to EC-488, "DTC Confirmation Procedure" .

OK or NG

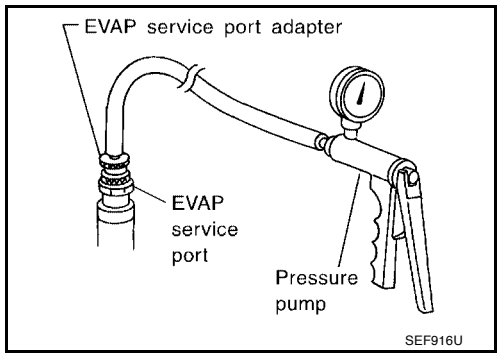
OK >> GO TO 8.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

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.

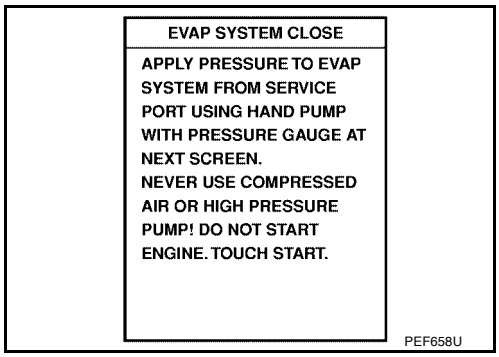


With CONSULT-II>>GO TO 9.
Without CONSULT-II>>GO TO 10.

9. CHECK FOR EVAP LEAK

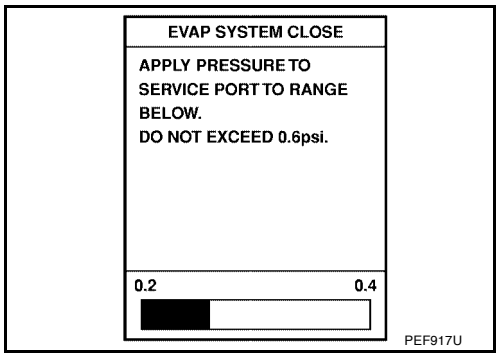
With CONSULT-II

1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.

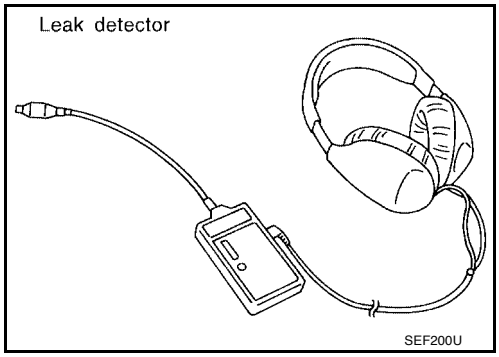


3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

   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-571, "EVAPORATIVE EMISSION LINE DRAWING"
   .



OK or NG

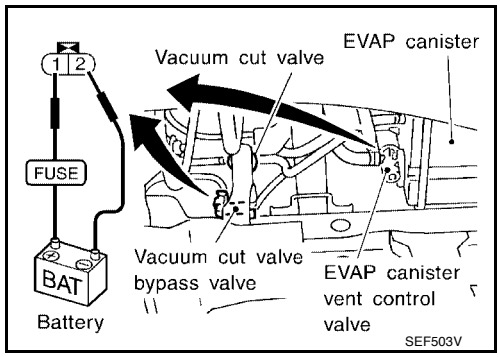
OK >> GO TO 11.
NG >> Repair or replace.

10. CHECK FOR EVAP LEAK

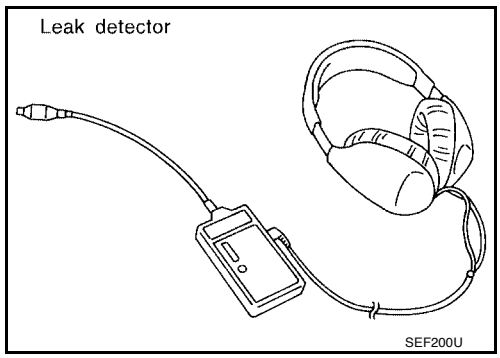
Without CONSULT-II

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-571, "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%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

   Vacuum should exist.

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 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 14.
NG >> GO TO 13.

13. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-30, "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	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN
THRTL POS SEN	XXX V

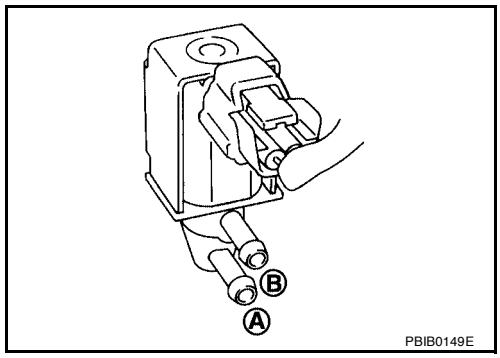
SEF801Y

15. CHECK 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.

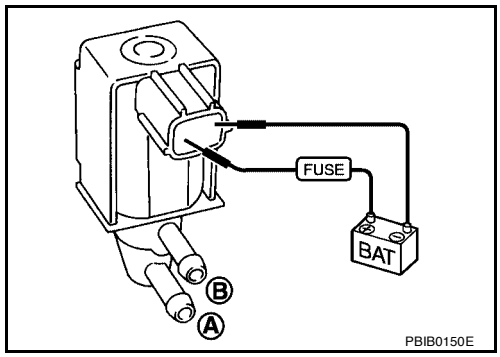
Condition (PURG VOL CONT/V valve)	Air passage continuity between A and B
100%	Yes
0%	No



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



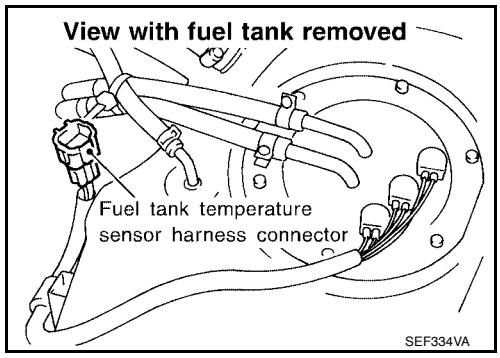
OK or NG

OK >> GO TO 16.

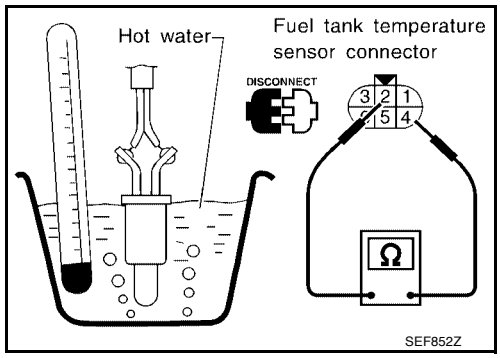
NG >> Replace EVAP canister purge volume control solenoid valve.

16. CHECK FUEL TANK TEMPERATURE SENSOR

Check resistance 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



OK or NG

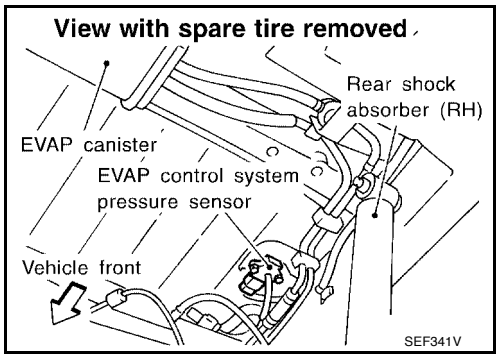
OK >> GO TO 17.

NG >> Replace fuel tank temperature sensor, refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

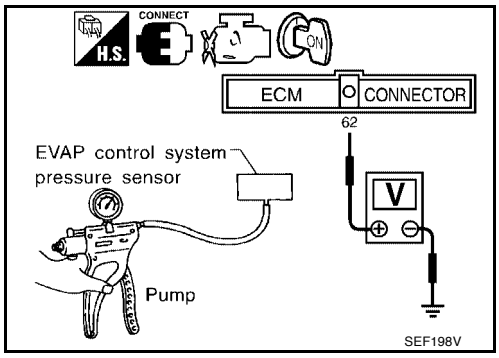
1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.56 inHg) of pressure.**



4. Check output voltage between ECM terminal 62 and ground.

Applied vacuum kPa (mmHg, inHg)	Voltage [V]
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value



CAUTION:
Discard any EVAP control system pressure 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.

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

18. 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-576, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)".

OK or NG

OK >> GO TO 19.
NG >> Repair or replace hoses and tubes.

19. CHECK SIGNAL LINE AND RECIRCULATION LINE

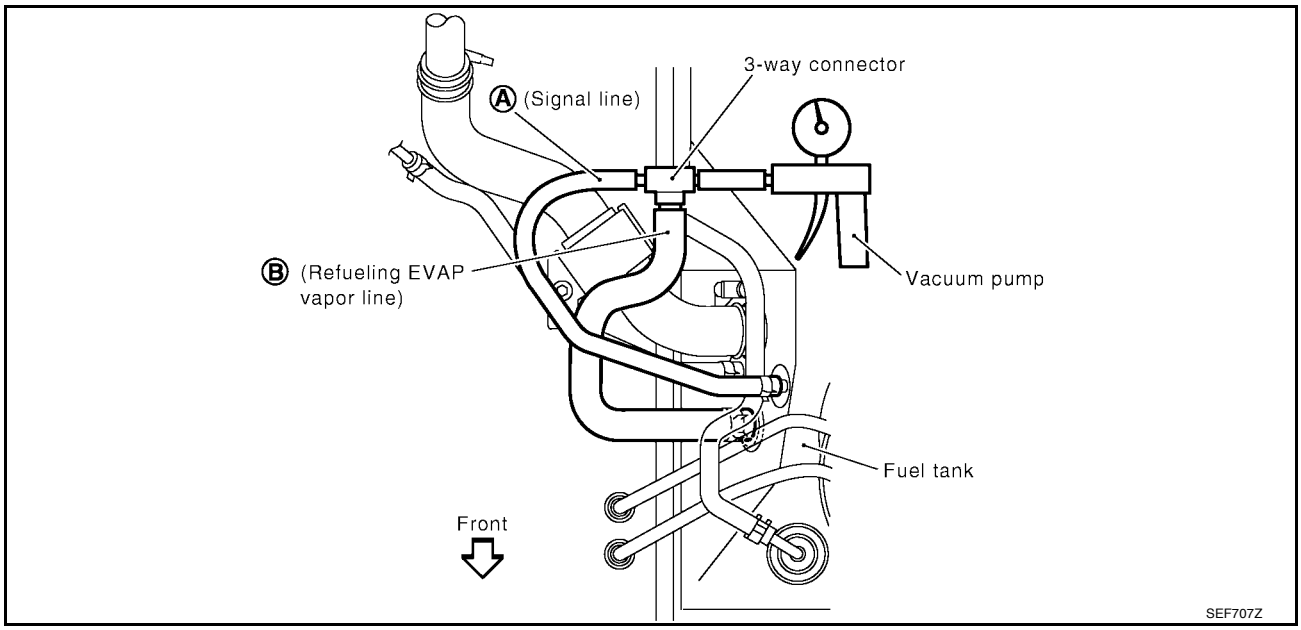
Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 20.
NG >> Repair or replace hoses, tubes or filler neck tube.

20. CHECK 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.



OK or NG

OK >> GO TO 21.
NG >> Replace refueling control valve with fuel tank.

21. CHECK FUEL LEVEL SENSOR

1. Remove fuel level sensor assembly.
   Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .
2. Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 22.
NG >> Replace fuel level sensor.

22. CHECK INTERMITTENT INCIDENT

Refer to EC-116, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .

>> **INSPECTION END**.

DTC P0456 EVAP CONTROL SYSTEM

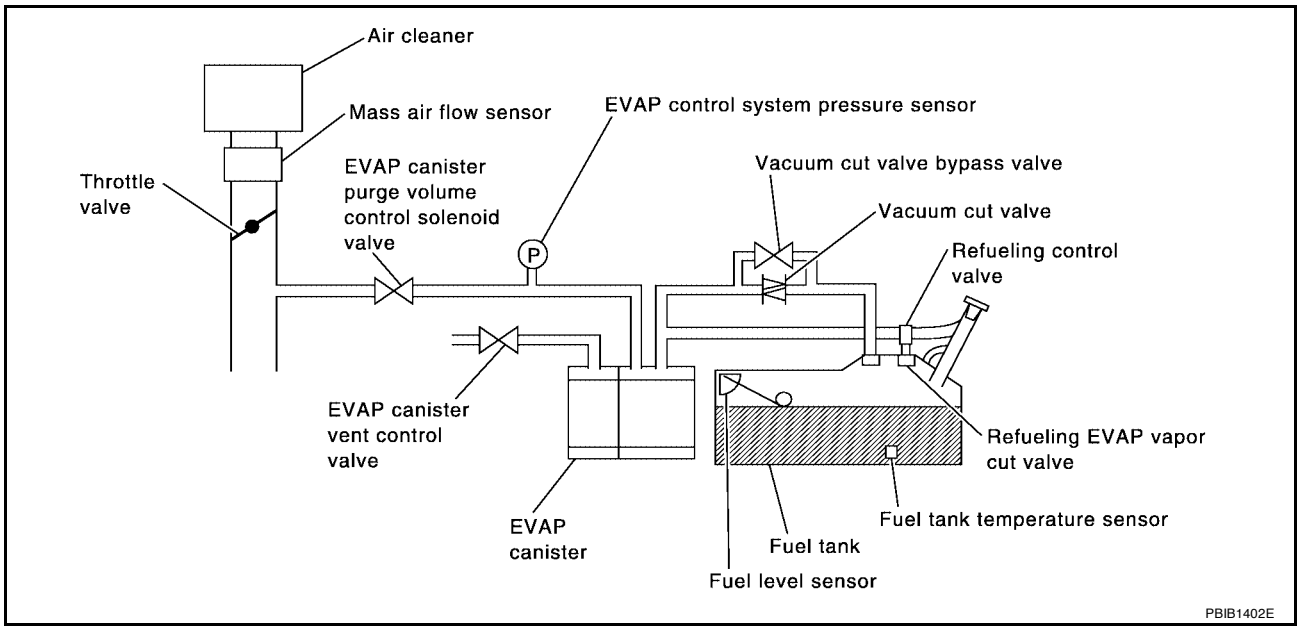
PFP:14950

On Board Diagnosis Logic

UBS00D87

This diagnosis detects very small leaks in the EVAP line between the fuel tank and the EVAP canister purge volume control solenoid valve using intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.

If the ECM judges a leak equivalent to a very small leak, the very small leak DTC P0456 or P1456 will be detected. If the ECM judges a leak equivalent to a small leak, the EVAP small leak DTC P0442 will be detected. Correspondingly, if the ECM judges there is no leak, the diagnosis result is OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456	Evaporative emission control system very small leak (negative pressure check)	• EVAP system has a very small leak. • EVAP system does not operate properly.	• 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 • 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 • Refueling control valve • ORVR system leaks • Fuel level sensor and the circuit • Foreign matter caught in EVAP canister purge volume control solenoid valve

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.**

DTC Confirmation Procedure

UBS00D88

NOTE:

- **If DTC P0456 or P1456 is displayed with P0442, first perform trouble diagnosis for DTC P0456 or P1456.**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**
- **After repair, make sure that the hoses and clips are installed properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

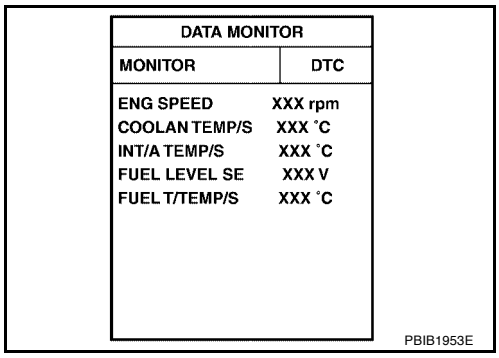
WITH CONSULT-II

TESTING CONDITION:

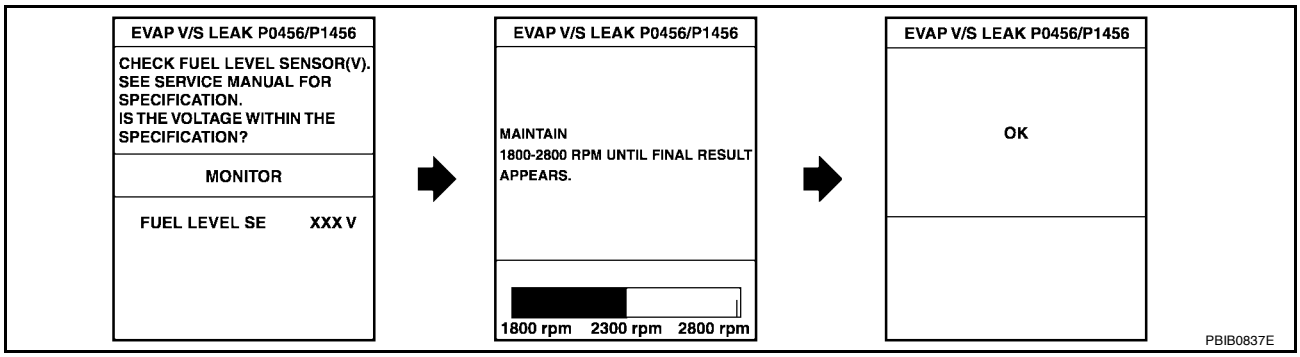
- **Open engine hood before conducting following procedure.**
- **If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**
  - **Fuel filler cap is removed.**
  - **Refilled or drained the fuel.**
  - **EVAP component parts is/are removed.**

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

1. Turn ignition switch “ON” and select “DATA MONITOR” mode with CONSULT-II.
2. Make sure the following conditions are met.
   FUEL LEVEL SE: 1.16 - 0.25V
   COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
   FUEL T/TMP SE: 0 - 32°C (32 - 90°F)
   INT A/TEMP SE: More than 0°C (32°F)
   If NG, turn ignition switch “OFF” and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the “FUEL LEVEL SE” meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1.



3. Turn ignition switch OFF and wait at least 5 seconds.
4. Turn ignition switch ON.
5. Select “EVAP V/S LEAK P0456/P1456” of “EVAP SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.



6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-375, "Diagnostic Procedure" .

NOTE:

- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to EC-74, "Basic Inspection" .**

Overall Function Check

UBS00D89

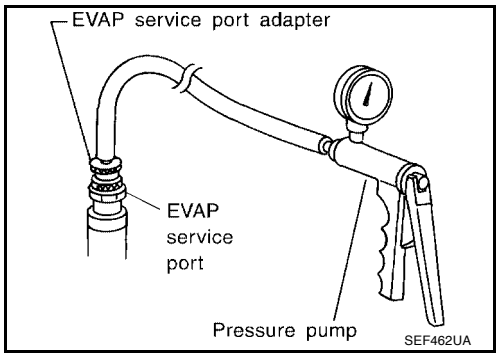
WITH GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2 , 0.6 psi).**

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Set the pressure pump and a hose.
3. Also set a vacuum gauge via 3-way connector and a hose.
4. Turn ignition switch ON.
5. Connect GST and select MODE 8.
6. Using MODE 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
7. Apply pressure and make sure the following conditions are satisfied.
   Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)



Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg)
If NG, go to EC-375, "Diagnostic Procedure" .
If OK, go to next step.

NOTE:
For more information, refer to GST Instruction Manual.

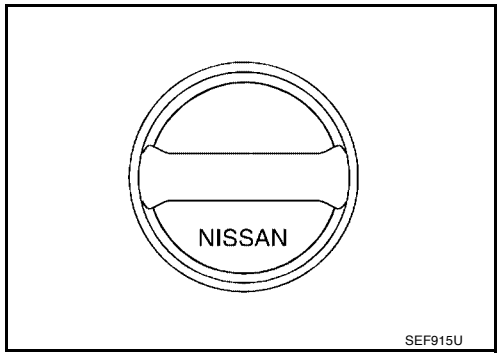
8. Disconnect GST.
9. Start engine and warm it up to normal operating temperature.
10. Turn ignition switch OFF and wait at least 10 seconds.
11. Restart engine and let it idle for 90 seconds.
12. Keep engine speed at 2,000 rpm for 30 seconds.
13. Turn ignition switch OFF.

Diagnostic Procedure

UBS00D8A

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

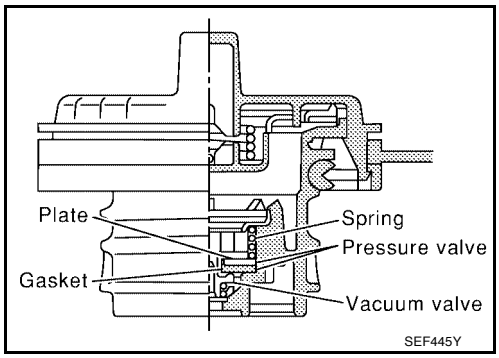
Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

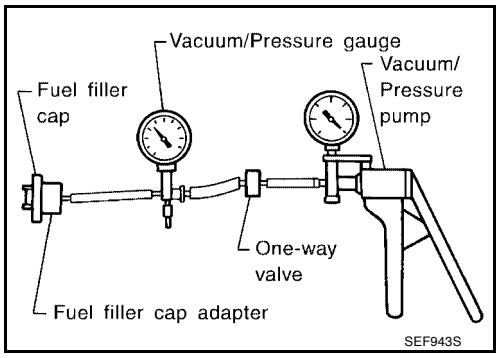
4. CHECK FUEL TANK VACUUM RELIEF VALVE

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)



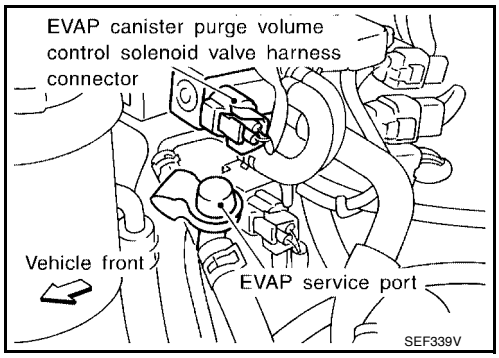
CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

OK or NG

OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

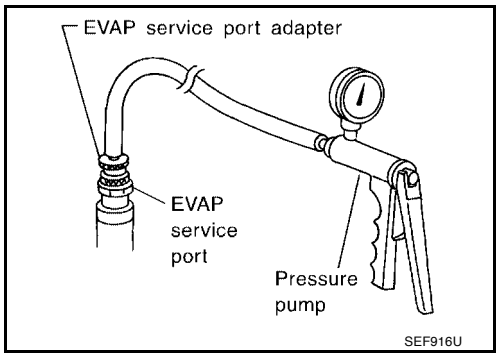
5. INSTALL THE PRESSURE PUMP

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.

With CONSULT-II>>GO TO 6.
Without CONSULT-II>>GO TO 7.

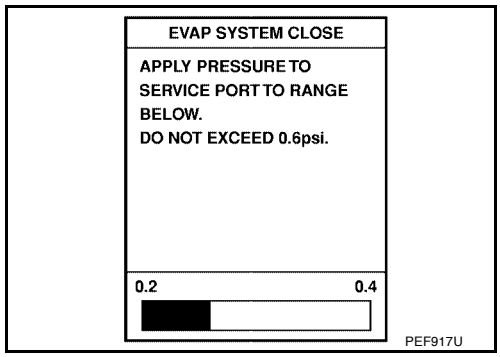


6. CHECK FOR EVAP LEAK

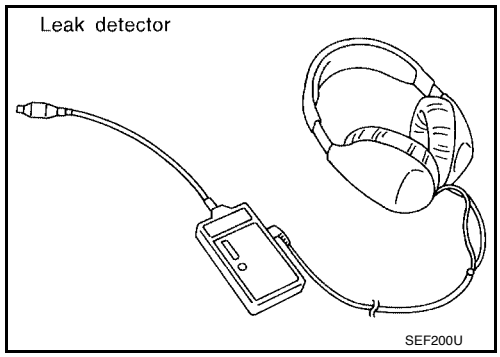
With CONSULT-II

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-571, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

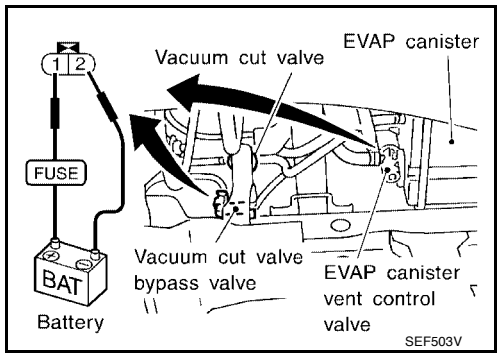
OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

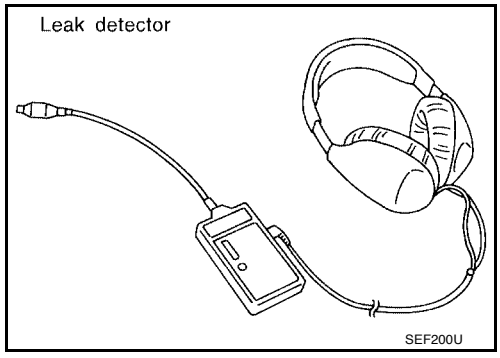
Without CONSULT-II

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-571, "EVAPORATIVE EMISSION LINE DRAWING" .

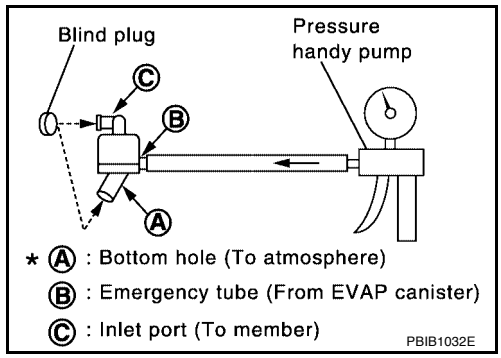


OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK 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.

OK or NG

OK >> GO TO 9.
NG >> Replace water separator.

9. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

Refer to EC-488, "DTC Confirmation Procedure" .

OK or NG

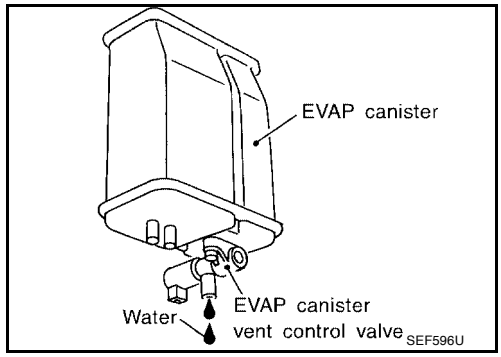
OK >> GO TO 10.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

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%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
HO2S1 MNTR (B1)	LEAN

PBIB0828E

OK or NG

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

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-30, "Vacuum Hose Drawing" .

OK or NG

OK (With CONSULT-II)>>GO TO 16.
OK (Without CONSULT-II)>>GO TO 17.
NG >> Repair or reconnect the hose.

16. 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	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

OK or NG

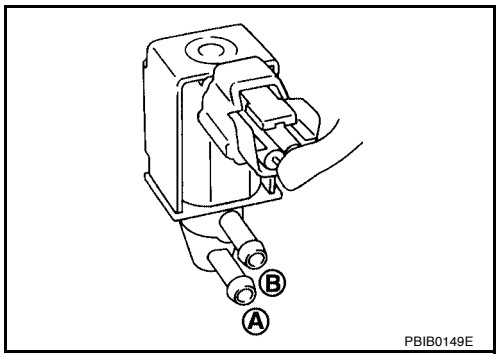
OK >> GO TO 18.
NG >> GO TO 17.

17. CHECK 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.

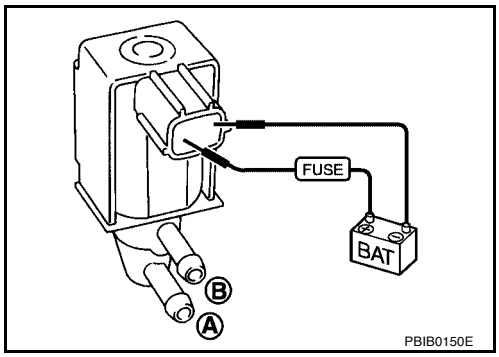
Condition (PURG VOL CONT/V valve)	Air passage continuity between A and B
100%	Yes
0%	No



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

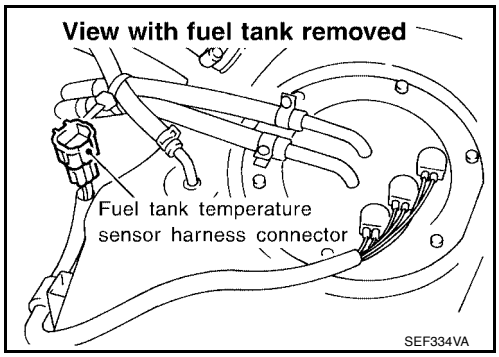


OK or NG

OK >> GO TO 18.
NG >> Replace EVAP canister purge volume control solenoid valve.

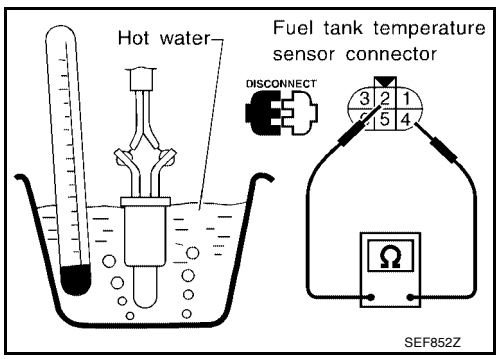
18. CHECK FUEL TANK TEMPERATURE SENSOR

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



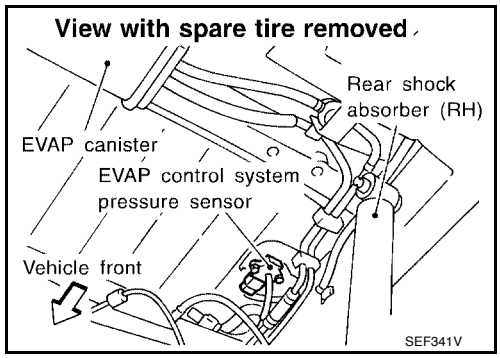
OK or NG

OK >> GO TO 19.
NG >> Replace fuel level sensor unit.

19. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

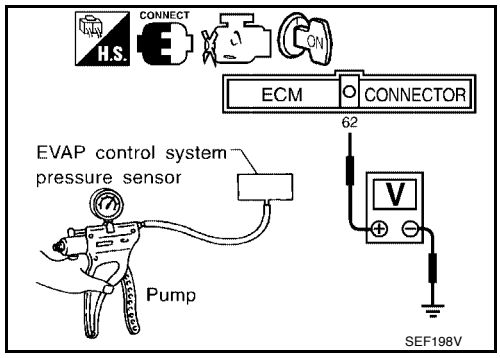
1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.56 inHg) of pressure.**



4. Check output voltage between ECM terminal 62 and ground.

Applied vacuum kPa (mmHg, inHg)	Voltage [V]
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value



CAUTION:
Discard any EVAP control system pressure 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.

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-571, "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-576, "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

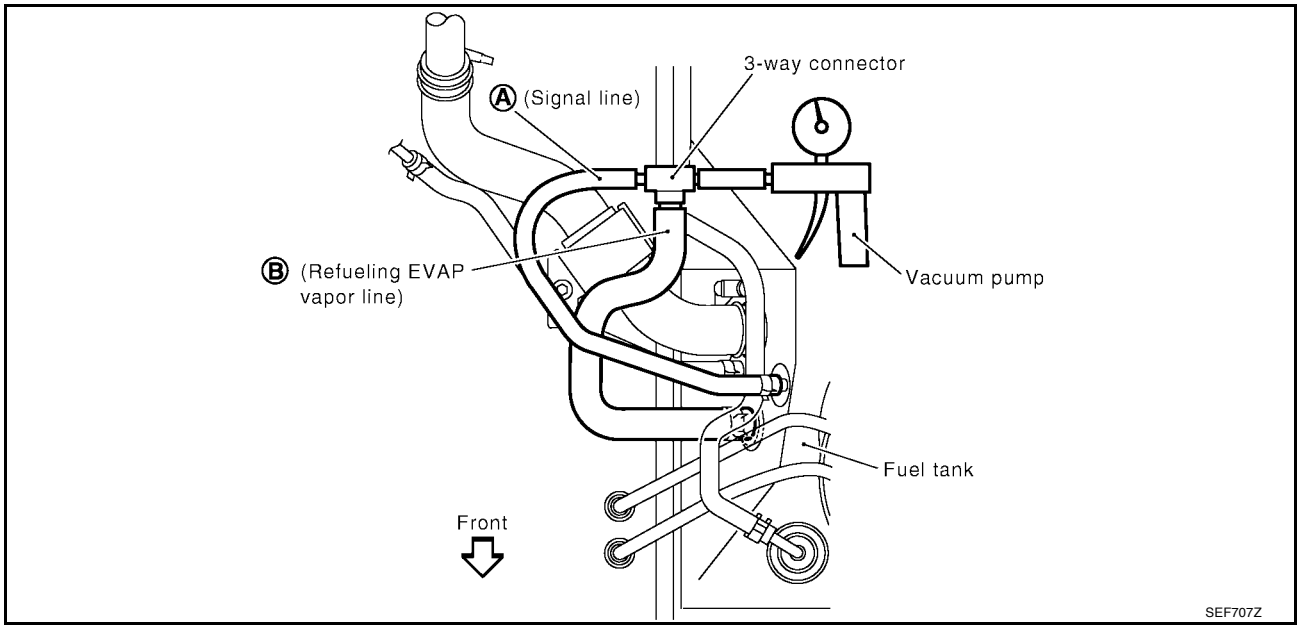
Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 24.
NG >> Repair or replace hoses, tubes or filler neck tube.

24. CHECK REFUELING CONTROL VALVE

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.



OK or NG

OK >> GO TO 25.
NG >> Replace refueling control valve with fuel tank.

25. CHECK FUEL LEVEL SENSOR

Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 26.
NG >> Replace fuel level sensor unit.

26. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

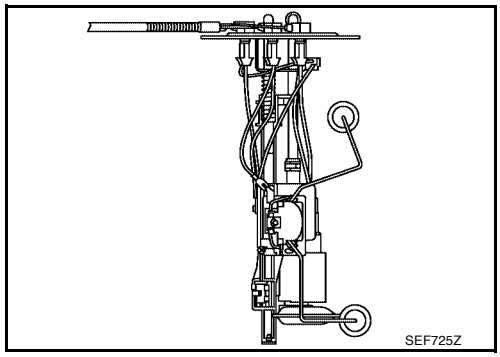
DTC P0460 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00D8B

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 is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.


SEF725Z

On Board Diagnostic Logic

UBS00D8C

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.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	● Fuel level sensor circuit (The sensor circuit is open or shorted) ● Fuel level sensor

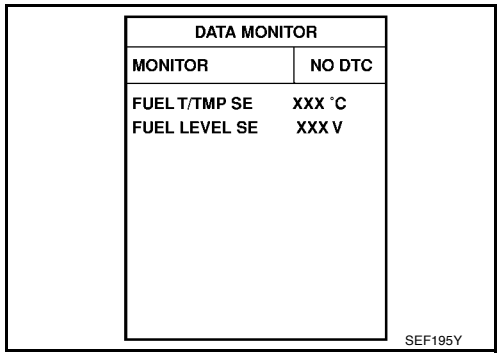
DTC Confirmation Procedure

UBS00D8D

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-385, "Diagnostic Procedure"
.



SEF195Y

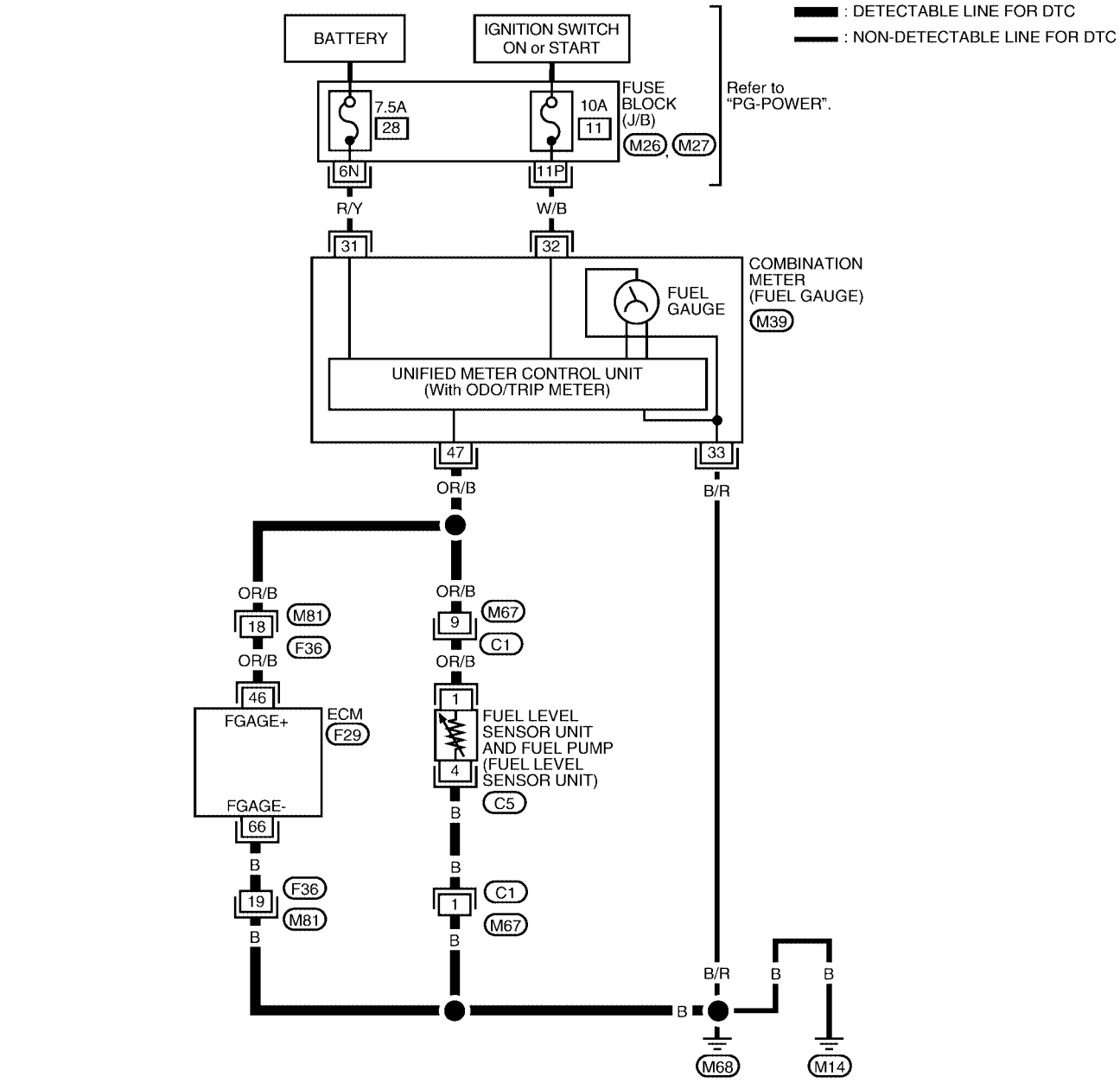
WITH GST

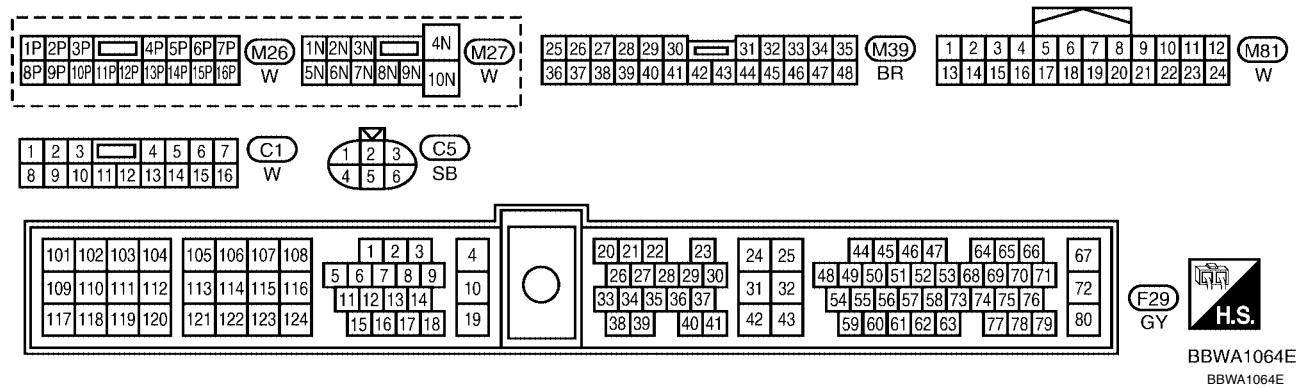
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00D8E

EC-FLS1-01





BBWA1064E

BBWA1064E

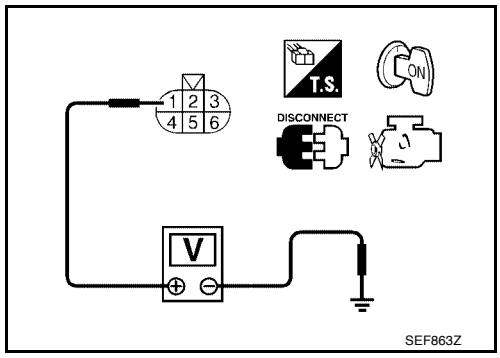
Diagnostic Procedure

UBS00D8F

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 1 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 M67, C1
- Harness for open or short between combination meter and “fuel level sensor until and fuel pump”

>> Repair or replace harness or connectors.

3. CHECK FUEL LEVEL 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 4 and 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.

- Harness connectors M67, C1
- Harness for open or short between “fuel level sensor unit and fuel pump” and ground

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

5. CHECK FUEL LEVEL SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between the following;
   ECM terminal 46 and “fuel level sensor unit and fuel pump” terminal 1,
   ECM terminal 66 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M81, F36
- Harness connectors M67, C1
- Harness for open or short between ECM and “fuel level sensor unit and fuel pump”
- Harness for open or short between ECM and ground

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

7. CHECK FUEL LEVEL SENSOR

Refer to DI-19, "VEHICLE SPEED SENSOR SIGNAL CHECK" .

OK or NG

OK >> GO TO 8.
NG >> Replace fuel level sensor unit.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00D8G

FUEL LEVEL SENSOR

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

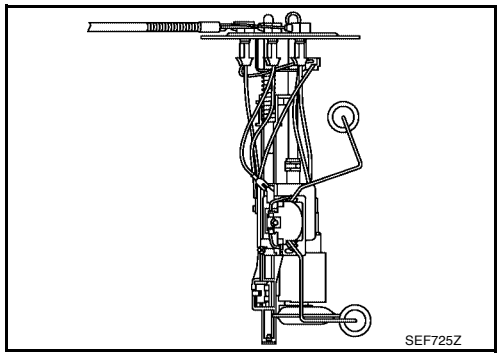
DTC P0461 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00D8H

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 is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.


SEF725Z

On Board Diagnostic Logic

UBS00D8I

Driving long distances naturally affects 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.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0461	Fuel level sensor circuit range/performance	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.	● Harness or connectors (The sensor circuit is open or shorted) ● Fuel level sensor

Overall Function Check

UBS00D8J

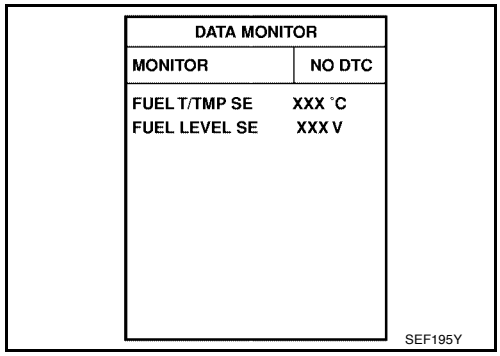
Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

WARNING:
When performing following procedure, be sure to observe the handling of the fuel. Refer to FL-3, "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 10, 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-46, "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. Check “FUEL LEVEL SE” output voltage and note it.
11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
12. Check “FUEL LEVEL SE” output voltage and note it.



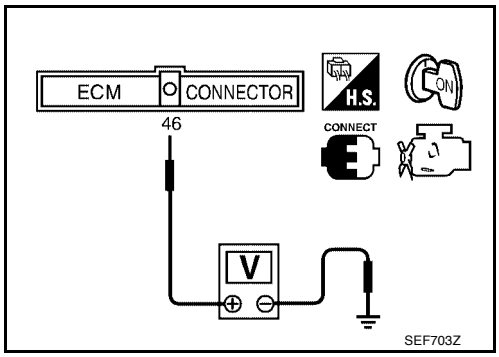
SEF195Y

13. Confirm whether the voltage changes more than 0.03V during step 7 to 10 and 10 to 12.
    If NG, check the fuel level sensor, refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

WITH GST

NOTE:
Start from step 8, 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-46, "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 46 (fuel level sensor signal) and ground.
7. Turn ignition switch ON.
8. Check voltage between ECM terminal 46 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 46 and ground changes more than 0.03V during step 8 - 10.
    If NG, check component of fuel level sensor, refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .



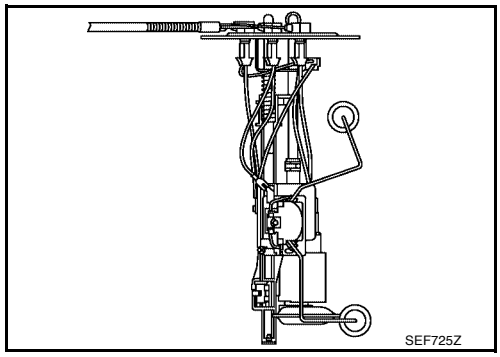
DTC P0462, P0463 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00D8K

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 is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.


SEF725Z

On Board Diagnostic Logic

UBS00D8L

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 (P0462) or high (P0463) voltage is sent from the sensor is sent to ECM.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462	Fuel level sensor circuit low input	An excessively low voltage is sent from the sensor is sent to ECM.	● Fuel level sensor circuit (The sensor circuit is open or shorted) ● Fuel level sensor
P0463	Fuel level sensor circuit high input	An excessively high voltage is sent from the sensor is sent to ECM.	

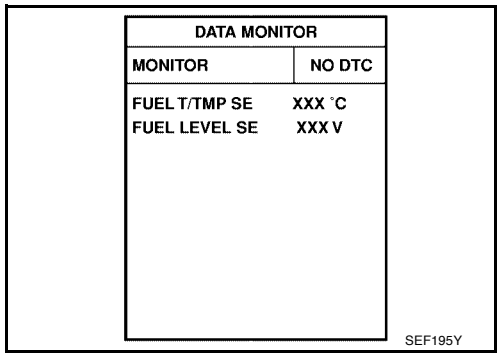
DTC Confirmation Procedure

UBS00D8M

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-391, "Diagnostic Procedure"
.



SEF195Y

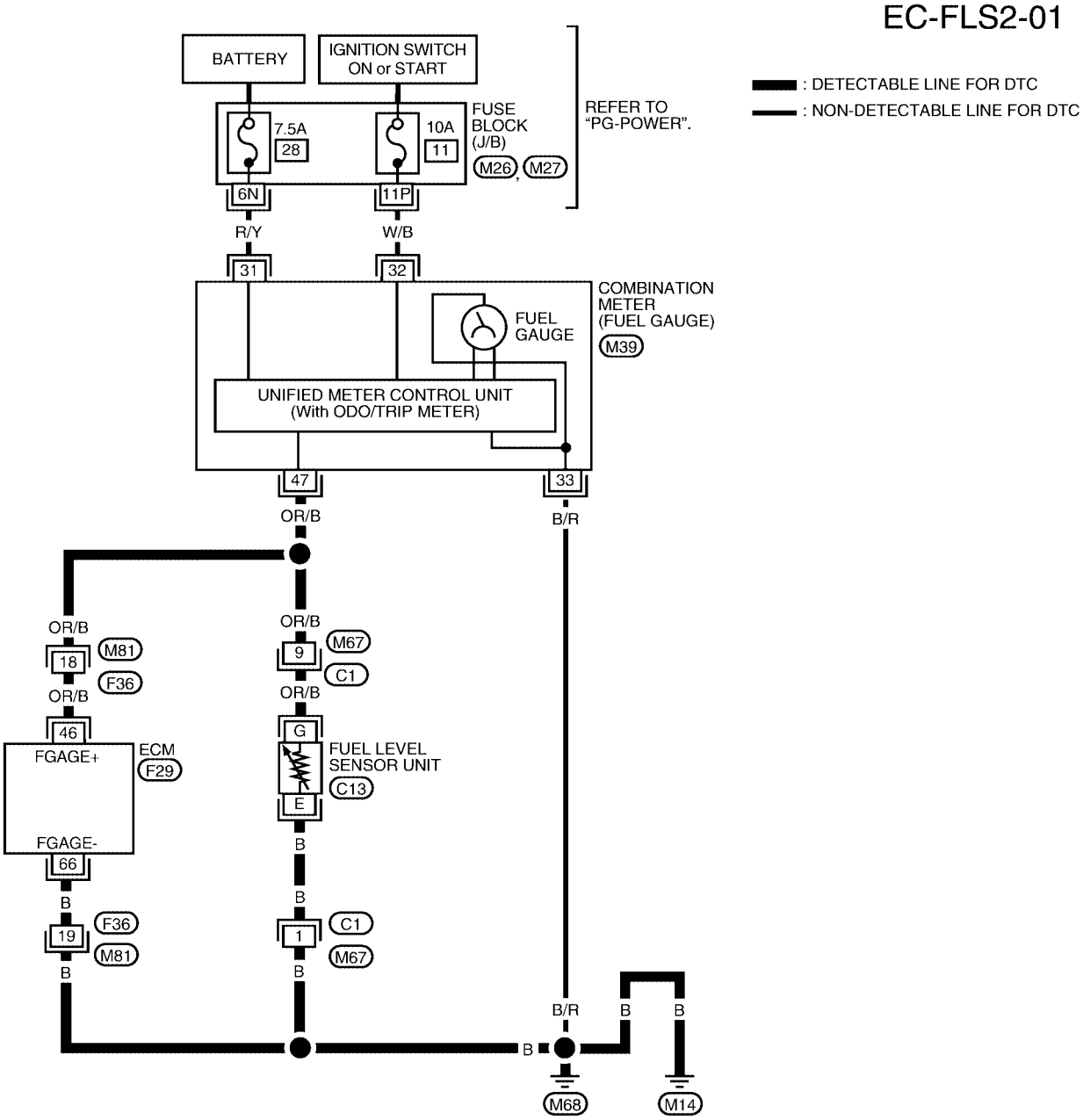
WITH GST

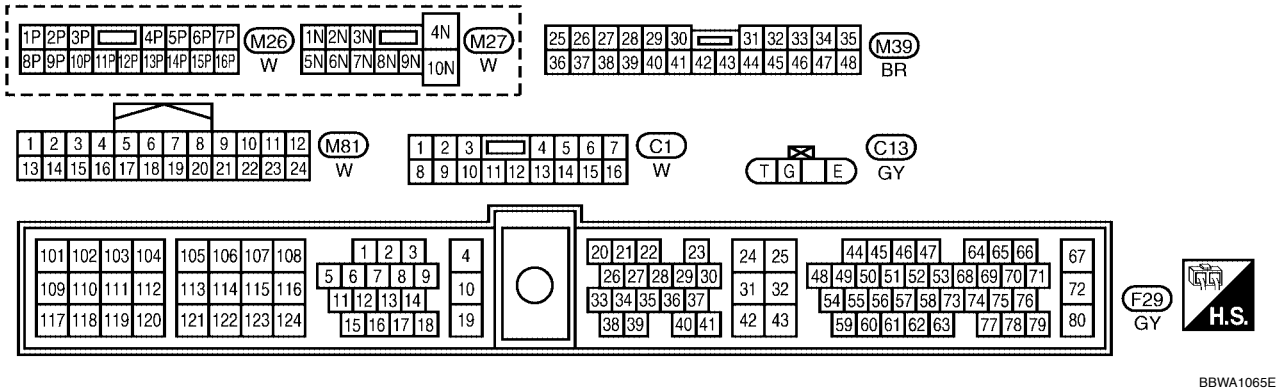
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00D8N

EC-FLS2-01





BBWA1065E

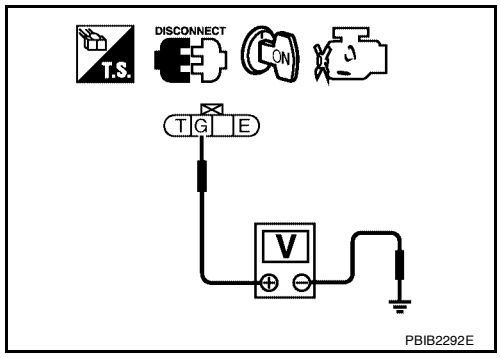
Diagnostic Procedure

UBS00D8O

1. CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit harness connector.
3. Turn ignition switch ON.
4. Check voltage between fuel level sensor unit terminal G 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 M67, C1
- Harness for open or short between combination meter and fuel level sensor unit

>> Repair or replace harness or connectors.

3. CHECK FUEL LEVEL SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between fuel level sensor unit terminal E and 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.

- Harness connectors M67, C1
- Harness for open or short between fuel level sensor unit and ground

>> Repair open circuit 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 46 and fuel level sensor unit terminal G. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M81, F36
- Harness connectors M67, C1
- Harness for open or short between ECM and fuel level sensor unit

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

7. CHECK FUEL LEVEL SENSOR

Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 8.
NG >> Replace fuel level sensor unit.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00D8P

FUEL LEVEL SENSOR

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

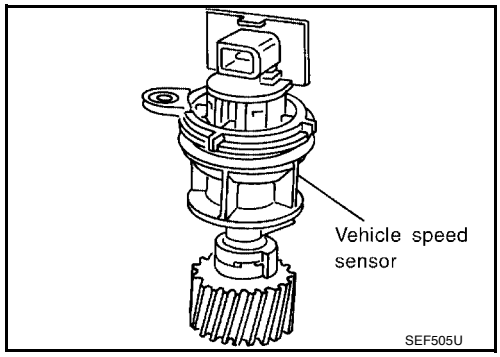
DTC P0500 VSS

PFP:32702

Component Description

UBS00D8Q

The vehicle speed sensor is installed in the transmission. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.



On Board Diagnosis Logic

UBS00D8R

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	● Harness or connectors (The vehicle speed sensor circuit is open or shorted) ● Vehicle speed sensor

DTC Confirmation Procedure

UBS00D8S

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 5 seconds before conducting the next test.

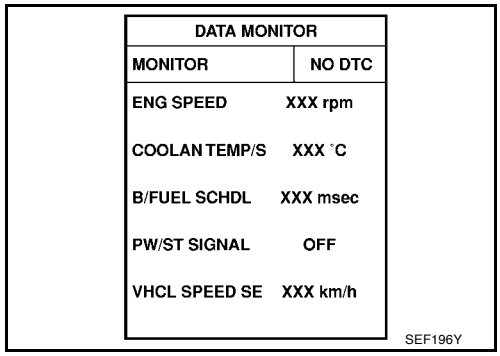
TESTING CONDITION:

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

WITH CONSULT-II

1. Start engine
2. Read vehicle speed sensor signal 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.
3. If NG, go to EC-395, "Wiring Diagram" .
   If OK, go to following step.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Warm engine up to normal operating temperature.
6. Maintain the following conditions for at least 1 minute.

ENG SPEED	1,800 - 6,000 rpm (M/T) 1,600 - 6,000 rpm (A/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	7 - 15 msec (M/T) 6 - 16 msec (A/T)
Shift lever	Suitable position
PW/ST SIGNAL	OFF



7. If 1st trip DTC is detected, go to EC-395, "Wiring Diagram" .

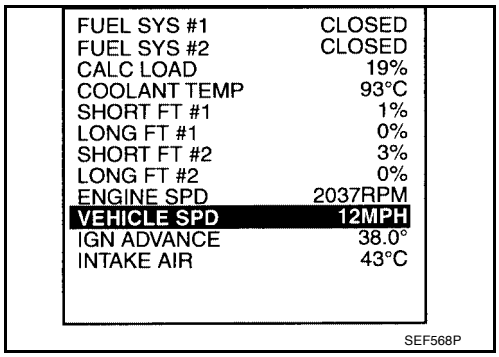
Overall Function Check

UBS00D8T

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

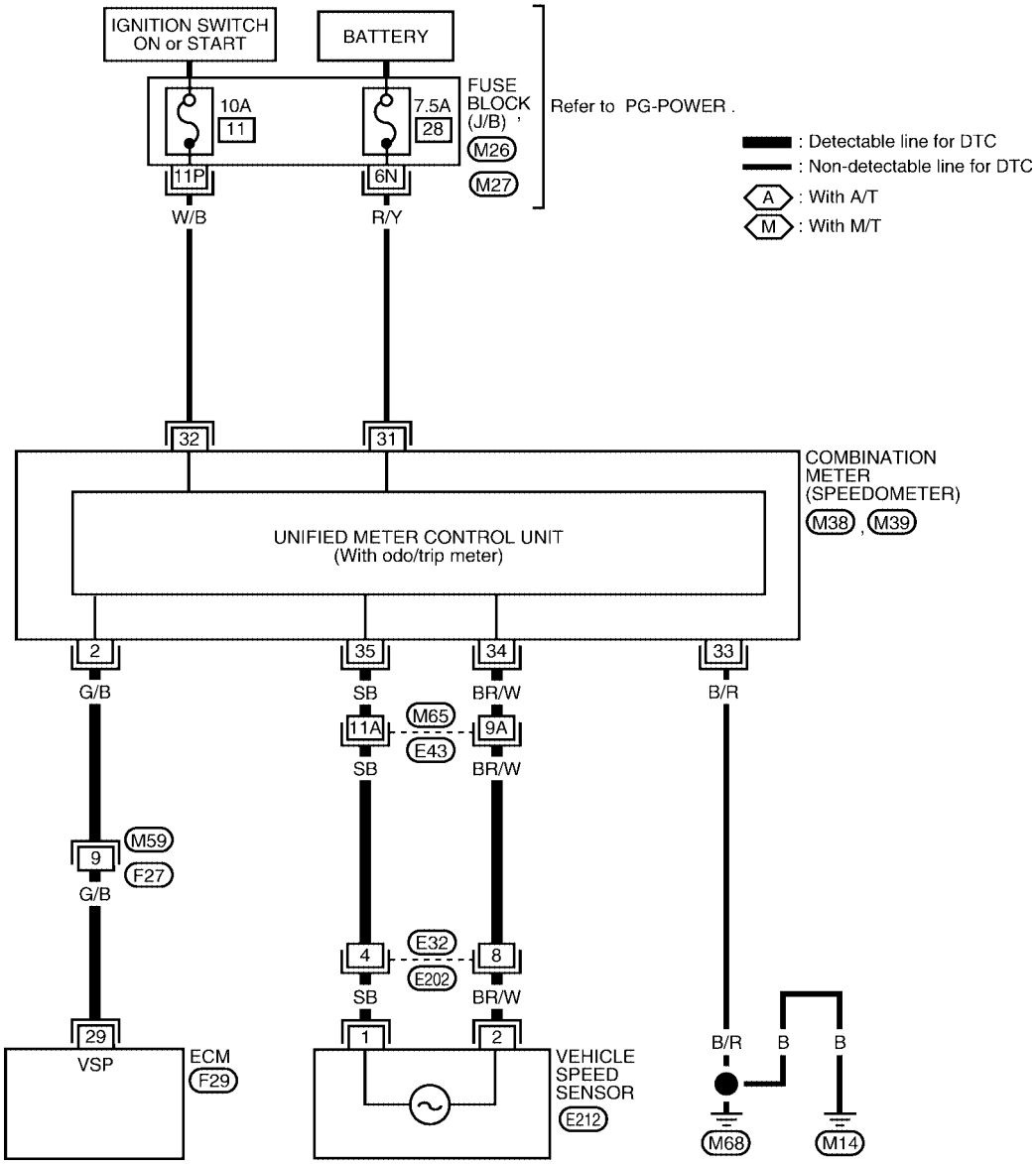
1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed sensor signal in “MODE 1” with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to EC-395, "Wiring Diagram" .

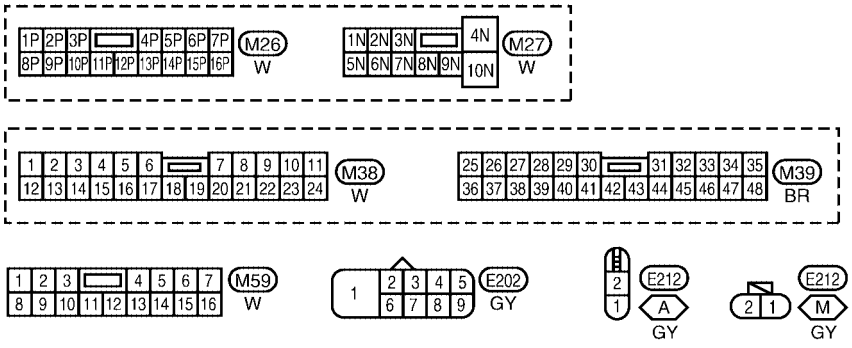


Wiring Diagram

UBS00D8U

EC-VSS-01





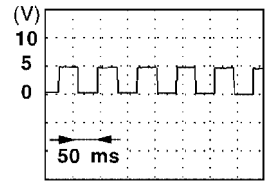
Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)
F29 - ELECTRICAL UNITS

BBWA0448E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	G/B	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle ● Shift lever: D (A/T), 2nd (M/T) ● Vehicle speed: 40 km/h (25 MPH)	1 - 4V★  SEF003W

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

Diagnostic Procedure

UBS00D8V

1. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and combination meter harness connector M38.
3. Check harness continuity between ECM terminal 29 and combination meter 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 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- 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.

3. CHECK SPEEDOMETER FUNCTION

Make sure that speedometer functions properly.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors E32, E202
- Harness for open or short between combination meter and vehicle speed sensor

>> Repair harness or connectors. Check vehicle speed sensor and its circuit. Refer to DI-13, "INSPECTION/VEHICLE SPEED SENSOR" .

5. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END.**

DTC P0505 ISC SYSTEM

PFP:23781

Description

UBS00D8W

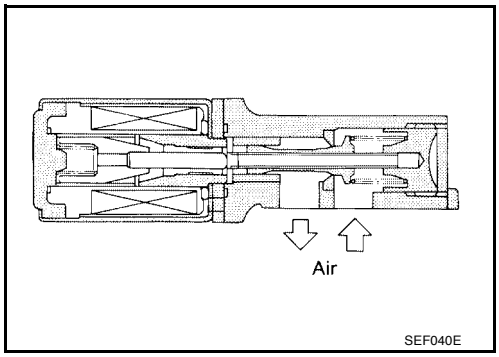
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Idle air control	IACV-AAC 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		
Park/neutral position (PNP) switch	Park/Neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Intake air temperature sensor	Intake air temperature		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in 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 warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).

COMPONENT DESCRIPTION

The IAC valve-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.



CONSULT-II Reference Value in Data Monitor Mode

UBS00D8X

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	Approx. 30%
		2,000 rpm	—

On Board Diagnosis Logic

UBS00D8Y

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0505	IACV-AAC valve circuit	An improper voltage signal is sent to ECM through IACV-AAC valve.	● Harness or connectors (The IACV-AAC valve circuit is open or shorted.) ● IACV-AAC valve

DTC Confirmation Procedure

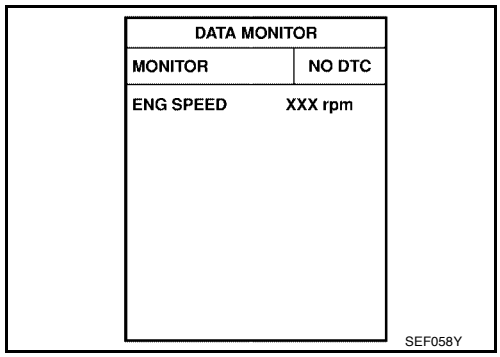
UBS00D8Z

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. Wait at least 2 seconds.
4. If 1st trip DTC is detected, go to EC-401, "Diagnostic Procedure"
.

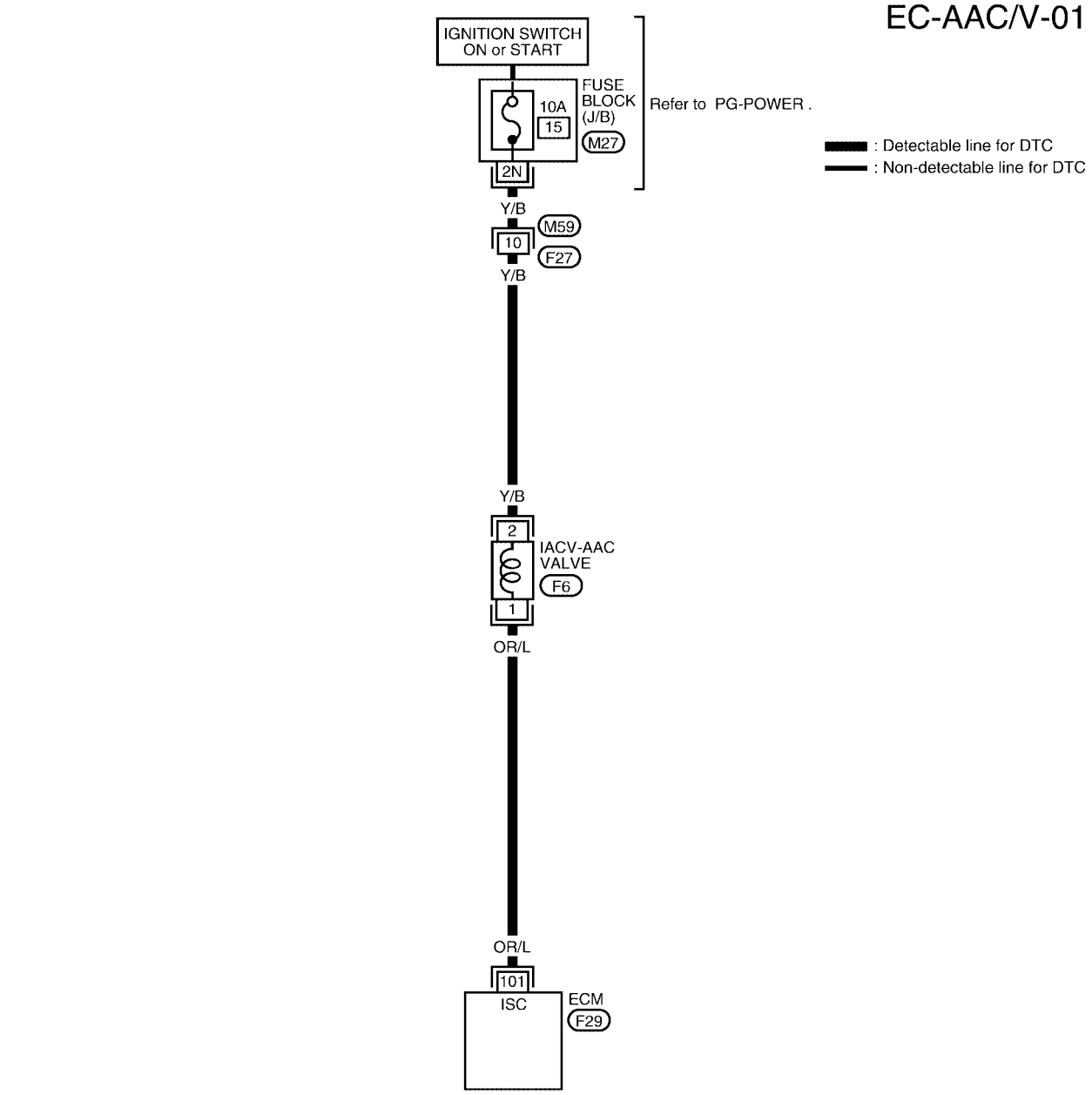


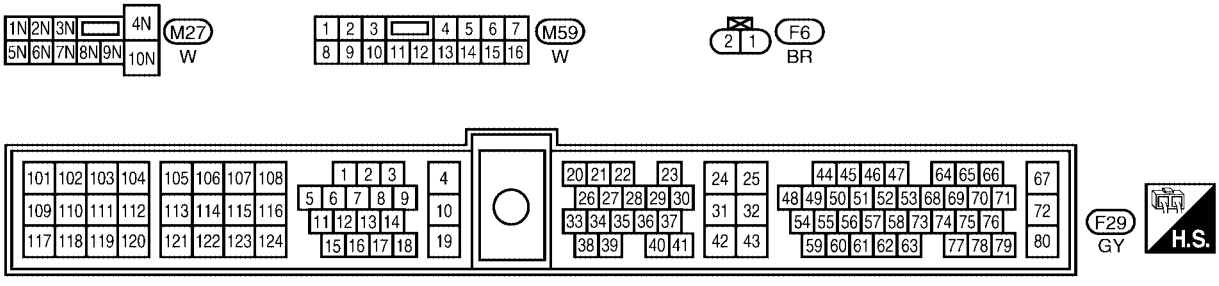
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00D90



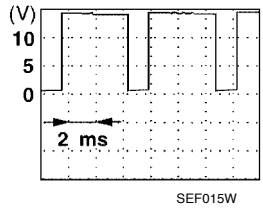
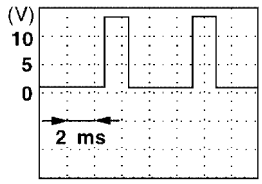


BBWA0449E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	10.5 - 11.5V★  SEF015W
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	1 - 13V★  SEF016W

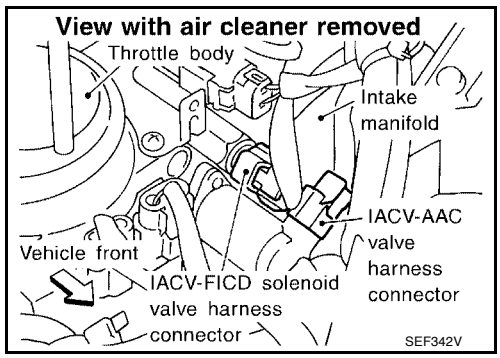
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00D91

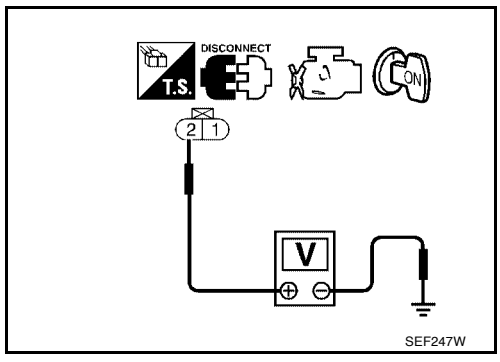
1. CHECK POWER SUPPLY

1. Stop engine and turn ignition switch OFF.
2. Disconnect IACV-AAC valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between IACV-AAC 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 M59, F27
- Fuse block (J/B) connector M27
- 10A fuse
- Harness for open or short between IACV-AAC valve and fuse

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

3. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and IACV-AAC 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

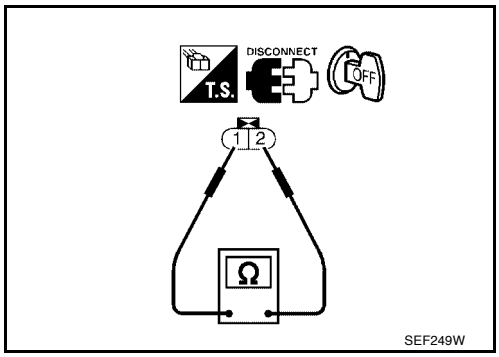
OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK IACV-AAC VALVE

- Check IACV-AAC valve resistance.

Resistance : Approximately 10 Ω [at 25°C (77°F)]

- Check plunger for seizing or sticking.
- Check for broken spring.



OK or NG

OK >> GO TO 5.
NG >> Replace IACV-AAC valve.

5. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

DTC P0506 ISC SYSTEM

PFP:23781

Description

UBS00D92

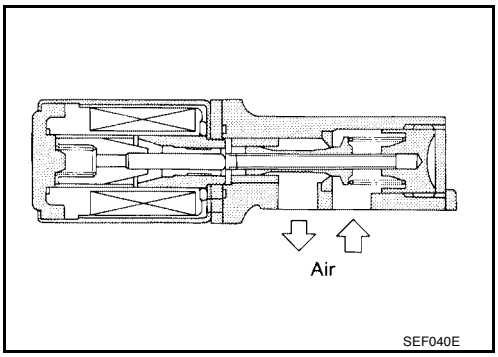
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Idle air control	IACV-AAC 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		
Park/neutral position (PNP) switch	Park/Neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Intake air temperature sensor	Intake air temperature		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in 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 warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).

COMPONENT DESCRIPTION

The IAC valve-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.



CONSULT-II Reference Value in Data Monitor Mode

UBS00D93

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	Approx. 30%
		2,000 rpm	—

On Board Diagnosis Logic

UBS00D94

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0506	Idle speed control system RPM lower than expected	The idle speed is less than the target idle speed by 100 rpm or more.	● Harness or connectors (The IACV-AAC valve circuit is open or shorted) ● IACV-AAC valve

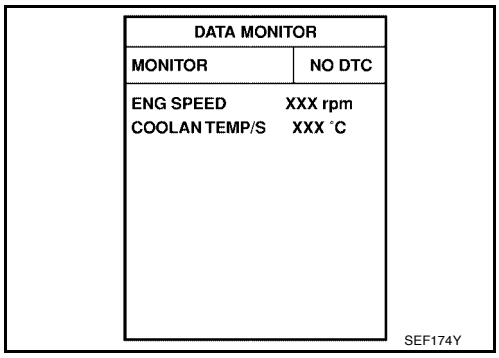
DTC Confirmation Procedure

UBS00D95

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and run it for at least 1 minute at idle speed.
5. If 1st trip DTC is detected, go to EC-406, "Diagnostic Procedure" .



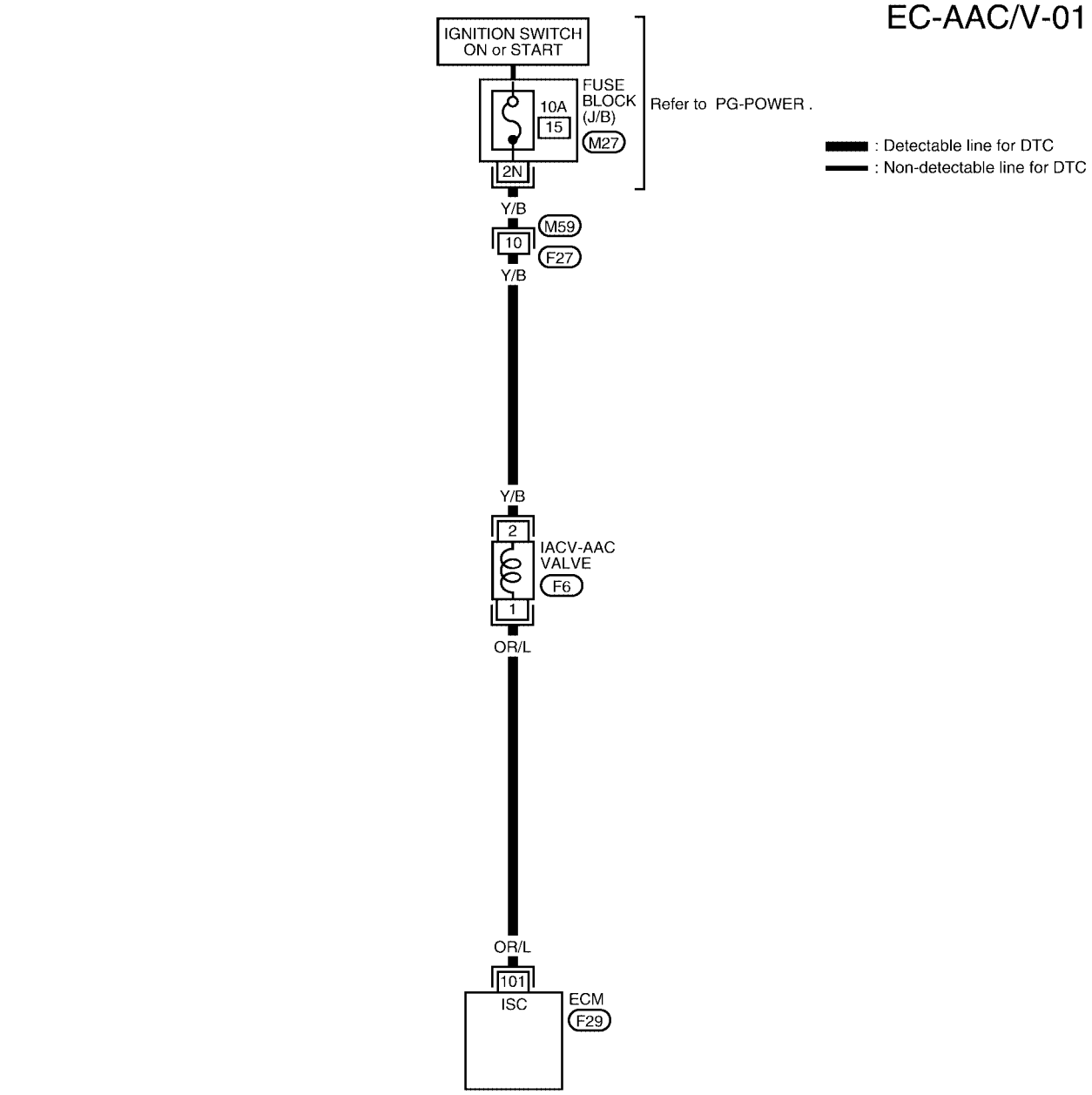
WITH GST

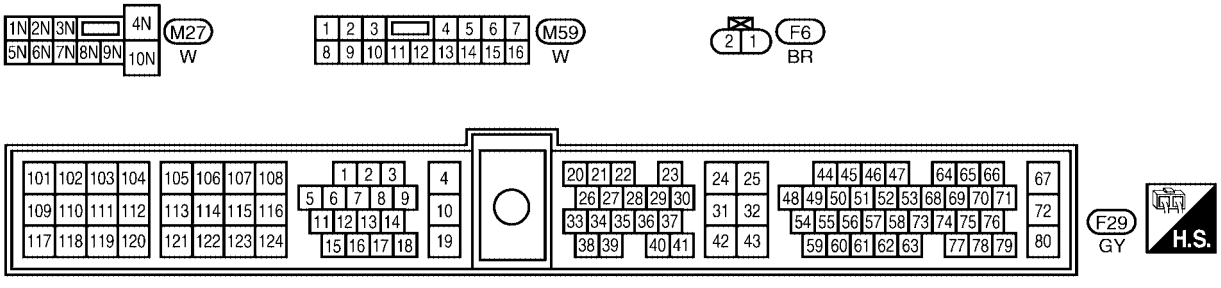
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00D96

EC-AAC/V-01



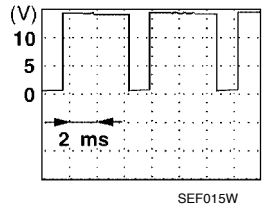
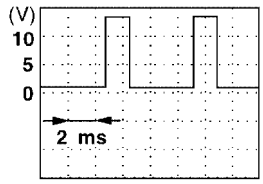


BBWA0449E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	10.5 - 11.5V★  SEF015W
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	1 - 13V★  SEF016W

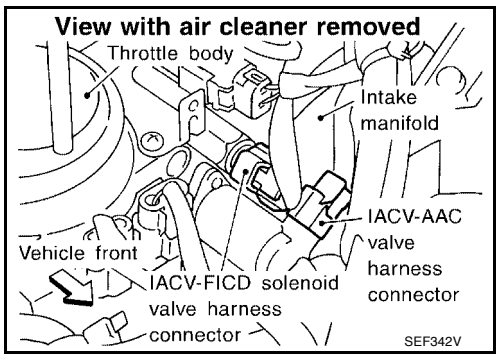
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00D97

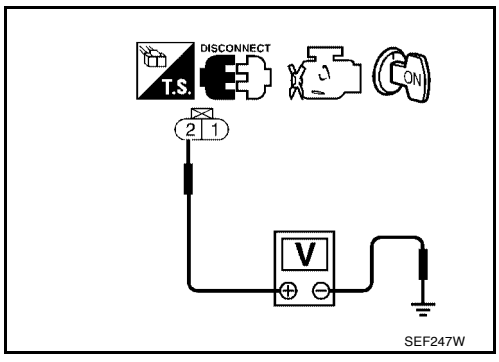
1. CHECK POWER SUPPLY

1. Stop engine and turn ignition switch OFF.
2. Disconnect IACV-AAC valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between IACV-AAC 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 M59, F27
- Fuse block (J/B) connector M27
- 10A fuse
- Harness for open or short between IACV-AAC valve and fuse

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

3. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and IACV-AAC 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 IACV-AAC VALVE

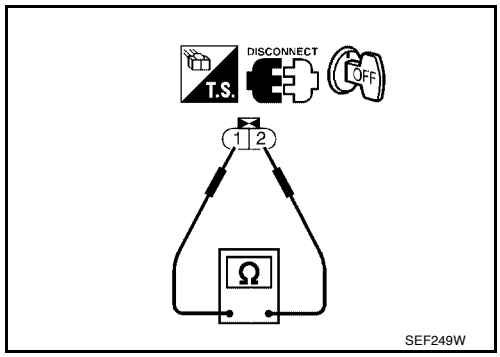
- Check IACV-AAC valve resistance.

Resistance : Approximately 10 Ω [at 25°C (77°F)]

- Check plunger for seizing or sticking.
- Check for broken spring.

OK or NG

OK >> GO TO 5.
NG >> Replace IACV-AAC valve.



5. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

DTC P0507 ISC SYSTEM

PFP:23781

Description

UBS00D98

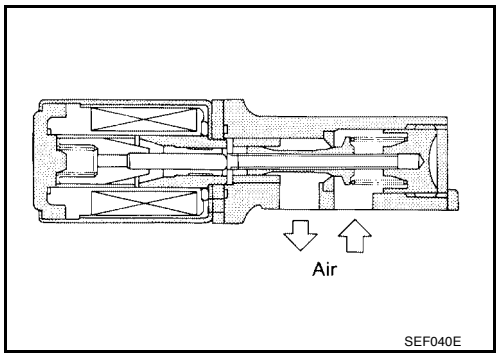
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Idle air control	IACV-AAC 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		
Park/neutral position (PNP) switch	Park/Neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Intake air temperature sensor	Intake air temperature		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in 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 warm up, deceleration, and engine load (air conditioner, power steering and cooling fan operation).

COMPONENT DESCRIPTION

The IAC valve-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.



CONSULT-II Reference Value in Data Monitor Mode

UBS00D99

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	Approx. 30%
		2,000 rpm	—

On Board Diagnosis Logic

UBS00D9A

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507	Idle speed control system RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	● Harness or connectors (The IACV-AAC valve circuit is open or shorted) ● IACV-AAC valve ● Intake air leaks ● PCV system

DTC Confirmation Procedure

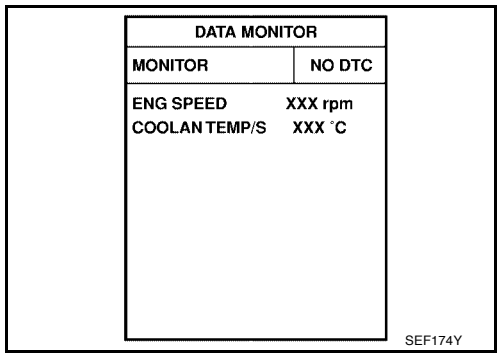
UBS00D9B

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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. Turn ignition switch OFF and wait at least 5 seconds.
3. Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and run it for at least 1 minute at idle speed.
5. If 1st trip DTC is detected, go to EC-411, "Diagnostic Procedure" .

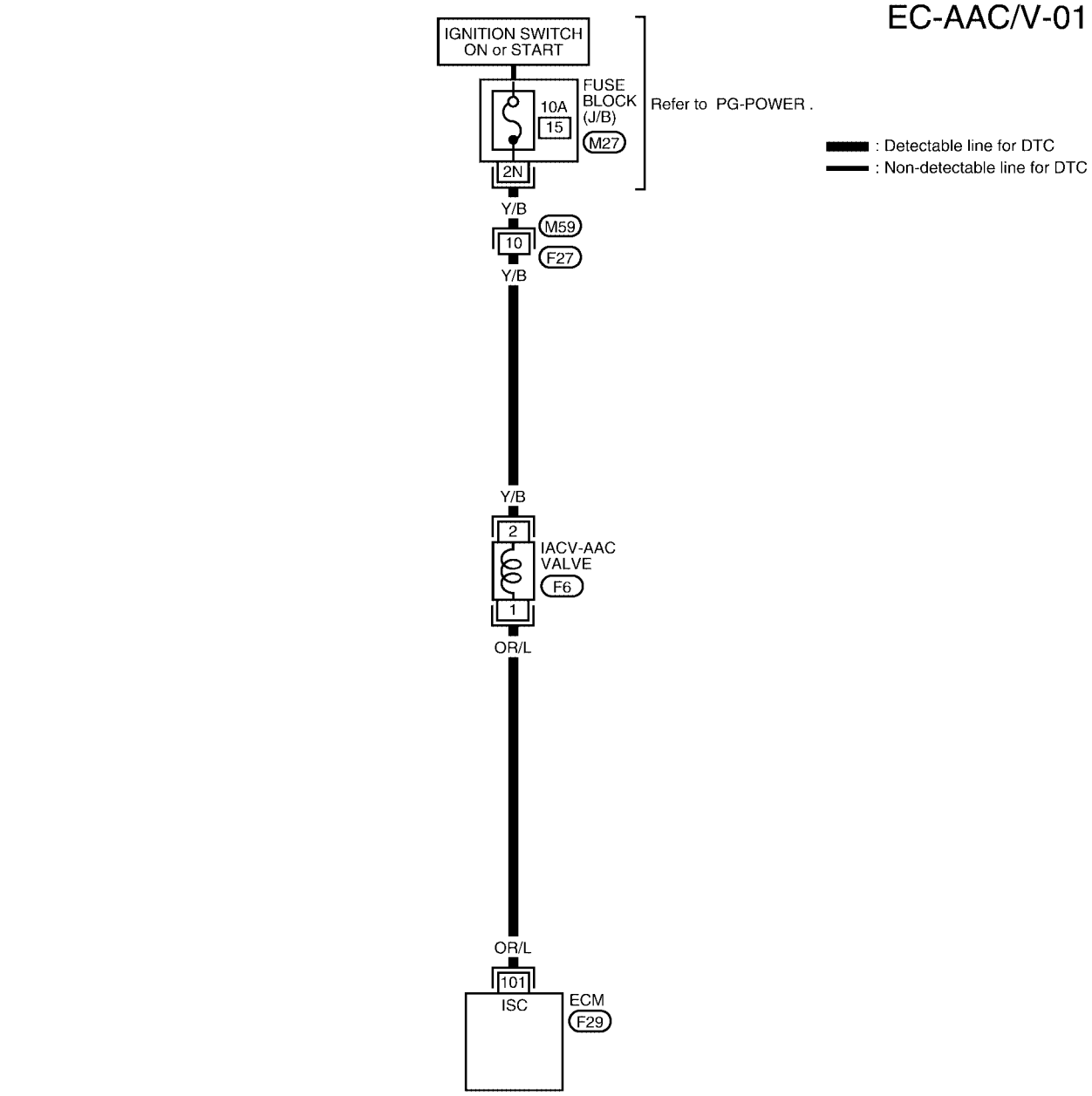


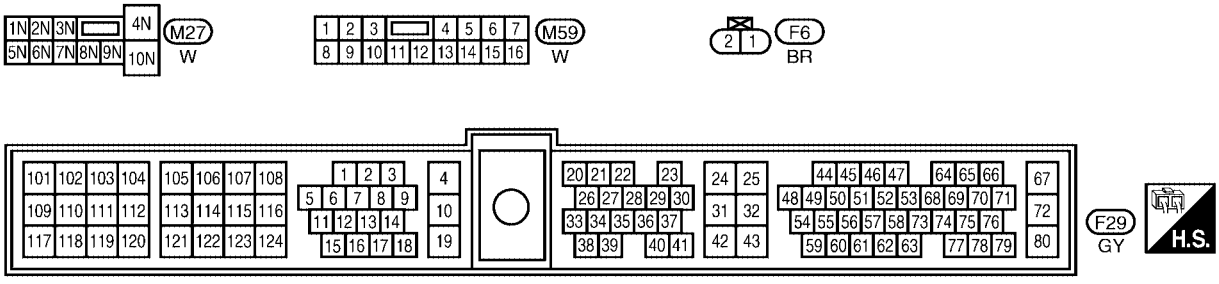
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00D9C



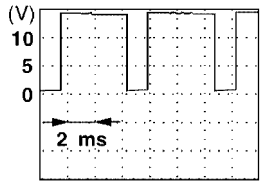
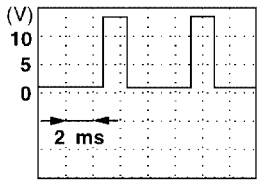


BBWA0449E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	10.5 - 11.5V★  SEF015W
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	1 - 13V★  SEF016W

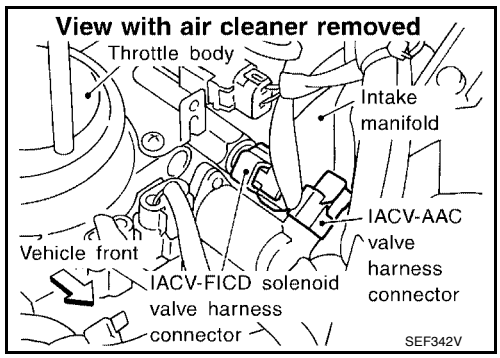
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00D9D

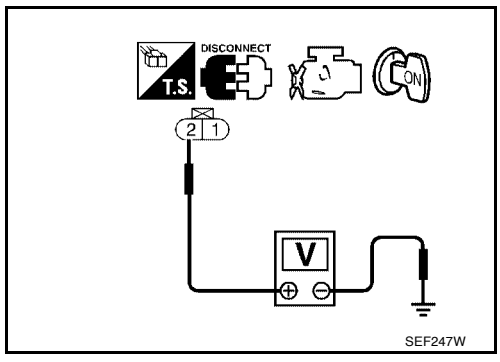
1. CHECK POWER SUPPLY

1. Stop engine and turn ignition switch OFF.
2. Disconnect IACV-AAC valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between IACV-AAC 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 M59, F27
- Fuse block (J/B) connector M27
- 10A fuse
- Harness for open or short between IACV-AAC valve and fuse

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

3. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and IACV-AAC 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

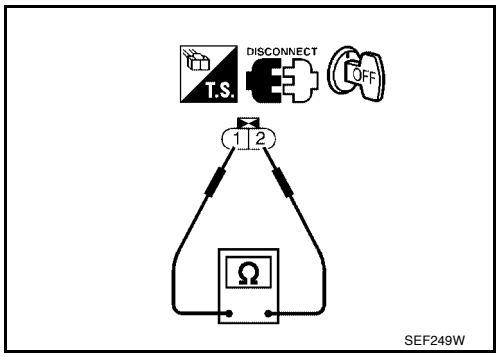
OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK IACV-AAC VALVE

- Check IACV-AAC valve resistance.

Resistance : Approximately 10 Ω [at 25°C (77°F)]

- Check plunger for seizing or sticking.
- Check for broken spring.



OK or NG

OK >> GO TO 5.
NG >> Replace IACV-AAC valve.

5. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

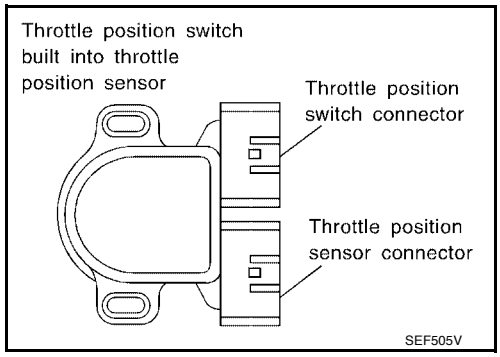
DTC P0510 CTP SWITCH

PFP:22620

Component Description

UBS00D9E

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.
When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge control valve when the throttle position sensor is malfunctioning.



On Board Diagnosis Logic

UBS00D9F

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0510	Closed throttle position switch circuit	Battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened.	● Harness or connectors (The closed throttle position switch circuit is shorted.) ● Closed throttle position switch ● Throttle position sensor

DTC Confirmation Procedure

UBS00D9G

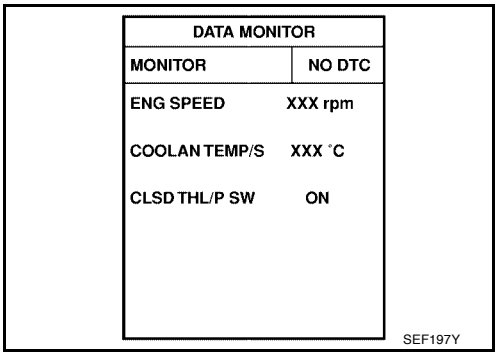
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “CLSD THL/P SW” in “DATA MONITOR” mode with CONSULT-II and check the indication under the following conditions.

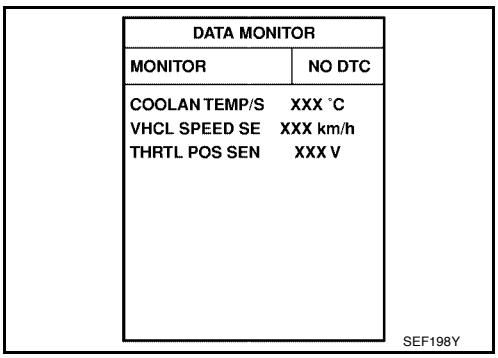
Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF



If the result is NG, go to EC-416, "Diagnostic Procedure" .
If OK, go to following step.

3. Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.5V
VHCL SPEED SE	More than 4 km/h (2 MPH)
Shift lever	Suitable position
Driving pattern	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-416, "Diagnostic Procedure" .

Overall Function Check

UBS00D9H

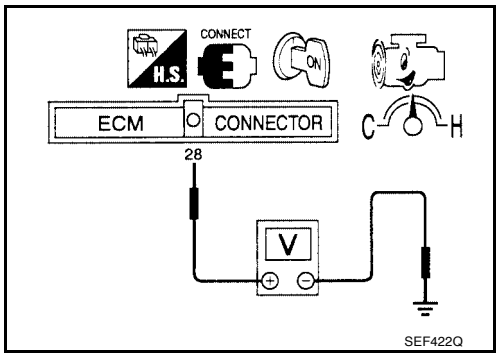
Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM terminal 28 (Closed throttle position switch signal) and ground under the following conditions.

Condition	Voltage
At idle	Battery voltage
At 2,000 rpm	Approximately 0 - 1V

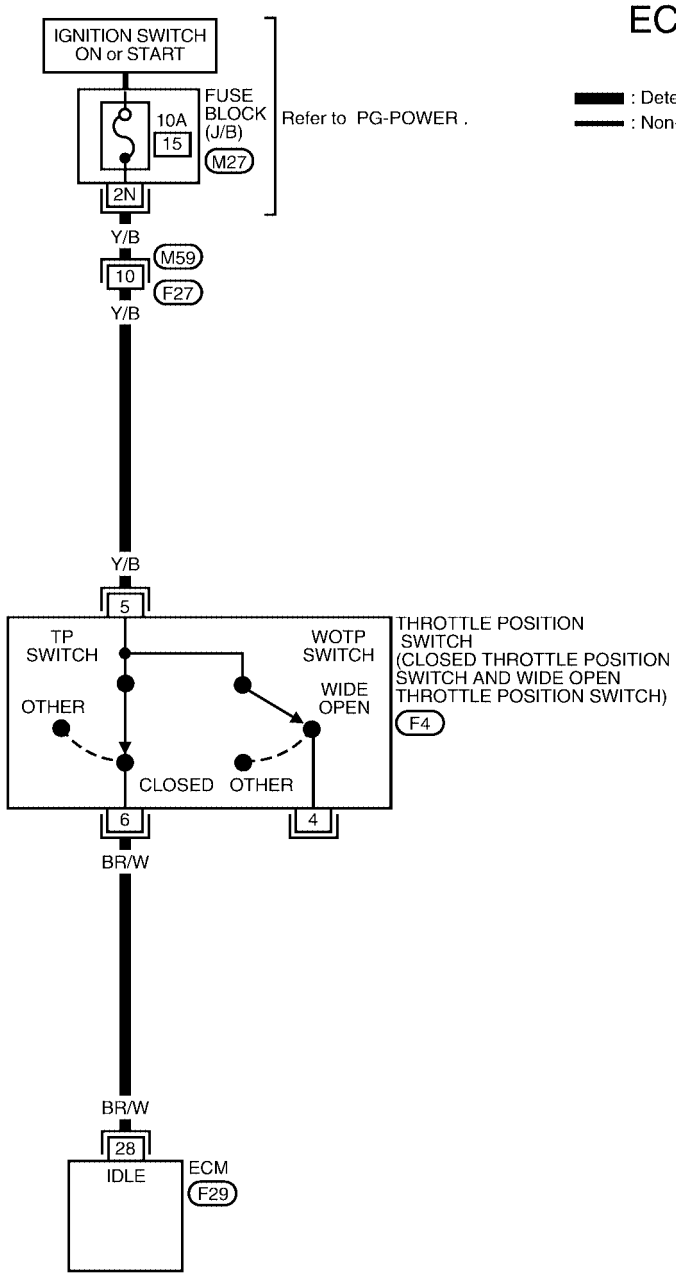
3. If NG, go to EC-416, "Diagnostic Procedure" .

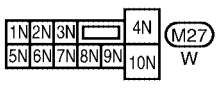


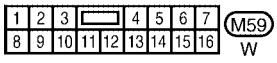
Wiring Diagram

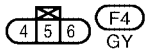
UBS00D9I

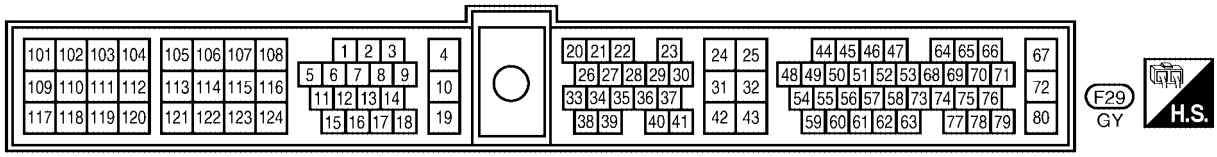
EC-TP/SW-01











BBWA0450E

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

CAUTION:

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

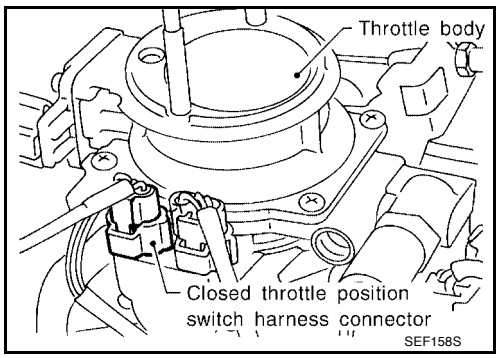
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	BR/W	Throttle position switch (Closed position)	**[Ignition switch: ON]** ● **Warm-up condition** ● Accelerator pedal is fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal is slightly depressed	Approximately 0V

Diagnostic Procedure

UBS00D9J

1. CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect throttle position switch harness connector.
3. Turn ignition switch ON.

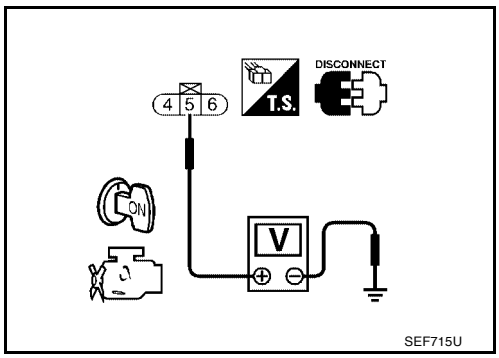


4. Check voltage between throttle position switch terminal 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Fuse block (J/B) connector M27
- 10A fuse
- Harness for open or short between throttle position switch and fuse

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

3. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 28 and closed throttle position switch 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 harness for open or short between throttle position switch and ECM.

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

5. ADJUST THROTTLE POSITION SWITCH IDLE POSITION

1. Check the following items. Refer to EC-74, "Basic Inspection" .
2. Reconnect disconnect all harness connectors.

Items	Specifications
Ignition timing	M/T: 20° ± 5° BTDC (in Neutral position) A/T: 20° ± 5° BTDC (in P or N position)
Base idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.1 mm (0.004 in): ON 0.3 mm (0.012 in): OFF
Target idle speed	M/T: 800 ± 50 rpm (in Neutral position) A/T: 800 ± 50 rpm (in P or N position)

>> GO TO 6.

6. CHECK CLOSED THROTTLE POSITION SWITCH

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and turn ignition switch ON.
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Check indication of “CLSD THL/P SW” under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C
CLSD THL/P SW	ON

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

SEF721Z

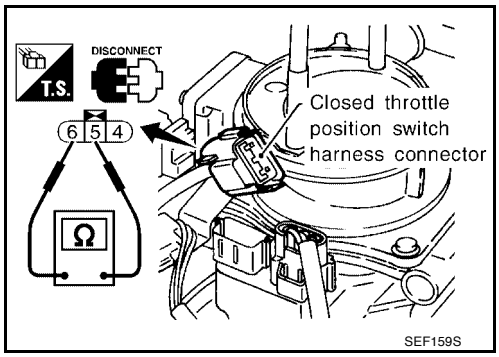
NOTE:
Measurement must be made with closed throttle position switch installed in vehicle.
If NG, adjust closed throttle position switch. Refer to EC-74, "Basic Inspection" .

5. If it is impossible to adjust closed throttle position switch in “Basic Inspection”, replace closed throttle position switch.

With GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect throttle position switch harness connector.
4. Check continuity between terminals 5 and 6 under the following conditions.

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely open	No



SEF159S

NOTE:
Continuity measurement must be made with closed throttle position switch installed in vehicle.
If NG, adjust closed throttle position switch. Refer to EC-74, "Basic Inspection" .

5. If it is impossible to adjust closed throttle position switch in “Basic Inspection”, replace closed throttle position switch.

OK or NG

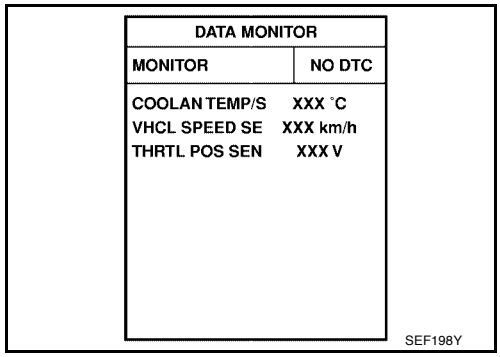
OK >> GO TO 7.
NG >> Replace throttle position switch.

7. CHECK THROTTLE POSITION SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and turn ignition switch ON.
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Check voltage of “THRTL POS SEN” under the following conditions.

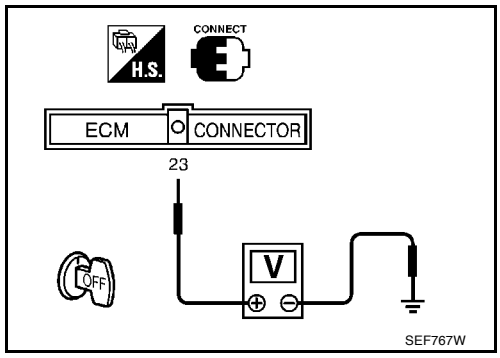
   NOTE:
   Voltage measurement must be made with throttle position sensor installed in vehicle.
   If NG, adjust closed throttle position switch. Refer to EC-74, "Basic Inspection" .
5. If it is impossible to adjust closed throttle position switch in “Basic Inspection”, replace throttle position sensor.



With GST

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and turn ignition switch ON.
3. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground under the following conditions.

Throttle valve conditions	Voltage [V]
Completely closed	0.2 - 0.8 (a)
Partially open	Between (a) and (b)
Completely open	3.5 - 4.5 (b)



NOTE:
Voltage measurement must be made with throttle position sensor installed in vehicle.
If NG, adjust closed throttle position switch. Refer to EC-74, "Basic Inspection" .

4. If it is impossible to adjust closed throttle position switch in “Basic Inspection”, replace throttle position sensor.

OK or NG

OK >> GO TO 8.
NG >> Replace throttle position sensor.

8. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

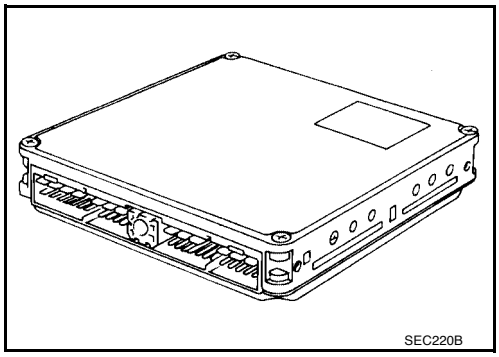
DTC P0605 ECM

PFP:23710

Component Description

UBS00D9K

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


SEC220B

On Board Diagnosis Logic

UBS00D9L

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0605	ECM	ECM calculation function is malfunctioning.	● ECM

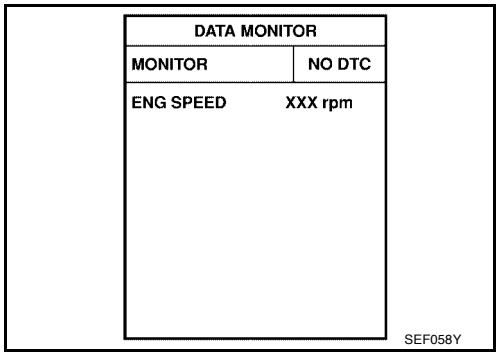
DTC Confirmation Procedure

UBS00D9M

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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. Run engine for at least 2 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-421, "Diagnostic Procedure" .



SEF058Y

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00D9N

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-420, "DTC Confirmation Procedure" .
5. Is the 1st trip DTC P0605 displayed again?

With GST

1. Turn ignition switch ON.
2. Select MODE 4 with GST.
3. Perform DTC Confirmation Procedure.
   See EC-420, "DTC Confirmation Procedure" .
4. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes >> Replace ECM.
No >> **INSPECTION END**

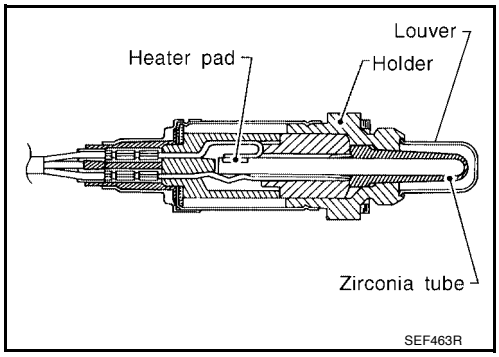
DTC P1143 HO2S1

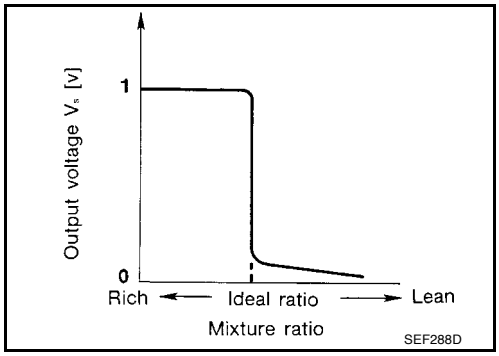
PFP:22690

Component Description

UBS00D9O

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





CONSULT-II Reference Value in Data Monitor Mode

UBS00D9P

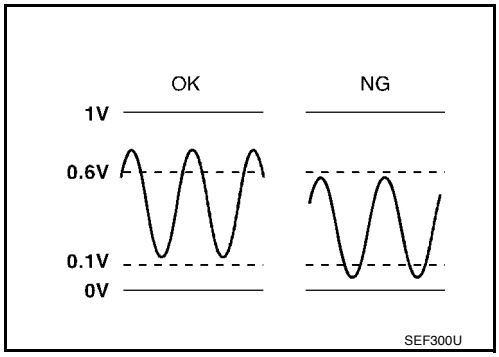
Specification data are reference values.

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

On Board Diagnosis Logic

UBS00D9Q

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1143	Heated oxygen sensor 1 lean shift monitoring	The maximum and minimum voltage from the sensor are not reached to the specified voltages.	● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Fuel injector ● Intake air leaks

DTC Confirmation Procedure

UBS00D9R

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 5 seconds before conducting the next test.

TESTING CONDITION:

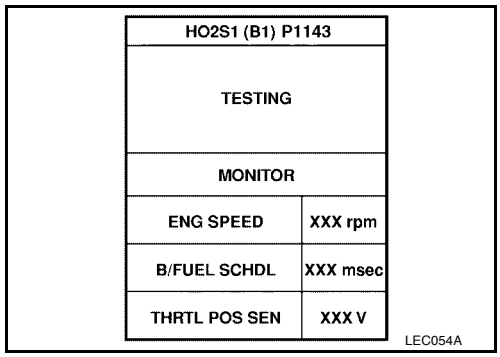
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

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) P1143” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.

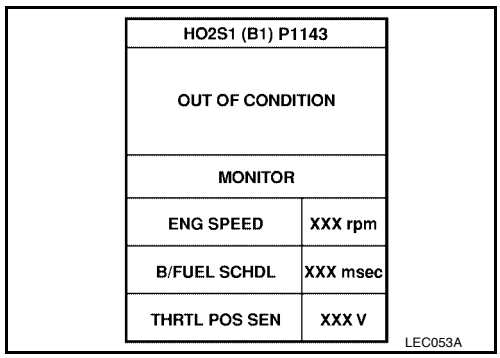
   NOTE:

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



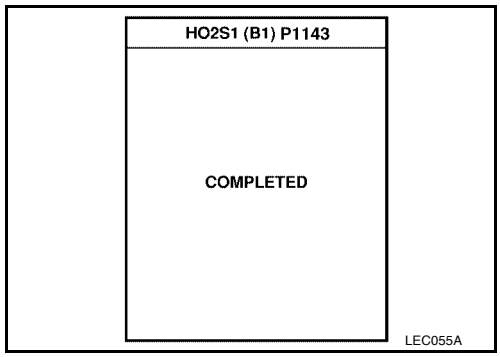
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,200 - 3,150 rpm
Vehicle speed	Less than 100 km/h (Less than 62 MPH)
B/FUEL SCHDL	3.5 - 15 msec
Shift 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-424, "Diagnostic Procedure" .



Overall Function Check

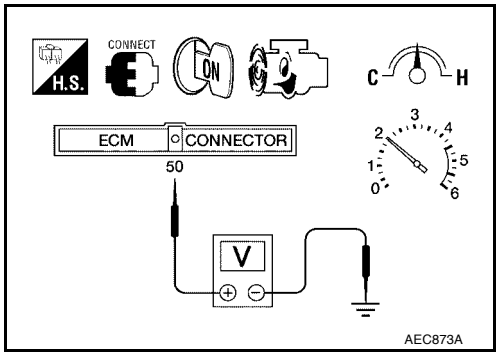
UBS00D9S

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 50 (Heated oxygen sensor 1 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
- The maximum voltage is over 0.6V at at least 1 time.
- The minimum voltage is over 0.1V at at least 1 time.
4. If NG, go to EC-424, "Diagnostic Procedure" .



Diagnostic Procedure

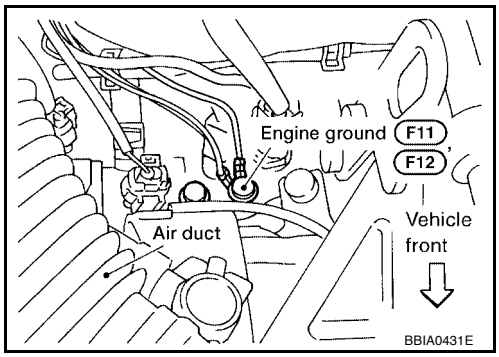
UBS00D9T

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
Refer to EC-127, "Ground Inspection" .

OK or NG

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

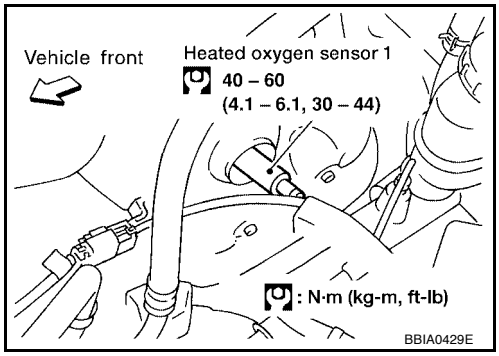


2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque :40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

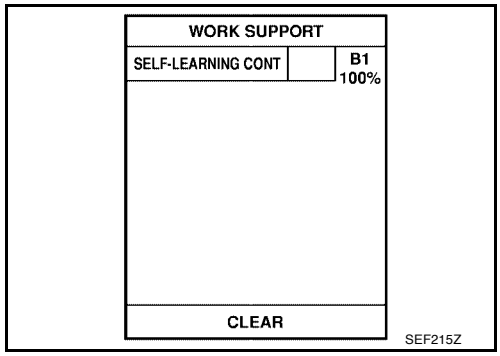
>> GO TO 3.



3. CLEAR THE SELF-LEARNING DATA.

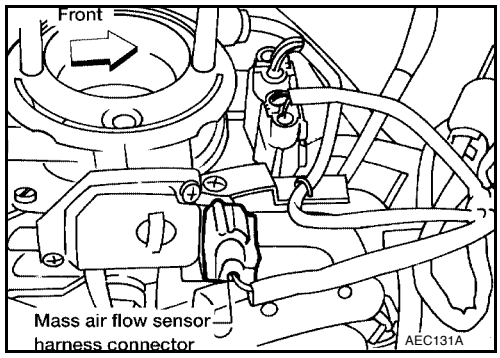
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-61, "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 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-231 .
No >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 1 HEATER

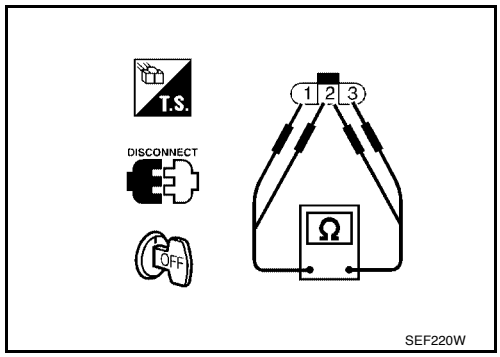
Check resistance between terminals 3 and 1.

Resistance : 3.3 - 4.0 Ω [at 25°C (77°F)]

Check continuity between terminals 2 and 1, 3 and 2.

Continuity should not exist.

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.



OK or NG

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

5. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-213, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
Refer to EC-211, "Wiring Diagram" , for circuit.

>> **INSPECTION END**

Removal and Installation

UBS00D9U

HEATED OXYGEN SENSOR 1

Refer toEM-13, "OUTER COMPONENT PARTS" .

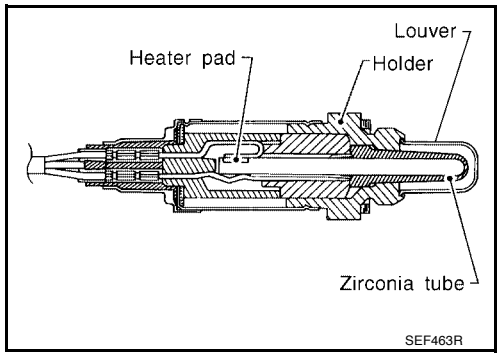
DTC P1144 HO2S1

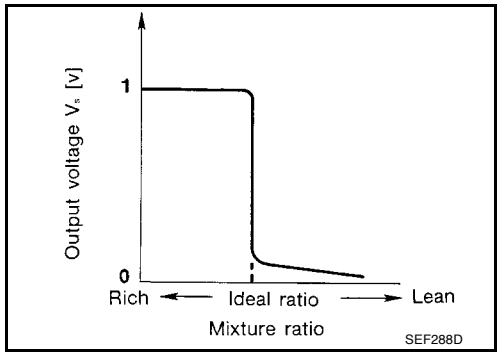
PFP:22690

Component Description

UBS00D9V

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





CONSULT-II Reference Value in Data Monitor Mode

UBS00D9W

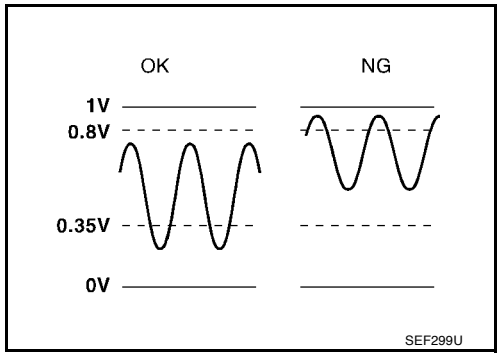
Specification data are reference values.

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

On Board Diagnosis Logic

UBS00D9X

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high. The “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1144	Heated oxygen sensor 1 rich shift monitoring	The maximum and minimum voltages from the sensor are beyond the specified voltages.	● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Fuel injector

DTC Confirmation Procedure

UBS00D9Y

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 5 seconds before conducting the next test.

TESTING CONDITION:

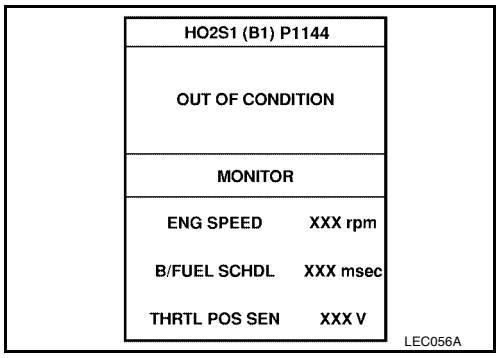
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 5 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P1144” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.

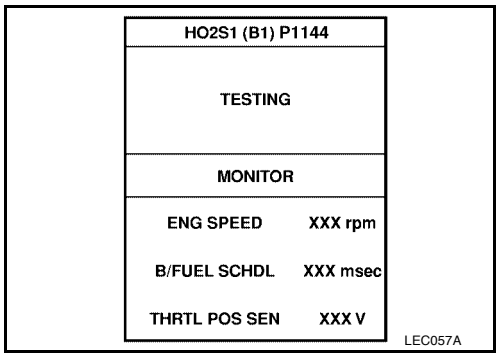
   NOTE:

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



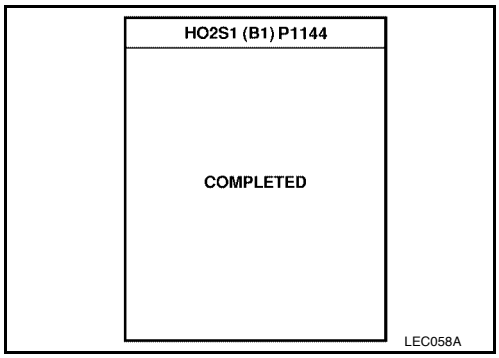
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,200 - 3,150 rpm
Vehicle speed	Less than 100 km/h (Less than 62 MPH)
B/FUEL SCHDL	3.5 - 15 msec
Shift 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-429, "Diagnostic Procedure" .



Overall Function Check

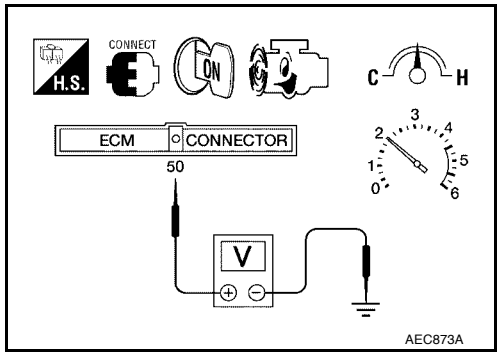
UBS00D9Z

Use this procedure to check the overall function of the front heated oxygen 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. Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
- The maximum voltage is below 0.8V at least 1 time.
- The minimum voltage is below 0.35V at least 1 time.
4. If NG, go to EC-429, "Diagnostic Procedure" .



Diagnostic Procedure

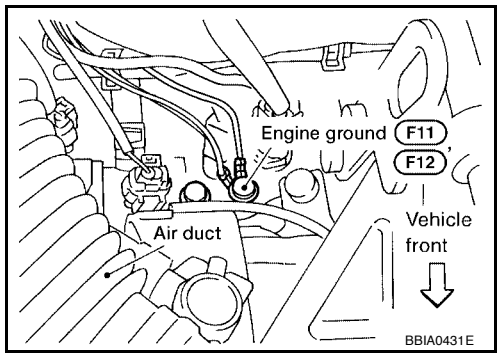
UBS00DA0

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
Refer to EC-127, "Ground Inspection" .

OK or NG

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

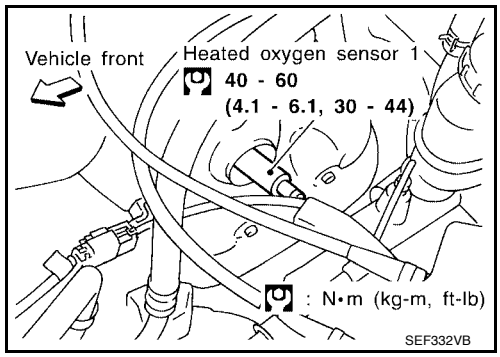


2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque : 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

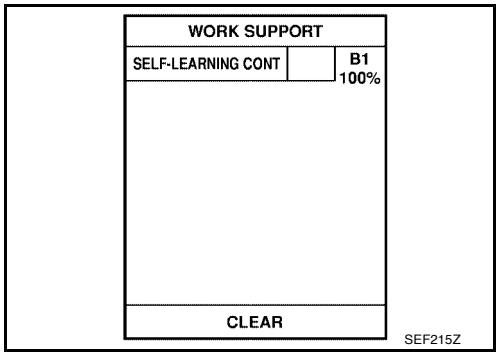
>> GO TO 3.



3. CLEAR THE SELF-LEARNING DATA

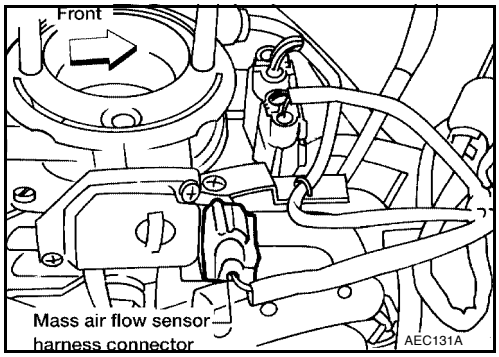
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “ACTIVE TEST” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-61, "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 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-238 .
No >> GO TO 4.

4. CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check harness connector for water.
   Water should not exit.

OK or NG

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

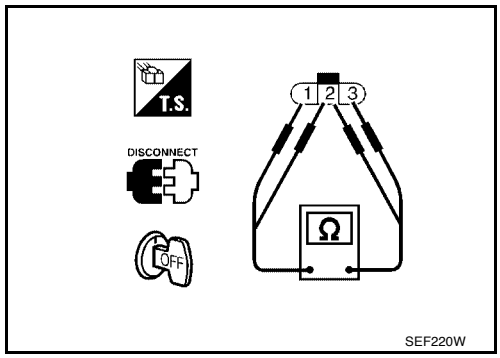
5. CHECK HEATED OXYGEN SENSOR 1 HEATER

Check resistance between terminals 3 and 1.

Resistance : 3.3 - 4.0 Ω [at 25°C (77°F)]

Check continuity between terminals 2 and 1, 3 and 2.

Continuity should not exist.



CAUTION:

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

OK or NG

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

6. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-213, "Component Inspection" .

OK or NG

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

7. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
Refer to EC-211, "Wiring Diagram" , for circuit.

>> **INSPECTION END**

Removal and Installation

UBS00DA1

HEATED OXYGEN SENSOR 1

Refer to EM-13, "OUTER COMPONENT PARTS" .

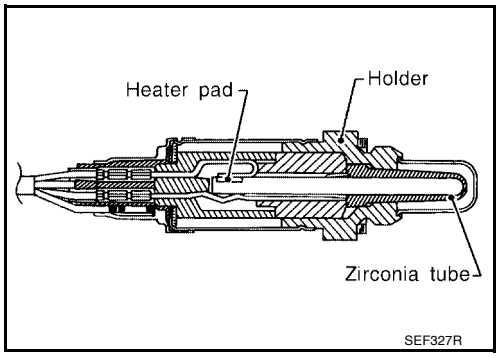
DTC P1146 HO2S2

PFP:226A0

Component Description

UBS00DA2

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DA3

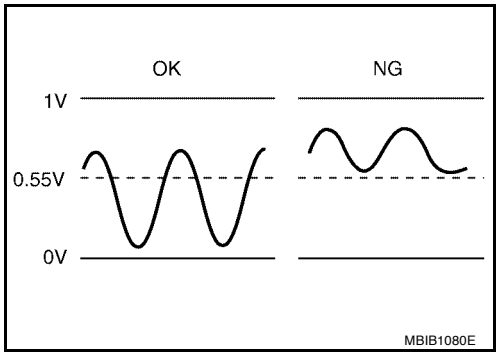
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm quickly.	LEAN ←→ RICH

On Board Diagnosis Logic

UBS00DA4

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of the sensor is sufficiently low during various driving conditions such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1146	Heated oxygen sensor 2 minimum voltage monitoring	● The minimum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector

DTC Confirmation Procedure

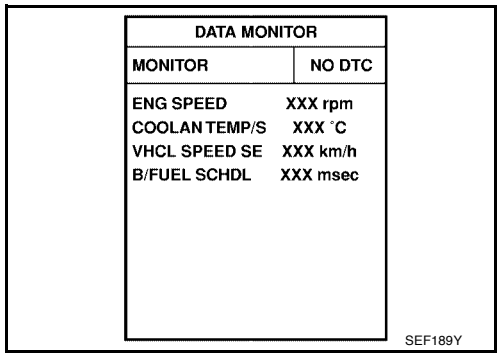
UBS00ELY

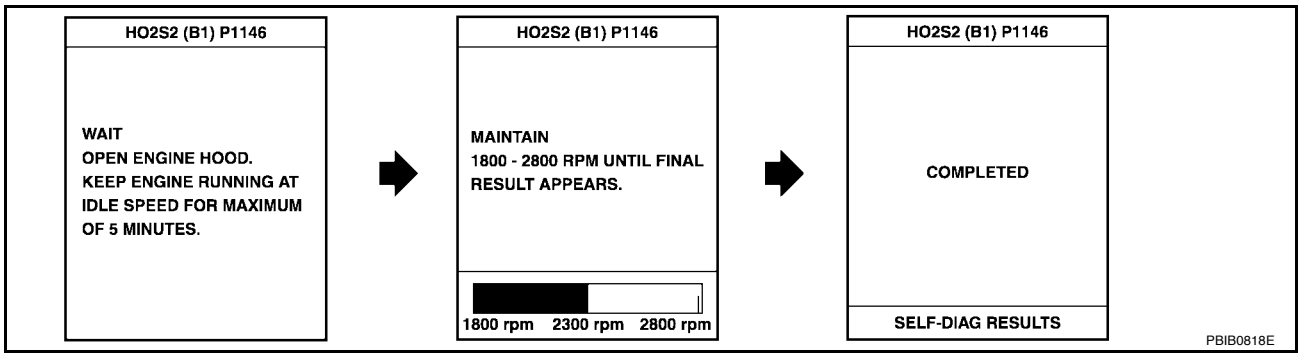
NOTE:
If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

TESTING CONDITION:
For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
7. Start engine and following the instruction of CONSULT-II.





8. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If "NG" is displayed, refer toEC-436, "Diagnostic Procedure" .
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Return to step 1.

Overall Function Check

UBS00DA6

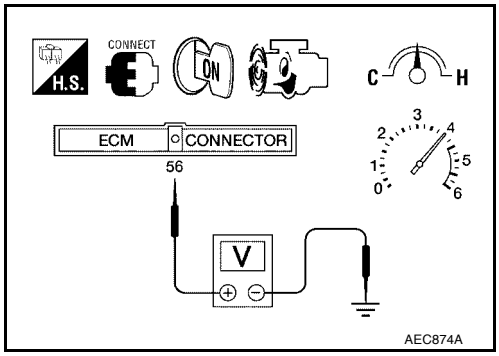
Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

WITH GST

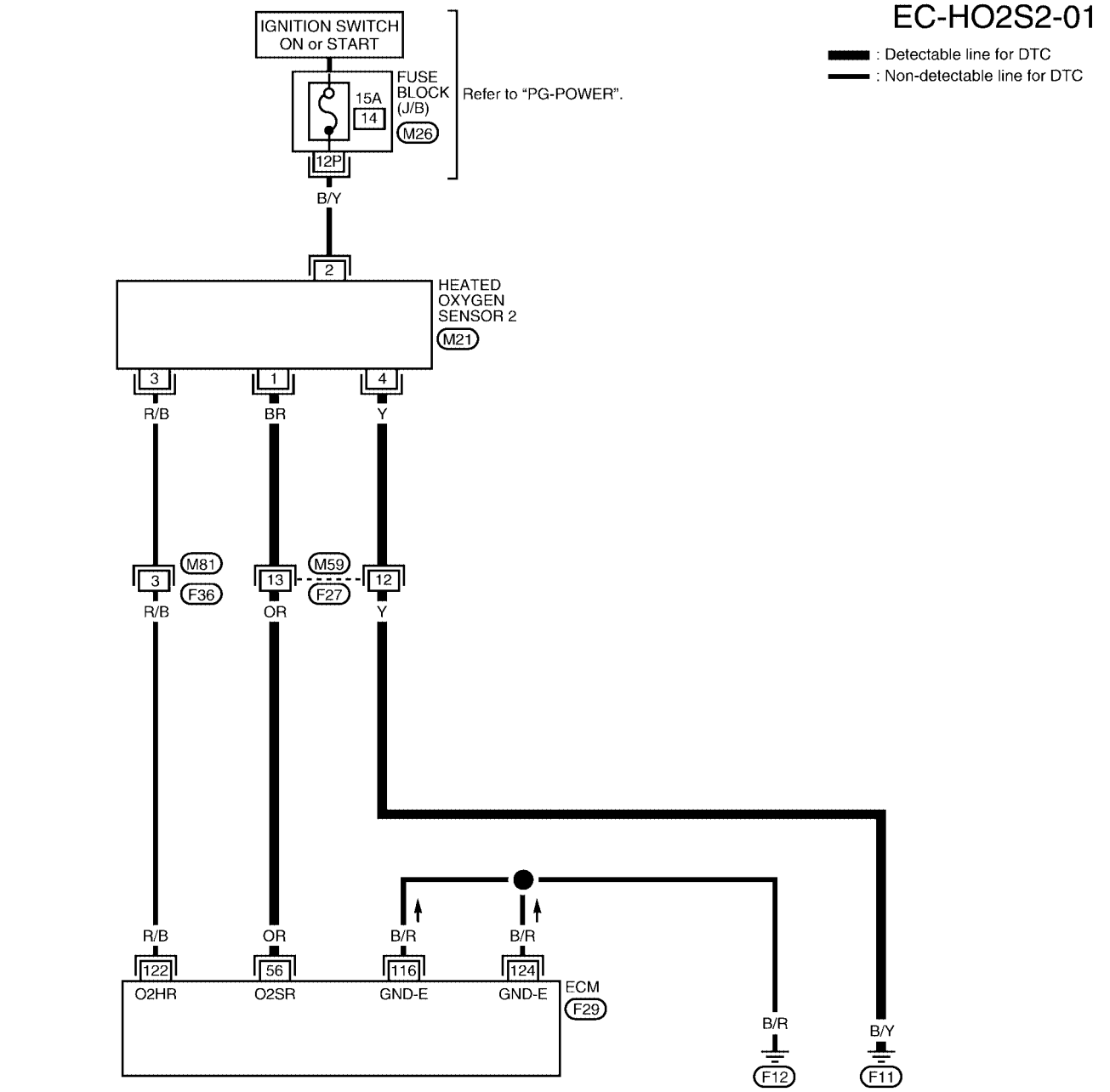
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.

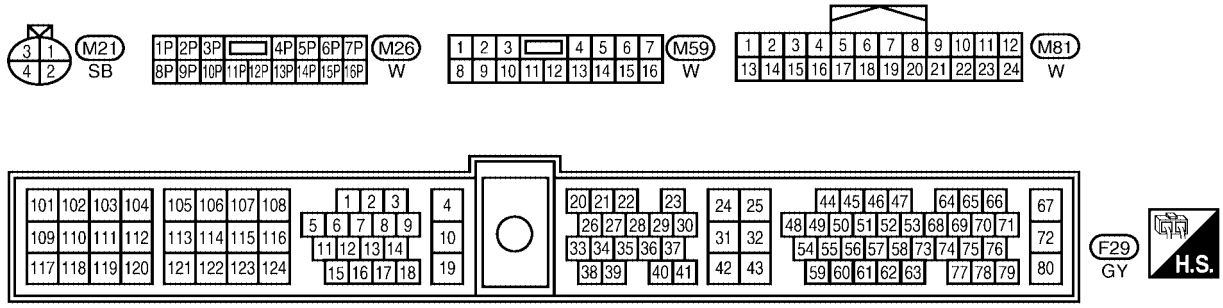
5. Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and ground.
6. Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.55V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
   The voltage should be below 0.55V at least once during this procedure.
8. If NG, go to EC-436, "Diagnostic Procedure" .



Wiring Diagram

UBS00DA7





BBWA1057E

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

CAUTION:

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

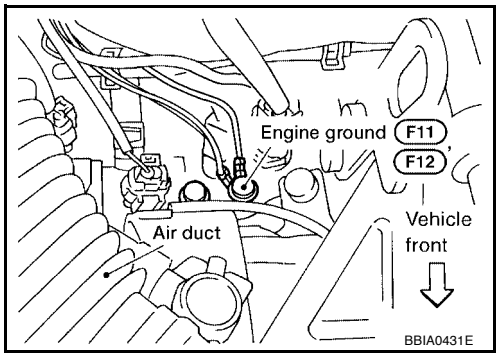
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

Diagnostic Procedure

UBS00DA8

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .



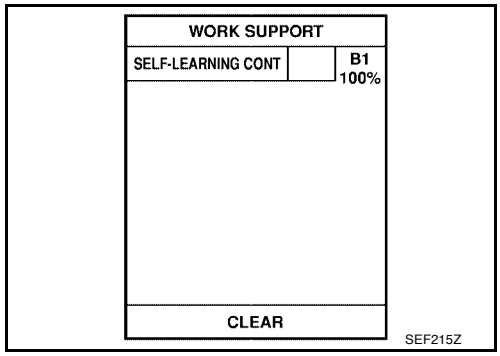
OK or NG

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

2. CLEAR THE SELF-LEARNING DATA

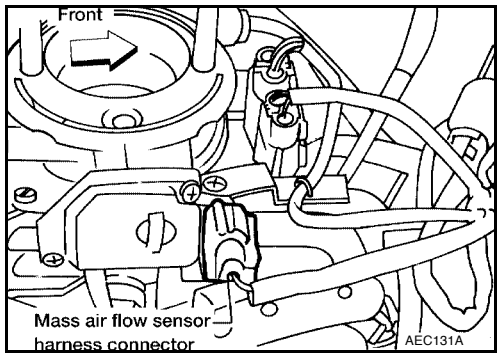
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-61, "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 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-238 .
No >> GO TO 3.

3. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector and ECM harness connector.
3. Check harness continuity between ECM terminal 56 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Check harness continuity between ECM terminal 56 or HO2S2 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

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

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- 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.

5. CHECK GROUND CIRCUIT

1. Check harness continuity between heated oxygen sensor 2 terminal 4 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between heated oxygen sensor 2 and ground

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

7. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-219, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace heated oxygen sensor 2.

8. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00DA9

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

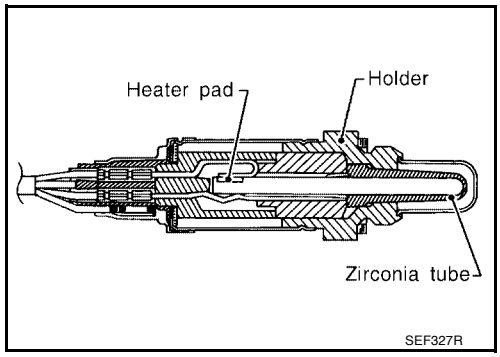
DTC P1147 HO2S2

PFP:226A0

Component Description

UBS00DAA

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DAB

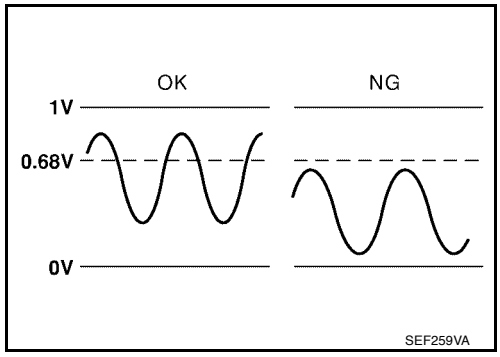
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle up to 3,000 rpm quickly.	LEAN ←→ RICH

On Board Diagnosis Logic

UBS00DAC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during various driving conditions such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1147	Heated oxygen sensor 2 maximum voltage monitoring	● The maximum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector ● Intake air leaks

DTC Confirmation Procedure

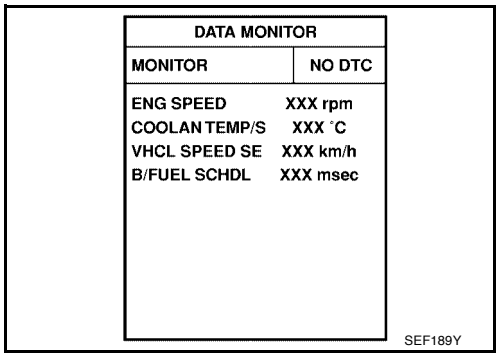
UBS00ELZ

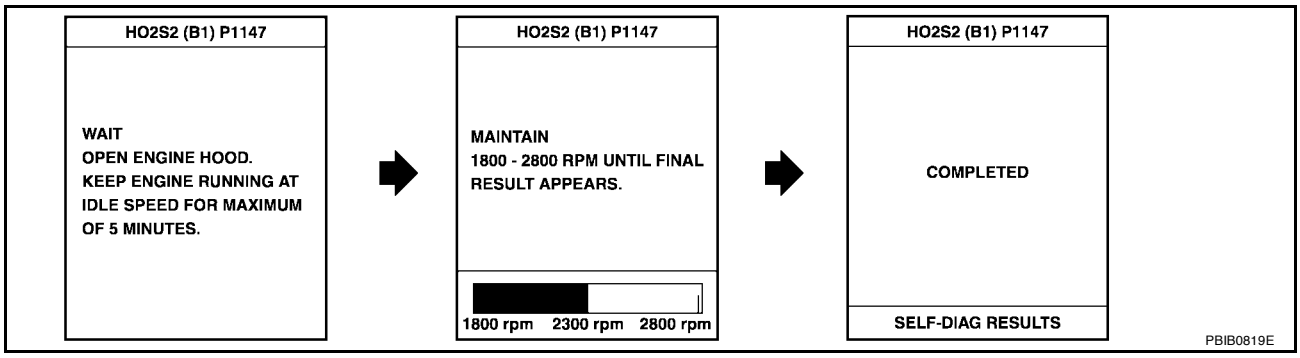
NOTE:
If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

TESTING CONDITION:
For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30 °C (32 to 86 °F).

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
7. Start engine and following the instruction of CONSULT-II.





8. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
   If "NG" is displayed, refer to EC-443, "Diagnostic Procedure" .
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Return to step 1.

Overall Function Check

UBS00DAE

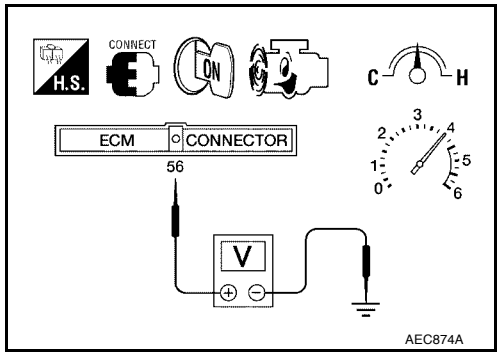
Use this procedure to check the overall function of the rear heated oxygen sensor circuit. During this check, a 1st trip DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

WITH GST

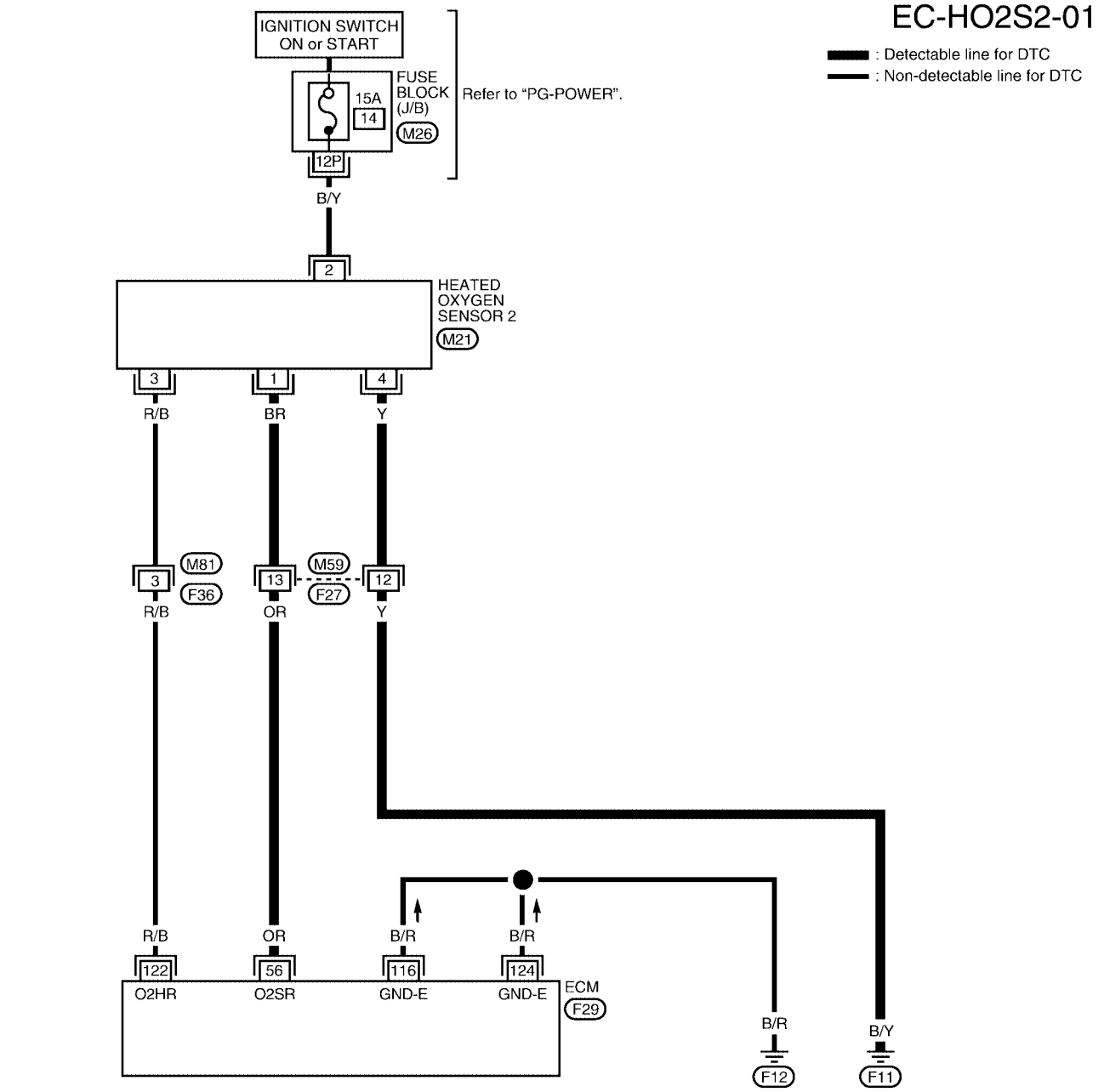
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.

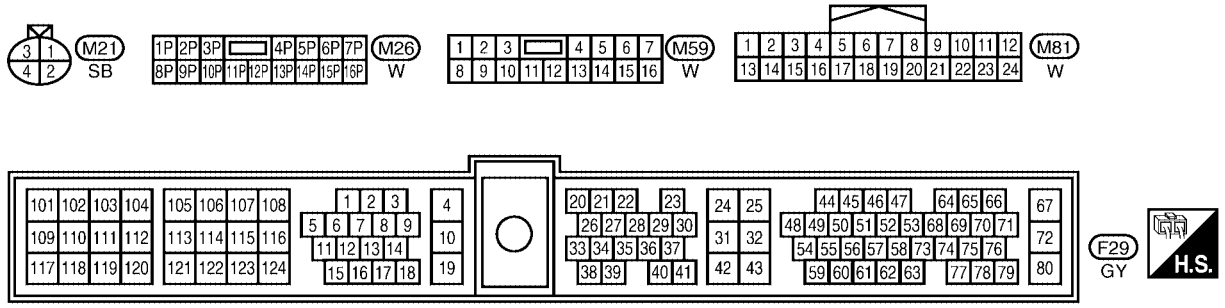
5. Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and ground.
6. Check the voltage when revving engine up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage can be confirmed in step 4, step 5 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), D position with “OD” OFF (A/T).
   The voltage should be above 0.68V at least once during this procedure.
8. If NG, go to EC-443, "Diagnostic Procedure" .



Wiring Diagram

UBS00DAF





BBWA1057E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

Diagnostic Procedure

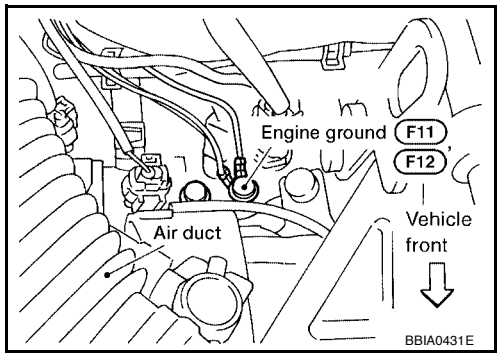
UBS00DAG

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

OK or NG

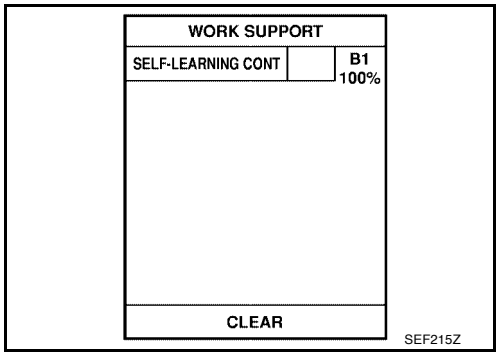
OK >> GO TO 2.
NG >> Repair or replace ground connections.



2. CLEAR THE SELF-LEARNING DATA

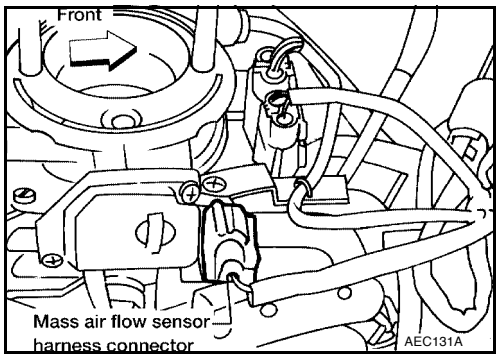
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-61, "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 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer EC-231 .
No >> GO TO 3.

3. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect heated oxygen sensor 2 harness connector and ECM harness connector.
2. Check harness continuity between ECM terminal 56 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Check harness continuity between ECM terminal 56 or HO2S2 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not 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 M59, F27
- Harness for open or short between ECM and heated oxygen sensor 2

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

5. CHECK GROUND CIRCUIT

1. Check harness continuity between heated oxygen sensor 2 terminal 4 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

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

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between heated oxygen sensor 2 and ground

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

7. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-219, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace heated oxygen sensor 2.

8. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00DAH

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

DTC P1148 CLOSED LOOP CONTROL

PFP:22690

On Board Diagnosis Logic

UBS00DAI

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148	Closed loop control function	The closed loop control function does not operate even when vehicle is driving in the specified condition.	● The heated oxygen sensor 1 circuit is open or shorted. ● Heated oxygen sensor 1 ● Heated oxygen sensor heater

DTC Confirmation Procedure

UBS00DAJ

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 5 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.**

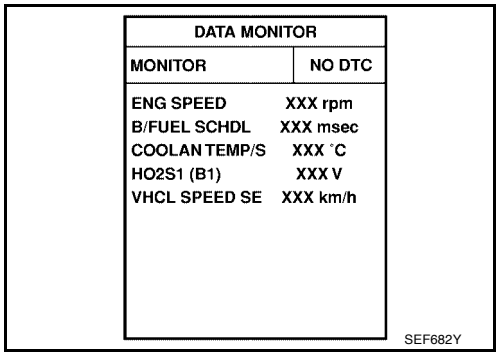
WITH CONSULT-II

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 the following.

– “HO2S1 (B1)” voltage should go above 0.70V at least once.

– “HO2S1 (B1)” voltage should go below 0.21V at least once.
If the result is NG, perform EC-447, "Diagnostic Procedure" .
If the 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	4.0 msec or more
ENG SPEED	More than 1,800 rpm
Shift lever	Suitable position
VHCL SPEED SE	More than 70 km/h (43 MPH)

During this test, DTC P0134 may be displayed on CONSULT-II screen.

6. If DTC is detected, go to EC-447, "Diagnostic Procedure" .

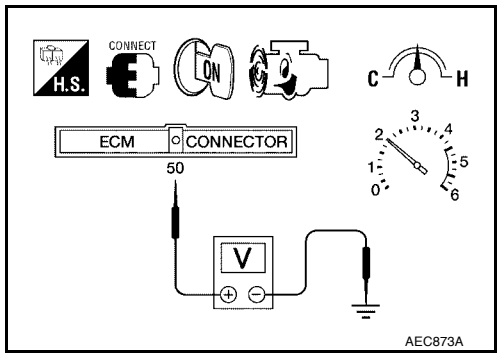
Overall Function Check

UBS00DAK

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 50 (Heated oxygen sensor 1 signal) and 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-447, "Diagnostic Procedure" .



Diagnostic Procedure

UBS00DAL

Refer to “Diagnostic Procedure” for DTC P0133, EC-202 .

DTC P1217 ENGINE OVER TEMPERATURE

PFP:00000

On Board Diagnosis Logic

UBS00DAM

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.
This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over temperature (Overheat)	● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant was not added to the system using the proper filling method. ● Engine coolant is not within the specified range.	● Cooling fan (crankshaft driven) ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat ● Engine coolant temperature sensor For more information, refer to EC-450, "Main 11 Causes of Overheating" .

CAUTION:
When a malfunction is indicated, be sure to replace the coolant. Refer to MA-16 , "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-14, "ANTI-FREEZE COOLANT MIXTURE RATIO" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

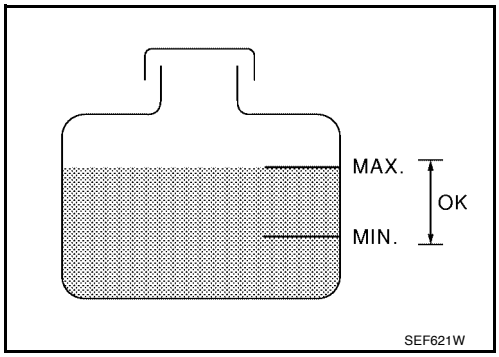
Overall Function Check

UBS00DAN

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-449, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-449, "Diagnostic Procedure" .
3. Start engine.
4. Make sure that cooling fan (crankshaft driven) operates.
5. If NG, go to EC-449, "Diagnostic Procedure" .



WITH GST

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-449, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-449, "Diagnostic Procedure" .
3. Start engine and make sure that cooling fan (crankshaft driven) operates.
   Be careful not to overheat engine.
4. If NG, go to EC-449, "Diagnostic Procedure" .

Diagnostic Procedure

UBS00DAO

1. CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION

Start engine and make sure that cooling fan (crankshaft driven) operates.

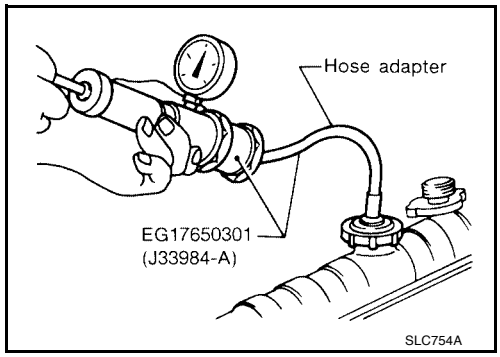
OK or NG

OK >> GO TO 2.
NG >> Check cooling fan (crankshaft driven). Refer to CO-16, "COOLING FAN (CRANKSHAFT DRIVEN)" .

2. 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.

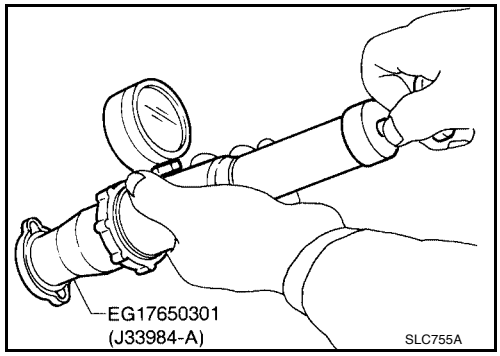
OK or NG

OK >> GO TO 3.
NG >> Check the following for leak.
- Hose
- Radiator
- Water pump
  Refer to CO-10, "WATER PUMP" .

3. CHECK RADIATOR CAP

Apply pressure to cap with a tester.

Radiator cap relief pressure : 78 - 98 kPa (0.8 - 1.0 kg/cm^2 , 11 - 14 psi)



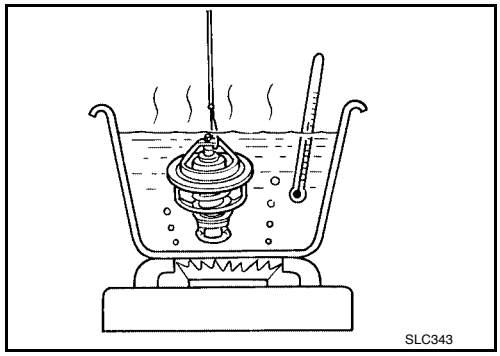
OK or NG

OK >> GO TO 4.
NG >> Replace radiator cap.

4. CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
   It should seat tightly.
2. Check valve opening temperature and valve lift.

Valve opening temperature : 76.5°C (170°F) [standard]
Valve lift : More than 8 mm/90°C (0.31 in/194°F)



3. Check if valve is closed at 5°C (41°F) below valve opening temperature.

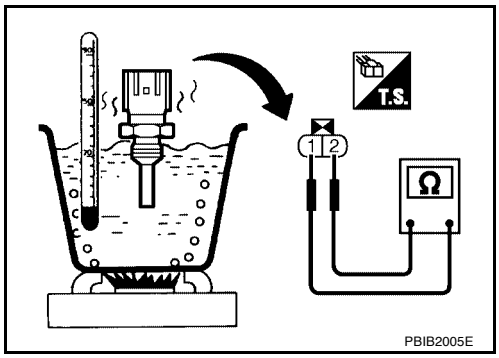
For details, refer to CO-13, "THERMOSTAT" .

OK or NG

OK >> GO TO 5.
NG >> Replace thermostat.

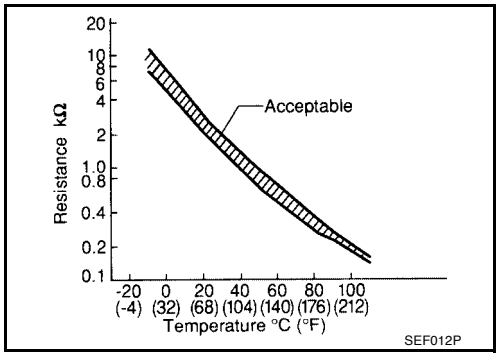
5. CHECK ENGINE COOLANT TEMPERATURE SENSOR

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



<Reference data>

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



OK or NG

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

6. CHECK MAIN 11 CAUSES

If the cause cannot be isolated, go to EC-450, "Main 11 Causes of Overheating" .

>> **INSPECTION END**

Perform FINAL CHECK by the following procedure after repair is completed.

1. Warm up engine. Run the vehicle for at least 20 minutes. Pay attention to engine coolant temperature gauge on the instrument panel. If the reading shows an abnormally high temperature, another part may be malfunctioning.
2. Stop vehicle and let engine idle. Check the intake and exhaust systems for leaks by listening for noise or visually inspecting the components.
3. Allow engine to cool and visually check for oil and coolant leaks. Then, perform “Overall Function Check”.

Main 11 Causes of Overheating

UBS00DAP

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-12, "Recommended Fluids and Lubricants" .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-16 , “Changing Engine Coolant”.
	4	● Radiator cap	● Pressure tester	78 - 98 kPa (0.8 - 1.0 kg/cm^2 , 11 - 14 psi) 59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See CO-8, "System Check" .

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*2	5	● Coolant leaks	● Visual	No leaks	See CO-8, "System Check" .
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-13, "THERMOSTAT" and CO-14, "RADIATOR" .
OFF	7	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	8	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See MA-16 , “Changing Engine Coolant”.
OFF*4	9	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See CO-8, "System Check" .
OFF	10	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-32, "CYLINDER HEAD" .
	11	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-48, "CYLINDER BLOCK" .

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to CO-6, "OVERHEATING CAUSE ANALYSIS" .

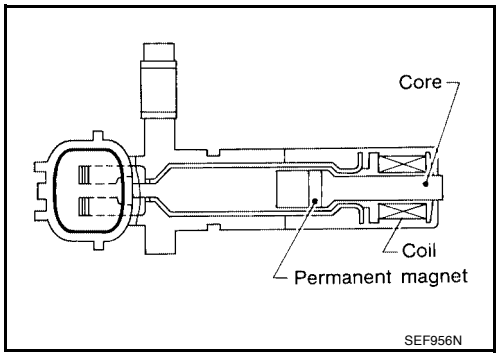
DTC P1336 CKP SENSOR (OBD)

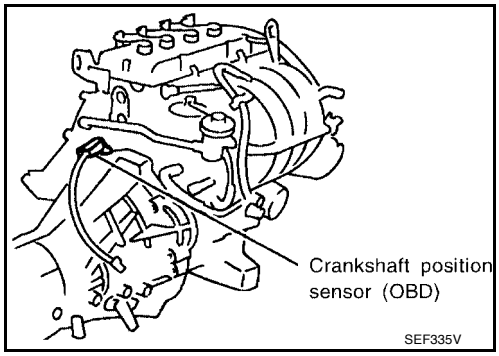
PFP:23731

Component Description

UBS00DAQ

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
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.
This sensor is not used to control the engine system.
It is used only for the on board diagnosis.





On Board Diagnosis Logic

UBS00DAR

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1336	Crankshaft position sensor (OBD) (COG)	● A chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM.	● Harness or connectors ● Crankshaft position sensor (OBD) ● Drive plate/Flywheel

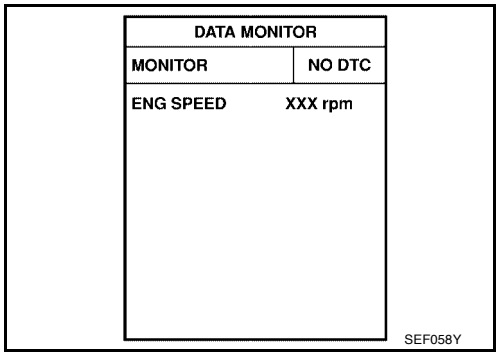
DTC Confirmation Procedure

UBS00DAS

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 run it for at least 2 minutes at idle speed.
3. If 1st trip DTC is detected, go to EC-454, "Diagnostic Procedure" .



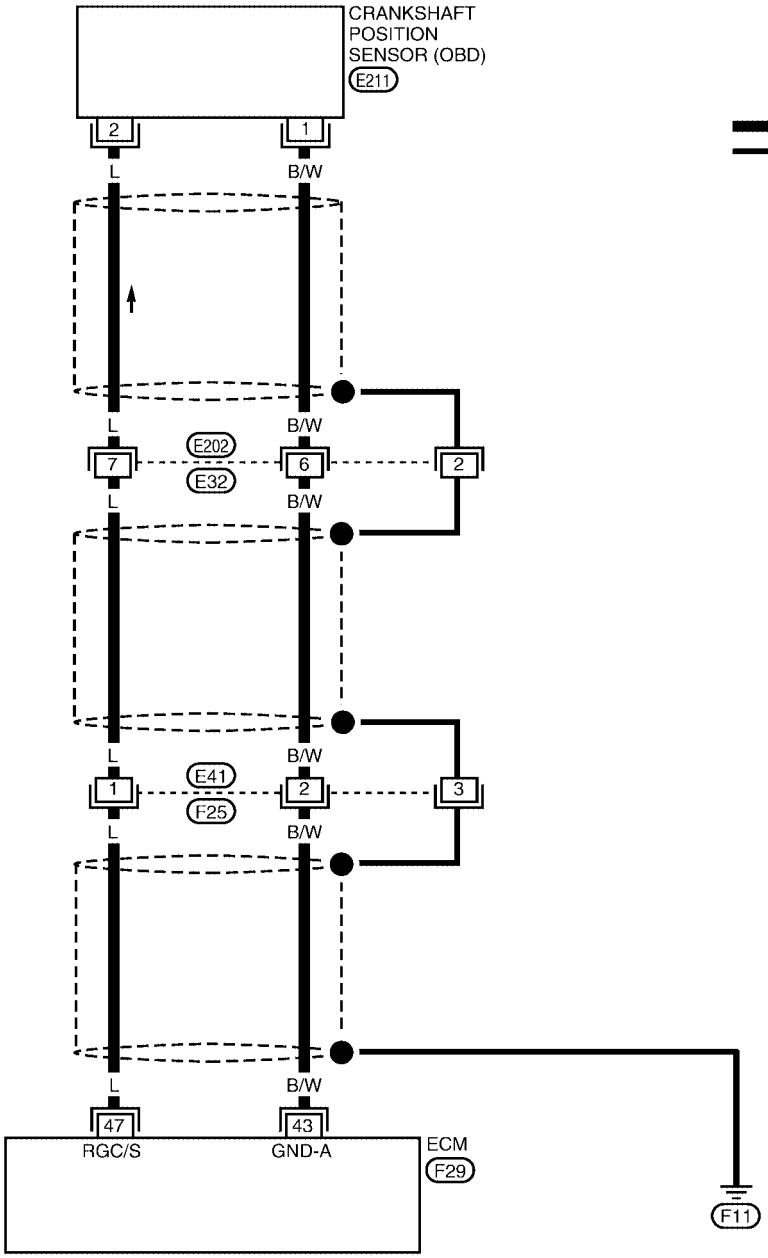
WITH GST

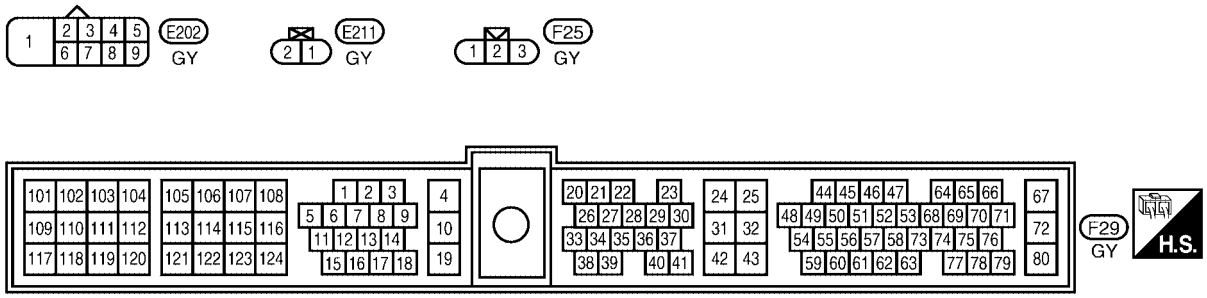
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DAT

EC-CKPS-01



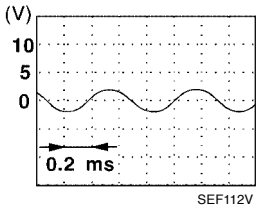
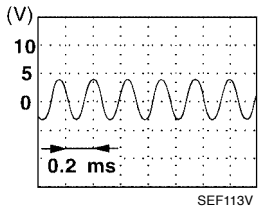


BBWA0548E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
43	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	Approx. 0V★  SEF112V
			[Engine is running] ● Engine speed is 2,000 rpm	Approx. 0V★  SEF113V

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

Diagnostic Procedure

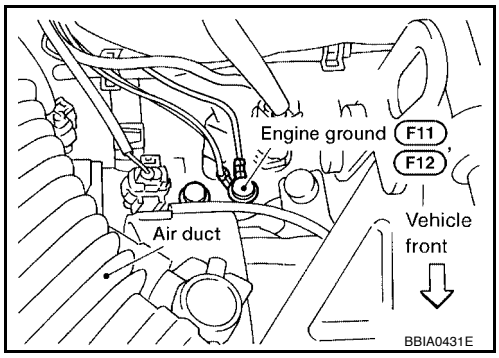
UBS00DAU

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-127, "Ground Inspection" .

OK or NG

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



BBIA0431E

2. CHECK INPUT SIGNAL CIRCUIT

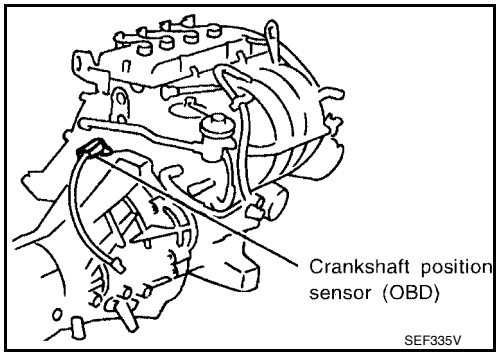
1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.
2. Check harness continuity between ECM terminal 47 and crankshaft position sensor (OBD) terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

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

OK or NG

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



SEF335V

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E202, E32
- Harness connectors E41, F25
- Harness for open or short between crankshaft position sensor (OBD) and ECM

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

4. CHECK GROUND CIRCUIT

1. Check harness continuity between crankshaft position sensor (OBD) terminal 1 and ECM terminal 43. Refer to wiring diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E202, E32
- Harness connectors E41, F25
- Harness for open or short between crankshaft position sensor (OBD) and ECM

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

6. CHECK SHIELD CIRCUIT

1. Disconnect harness connectors E202, E32.
2. Check harness continuity between harness connector E32 terminal 2 and ground. Refer to wiring diagram.

Continuity should exist

3. Also check harness for short to power.
4. Then reconnect harness connectors.

OK or NG

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

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E41, F25
- Harness for open or short between harness connector E32 and ground

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

8. CHECK IMPROPER INSTALLATION

1. Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD). Then retest.
2. Perform EC-452, "DTC Confirmation Procedure" again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 9.

9. CHECK CRANKSHAFT POSITION SENSOR (OBD)

Refer to EC-274, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace crankshaft position sensor (OBD).

10. CHECK GEAR TOOTH

Visually check for chipping flywheel or drive plate gear tooth (cog).

OK or NG

OK >> GO TO 11.
NG >> Replace the flywheel or drive plate.

11. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

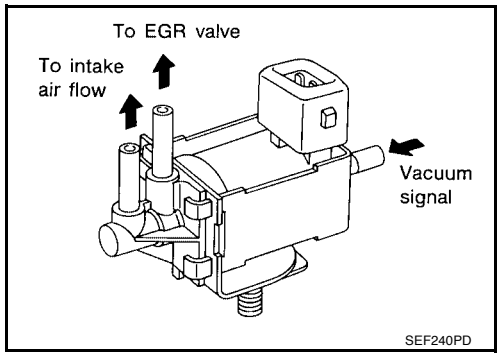
DTC P1400 EGRC-SOLENOID VALVE

PFP:14956

Component Description

UBS00DAV

The EGRC solenoid valve responds to signals from the ECM. When the ECM sends an OFF signal, the vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve.
When the ECM sends an ON signal, a plunger will then move to cut the vacuum signal from the throttle body to the EGR valve.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DAW

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGRC SOL/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	ON
		Rev engine up from idle to 3,000 rpm quickly.	OFF

On Board Diagnosis Logic

UBS00DAX

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1400	EGRC solenoid valve circuit	The improper voltage signal is sent to ECM through EGRC solenoid valve.	● Harness or connectors (The EGRC solenoid valve circuit is open or shorted.) ● EGRC solenoid valve

DTC Confirmation Procedure

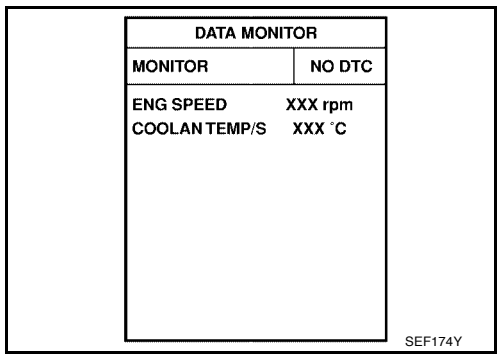
UBS00DAY

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Always perform at a temperature above –10°C (14°F).

WITH CONSULT-II

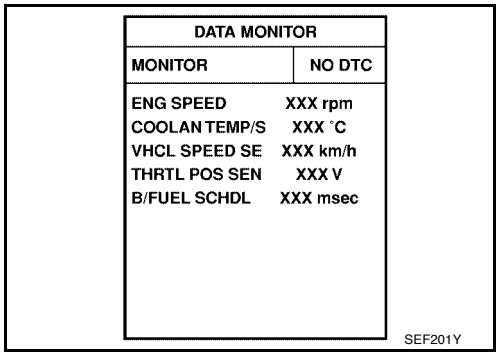
1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.



3. Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	Less than 3,000 rpm
B/FUEL SCHDL	Less than 12.6 msec
VHCL SPEED SE	Suitable speed

4. If 1st trip DTC is detected, go to EC-460, "Diagnostic Procedure" .



Overall Function Check

UBS00DAZ

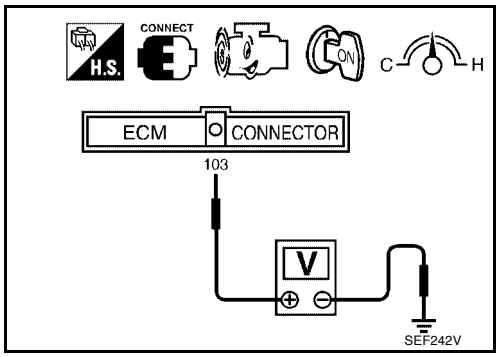
Use this procedure to check the overall function of the EGR temperature sensor. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM terminal 103 and ground at idle.

   Voltage: 0 - 1V

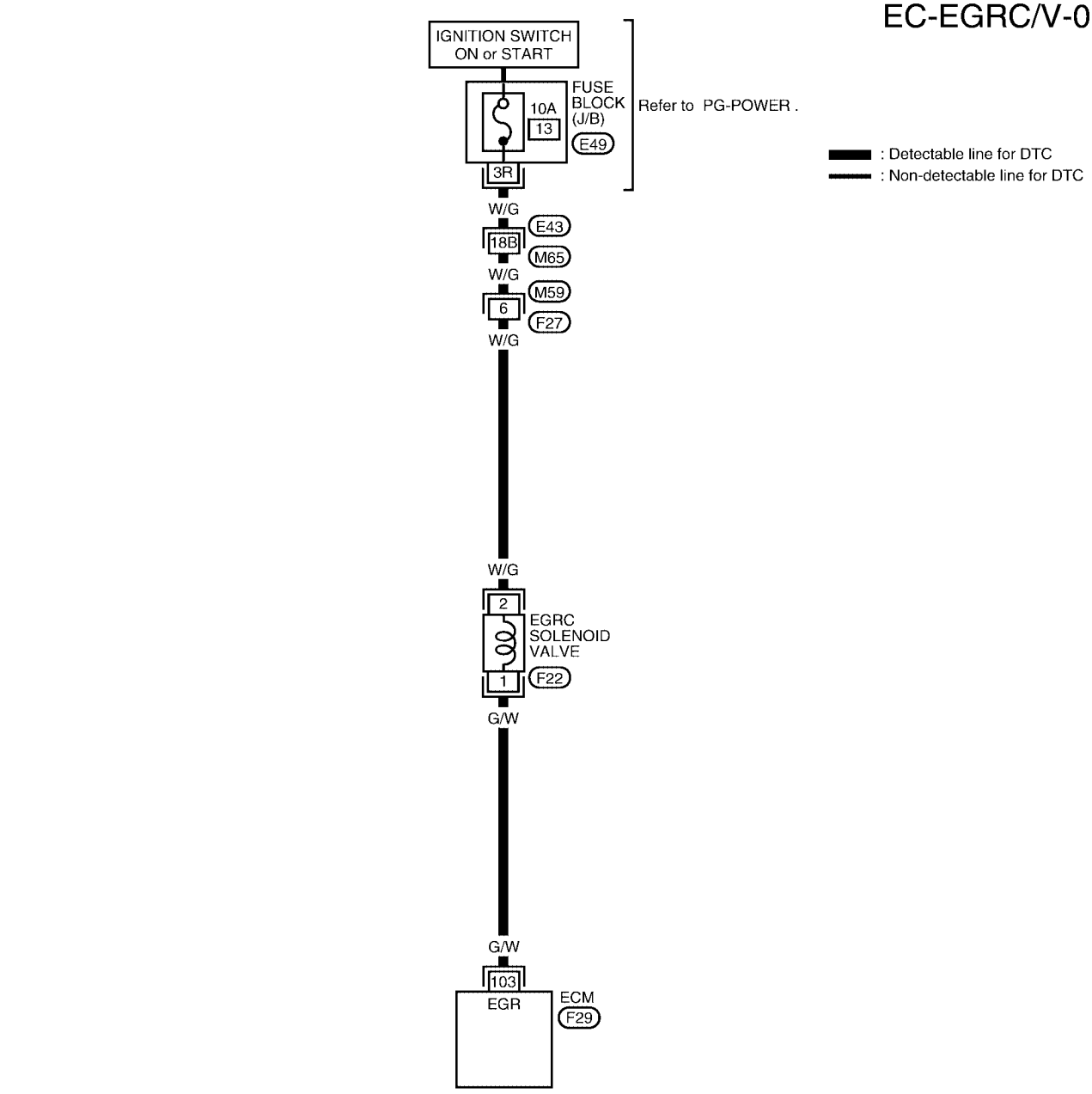
3. Check that the voltage changes to battery voltage and returns to 0 - 1V when revving the engine from idle to 3,000 rpm quickly.
4. If NG, go to EC-460, "Diagnostic Procedure" .

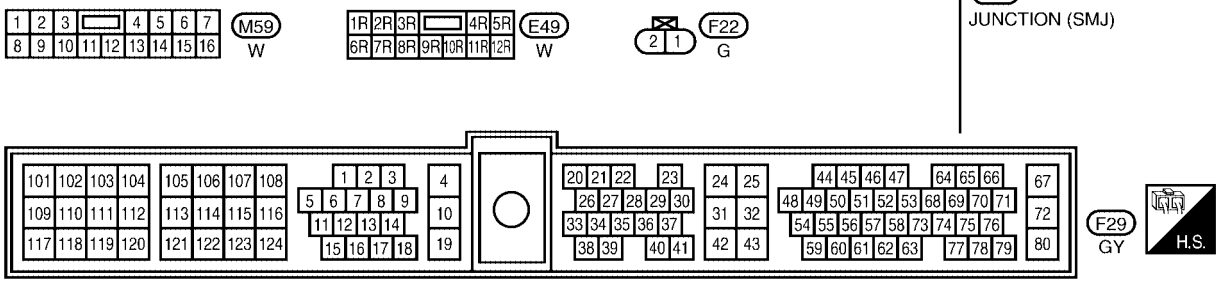


Wiring Diagram

UBS00DB0

EC-EGRC/V-01





BBWA0452E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
103	G/W	EGRC-solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Lift up the vehicle ● Shift lever: D (A/T), 1st (M/T) ● Revving engine from idle to 3,000 rpm quickly	0 - 1V

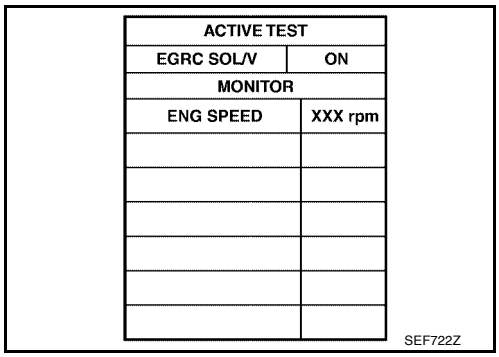
Diagnostic Procedure

UBS00DB1

1. CHECK EGRC SOLENOID VALVE

With CONSULT-II

1. Turn ignition switch ON.
2. Turn EGRC solenoid valve “ON” and “OFF” in “ACTIVE TEST” mode with CONSULT-II and check operating sound.



Without CONSULT-II

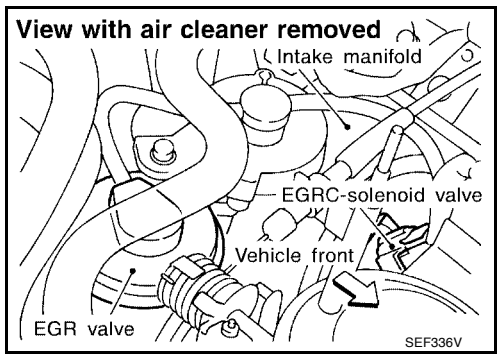
1. Start engine and rev engine up to 3,000 rpm quickly.
2. When disconnecting and reconnecting the EGRC solenoid valve harness connector, make sure that the EGRC solenoid valve makes operating sound. (The DTC or the 1st trip DTC for the EGRC solenoid valve will be displayed, however, ignore it.)

OK or NG

OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> GO TO 2

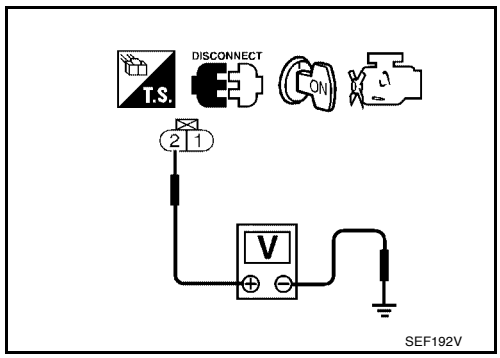
2. CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EGRC solenoid valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between EGRC solenoid valve terminal 2 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 E43, M65
- Harness connectors M59, F27
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between EGRC solenoid valve and fuse

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

4. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 103 and EGRC solenoid valve terminal 1. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> GO TO 5

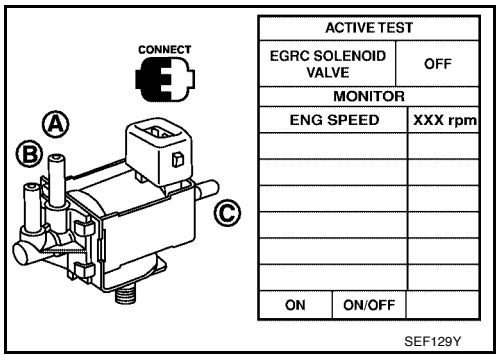
5. DETECT MALFUNCTIONING PART

Check the harness for open or short between EGRC solenoid valve and ECM.

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

6. CHECK EGRC-SOLENOID VALVE

1. Perform “EGRC SOLENOID VALVE” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time under the following conditions.



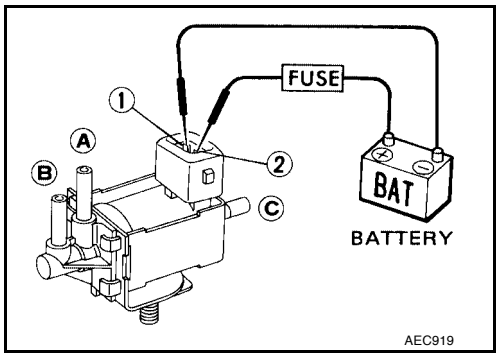
Conditions	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

OK or NG

OK >> GO TO 8.
NG >> Replace EGRC-solenoid valve.

7. CHECK EGRC-SOLENOID VALVE

1. Check air passage continuity and operation delay time under the following conditions.



Conditions	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

OK or NG

OK >> GO TO 8.
NG >> Replace EGRC-solenoid valve.

8. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1402 EGR FUNCTION

PFP:14710

Description

UBS00DB2

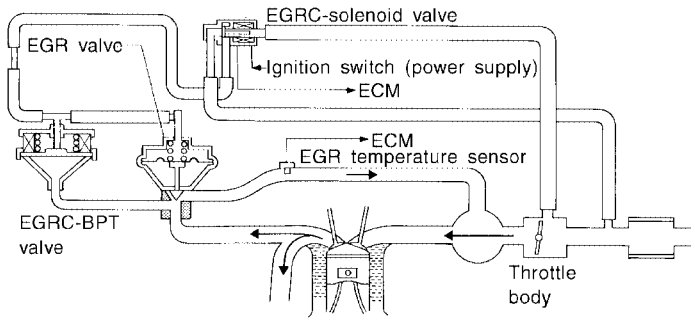
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC 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		
Park/neutral position (PNP) switch	Gear position		

This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC solenoid valve. When the ECM detects any of the following conditions, current through the solenoid valve is cut. This causes the vacuum to be cut. The EGR valve remains closed.

- Engine stopped
- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Wide open throttle
- Mass air flow sensor malfunction

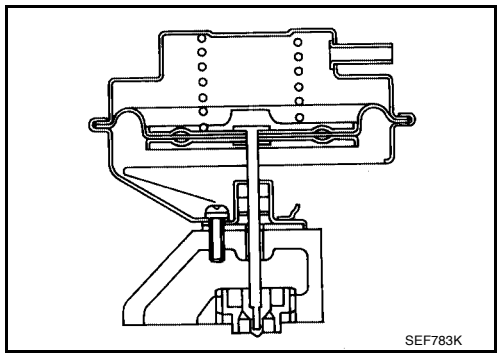
EGR and vacuum



COMPONENT DESCRIPTION

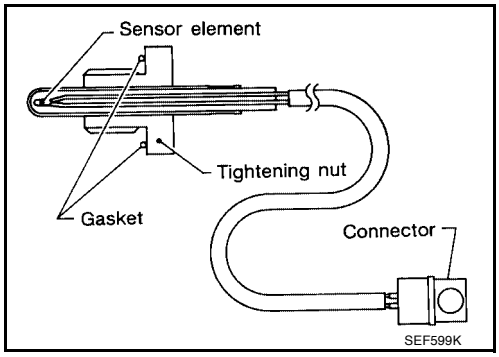
Exhaust Gas Recirculation (EGR) Valve

The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.



EGR temperature sensor

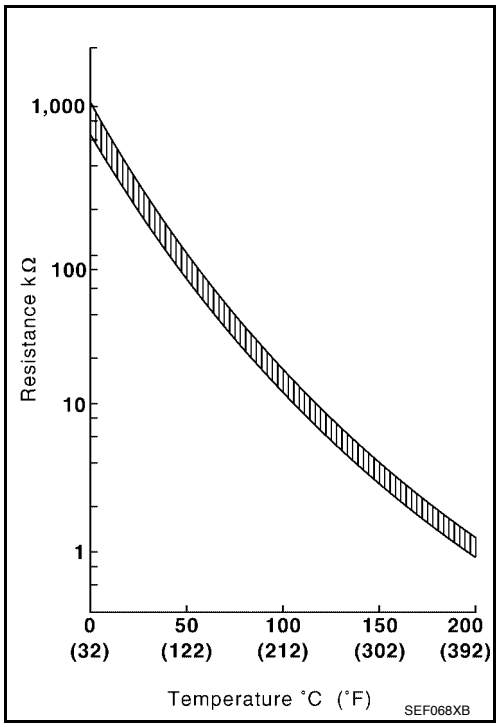
The EGR temperature sensor detects temperature changes in the EGR passageway. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passageway changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases. This sensor is not used to control the engine system.
It is used only for the on board diagnosis.



<Reference data>

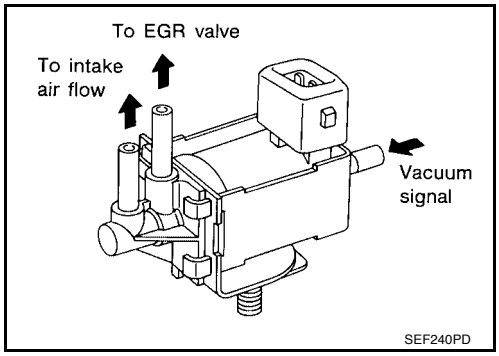
EGR temperature °C (°F)	Voltage* V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

*: This data is reference value and is measured between ECM terminal 63 (EGR temperature sensor) and ground.
When EGR system is operating.
Voltage: 0 - 1.5V



EGRC Solenoid Valve

The EGRC solenoid valve responds to signals from the ECM. When the ECM sends an OFF signal, the vacuum signal passes through the solenoid valve. The signal then reaches the EGR valve.
When the ECM sends an ON signal, a plunger will then move to cut the vacuum signal from the intake manifold collector to the EGR valve.



CONSULT-II Reference Value in Data Monitor Mode

UBS00EM0

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EGR TEMP SEN	● Engine: After warming up	Less than 4.5V

MONITOR ITEM	CONDITION		SPECIFICATION
EGRC SOL/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	OFF
		Engine speed: Revving engine from idle to 3,000 rpm quickly.	ON

On Board Diagnosis Logic

UBS00DB3

If EGR temperature sensor detects EGR flow under the condition that does not call for EGR, a high-flow malfunction is diagnosed.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1402	EGR control system stuck open	EGR flow is detected under conditions that do not call for EGR.	● EGRC solenoid valve ● EGR valve leaking or stuck open ● EGR temperature sensor ● EGRC-BPT valve

DTC Confirmation Procedure

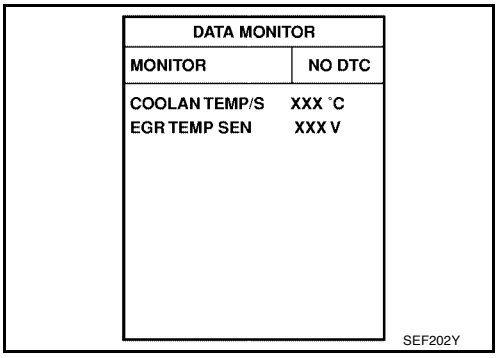
UBS00DB4

NOTE:

- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- Diagnosis for this DTC will occur when engine coolant temperature is approx. 50 to 60°C (122 to 140°F). Therefore, it will be better to turn ignition switch ON (Start engine) at the engine coolant temperature below 30°C (86°F) when starting DTC confirmation procedure.

TESTING CONDITION:

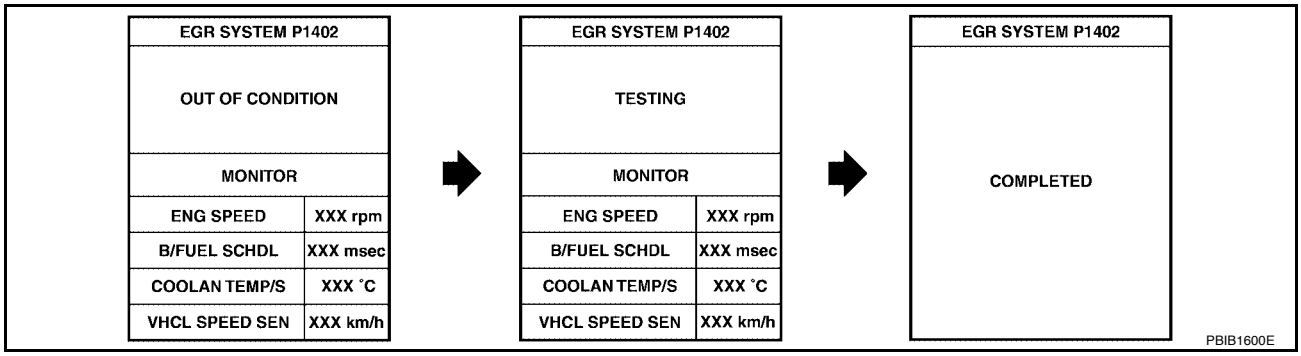
- **Always perform the test 9 temperature above –10°C (14°F)**.
- **Engine coolant temperature and EGR temperature must be verified in "DATA MONITOR" mode with CONSULT-II before starting DTC WORK SUPPORT test. If it is out of range below, the test cannot be conducted.**
  COOLAN TEMP/S: –10 to 60°C (14 to 140°F)*
  EGR TEMP SEN: Less than 3.7V
  If the values are out of the ranges indicated above, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to reduce the engine coolant or EGR temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.



*: Although CONSULT-II screen displays "–10 to 40°C (14 to 104°F)" as a range of engine coolant temperature, ignore it.

WITH CONSULT-II

1. Turn ignition switch OFF and wait at least 10 seconds, then turn ignition switch ON.
2. Select "EGR SYSTEM P1402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
3. Touch "START". Follow instruction of CONSULT-II.
4. Start engine and let it idle until "TESTING" on CONSULT-II screen is turned to "COMPLETED". (It will take 80 seconds or more.)

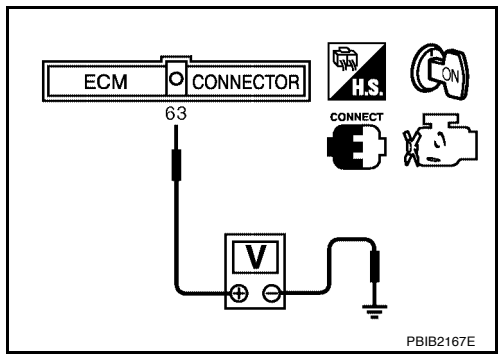


If "TESTING" is not displayed after 5 minutes, turn ignition OFF and cool the engine coolant temperature to the range of −10 to 50°C (14 to 122°F). Retry from step 1.

5. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to EC-468, "Diagnostic Procedure" .

WITH GST

1. Turn ignition switch ON and select "MODE 1" with GST.
2. Check that engine coolant temperature is within the range of −10 to 50°C (14 to 122°F).
3. Check that voltage between ECM terminal 63 (EGR temperature sensor signal) and ground is less than 4.5V.
4. Start engine and let it idle for at least 80 seconds.
5. Stop engine.
6. Perform from step 1 to 4.
7. Select "MODE 3" with GST.
8. If DTC is detected, go to EC-468, "Diagnostic Procedure" .

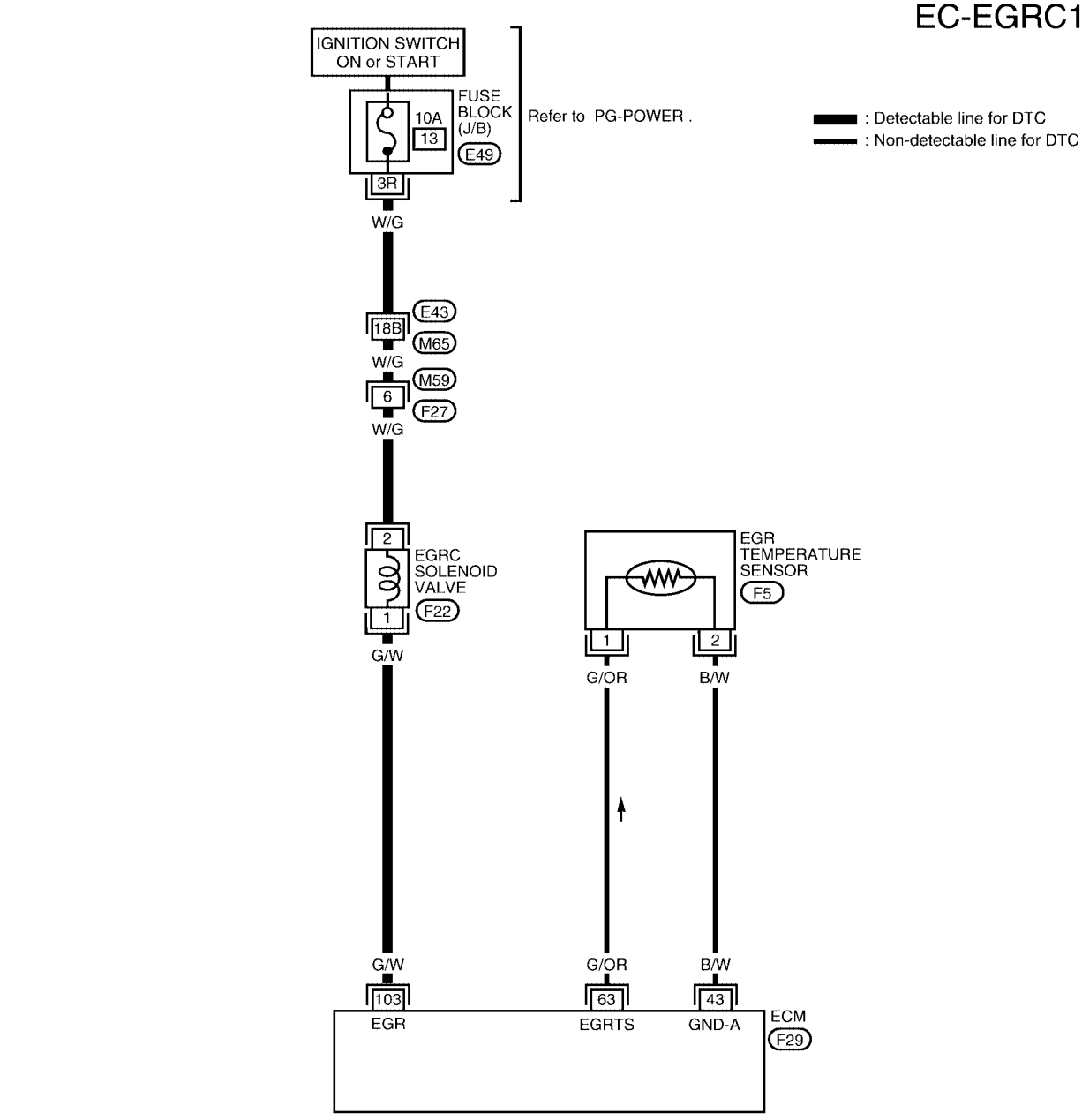


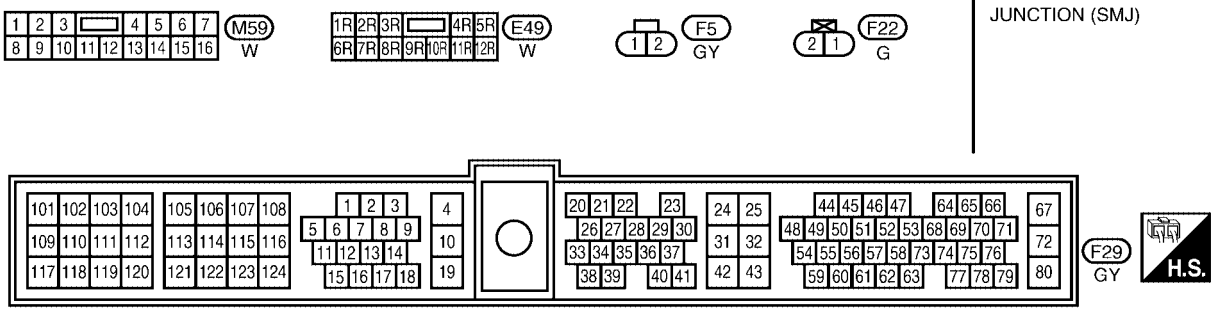
- **When using GST, DTC Confirmation Procedure should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram

UBS00DB5

EC-EGRC1-01





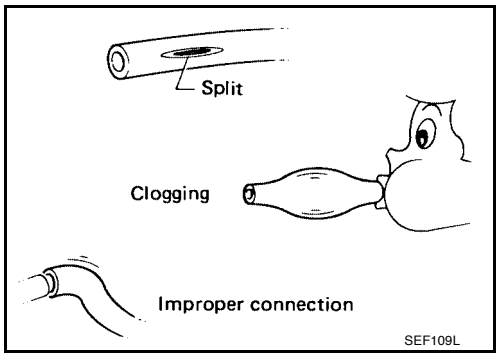
BBWA0453E

Diagnostic Procedure

UBS00DB6

1. CHECK VACUUM HOSE

Check vacuum hose for clogging, cracks or improper connection.
Refer to EC-30, "Vacuum Hose Drawing" .



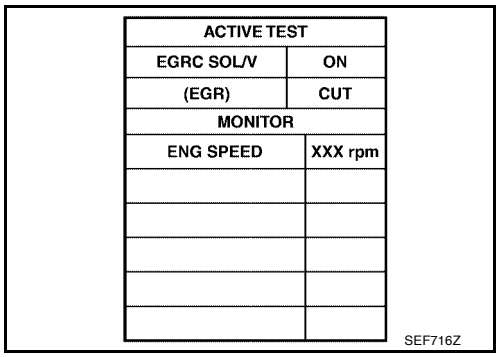
OK or NG

OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> Repair or replace vacuum hose.

2. CHECK EGRC SOLENOID VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch ON.
2. Turn EGRC solenoid valve “ON” and “OFF” in “ACTIVE TEST” mode with CONSULT-II and check operating sound.
   Clicking noise should be heard.



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

3. CHECK EGRC SOLENOID VALVE CIRCUIT

Without CONSULT-II

1. Turn ignition switch OFF.
2. Disconnect EGRC solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check operating sound of the solenoid valve when disconnecting and reconnecting EGRC solenoid valve harness connector. (The DTC or the 1st trip DTC for the EGRC solenoid valve will be displayed, however, ignore it.)

OK or NG

OK >> GO TO 6.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M59, F27
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between fuse block and EGRC solenoid valve
- Harness for open or short between ECM and EGRC solenoid valve

OK or NG

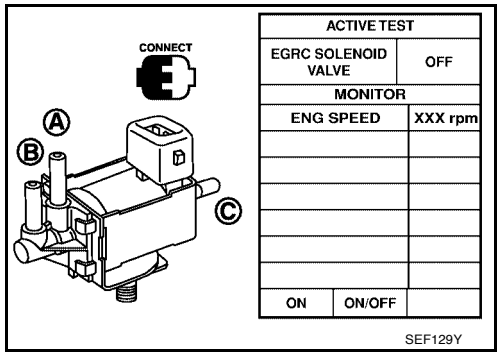
OK >> GO TO 5.
NG >> Repair open circuit or short to power in harness or connector.

5. CHECK EGRC-SOLENOID VALVE

With CONSULT-II

1. Perform “EGRC SOLENOID VALVE” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time under the following conditions.

Conditions	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes



OK or NG

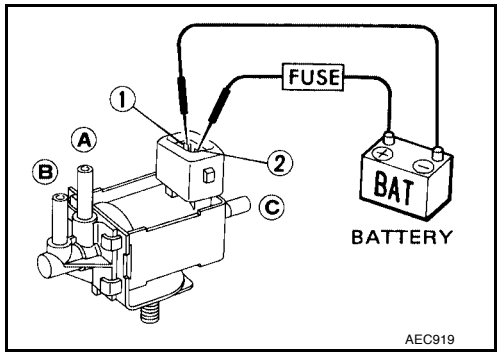
OK >> GO TO 7.
NG >> Replace EGRC-solenoid valve.

6. CHECK EGRC-SOLENOID VALVE

Without CONSULT-II

1. Check air passage continuity and operation delay time under the following conditions.

Conditions	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

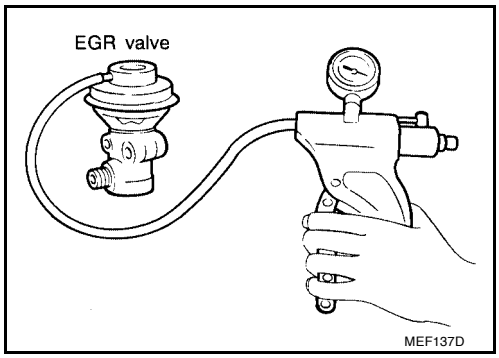


OK or NG

OK >> GO TO 7.
NG >> Replace EGRC-solenoid valve.

7. CHECK EGR VALVE

- Apply vacuum to EGR vacuum port with a hand vacuum pump. **EGR valve spring should lift.**
- Check for sticking.

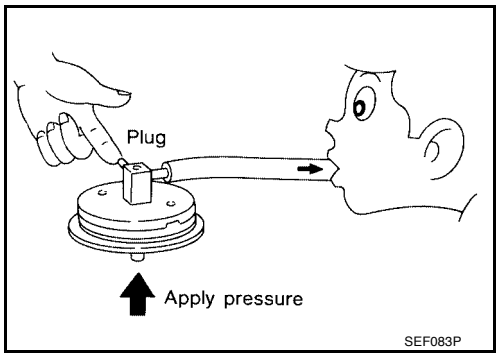


OK or NG

OK >> GO TO 8.
NG >> Replace EGR valve.

8. CHECK EGRC-BPT VALVE

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH_2 O, 3.94 inH_2 O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.

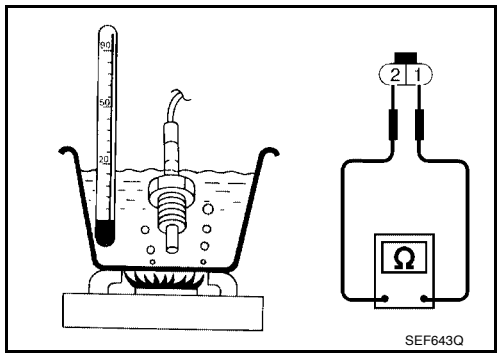


OK or NG

OK >> GO TO 9.
NG >> Replace EGRC-BPT valve.

9. CHECK EGR TEMPERATURE SENSOR

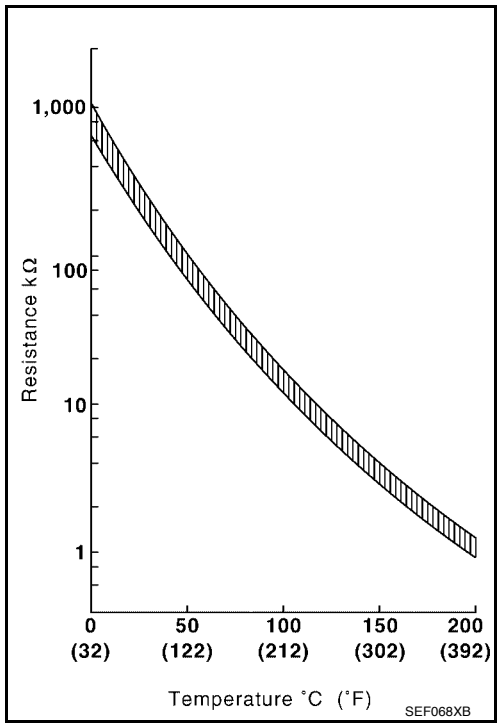
1. Turn ignition switch OFF.
2. Disconnect EGR temperature sensor harness connector.
3. Check resistance between EGR temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

EGR temperature °C (°F)	Voltage [V]*	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

*: This data reference value and is measured between ECM terminal 63 (EGR temperature sensor) and ground.



OK or NG

OK >> GO TO 10.
NG >> Replace EGR temperature sensor.

10. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

DTC P1442 EVAP CONTROL SYSTEM

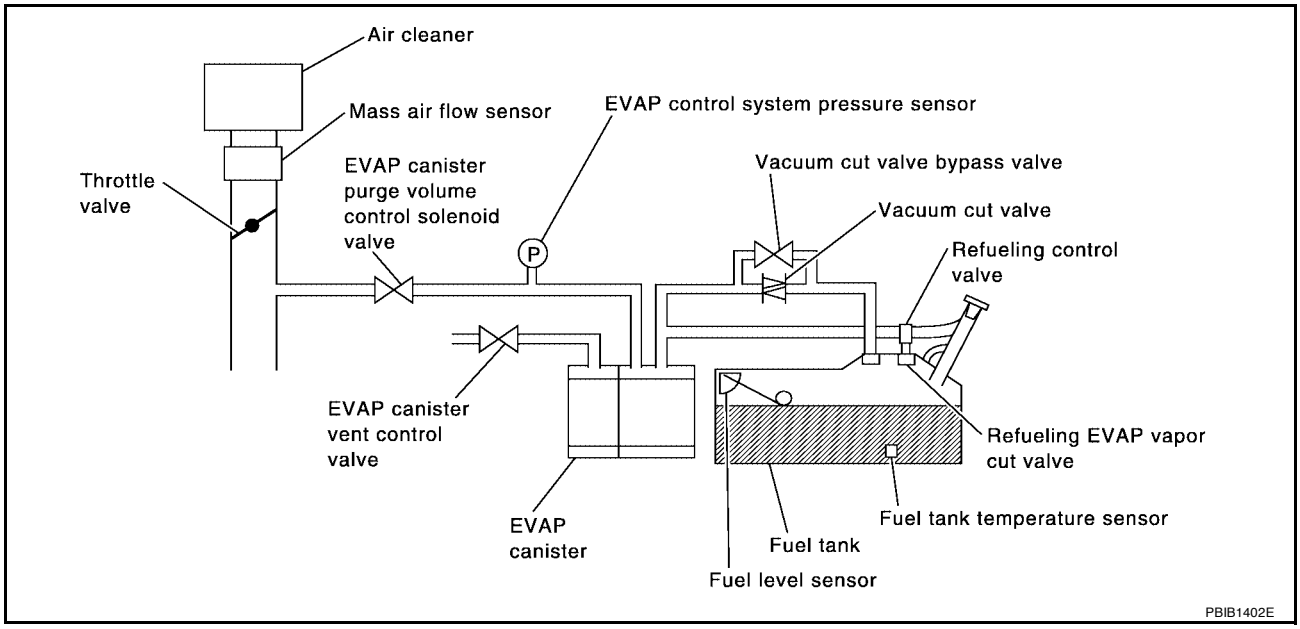
PFP:14950

On Board Diagnosis Logic

UBS00DB7

NOTE:
If DTC P0442 is displayed with DTC P1448, perform trouble diagnosis for DTC P1448 first. (See EC-487 .)

This diagnosis detects leaks in the EVAP purge line using of 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.



DTC No.	Trouble diagnosis name	DTC detecting condition	Check Items (Possible Cause)
P1442	EVAP control system small leak detected (positive pressure)	● EVAP control system has a leak. ● EVAP control system does not operate properly.	● 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 ● 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

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.**

DTC Confirmation Procedure

UBS00DB8

Refer to “DTC P0442 EVAP CONTROL SYSTEM”, EC-321, "DTC Confirmation Procedure" .

Diagnostic Procedure

UBS00DB9

Refer to “DTC P0442 EVAP CONTROL SYSTEM”, EC-323, "Diagnostic Procedure" .

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

UBS00DBA

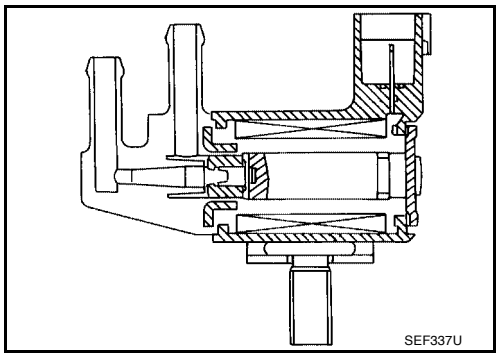
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	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		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	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

UBS00DBB

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle (Vehicle stopped)	0%
		2,000 rpm (200 seconds after starting engine)	—

On Board Diagnosis Logic

UBS00DBC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1444	EVAP canister purge volume control solenoid valve	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	● 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

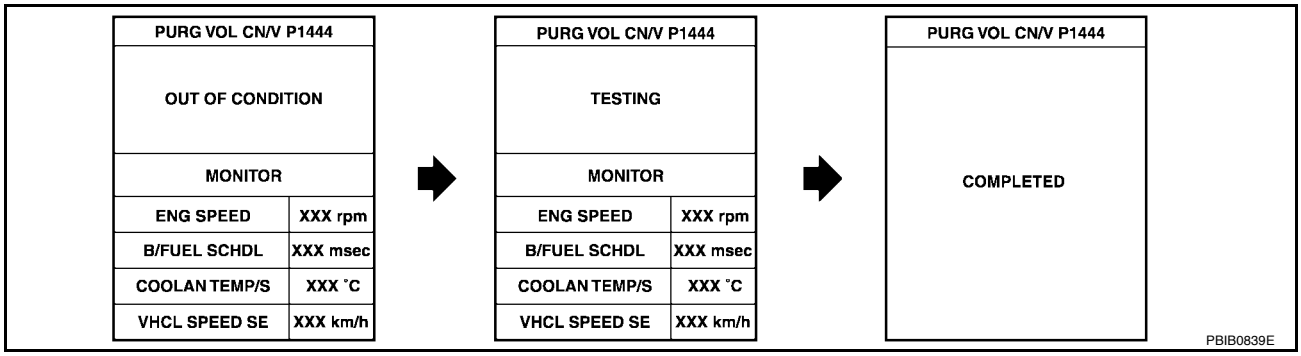
UBS00DBD

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 C/V P1444” of “EVAP SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
5. Touch “START”.



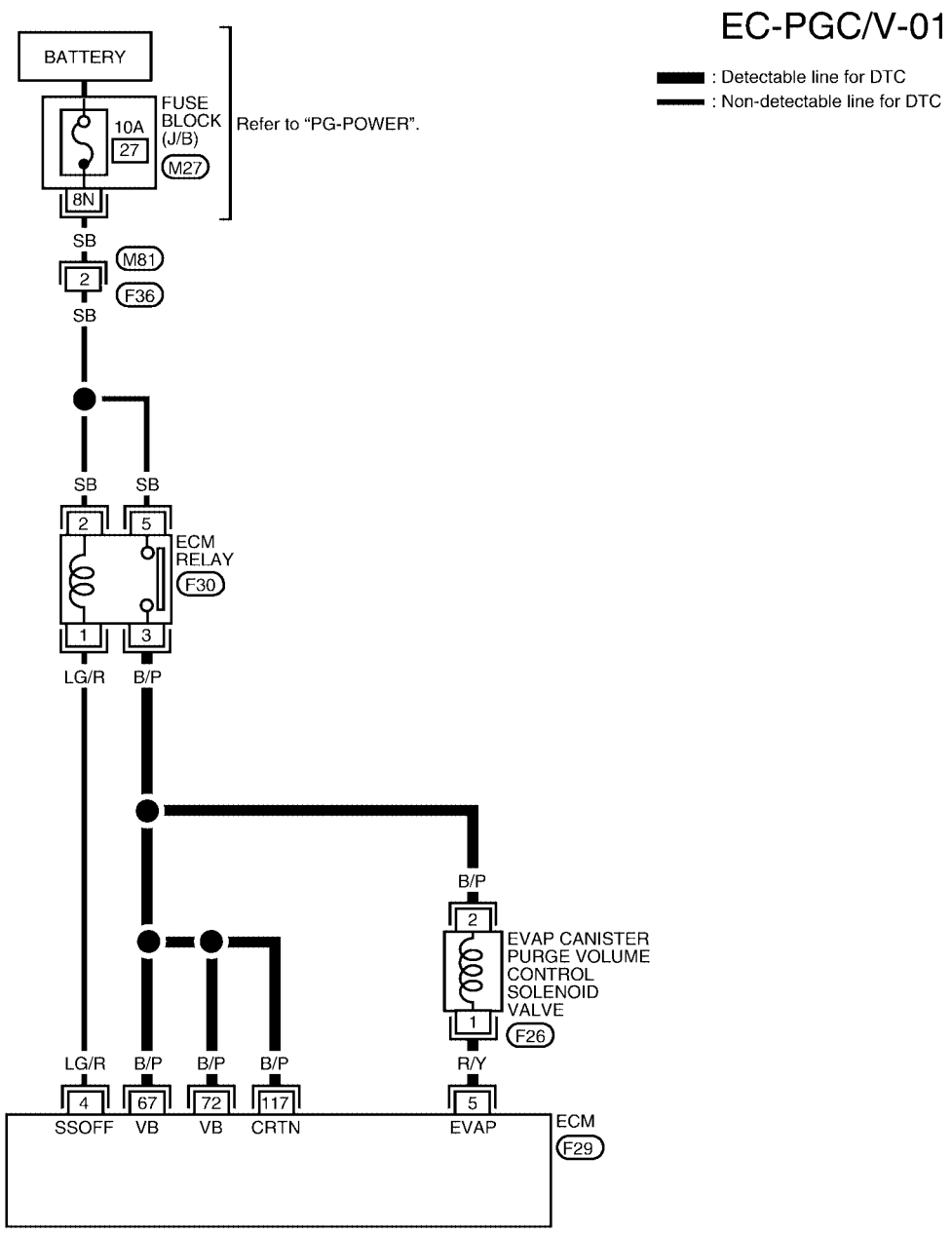
6. Start engine and let it idle until “TESTING” on CONSULT-II changes to “COMPLETED”. (It will take for at least 10 seconds.)
   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-478, "Diagnostic Procedure" .

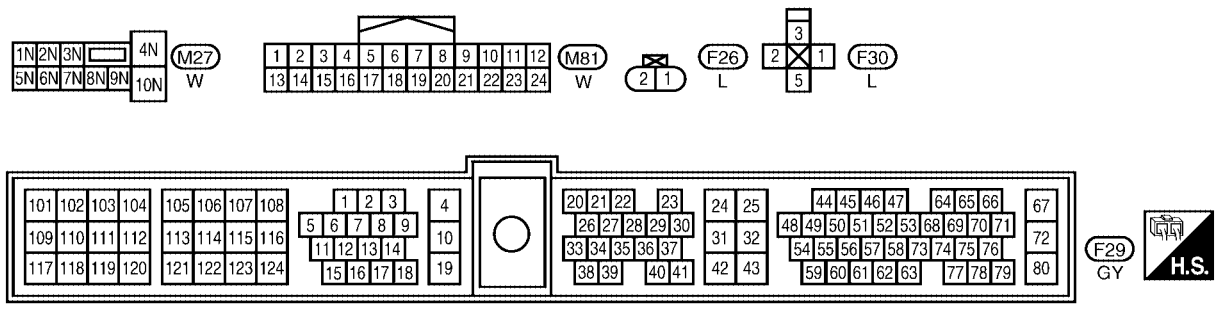
WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. 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 EC-478, "Diagnostic Procedure" .

Wiring Diagram

UBS00DBE



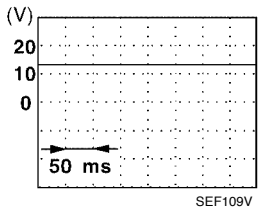
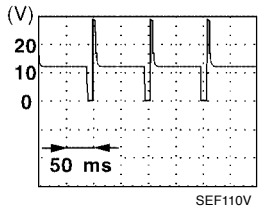


BBWA1061E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	LG/R	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  SEF109V
			[Engine is running] ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEF110V
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

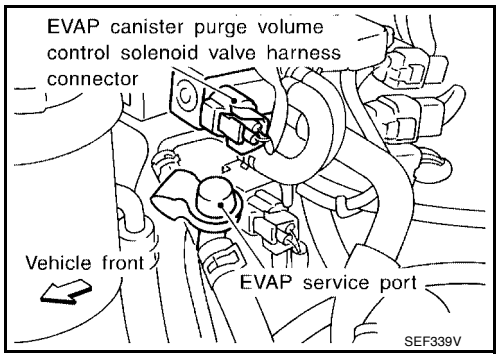
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00DBF

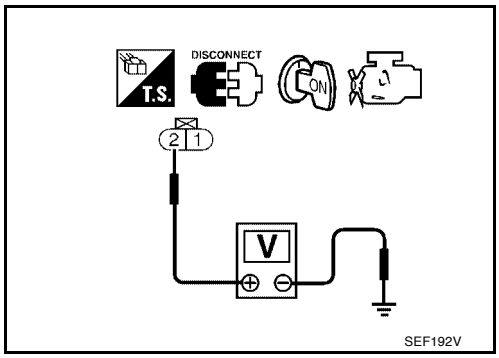
1. CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between EVAP canister purge volume control solenoid valve terminal 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 for open or short between EVAP canister purge volume control solenoid valve and ECM relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair harness or connectors.

3. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 5 and EVAP canister purge volume control solenoid valve terminal 1.
   Refer to Wiring Diagram.
   Continuity should exist.
4. Also, check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

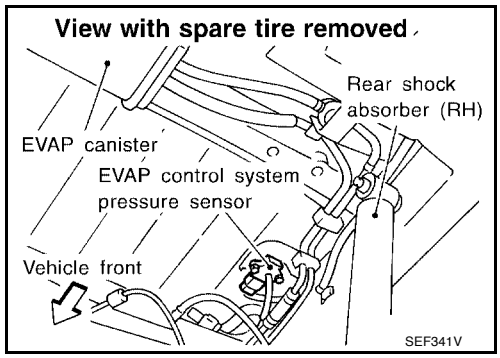
Check the harness for open or short between EVAP canister purge volume control solenoid valve and ECM.

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

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

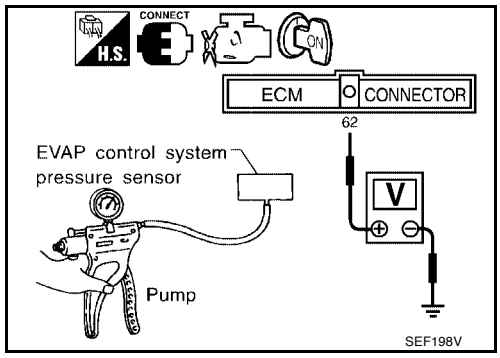
1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.56 inHg) of pressure.**



4. Check output voltage between ECM terminal 62 and ground.

Applied vacuum kPa (mmHg, inHg)	Voltage [V]
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value



CAUTION:
Discard any EVAP control system pressure 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.

OK or NG

OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> Replace EVAP control system pressure sensor.

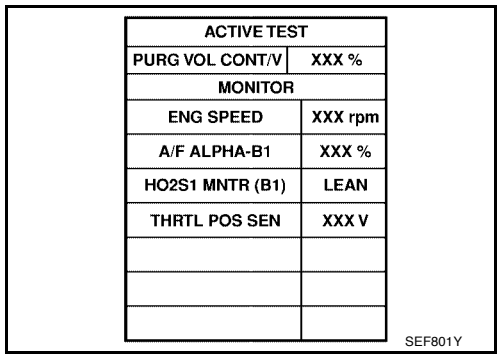
6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

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.

OK or NG

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

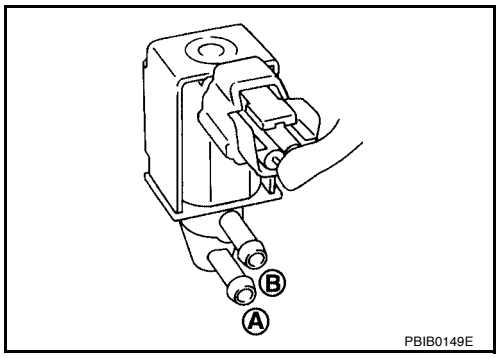


7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

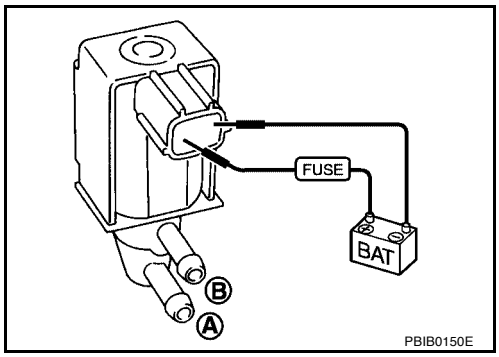
Condition (PURG VOL CONT/V valve)	Air passage continuity between A and B
100%	Yes
0%	No



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



OK or NG

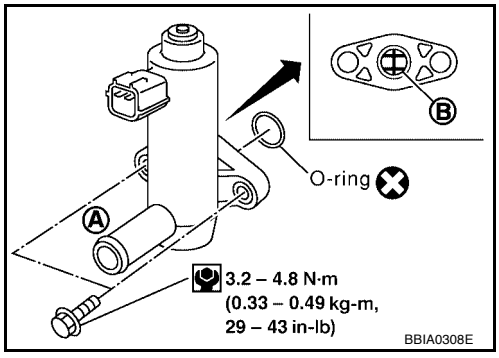
OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

OK or NG

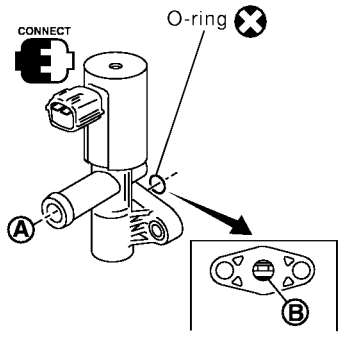
OK >> GO TO 9.
NG >> Replace EVAP canister vent control valve.



9. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

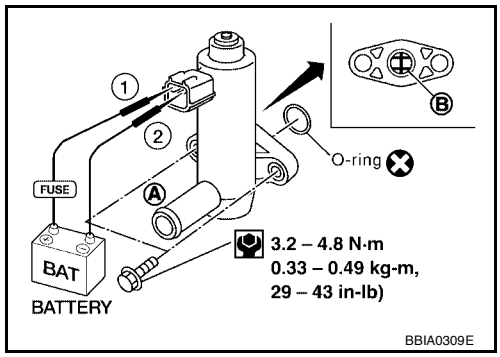
SEF803Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



BBIA0309E

OK or NG

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

10. CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 9 again.

OK or NG

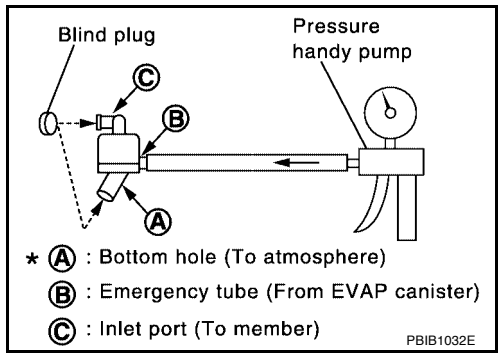
OK >> GO TO 11.
NG >> Replace EVAP canister vent control valve.

11. CHECK RUBBER TUBE

Check for obstructed water separator and rubber tube connected to EVAP canister vent control valve and clean the rubber tube using air blower. Check 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.

- **Do not disassemble water separator.**

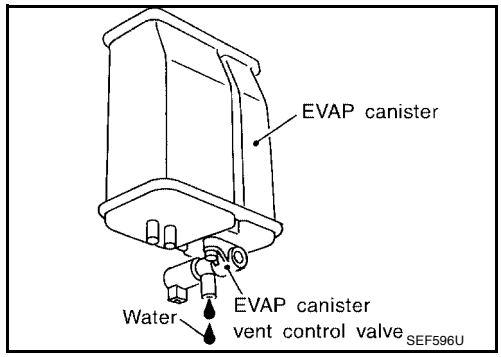


OK or NG

OK >> GO TO 12.
NG >> Clean, repair or replace rubber tube and/or water separator.

12. 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 13.
No >> GO TO 14.

13. 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 15.
NG >> GO TO 14.

14. 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.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-116, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .

>> **INSPECTION END**

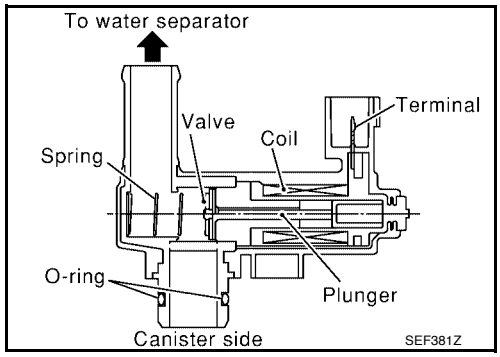
DTC P1446 EVAP CANISTER VENT CONTROL VALVE

PFP:14935

Component Description

UBS00DBG

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent. This solenoid (the EVAP canister vent control 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

UBS00DBH

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00DBI

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1446	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	● 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

UBS00DBJ

CAUTION:
Always drive vehicle at a safe speed.

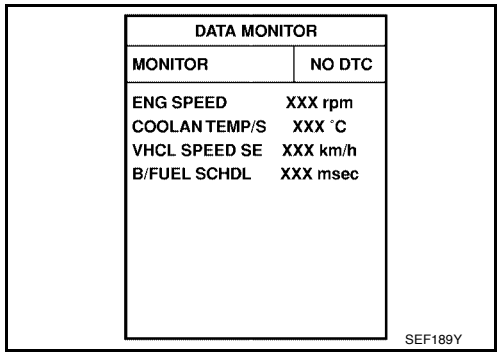
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Always perform at a temperature above 0°C (32°F).

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Check that “FUEL T/TMP SE” is 0°C (32°F) or more.
6. Drive vehicle at a speed of approximately 80 km/h (50 MPH) for a maximum of 15 minutes.
7. If 1st trip DTC is detected, go to EC-484, "Diagnostic Procedure"
.

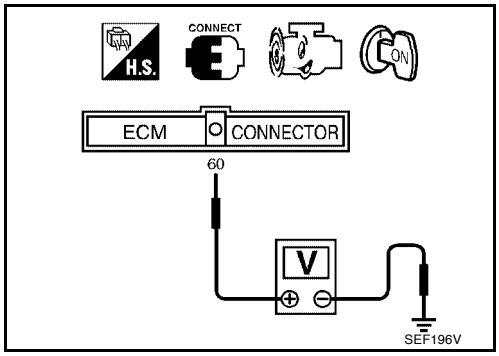
NOTE:
If a malfunction exists, NG result may be displayed quicker.



WITH GST

1. Start engine and warm it up to normal operating temperature.

2. Check that voltage between ECM terminal 60 (fuel tank temperature sensor signal) and ground is less than 4.8V.
3. Drive vehicle at a speed of approximately 80 km/h (50 MPH) for 15 minutes.
4. Select “MODE 7” with GST.
5. If 1st trip DTC is detected, go to EC-484, "Diagnostic Procedure" .



Diagnostic Procedure

UBS00DBK

1. CHECK RUBBER TUBE FOR CLOGGING

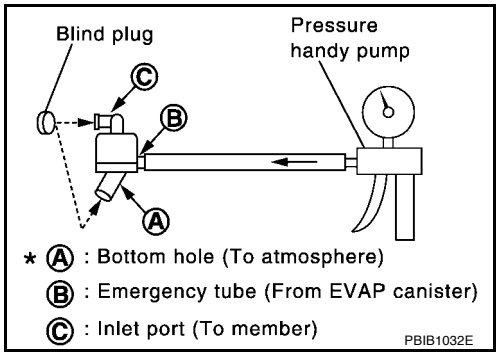
Check obstructed water separator and rubber tube to EVAP canister vent control valve and clean the rubber tube using air blower.
Check water separator.

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.

- **Do not disassemble water separator.**

OK or NG

OK >> GO TO 2.
NG >> Clean, repair or replace rubber tube and/or water separator.

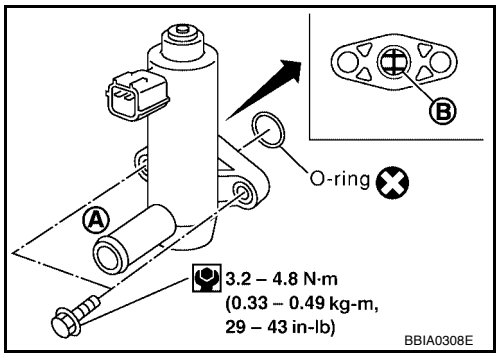


2. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

OK or NG

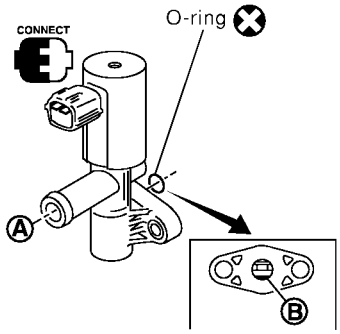
OK >> GO TO 3.
NG >> Replace EVAP canister vent control valve.



3. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch “ON”.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time.



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
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

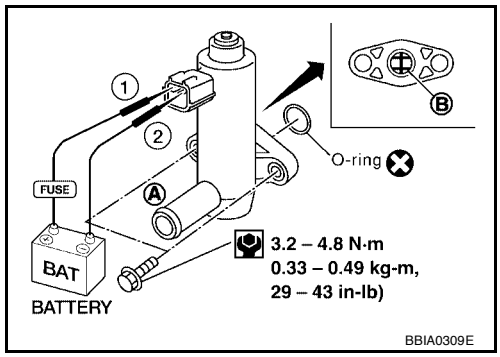
SEF991Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 3 again.

OK or NG

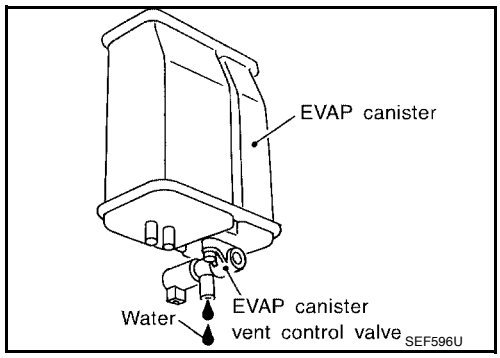
OK >> GO TO 5.
NG >> Replace EVAP canister vent control valve.

5. CHECK IF EVAP CANISTER IS 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 6.
No >> GO TO 8.



6. CHECK EVAP CANISTER

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 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Visually check the EVAP canister for damage.
- Check hose connection between EVAP canister and water separator for clogging and poor connection.

>> Repair hose or replace EVAP canister.

8. 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 9.
NG >> Install hose properly or replace it.

9. CHECK HARNESS CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check harness connector 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 AND CIRCUIT

Refer to “DTC Confirmation Procedure”, for DTC P0452, EC-345 and DTC P0453, EC-352 .

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP control system pressure sensor and repair or replace harness and connector.

11. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

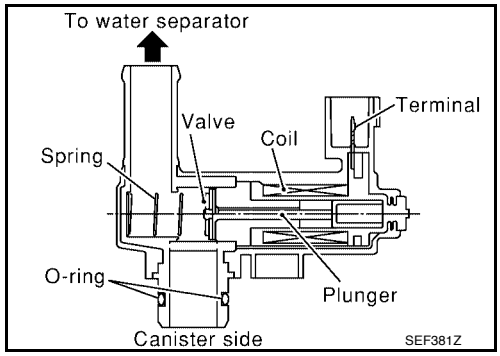
DTC P1448 EVAP CANISTER VENT CONTROL VALVE

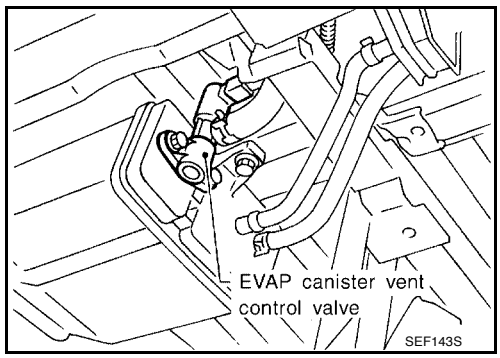
PFP:14935

Component Description

UBS00DBL

NOTE:
If DTC P1448 is displayed with P0442, 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 (the EVAP canister vent control 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

UBS00DBM

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00DBN

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1448	EVAP canister vent control valve open	EVAP canister vent control valve remains opened under specified driving conditions.	● 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 ● Vacuum cut valve

DTC Confirmation Procedure

UBS00DBO

NOTE:

- **If DTC P1448 is displayed with P0442, first perform trouble diagnosis for DTC P1448.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

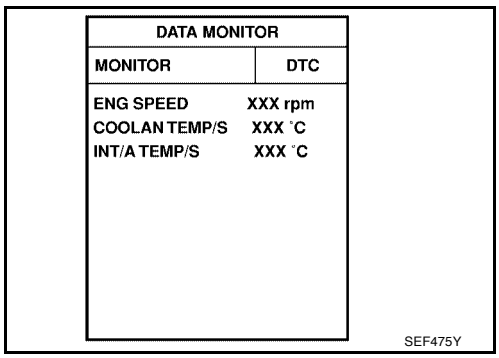
WITH CONSULT-II

TESTING CONDITION:

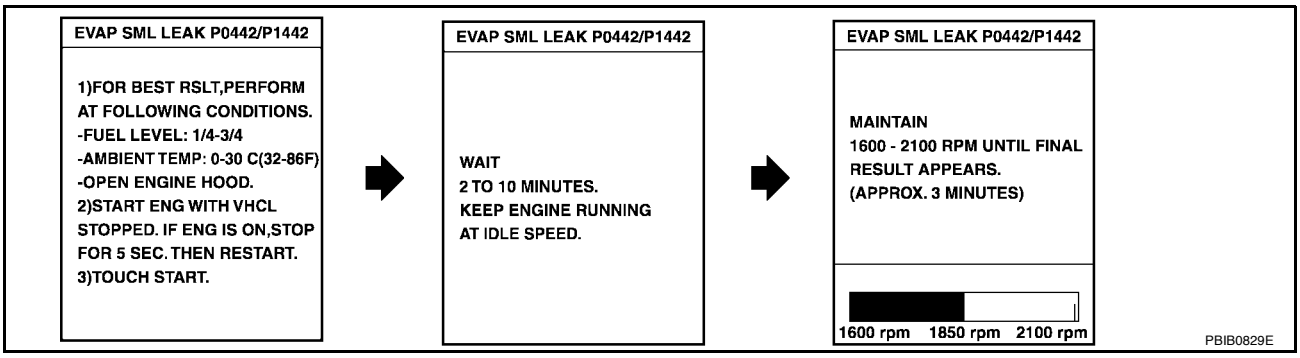
- **Perform "DTC WORK SUPPORT" when the fuel level is less than 3/4 full, and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
4. Check 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)



5. Select "EVAP SML LEAK P0442/P1442" of "EVAP SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.

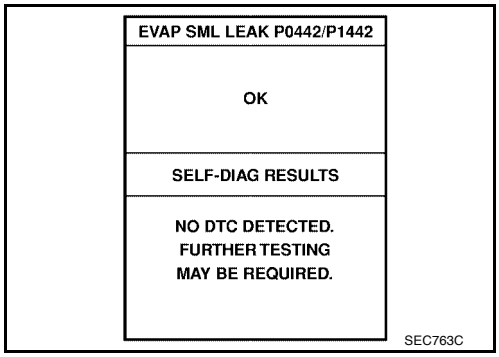


NOTE:

- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to EC-74, "Basic Inspection" .**

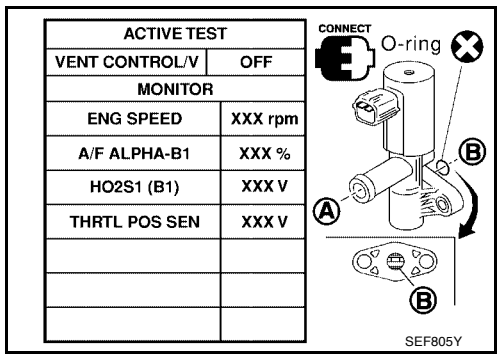
6. Make sure that "OK" is displayed.
   If "NG" is displayed, go to following step.

   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 of the following.

Condition	Air passage continuity between **A** and **B**
Touching “ON”	No
Touching “OFF”	Yes



If the result is NG, go to EC-489, "Diagnostic Procedure" .
If the result is OK, go to “Diagnostic Procedure” for DTC P0442, EC-323 .

Overall Function Check

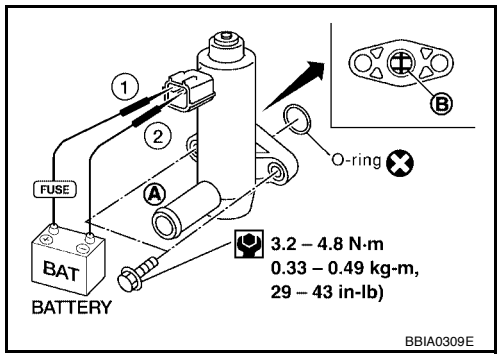
UBS00DBP

Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a 1st trip 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 EC-489, "Diagnostic Procedure" .
If the result is OK, perform trouble diagnosis for DTC P0442. Refer to EC-323 .

Diagnostic Procedure

UBS00DBQ

1. CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Check disconnection or obstruction of rubber tube connected to EVAP canister vent control valve.

OK or NG

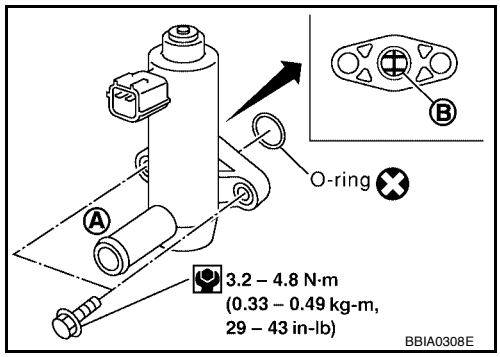
OK >> GO TO 2.
NG >> Repair or clean rubber tube.

2. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

OK or NG

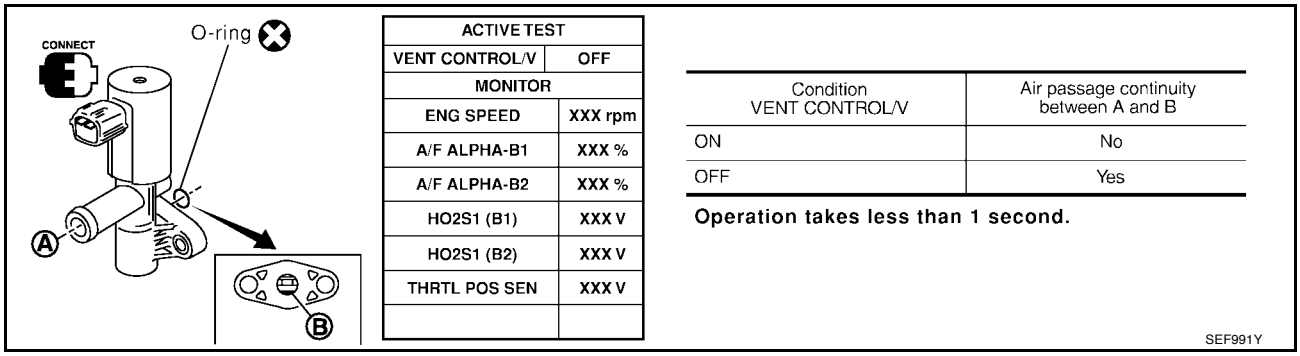
OK >> GO TO 3.
NG >> Replace EVAP canister vent control valve.



3. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time.



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
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

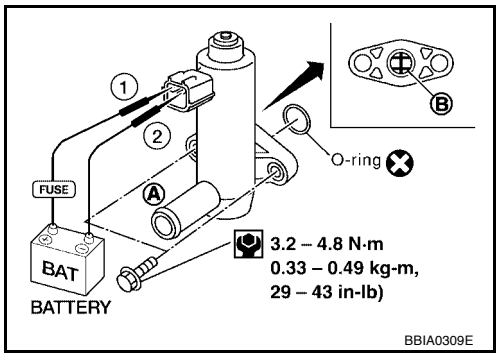
SEF991Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



BBIA0309E

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 3 again.

OK or NG

OK >> GO TO 5.
NG >> Replace EVAP canister vent control valve.

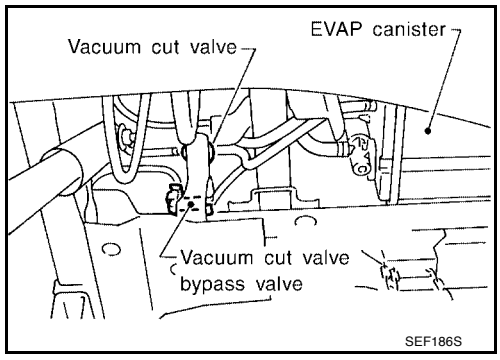
5. CHECK VACUUM CUT VALVE

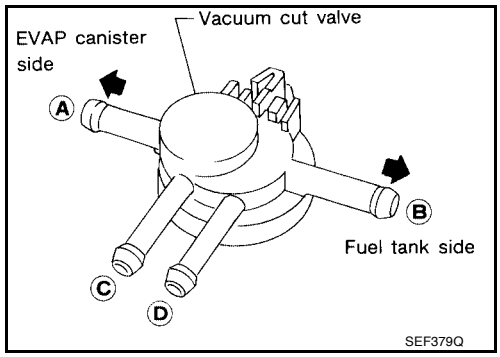
Check vacuum cut valve as follows:

1. Plug port **C** and **D** with fingers.
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. Open port **C** and **D** .
6. Blow air in port **A** check that air flows freely out of port **C** .
7. Blow air in port **B** check that air flows freely out of port **D** .

OK or NG

OK >> GO TO 6.
NG >> Replace vacuum cut valve.



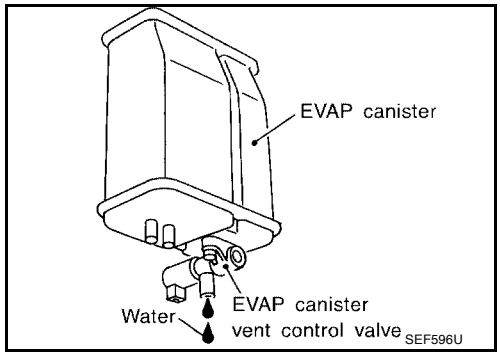


6. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with the vent control valve attached.
2. Check if water will drain from the EVAP canister.

Yes or No

Yes >> GO TO 9.
No >> GO TO 7.



7. CHECK EVAP CANISTER

Weigh the EVAP canister with EVAP canister vent control valve attached.
The weight should be less than 1.8 kg (4.0lb).

OK or NG

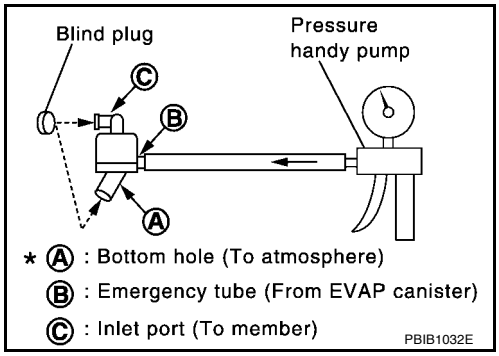
OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

1. Visually check the EVAP canister for damage.
2. Check hose connection between EVAP canister and water separator for clogging and poor connection.
3. Check water separator.

- Check visually for insect nests in the water separator air inlet.
- Check visually for cracks or flaws in the appearance.
- Check visually for cracks or flaws in the hose.
- Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
- In case of NG in items 2 - 4, replace the parts.
- **Do not disassemble water separator.**



>> Repair hose or replace EVAP canister or water separator.

9. 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 10.
NG >> Install hose property or replace it.

10. CHECK HARNESS CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check harness connector for water.
   Water should not exist.

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP control system pressure sensor.

11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Perform DTC Confirmation Procedure, for DTC P0452, EC-345 and DTC P0453, EC-352 .

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP control system pressure sensor and repair or replace harness and connector.

12. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

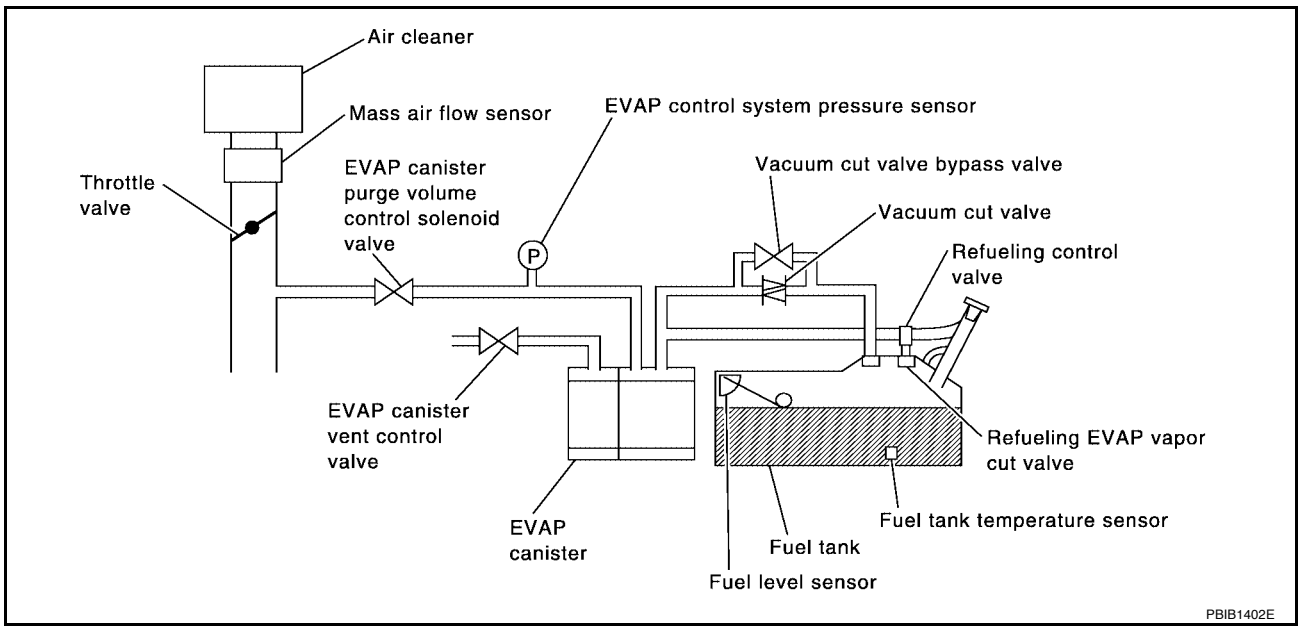
DTC P1456 EVAP CONTROL SYSTEM

PFP:14710

On Board Diagnosis Logic

UBS00DBR

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using of 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.
If ECM judges a leak which corresponds to a very small leak, the very small leak P1456 will be detected.
If ECM judges a leak equivalent to a small leak, EVAP small leak P1442 will be detected.
If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1456	Evaporative emission control system very small leak (positive pressure check)	● EVAP system has a very small leak. ● EVAP system does not operate properly.	● 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 ● 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 ● Refueling control valve ● ORVR system leaks ● Fuel level sensor and the circuit ● Foreign matter caught in EVAP canister purge volume control solenoid valve

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.**

DTC Confirmation Procedure

UBS00DBS

NOTE:

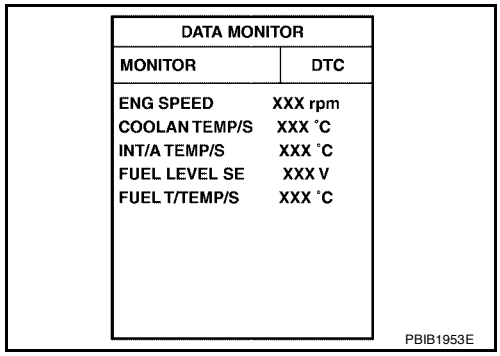
- **If DTC P0456 or P1456 is displayed with P0442, first perform trouble diagnosis for DTC P0456 or P1456.**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**
- **After repair, make sure that the hoses and clips are installed properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

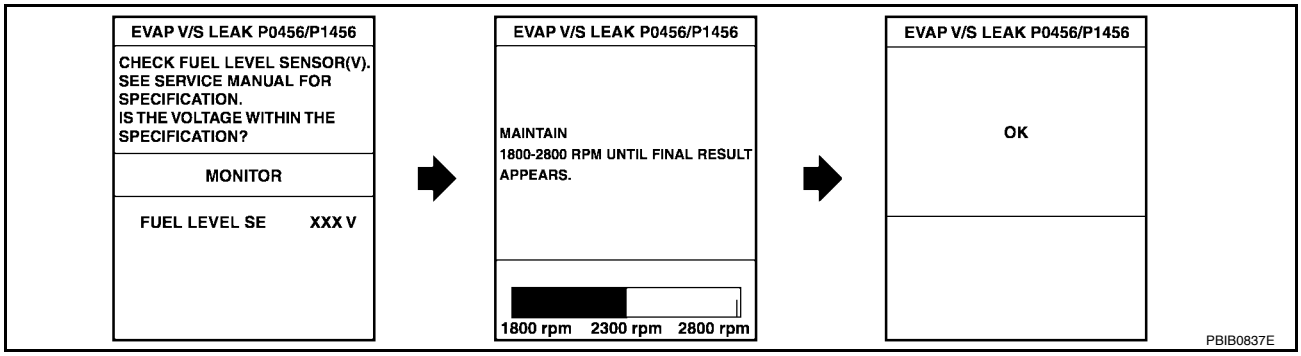
TESTING CONDITION:

- **Open engine hood before conducting following procedure.**
- **If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**
  - **Fuel filler cap is removed.**
  - **Refilled or drained the fuel.**
  - **EVAP component parts is/are removed.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Make sure the following conditions are met.
   FUEL LEVEL SE: 1.16 - 0.25V
   COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
   FUEL T/TMP SE: 0 - 32°C (32 - 90°F)
   INT A/TEMP SE: More than 0°C (32°F)
   If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the “FUEL LEVEL SE” meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1.



3. Turn ignition switch OFF and wait at least 5 seconds.
4. Turn ignition switch ON.
5. Select “EVAP V/S LEAK P0456/P1456” of “EVAP SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.



6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-496, "Diagnostic Procedure" .

NOTE:
- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to EC-74, "Basic Inspection" .**

Overall Function Check

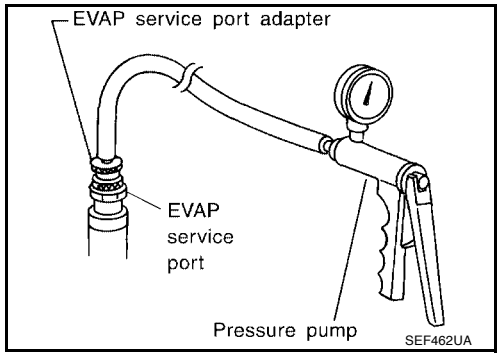
UBS00DBT

WITH GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

CAUTION:
- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2 , 0.6 psi).**

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Set the pressure pump and a hose.
3. Also set a vacuum gauge via 3-way connector and a hose.
4. Turn ignition switch ON.
5. Connect GST and select MODE 8.
6. Using MODE 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
7. Apply pressure and make sure the following conditions are satisfied.
   Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)
   Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg)
   If NG, go to EC-496, "Diagnostic Procedure" .



If OK, go to next step.

NOTE:
For more information, refer to GST instruction manual.

8. Disconnect GST.
9. Start engine and warm it up to normal operating temperature.
10. Turn ignition switch OFF and wait at least 10 seconds.
11. Restart engine and let it idle for 90 seconds.
12. Keep engine speed at 2,000 rpm for 30 seconds.
13. Turn ignition switch OFF.

Diagnostic Procedure

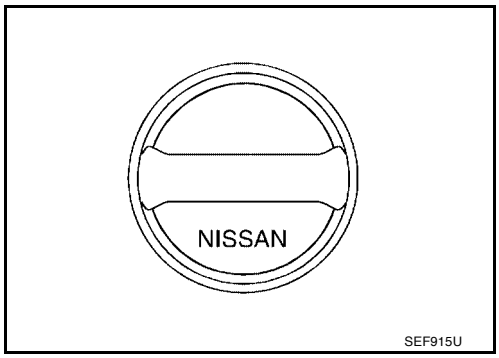
UBS00DBU

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

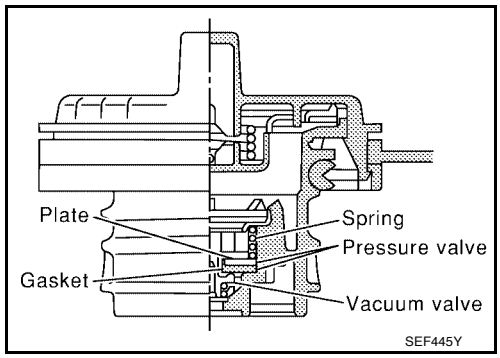
Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

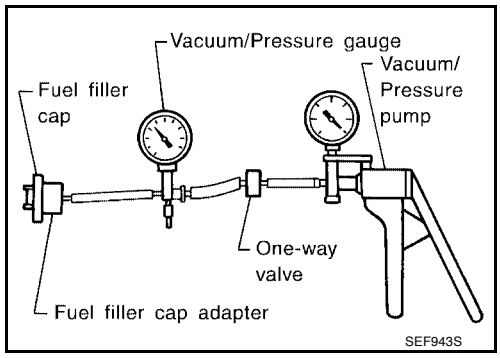
1. Wipe clean valve housing.



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)

CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

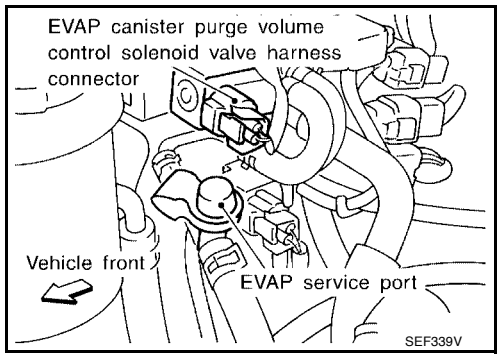


OK or NG

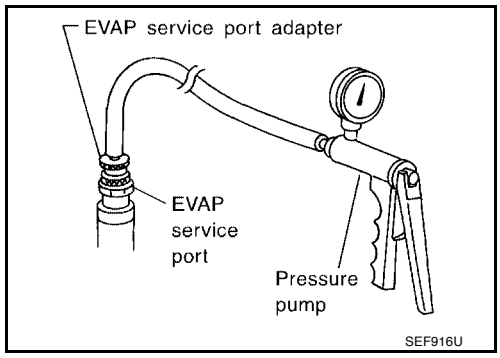
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

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.



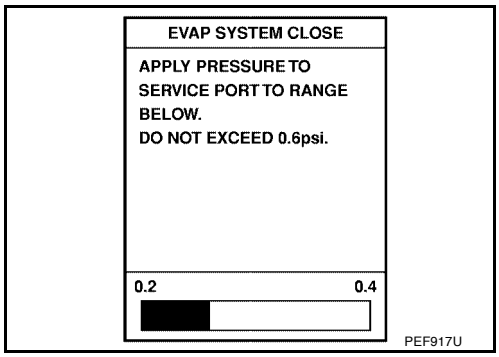
Models with CONSULT-II>>GO TO 6.
Models without CONSULT-II>>GO TO 7.

6. CHECK FOR EVAP LEAK

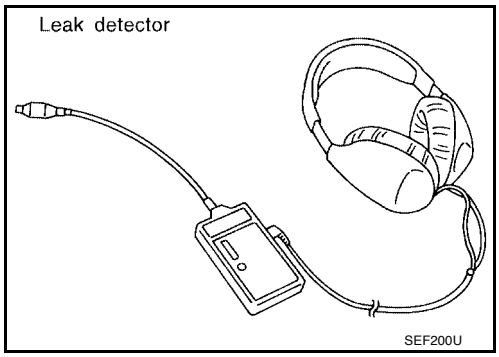
With CONSULT-II

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-571, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

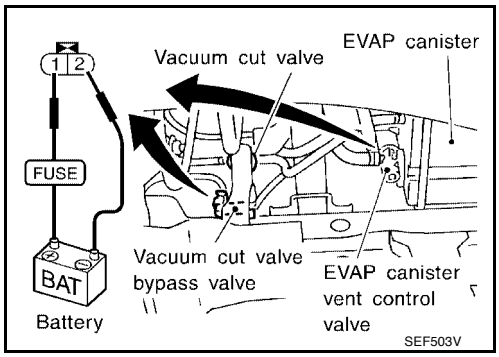
OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

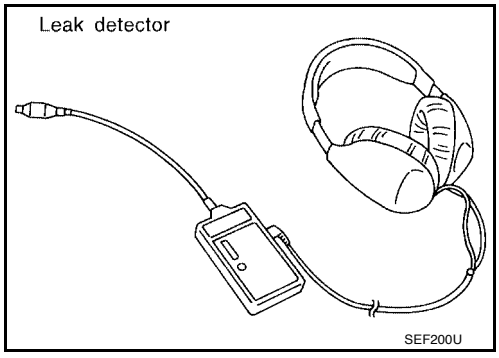
Without CONSULT-II

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-571, "EVAPORATIVE EMISSION LINE DRAWING" .

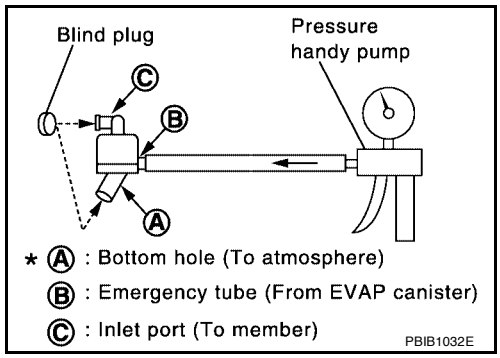


OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK 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.

OK or NG

OK >> GO TO 9.
NG >> Replace water separator.

9. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

Refer to EC-488, "DTC Confirmation Procedure" .

OK or NG

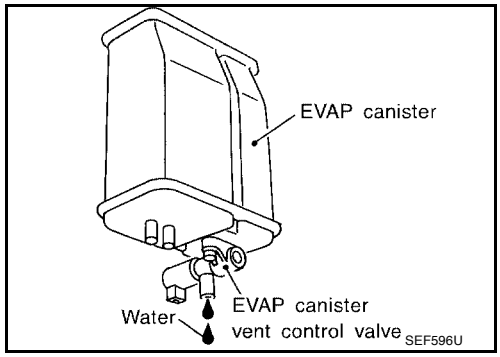
OK >> GO TO 10.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

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

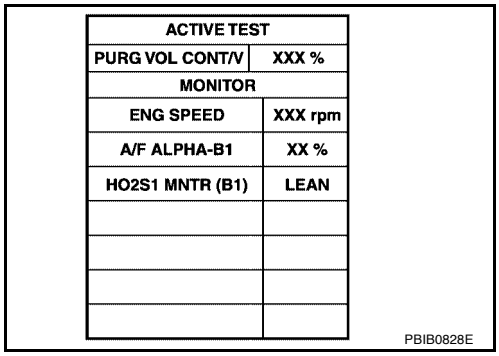
>> Repair hose or replace EVAP canister.

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%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.



OK or NG

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

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-30, "Vacuum Hose Drawing" .

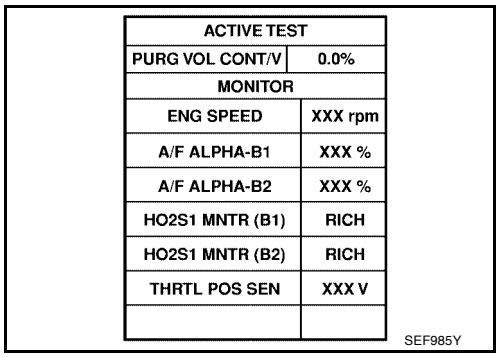
OK or NG

OK (With CONSULT-II)>>GO TO 16.
OK (Without CONSULT-II)>>GO TO 17.
NG >> Repair or reconnect the hose.

16. 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

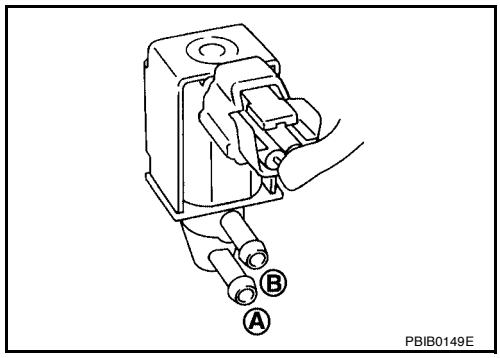
OK >> GO TO 18.
NG >> GO TO 17.

17. CHECK 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.

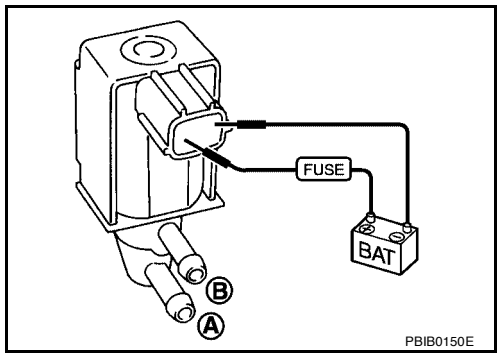
Condition (PURG VOL CONT/V valve)	Air passage continuity between A and B
100%	Yes
0%	No



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



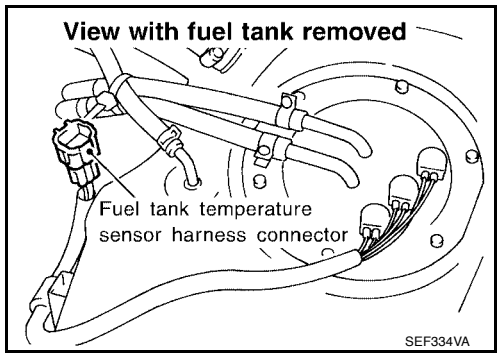
OK or NG

OK >> GO TO 18.

NG >> Replace EVAP canister purge volume control solenoid valve.

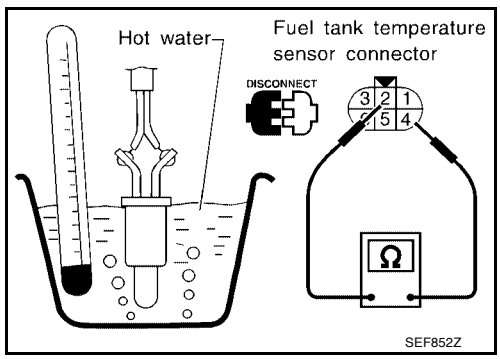
18. CHECK FUEL TANK TEMPERATURE SENSOR

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



OK or NG

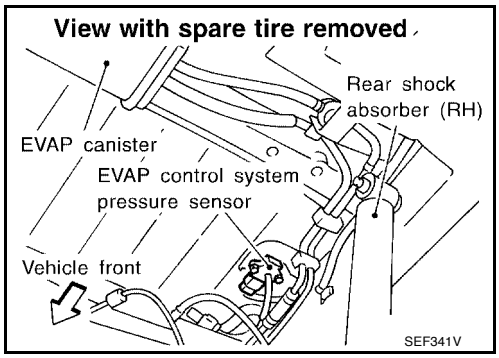
OK >> GO TO 19.

NG >> Replace fuel level sensor unit.

19. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

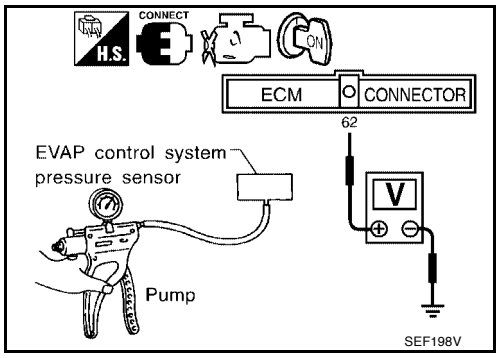
1. Remove EVAP control system pressure sensor with its harness connector connected.
2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.56 inHg) of pressure.**



4. Check output voltage between ECM terminal 62 and ground.

Applied vacuum kPa (mmHg, inHg)	Voltage [V]
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value



CAUTION:
Discard any EVAP control system pressure 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.

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-571, "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-576, "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

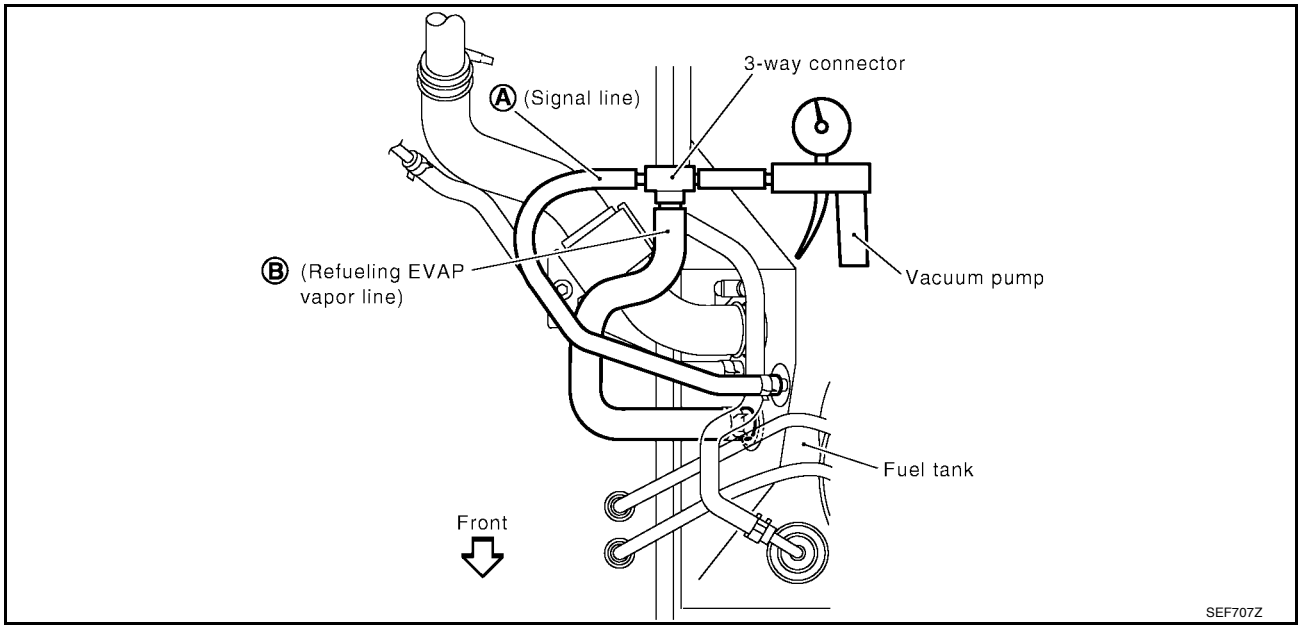
Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 24.
NG >> Repair or replace hoses, tubes or filler neck tube.

24. CHECK REFUELING CONTROL VALVE

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.



OK or NG

OK >> GO TO 25.
NG >> Replace refueling control valve with fuel tank.

25. CHECK FUEL LEVEL SENSOR

Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 26.
NG >> Replace fuel level sensor unit.

26. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

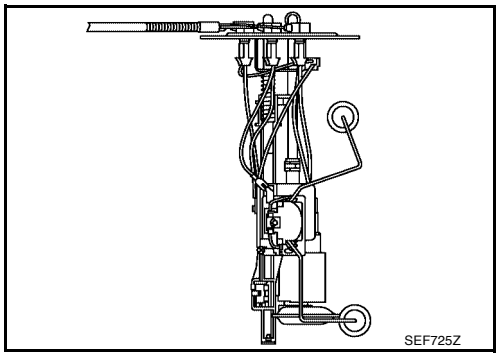
DTC P1464 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00DBV

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 is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.


SEF725Z

On Board Diagnostic Logic

UBS00DBW

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.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1464	Fuel level sensor circuit ground signal	A high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted)

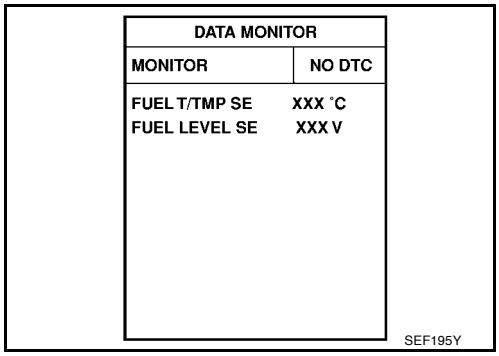
DTC Confirmation Procedure

UBS00DBX

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-506, "Diagnostic Procedure" .



SEF195Y

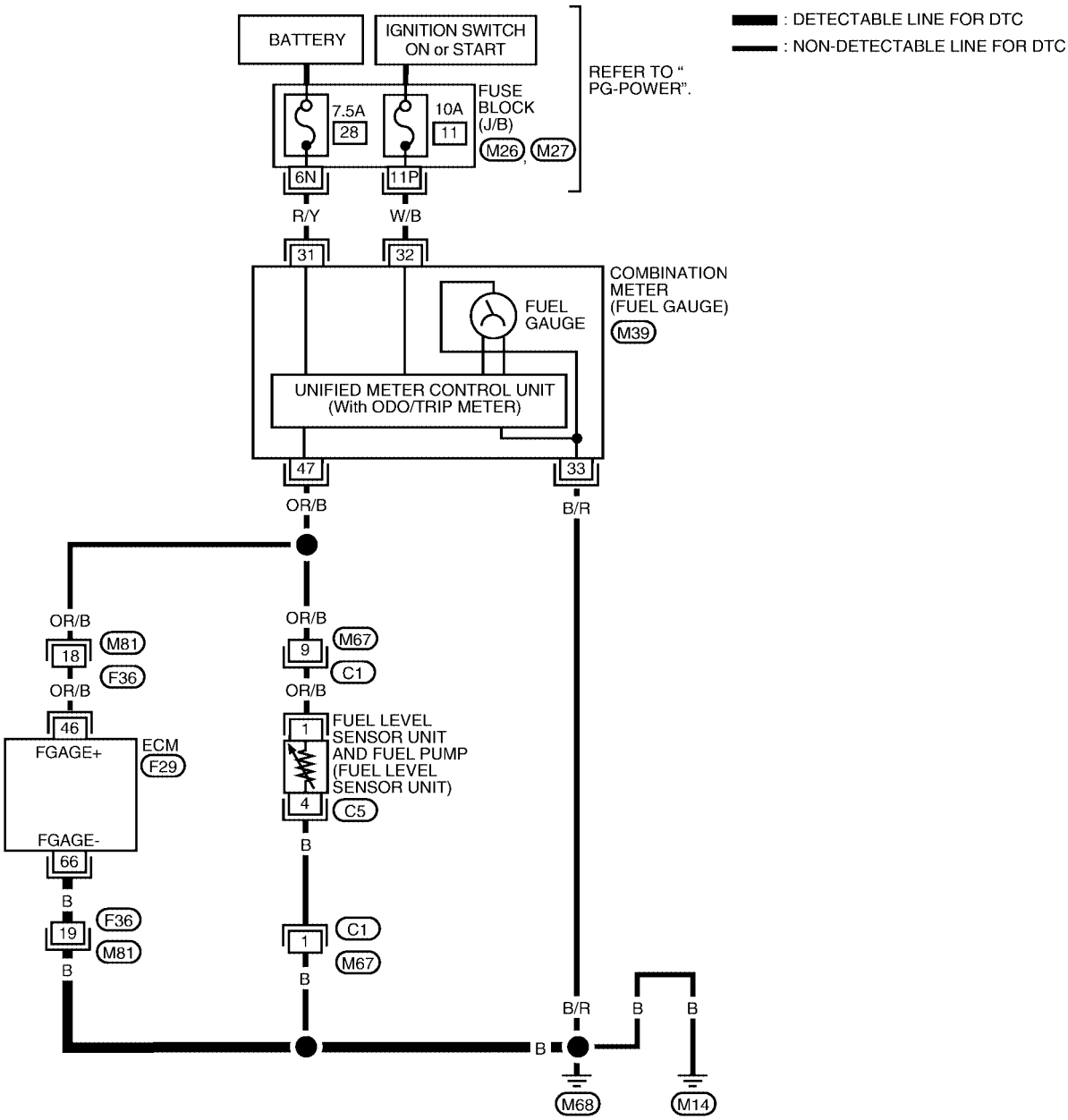
WITH GST

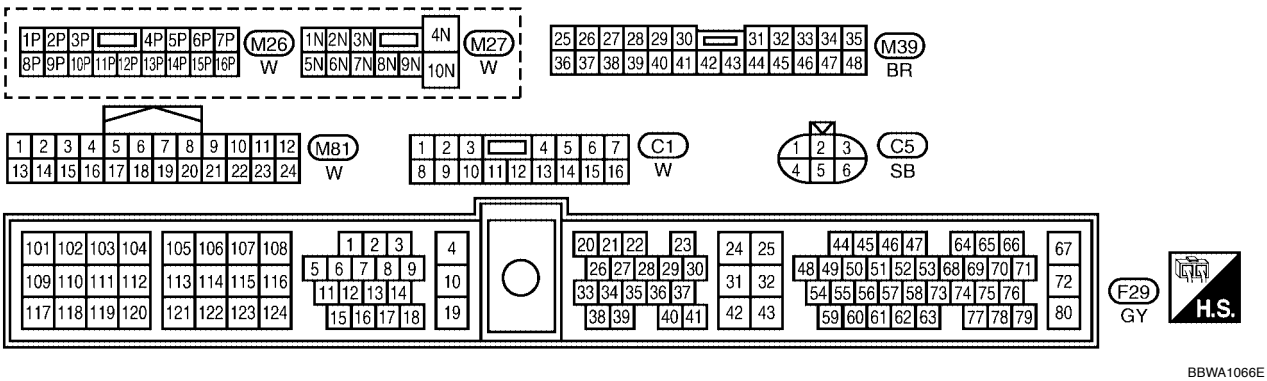
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DBY

EC-FLS3-01





BBWA1066E

Diagnostic Procedure

UBS00DBZ

1. 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 66 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to power.

OK or NG

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

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F36, M81
- Harness for open and short between ECM and ground

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

3. CHECK FUEL LEVEL SENSOR

Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel level sensor unit.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

>> **INSPECTION END**.

Removal and Installation

UBS00DC0

FUEL LEVEL SENSOR UNIT

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

DTC P1490 VACUUM CUT VALVE BYPASS VALVE

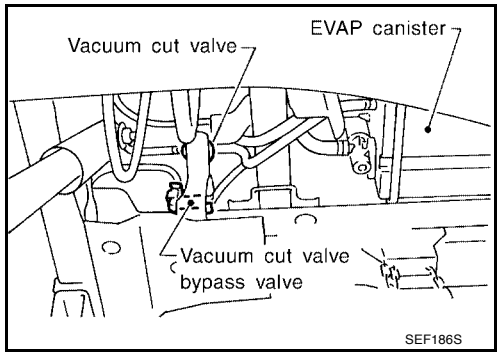
PFP:17372

Description

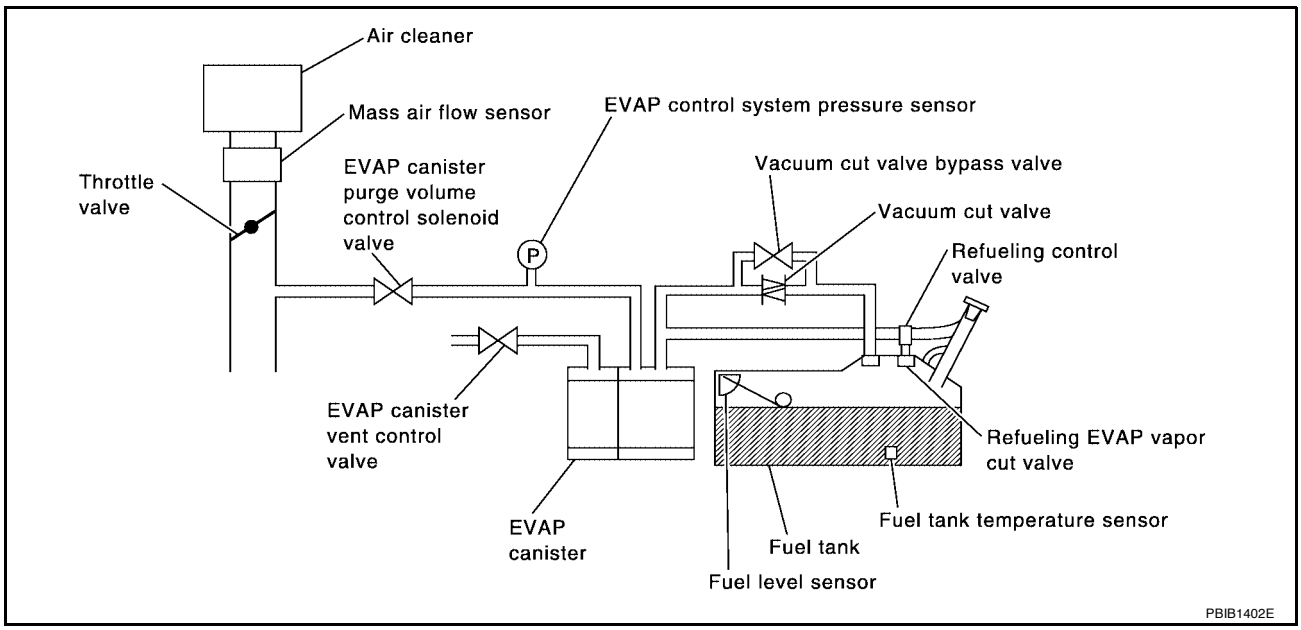
UBS00DC1

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

UBS00DC2

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00DC3

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1490	Vacuum cut valve bypass valve circuit	An improper voltage signal is sent to ECM through vacuum cut valve bypass valve.	● Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted) ● Vacuum cut valve bypass valve

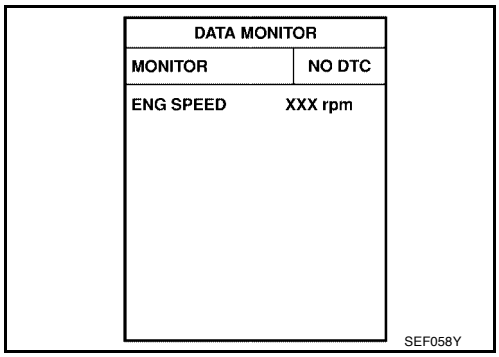
DTC Confirmation Procedure

UBS00DC4

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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

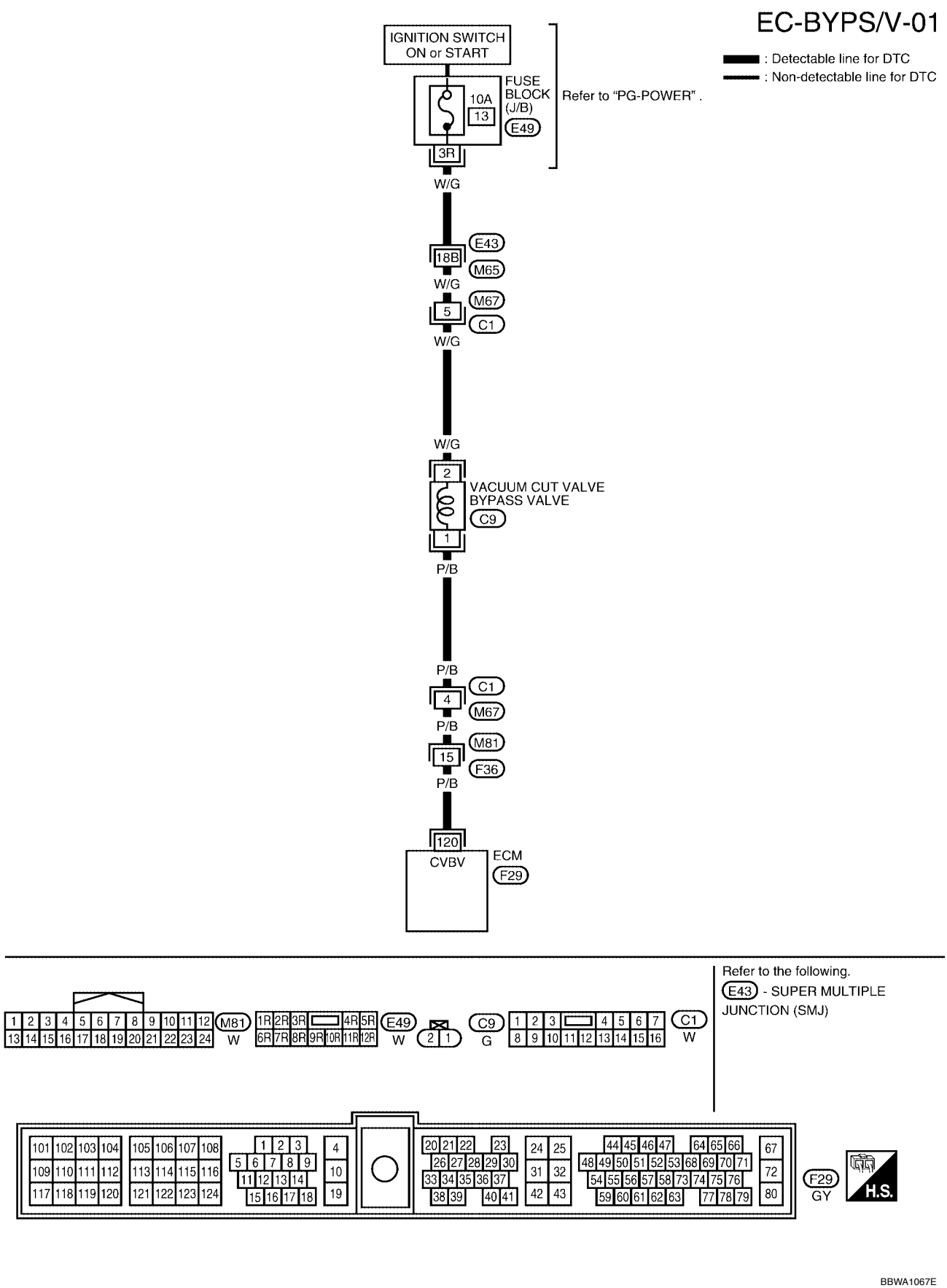
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-510, "Diagnostic Procedure"
.



WITH GST
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DC5



BBWA1067E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00DC6

1. INSPECTION START

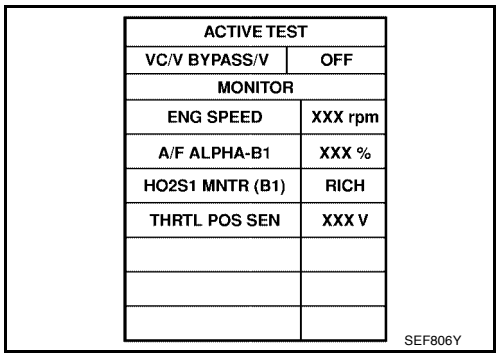
Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK VACUUM CUT VALVE BYPASS VALVE CIRCUIT

1. Turn ignition switch ON.
2. Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.
3. Make sure that clicking sound is heard from the vacuum cut valve bypass valve.

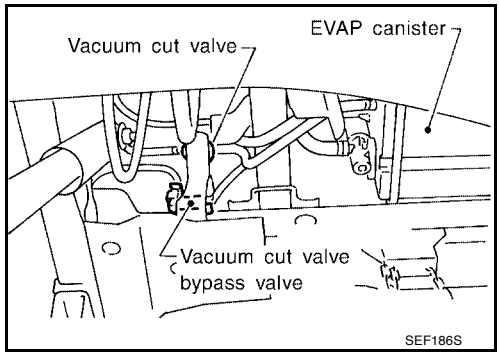


OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

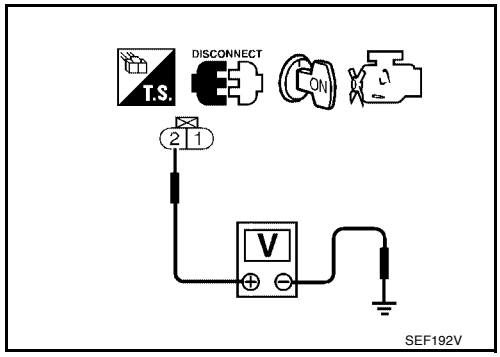
3. CHECK POWER SUPPLY

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 2 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 E43, M65
- Harness connectors M67, C1
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between vacuum cut valve bypass valve and fuse

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

5. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 120 and vacuum cut valve bypass 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 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

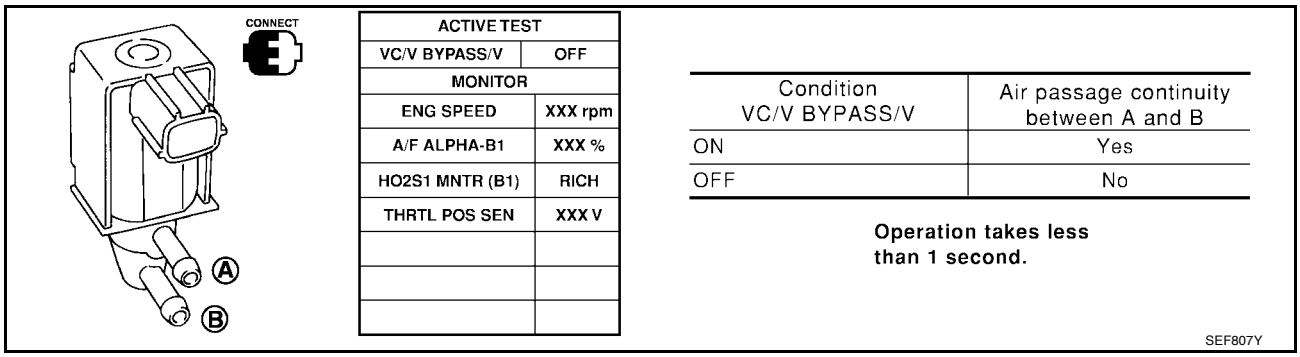
- Harness connectors M67, C1
- Harness connectors M81, F36
- Harness for open or short between vacuum cut valve bypass valve and ECM

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

7. CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

Check air passage continuity.
Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	RICH
THRTL POS SEN	XXX V

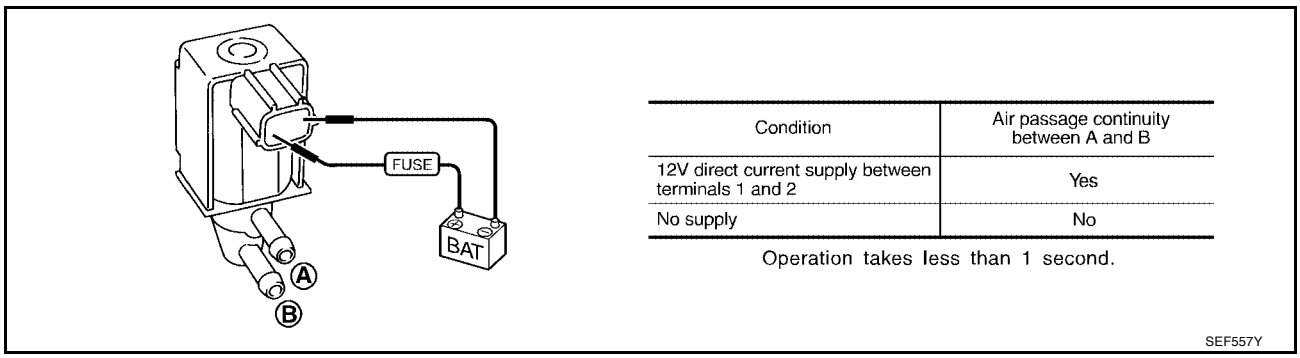
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF807Y

Without CONSULT-II

Check air passage continuity shown in the figure.



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.

SEF557Y

OK or NG

OK >> GO TO 8.
NG >> Replace vacuum cut valve bypass valve.

8. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1491 VACUUM CUT VALVE BYPASS VALVE

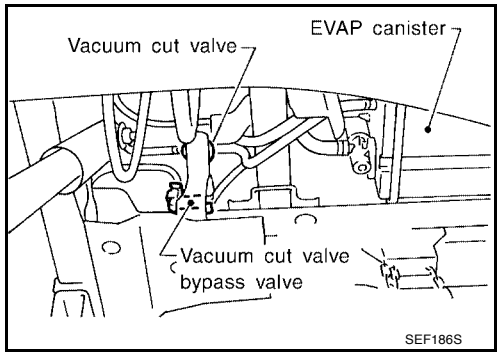
PFP:17372

Description

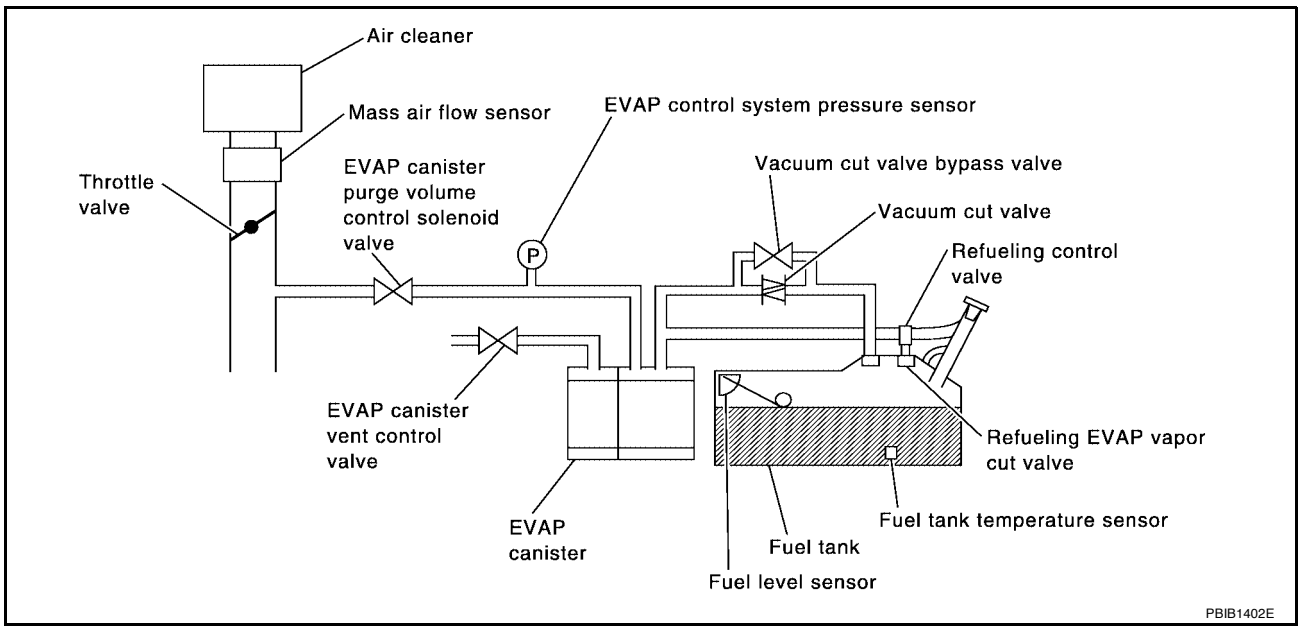
UBS00DC7

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

UBS00DC8

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00DC9

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1491	Vacuum cut valve bypass valve	Vacuum cut valve bypass valve does not operate properly.	● 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 ● Refueling control valve ● Refueling EVAP vapor cut valve

DTC Confirmation Procedure

UBS00DCA

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 5 seconds before conducting the next test.

TESTING CONDITION:

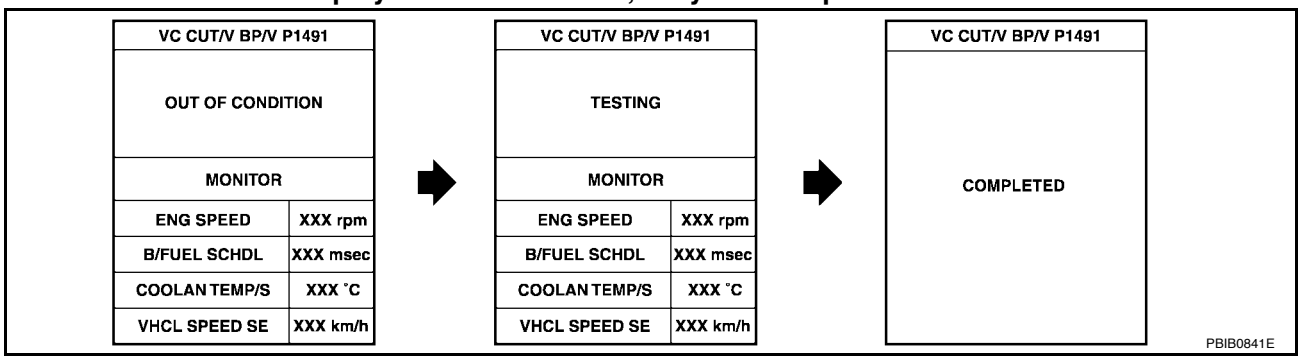
- **Always perform test at a temperature of 5 to 30°C (41 to 86°F).**
- **This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

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 5 seconds.
4. Start engine and let it idle for at least 60 seconds.
5. Select “VC CUT/V BP/V P1491” of “EVAP 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	1,000 rpm - 3,750 rpm
Shift lever	Suitable position
Vehicle speed	36 - 120 km/h (22 - 75 MPH)
B/FUEL SCHDL	Less than 10 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 EC-517, "Diagnostic Procedure"

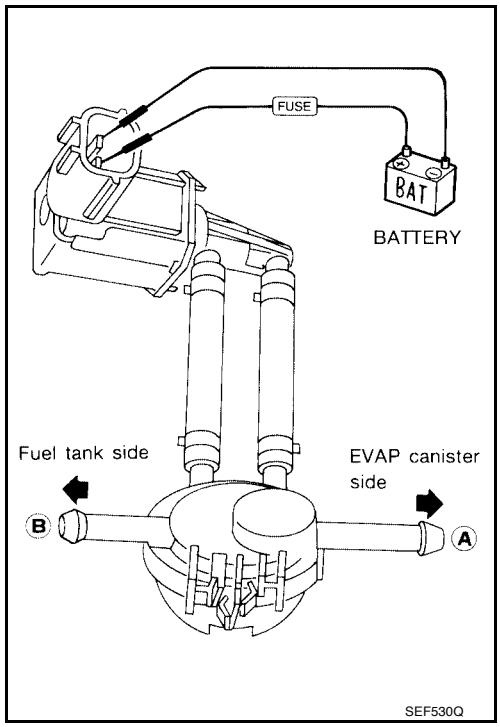
Overall Function Check

UBS00DCB

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.

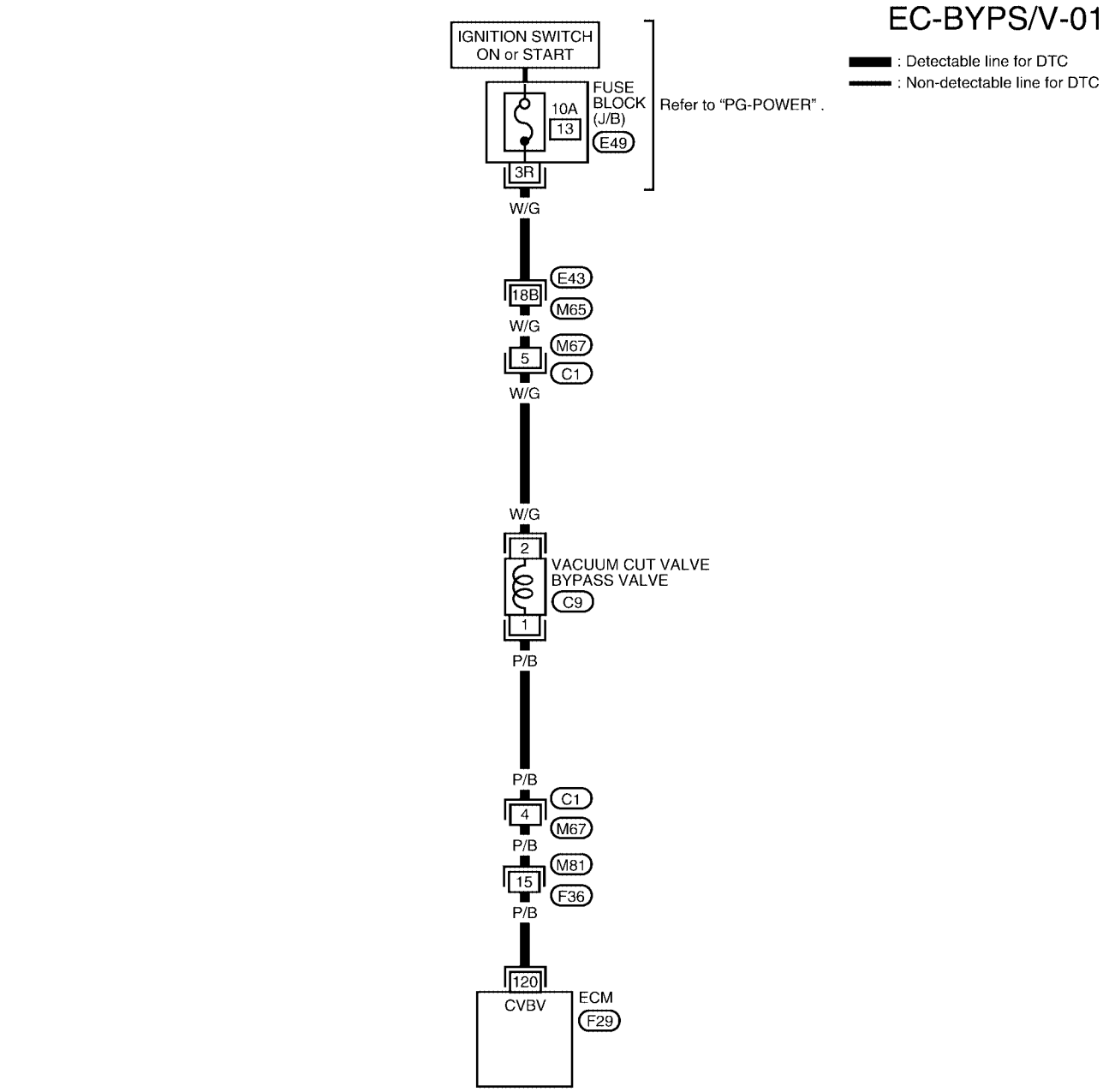
WITH GST

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 EC-517, "Diagnostic Procedure" .



Wiring Diagram

UBS00DCC



BBWA1067E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00DCD

1. INSPECTION START

Do you have CONSULT-II?

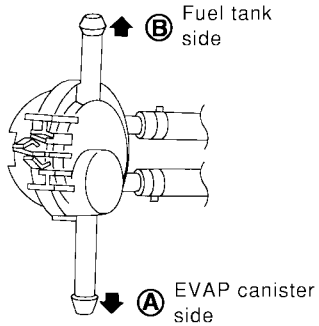
Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK COMPONENT

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 %
HO2S1 MNTR (B1)	RICH
THRTL POS SEN	XXX V

SEF808Y

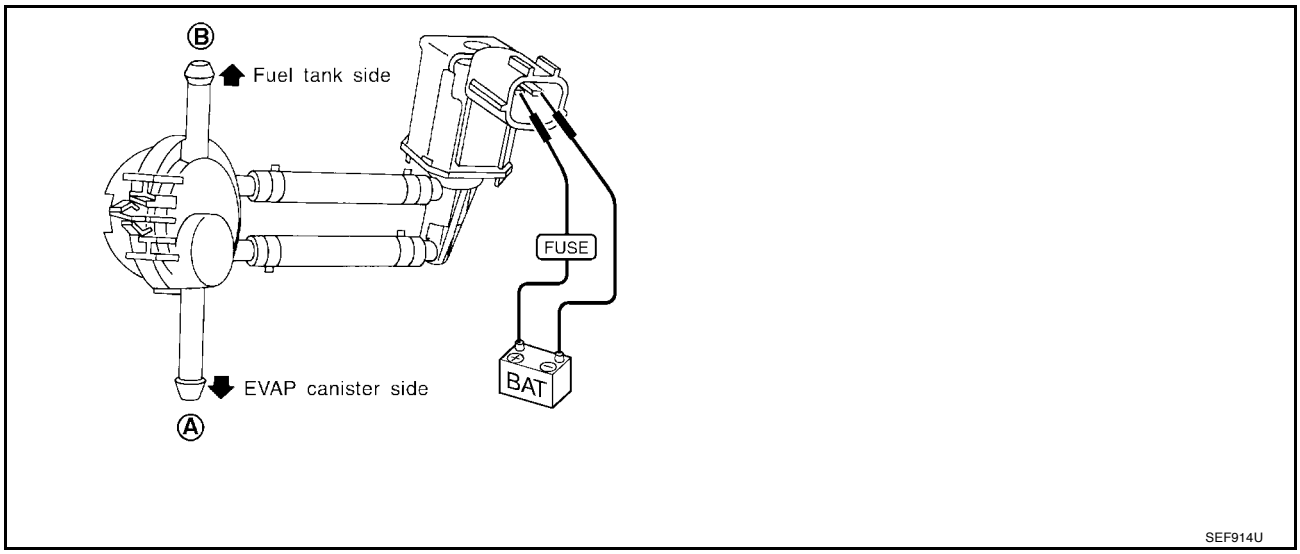
OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

3. CHECK COMPONENT

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 5.

4. CHECK EVAP PURGE LINE

1. Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.
2. Check EVAP purge port of fuel tank for clogging.
3. Check EVAP canister. Refer to EC-573, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG (Step 1)>>Repair it.
NG (Step 2)>>Clean EVAP purge port.
NG (Step 3)>>Replace EVAP canister.

5. CHECK BYPASS HOSE

Check bypass hoses for clogging.

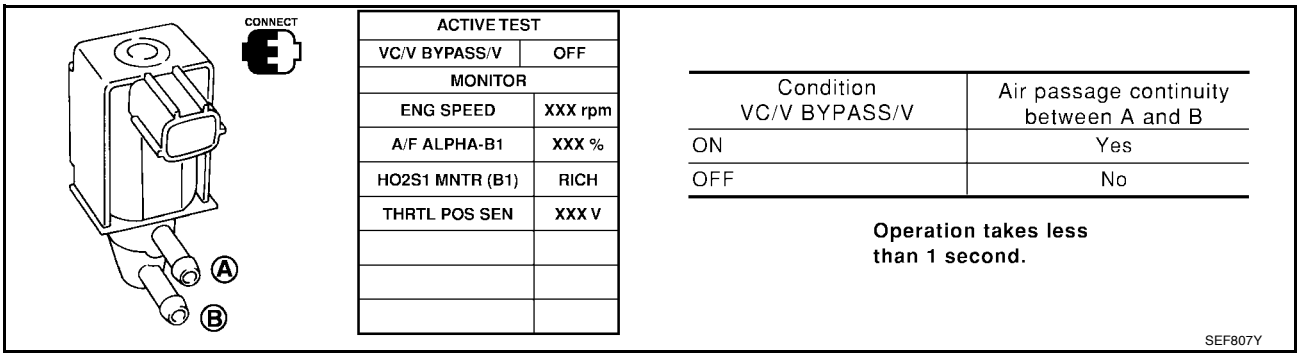
OK or NG

OK >> GO TO 6.
NG >> Repair or replace hoses.

6. CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

Check air passage continuity.
Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.



ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	RICH
THRTL POS SEN	XXX V

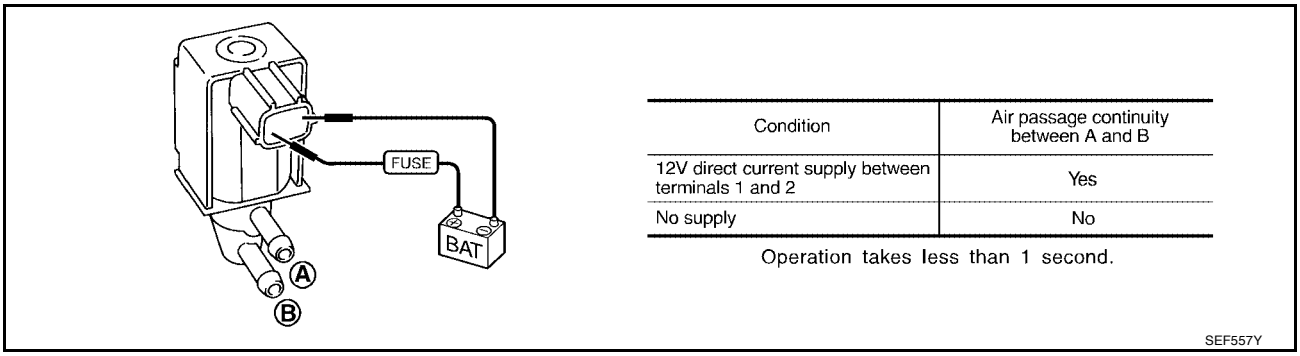
Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

SEF807Y

Without CONSULT-II

Check air passage continuity shown in the figure.



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.

SEF557Y

OK or NG

OK >> GO TO 7.
NG >> Replace vacuum cut valve bypass valve.

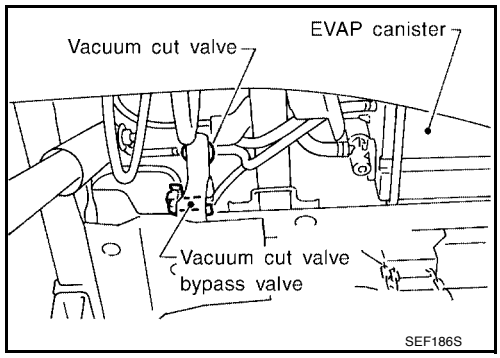
7. CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:

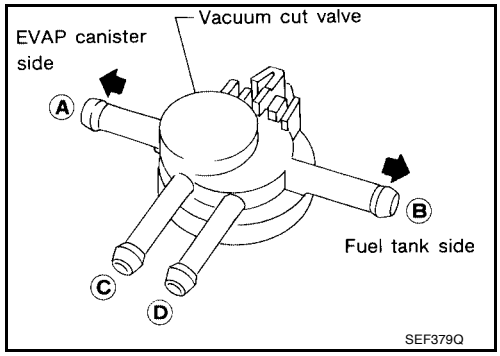
1. Plug port **C** and **D** with fingers.
2. Apply vacuum to port **A** and check that there is no suction from port **B** .
3. Apply vacuum to port **B** and check that there is suction from port **A** .
4. Blow air in port **B** and check that there is a resistance to flow out of port **A** .
5. Open port **C** and **D** .
6. Blow air in port **A** check that air flows freely out of port **C** .
7. Blow air in port **B** check that air flows freely out of port **D** .

OK or NG

OK >> GO TO 8.
NG >> Replace vacuum cut valve.



SEF186S



SEF379Q

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

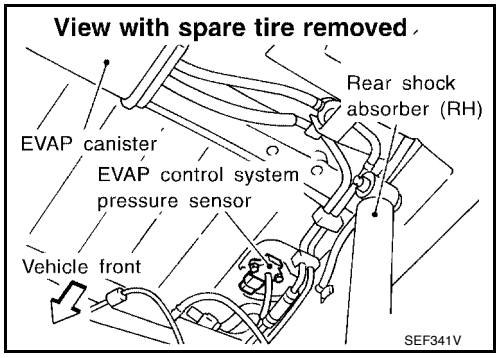
OK >> GO TO 9.
NG >> Repair it

9. CHECK 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

Perform DTC Confirmation Procedure, for DTC P0452, EC-345 and DTC P0453, EC-352 .

OK or NG

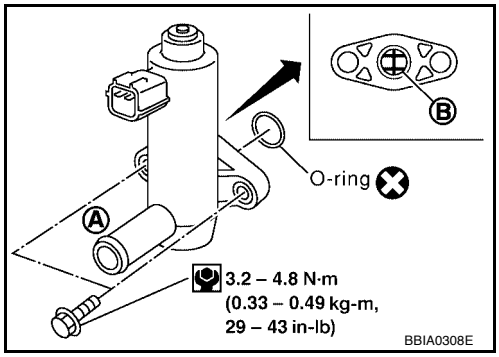
OK >> GO TO 11.
NG >> Replace EVAP control system pressure sensor.

11. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

OK or NG

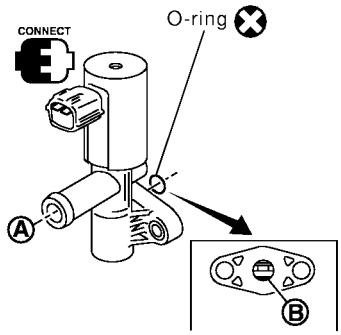
OK >> GO TO 12.
NG >> Replace EVAP canister vent control valve.



12. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-II

1. Turn ignition switch ON.
2. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
3. Check air passage continuity and operation delay time.



ACTIVE TEST	
VENT CONTROL/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 (B1)	XXX V
THRTL POS SEN	XXX V

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

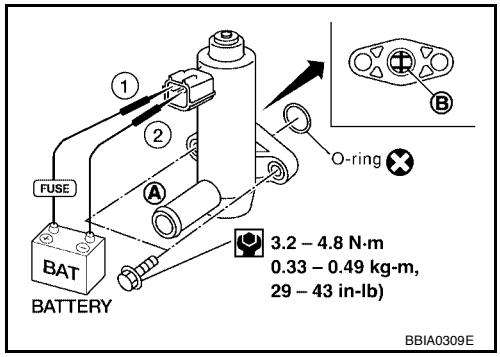
SEF803Y

Without CONSULT-II

Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



BBIA0309E

OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. CHECK EVAP CANISTER VENT CONTROL VALVE-III

1. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 12 again.

OK or NG

OK >> GO TO 14.
NG >> Replace EVAP canister vent control valve.

14. CHECK REFUELING CONTROL VALVE

Refer to EC-576, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 15.
NG >> Repair or replace hoses.

15. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-576, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 16.
NG >> Repair or replace hoses.

16. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

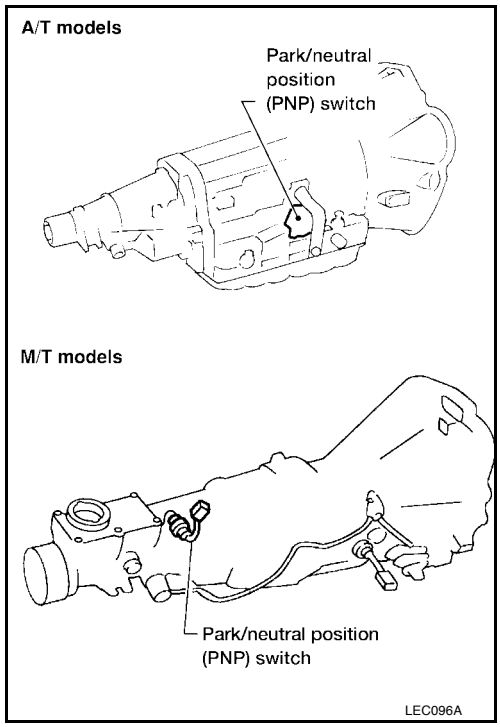
DTC P1706 PNP SWITCH

PFP:32006

Component Description

UBS00DCE

When the shift lever position is N or P (A/T), Neutral (M/T) park/neutral position (PNP) switch is ON.
ECM detects the park/neutral position when continuity with ground exists.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DCF

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF

On Board Diagnosis Logic

UBS00DCG

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	● Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] ● Park/neutral position (PNP) switch

DTC Confirmation Procedure

UBS00DCH

CAUTION:

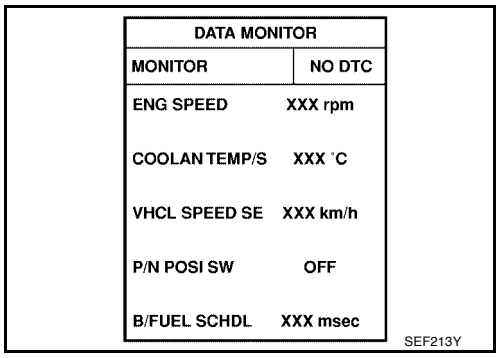
Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 (Shift lever)	Known-good signal
P or N (A/T) Neutral (M/T)	ON
Except above position	OFF

If NG, go to EC-526, "Diagnostic Procedure For M/T Models" or EC-527, "Diagnostic Procedure For A/T Models" .
If OK, go to following step.

3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,400 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.5 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (More than 40 MPH)
Shift lever	Suitable position

6. If 1st trip DTC is detected, go to EC-526, "Diagnostic Procedure For M/T Models" or EC-527, "Diagnostic Procedure For A/T Models" .

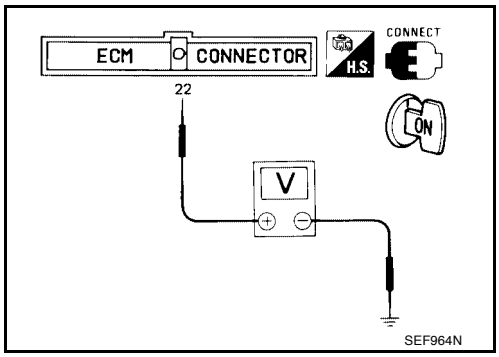
Overall Function Check

UBS00DCI

Use this procedure to check the overall function of the park/neutral position 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 22 (PNP switch signal) and body ground under the following conditions.



Position (Shift lever)	Voltage (V) (Known-good data)
P or N (A/T) Neutral (M/T)	Approx. 0
Except above position	Approx. 5

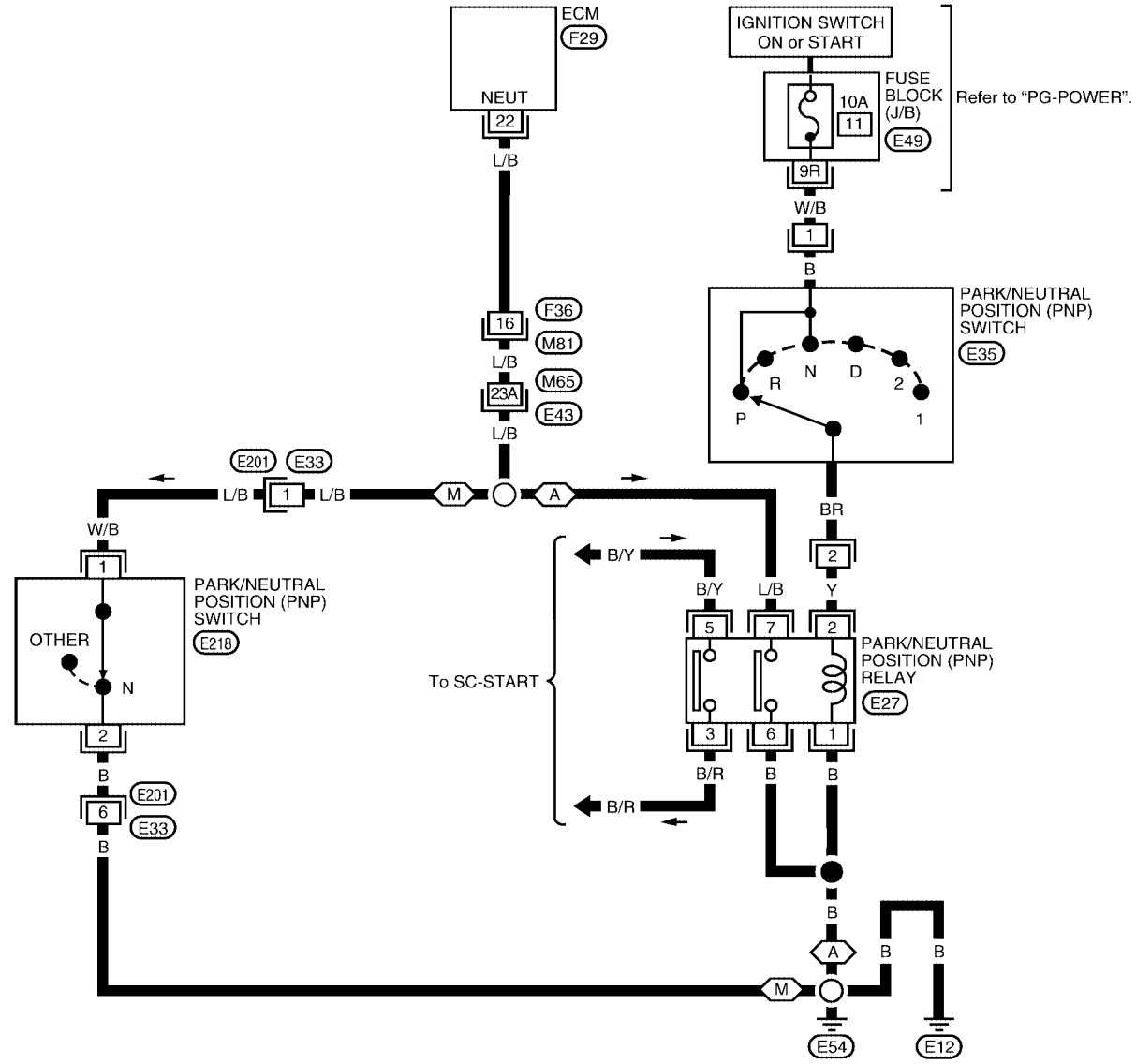
3. If NG, go to EC-526, "Diagnostic Procedure For M/T Models" or EC-527, "Diagnostic Procedure For A/T Models" .

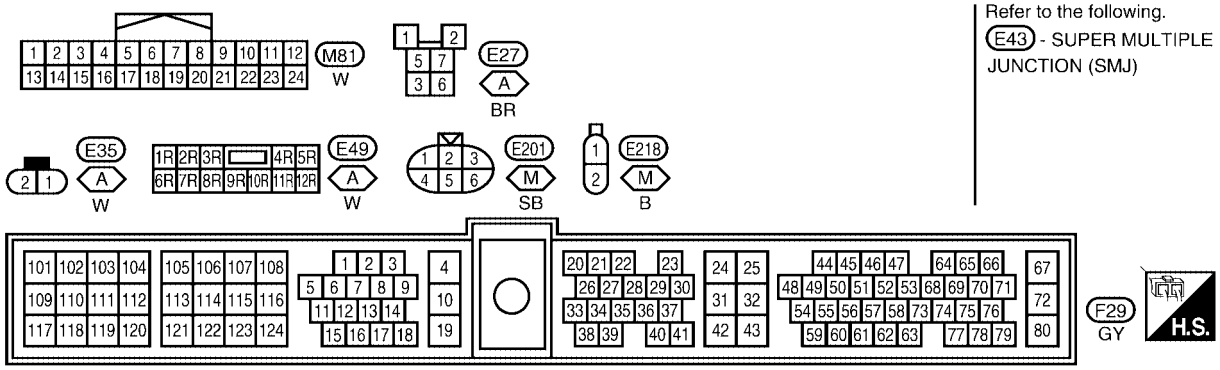
Wiring Diagram

UBS00DCJ

EC-PNP/SW-01

: Detectable line for DTC
: Non-detectable line for DTC
A : With A/T
M : With M/T





Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)

BBWA1068E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	L/B	Park/neutral position (PNP) switch	**[Ignition switch: ON]** ● Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] ● Except above position	Approximately 5V

Diagnostic Procedure For M/T Models

UBS00DCK

1. CHECK GROUND CIRCUIT

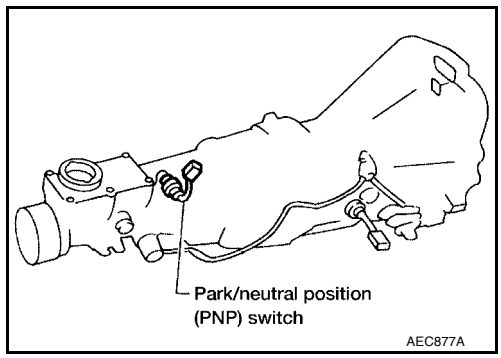
1. Turn ignition switch OFF.
2. Disconnect neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to power.

OK or NG

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



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E33, E201
- Harness for open or short between PNP switch and ground

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

3. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 22 and PNP switch terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

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

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F36, M81
- Harness connectors M65, E43
- Harness connectors E33, E201
- Harness for open or short between ECM and PNP switch

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

5. CHECK PNP SWITCH

Refer to MT-46, "Position Switch Check" .

OK or NG

OK >> GO TO 6.
NG >> Replace PNP switch.

6. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

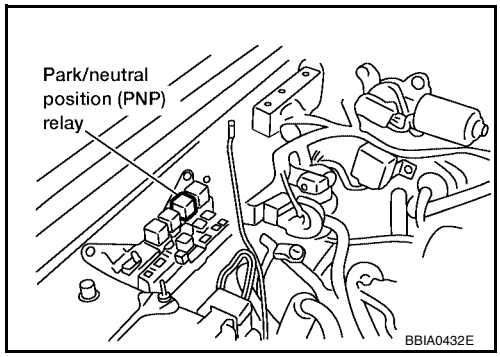
>> **INSPECTION END**

Diagnostic Procedure For A/T Models

UBS00DCL

1. CHECK PNP SWITCH POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) relay.
3. Turn ignition switch ON.
4. Shift selector lever to P or N position.

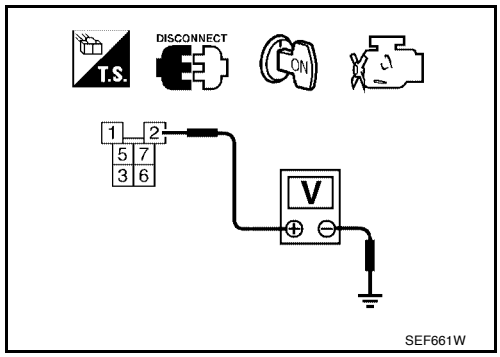


5. Check voltage between PNP relay terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 6.
NG >> GO TO 2.



2. CHECK PNP SWITCH POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between park/neutral position (PNP) switch terminal 2 and park/neutral position (PNP) relay terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

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

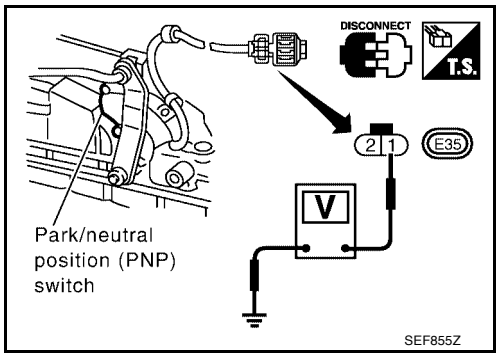
OK or NG

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

3. CHECK PNP SWITCH POWER SUPPLY CIRCUIT-III

1. Turn ignition switch ON.
2. Check voltage between park/neutral position (PNP) switch 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.

- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between park/neutral position (PNP) switch and fuse

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

5. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH

Refer to AT-46, "PARK/NEUTRAL POSITION (PNP) SWITCH" .

OK or NG

OK >> GO TO 10.
NG >> Replace park/neutral position (PNP) switch.

6. CHECK PNP RELAY GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between relay terminals 1, 6 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for and short to power.

OK or NG

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

7. CHECK PNP RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 22 and park/neutral position relay terminal 7. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

8. DETECT MALFUNCTIONING PART

Check the following.

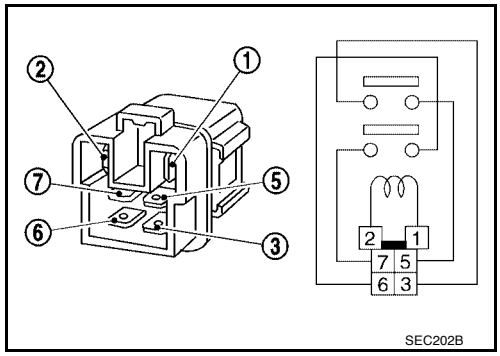
- Harness connectors F36, M81
- Harness connectors M65, E43
- Harness for open or short between ECM and park/neutral position (PNP) relay

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

9. CHECK PARK/NEUTRAL POSITION (PNP) RELAY

1. Apply 12V direct current between park/neutral position (PNP) relay terminals 1 and 2.
2. Check continuity between park/neutral position (PNP) relay terminals 3 and 5, 6 and 7.

12V (1 and 2) applied : Continuity should exist.
No voltage applied : Continuity should not exist.



OK or NG

OK >> GO TO 10.
NG >> Replace park/neutral position (PNP) relay.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1775 TCC SOLENOID VALVE

PFP:31705

System Description

UBS00DCM

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Torque converter lock-up control	Torque converter clutch solenoid valve
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		

The ECM controls torque converter clutch solenoid valve to cancel the lock-up condition of A/T. When the solenoid valve is **turned ON,** lock-up is **cancelled** . When the solenoid valve is turned OFF, A/T lock-up is operational.

Conditions for lock-up cancel:

Torque converter clutch solenoid valve is turned “ON” when;

- Throttle valve is fully closed (during idling or deceleration)
- Engine coolant temperature is below 40°C (104°F)
- Engine is stopped

Conditions for lock-up operation:

- Under 55 to 63 km/h (34 to 39 MPH) (2/8 throttle on flat road), lock-up does not operate even when the torque converter clutch solenoid valve is “OFF”.
- Over 58 to 66 km/h (36 to 41 MPH) (2/8 throttle on flat road), lock-up should operate because the torque converter clutch solenoid valve is “OFF”.

To confirm vehicle lock-up, the torque converter clutch solenoid valve must be in operation (“ON” during idle and deceleration, and “OFF” during acceleration) and engine speed should drop. When the accelerator pedal is depressed (less than 2/8) in lock-up, the engine speed should not change abruptly. If there is a big jump in engine speed, there will be no lock up.

CONSULT-II Reference Value in Data Monitor Mode

UBS00DCN

MONITOR ITEM	CONDITON		SPECIFICATION
TCC SOL/V	● Engine: After warming up	Idle	ON
		2,000 rpm	OFF

On Board Diagnosis Logic

UBS00DCO

DTC No.	Trouble Diagnosis Name	DTC detecting Condition	Possible Cause
P1775	TCC solenoid valve circuit	● An excessively low voltage from the solenoid is sent to ECM.	● Harness or connectors (The circuit is open or shorted). ● Torque converter clutch solenoid valve

DTC Confirmation Procedure

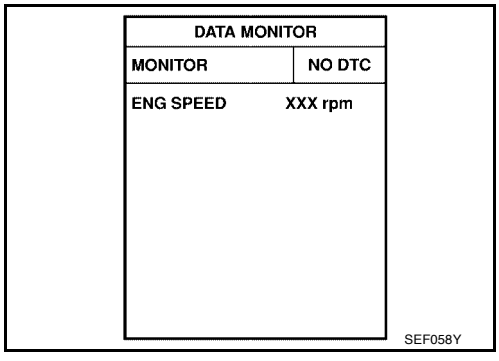
UBS00DCP

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-532, "Diagnostic Procedure" .



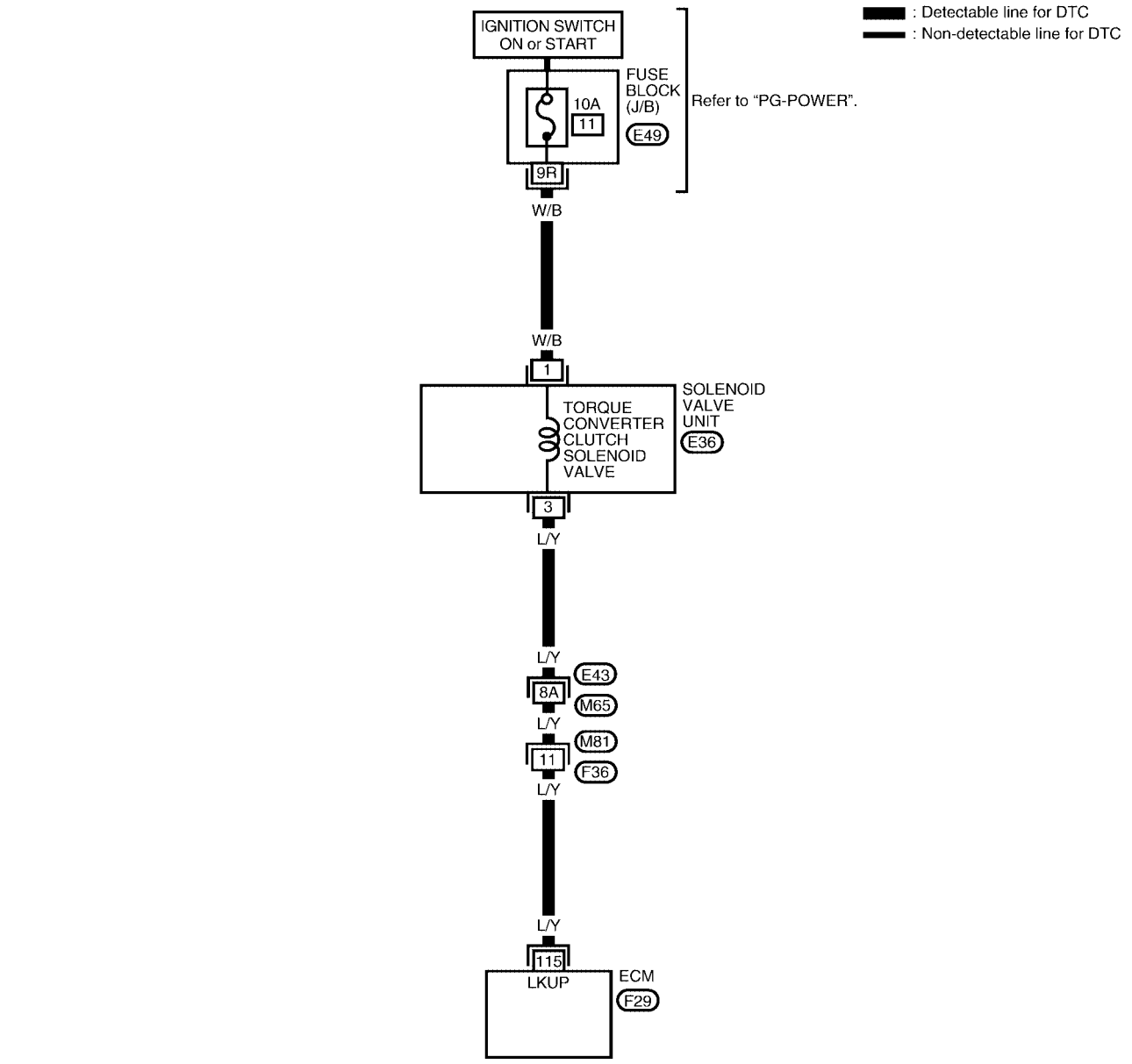
WITH GST

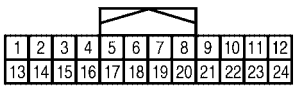
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

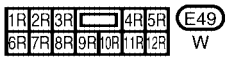
UBS00DCQ

EC-LKUP-01

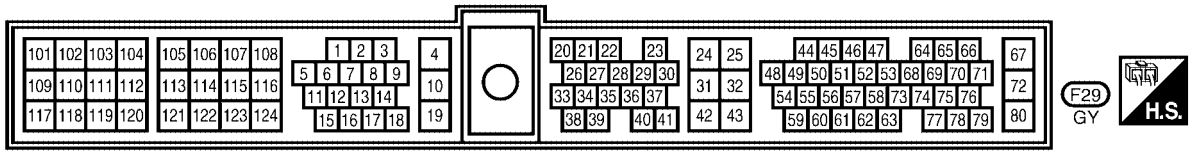








Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)



BBWA1069E

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

CAUTION:

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

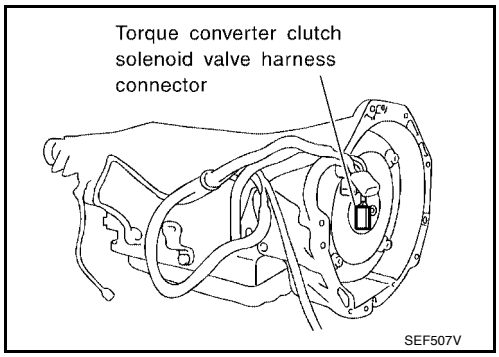
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
115	L/Y	Torque converter clutch solenoid valve	**[Engine is running]** ● Idle Speed	Approximately 1V
			● **[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00DCR

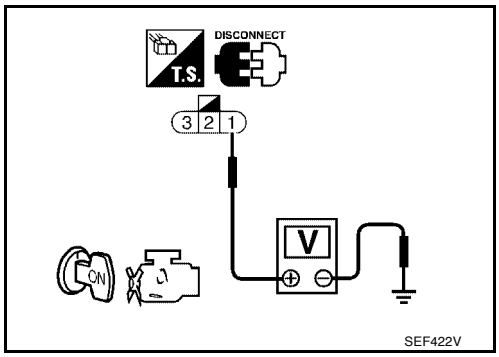
1. CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect torque converter clutch (TCC) solenoid valve harness connector.
3. Turn ignition switch “ON”.



4. Check voltage between TCC 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.

2. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E49
- 10A fuse
- Harness continuity between torque converter clutch solenoid valve and fuse

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

3. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 115 and TCC solenoid valve terminal 3. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

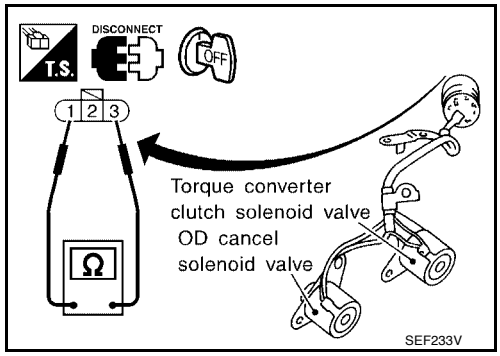
Check the following.

- Harness connectors E43, M65
- Harness connectors M81, F36
- Harness for open and short between torque converter clutch solenoid valve and ECM

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

5. CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE

1. Check resistance between torque converter clutch solenoid valve terminals 1 and 3.
Resistance: Approximately 25Ω [at 25°C (77°F)]
2. Remove torque converter clutch solenoid valve. Refer to AT-58, "REMOVAL" .

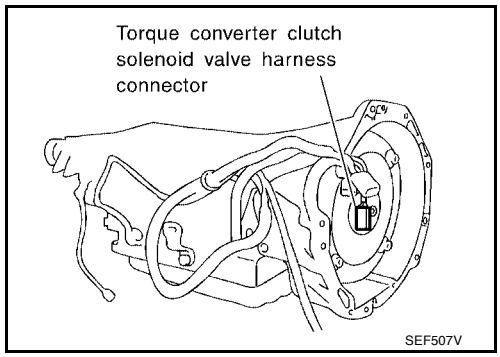


3. Supply the solenoid valve terminals 1 and 3 with battery voltage and check the solenoid valve operation.

Torque converter clutch solenoid valve should be operated.

OK or NG

OK >> GO TO 6.
NG >> Replace torque converter clutch solenoid valve.



6. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00DCS

TORQUE CONVERTER CLUTCH SOLENOID VALVE

Refer to AT-58, "REMOVAL" .

DTC P1776 TCC SOLENOID VALVE

PFP:31705

System Description

UBS00DCT

ECM controls torque converter clutch solenoid valve with the signals below.

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Torque converter lock-up control	Torque converter clutch solenoid valve
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Vehicle speed sensor *	Vehicle speed		

*: This signal is used only for diagnosis.

The ECM controls torque converter clutch solenoid valve to cancel the lock-up condition of A/T. When the solenoid valve is **turned ON,** lock-up is **cancelled** . When the solenoid valve is turned OFF, A/T lock-up is operational.

Conditions for lock-up cancel:

Torque converter clutch solenoid valve is turned “ON” when;

- Throttle valve is fully closed (during idling or deceleration)
- Engine coolant temperature is below 40°C (104°F)
- Engine is stopped

Conditions for lock-up operation:

- Under 55 to 63 km/h (34 to 39 MPH) (2/8 throttle on flat road), lock-up does not operate even when the torque converter clutch solenoid valve is “OFF”.
- Over 58 to 66 km/h (36 to 41 MPH) (2/8 throttle on flat road), lock-up should operate because the torque converter clutch solenoid valve is “OFF”.

To confirm vehicle lock-up, the torque converter clutch solenoid valve must be in operation (“ON” during idle and deceleration, and “OFF” during acceleration) and engine speed should drop. When the accelerator pedal is depressed (less than 2/8) in lock-up, the engine speed should not change abruptly. If there is a big jump in engine speed, there will be no lock up.

CONSULT-II Reference Value in Data Monitor Mode

UBS00DCU

MONITOR ITEM	CONDITON		SPECIFICATION
TCC SOL/V	● Engine: After warming up	Idle	ON
		2,000 rpm	OFF

On Board Diagnosis Logic

UBS00DCV

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1776	Lock-up control system function	A/T torque converter slip has occurred in lock-up condition.	● Torque converter clutch solenoid valve ● A/T hydraulic control system ● Torque converter

DTC Confirmation Procedure

UBS00DCW

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 5 seconds before conducting the next test.

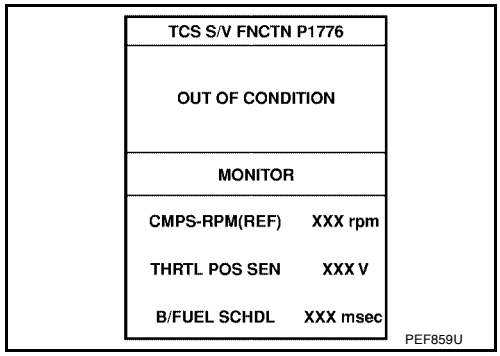
TESTING CONDITION:

Always perform at a temperature above –10°C (14°F).

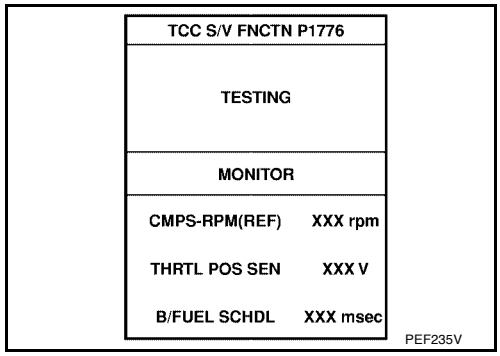
WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Start engine.

4. Select “TCC S/V FNCTN P1776” of “A/T (TCC S/V) in DTC WORK SUPPORT” mode with CONSULT-II.

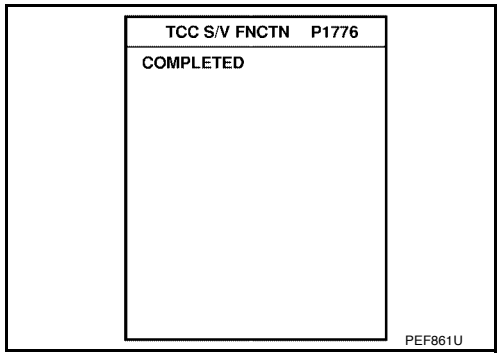


5. Touch “START”.



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 20 seconds.)

Selector lever		D (OD “ON”)
Vehicle speed		76 - 100 km/h (47 - 62 MPH)
ENG SPEED	King cab model	Less than 2,300 rpm
B/FUEL SCHDL		7 - 16 msec
THRTL POS SEN		Less than 1.3V



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-536, "Diagnostic Procedure" .

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

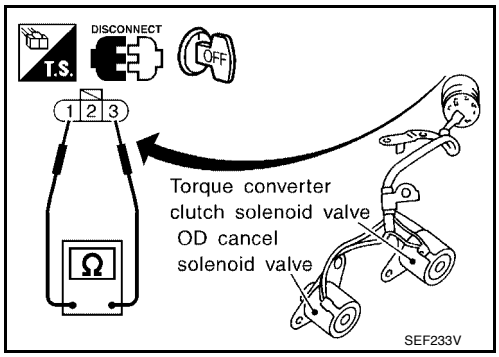
UBS00DCX

1. CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE

1. Check resistance between torque converter clutch solenoid valve terminals 1 and 3.

Resistance: Approximately 25Ω [at 25°C (77°F)]

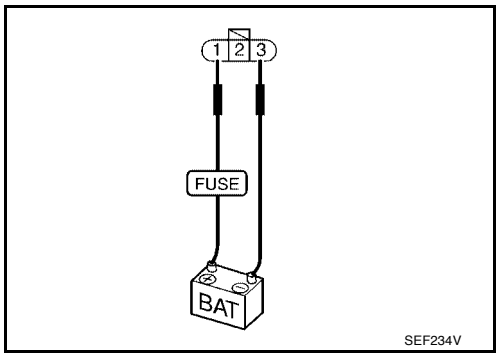
2. Remove torque converter clutch solenoid valve. Refer to AT-58, "Control Valve Assembly and Accumulators" .



3. Supply the solenoid valve terminals 1 and 3 with battery voltage and check the solenoid valve operation.
Torque converter clutch solenoid valve should be operated.

OK or NG

OK >> GO TO 2.
NG >> Replace torque converter clutch solenoid valve.



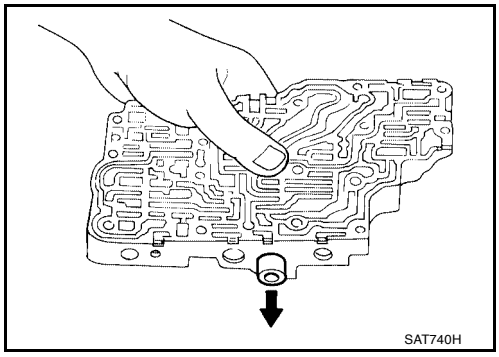
2. CHECK TORQUE CONVERTER CLUTCH CONTROL VALVE

1. Disassemble torque converter clutch control valve assembly. Refer to AT-58, "Control Valve Assembly and Accumulators" .
2. Check torque converter clutch control valve.

- Valve, and sleeve slide along valve bore under their own weight.
- Valve, and sleeve are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.

OK or NG

OK >> GO TO 3.
NG >> Replace torque converter clutch control valve.



3. CHECK VEHICLE SPEED SENSOR SIGANL

Check vehicle speed signal with CONSULT-II or speedometer if it is shows an actual vehicle speed.

OK or NG

OK >> GO TO 4.
NG >> Check The following: Vehicle speed sensor, Vehicle speed sensor driven gear. If NG, replace parts

4. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00DCY

TORQUE CONVERTER CLUTCH SOLENOID VALVE

Refer to AT-58, "Control Valve Assembly and Accumulators" .

IGNITION SIGNAL

PFP:22448

Component Description

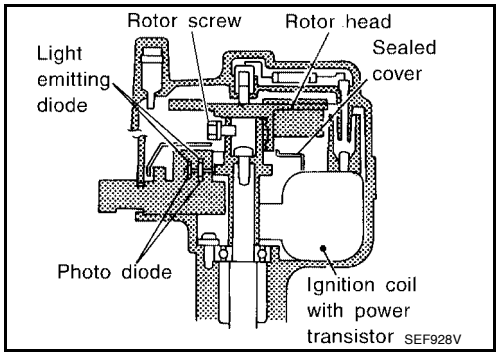
UBS00DCZ

IGNITION COIL & POWER TRANSISTOR

The ignition signal from the ECM is sent to the power transistor. The power transistor switches the ignition coil primary circuit ON and OFF. As the primary circuit is turned ON and OFF, the proper high voltage is induced in the coil secondary circuit.
The distributor is not repairable and must be replaced as an assembly except distributor cap and rotor head.

NOTE:
The rotor screw which secures the distributor rotor head to the distributor shaft must be tightened properly.

: 3.3 - 3.9 N·m (0.34 - 0.40 kg-m, 29.5 - 34.7 in-lb)



CONSULT-II Reference Value in Data Monitor Mode

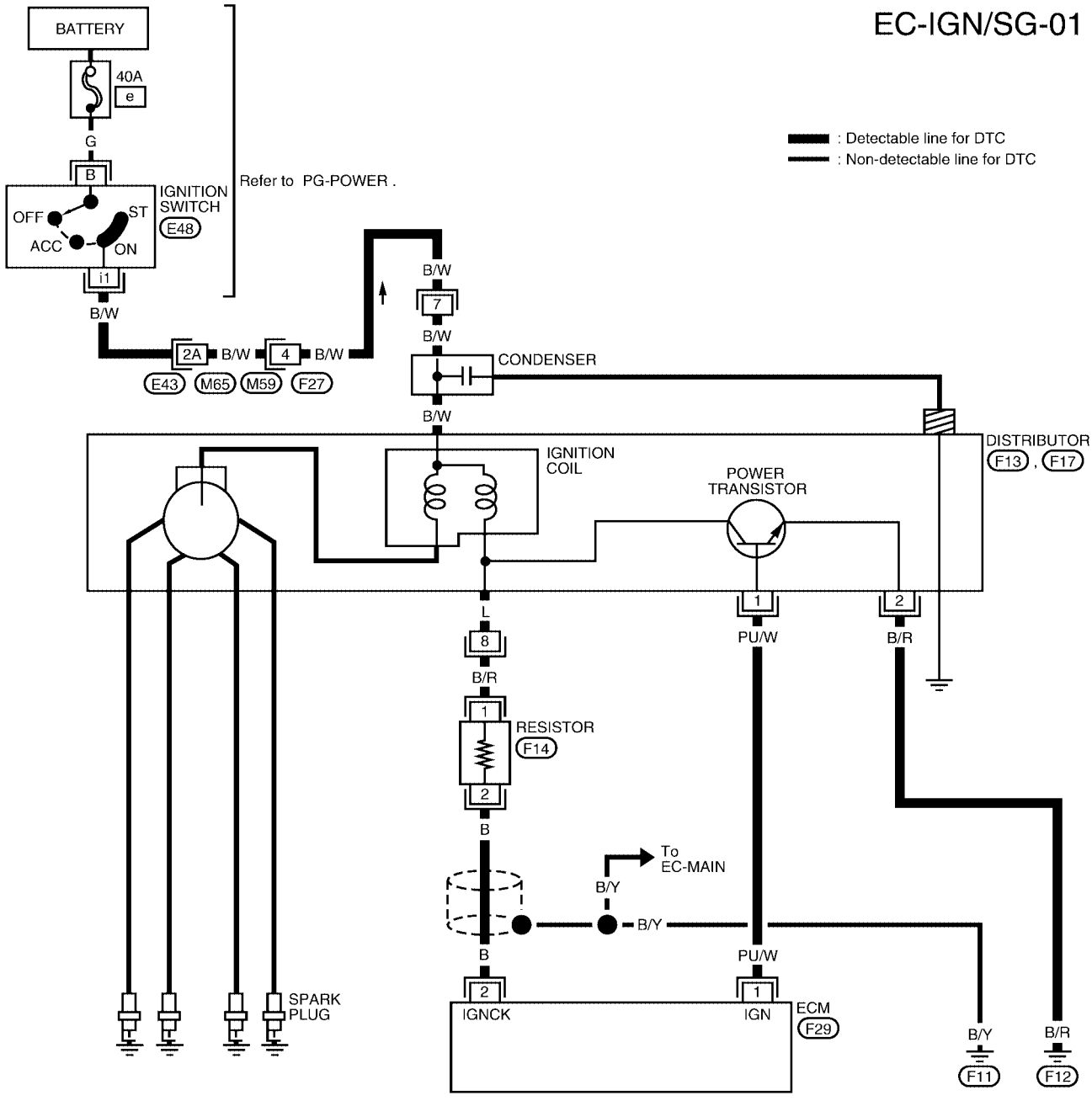
UBS00DD0

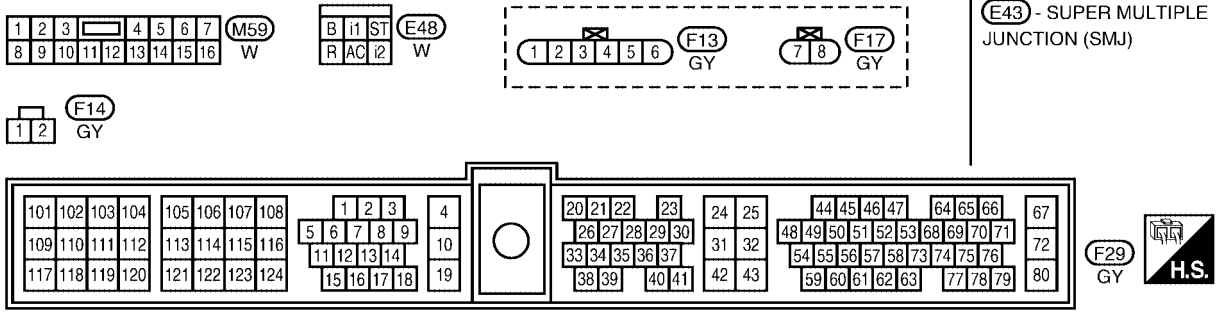
MONITOR ITEM	CONDITION		SPECIFICATION
IGN TIMING	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	Approx. 20° BTDC
		2,000 rpm	More than 25° BTDC

Wiring Diagram

UBS00DD1

EC-IGN/SG-01





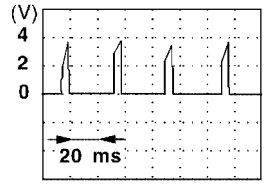
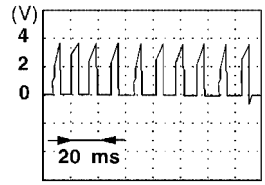
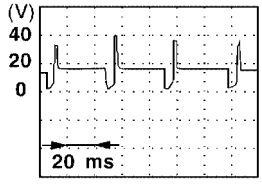
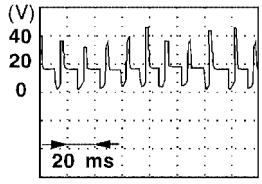
Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)

BBWA0458E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 0.5V★  SEF996V
			[Engine is running] ● Engine speed is 2,000 rpm	0.2 - 1.0V★  SEF997V
2	B	Ignition check	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	12 - 14V★  SEF998V
			[Engine is running] ● Engine speed is 2,000 rpm	12 - 13V★  SEF999V

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

Diagnostic Procedure

UBS00DD2

1. INSPECTION START

Turn ignition switch OFF, and restart engine.

Is engine running?

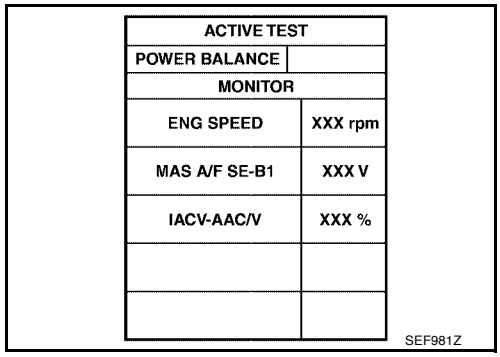
Yes or No

Yes (With CONSULT-II)>>GO TO 2.
Yes (Without CONSULT-II)>>GO TO 3.
No >> GO TO 4.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
2. Make sure that all circuits do not produce a momentary engine speed drop.



OK or NG

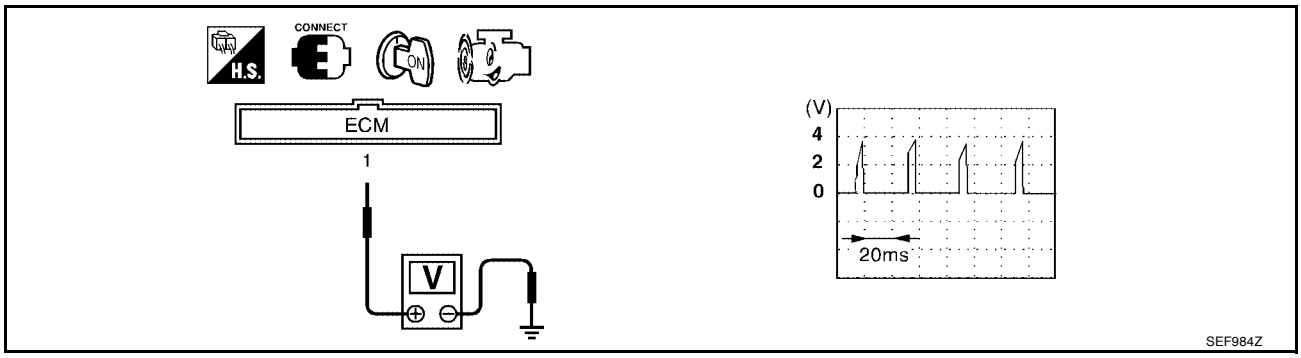
OK >> **INSPECTION END**
NG >> GO TO 7.

3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Let engine idle.
2. Read the voltage signal between ECM terminal 1 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.

NOTE:
The pulse cycle changes depending on rpm at idle.

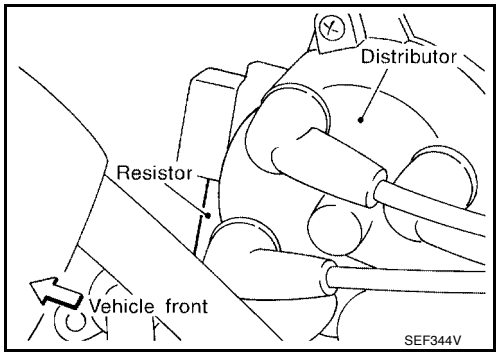


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

4. CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect distributor harness connector F17.
3. Turn ignition switch ON.

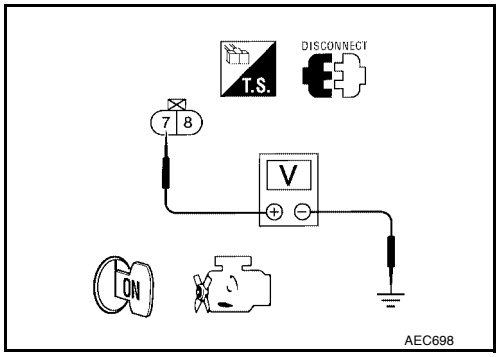


4. Check voltage between ignition coil terminal 7 and ground with CONSULT-II or tester.

Voltage : Battery voltage

OK or NG

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



5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M59, F27
- Harness for open or short between ignition coil and ignition switch

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

6. CHECK GROUND CIRCUIT

1. Disconnect distributor harness connector F13.
2. Check harness continuity between power transistor terminal 2 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

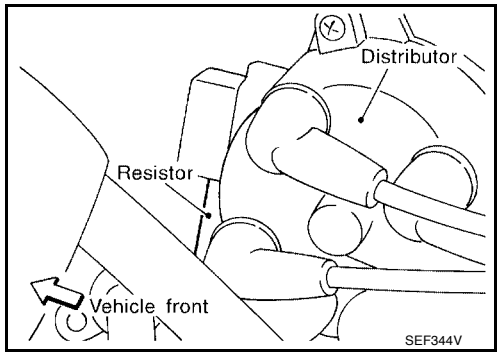
OK >> GO TO 7.
NG >> Repair open circuit or short to power in harness or connectors.

7. CHECK OUTPUT SIGNAL CIRCUIT

1. Stop engine.
2. Disconnect distributor harness connector F13.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 1 and power transistor terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

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



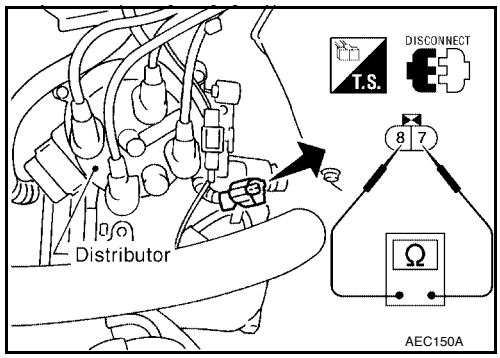
OK or NG

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

8. CHECK IGNITION COIL

1. Remove distributor cap.
2. Check resistance as shown in the figure.

Terminal	Resistance [at 25°C (77°F)]
7 - 8	Less than 1Ω
7 - 9	7 - 13Ω



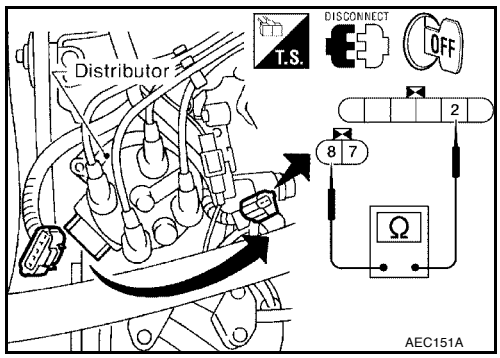
OK or NG

OK >> GO TO 9.
NG >> Replace distributor assembly as a unit.

9. CHECK POWER TRANSISTOR

1. Disconnect distributor harness connector F17.
2. Check power transistor resistance between terminals 2 and 8.

Terminals	Resistance	Result
2 and 8	Except 0Ω	OK
	0Ω	NG



OK or NG

OK >> GO TO 10.
NG >> Replace distributor assembly.

10. CHECK INPUT SIGNAL CIRCUIT

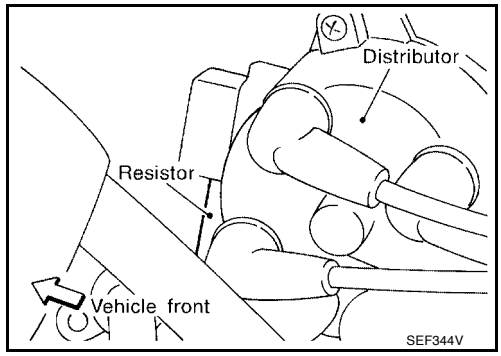
1. Strip tape covering resistor.
2. Disconnect resistor harness connector.
3. Check harness continuity between the following; ignition coil terminal 8 and resistor terminal 1, resistor terminal 2 and ECM terminal 2.

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.



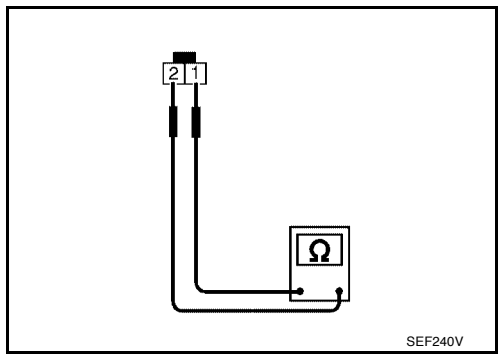
11. CHECK RESISTOR

Check resistance between resistor terminals 1 and 2.

Resistance : Approximately 2.2 kΩ [at 25°C (77°F)]

OK or NG

OK >> GO TO 12.
NG >> Replace resistor.



12. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00DD3

DISTRIBUTOR

Refer to EM-13, "OUTER COMPONENT PARTS" .

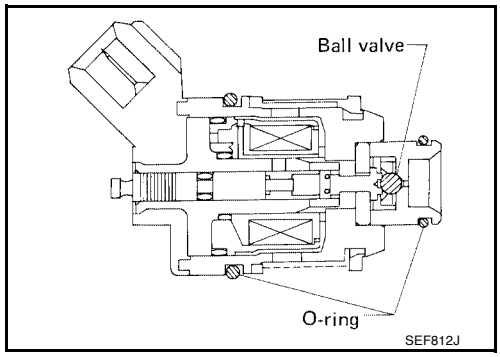
INJECTOR CIRCUIT

PFP:16600

Component Description

UBS00DD4

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 ball 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

UBS00DD5

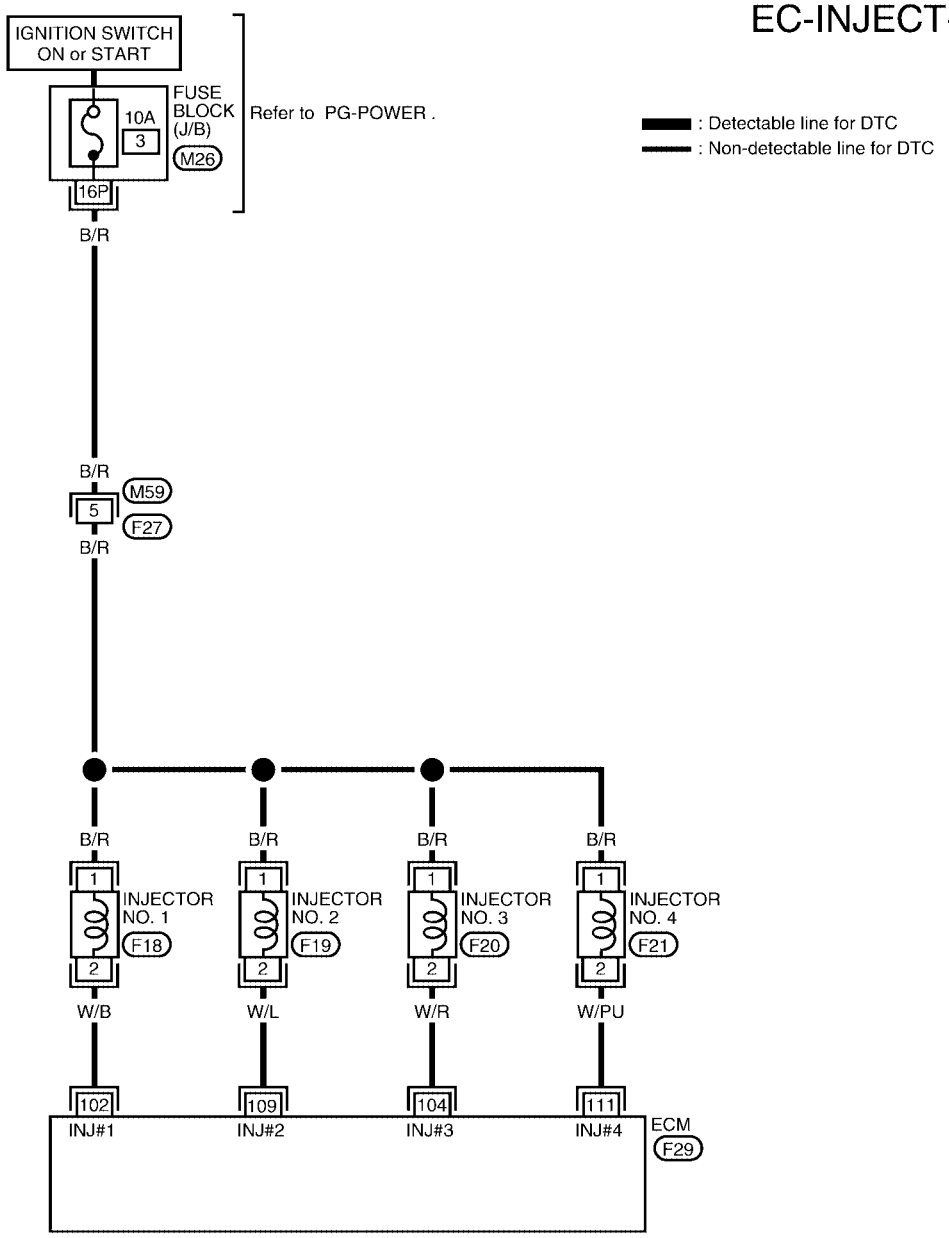
Specification data are reference values.

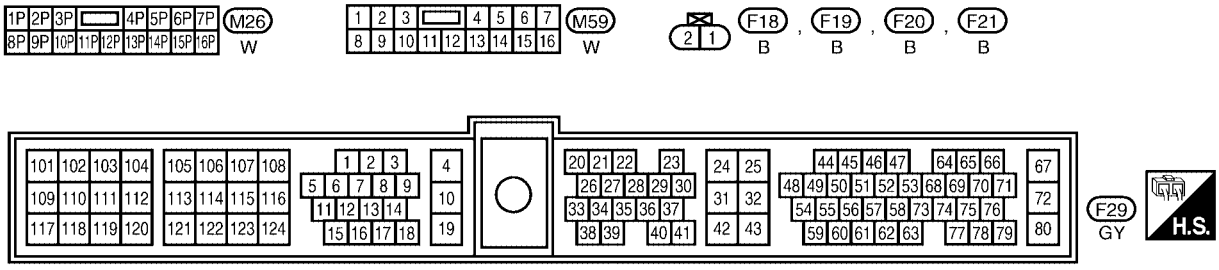
MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	2.5 - 3.3 msec
		2,000 rpm	2.4 - 3.2 msec
B/FUEL SCHDL	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No-load	Idle	0.8 - 1.2 msec
		2,000 rpm	0.8 - 1.2 msec

Wiring Diagram

UBS00DD6

EC-INJECT-01



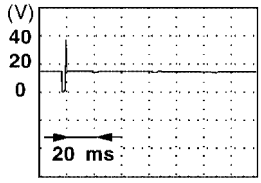
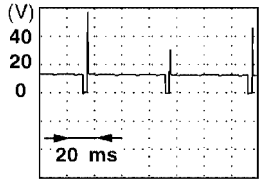


BBWA0459E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 109 111	W/B W/R W/L W/PU	Injector No. 1 Injector No. 3 Injector No. 2 Injector No. 4	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)★  SEF011W
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEF012W

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

Diagnostic Procedure

UBS00DD7

1. 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
IACV-AAC/V	XXX %

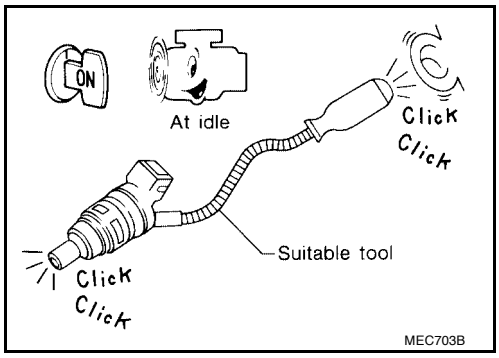
SEF981Z

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 2.



MEC703B

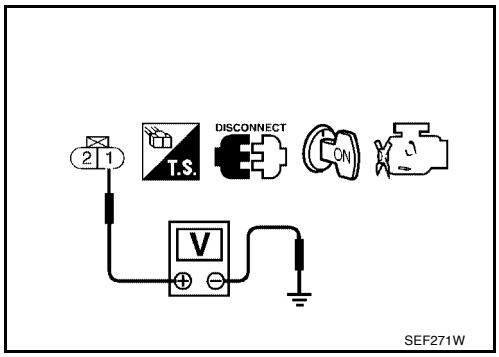
2. CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect injector harness connector.
3. Turn ignition switch ON.
4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.

Voltage : Battery voltage

OK or NG

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



SEF271W

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F27, M59
- Fuse block (J/B) connector M26
- 10A fuse
- Harness for open or short between injector and fuse

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

4. CHECK OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 102, 104, 109, 111. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

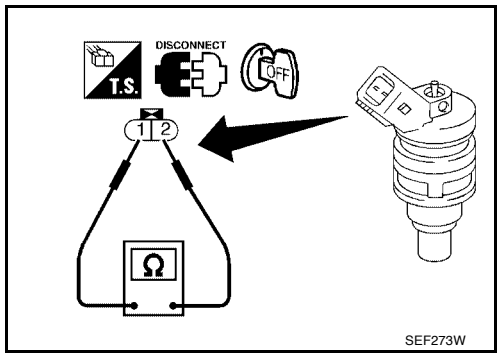
Check the harness for open or short between ECM and injector.

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

6. CHECK INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance : 7.4 - 10.9Ω [at 10 - 60°C (50 - 140°F)]



OK or NG

OK >> GO TO 7.
NG >> Replace injector.

7. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00DD8

INJECTOR

Refer to EM-13, "OUTER COMPONENT PARTS" .

START SIGNAL

PFP:48750

CONSULT-II Reference Value in Data Monitor Mode

UBS00DD9

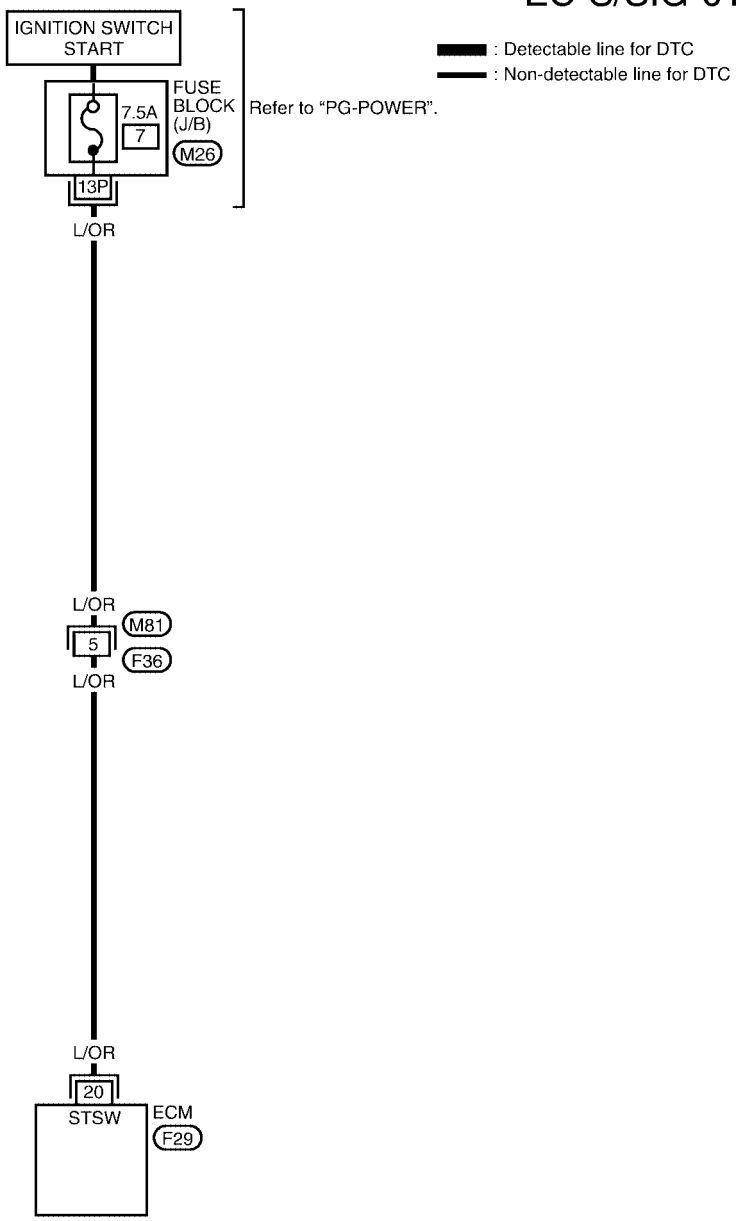
Specification data are reference values.

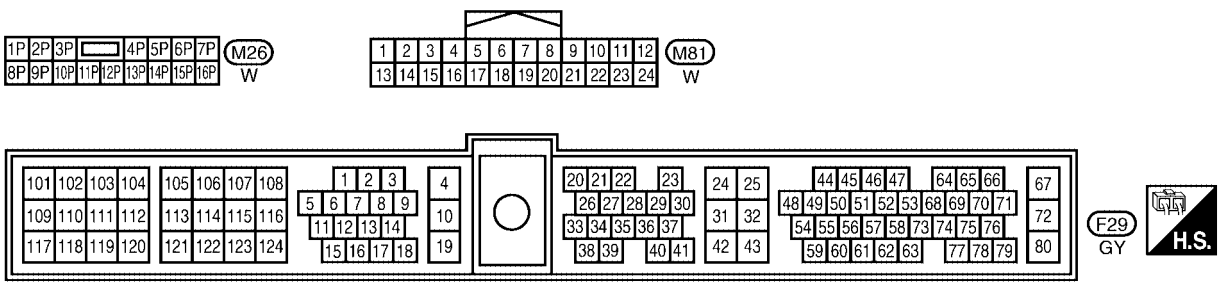
MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

Wiring Diagram

UBS00DDA

EC-S/SIG-01





BBWA1070E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	L/OR	Start signal	**[Ignition switch: ON]**	Approximately 0V
			[Ignition switch: START]	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00DDB

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.

DATA MONITOR	
MONITOR	NO DTC
START SIGNAL	OFF

Condition	“START SIGNAL”
Ignition switch “ON”	OFF
Ignition switch “START”	ON

SEF227Y

OK or NG

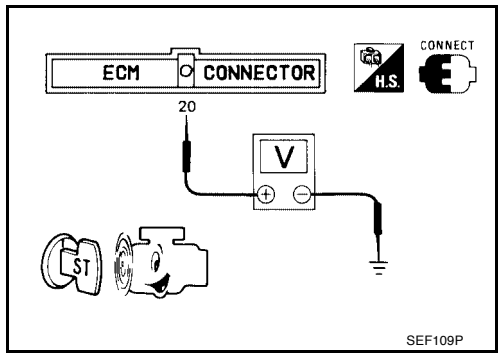
OK >> **INSPECTION END**.
NG >> GO TO 4.

3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Turn ignition switch to START.
2. Check voltage between ECM terminal 20 and ground under the following conditions.

Condition	Voltage
Ignition switch START	Battery voltage
Except above	Approx. 0V



SEF109P

OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the 7.5A fuse.

OK or NG

OK >> GO TO 5.
NG >> Replace 7.5A fuse.

5. CHECK INPUT SIGNAL CIRCUIT

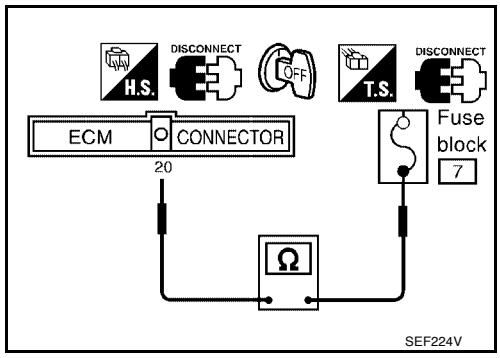
1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and 7.5A fuse.
3. Check harness continuity between ECM terminal 20 and fuse block.

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 M81, F36
- Fuse block (J/B) connector M26
- Harness for open or short between ECM and fuse block

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 INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

FUEL PUMP CIRCUIT

PFP:17042

Description

UBS00DDC

SYSTEM DESCRIPTION

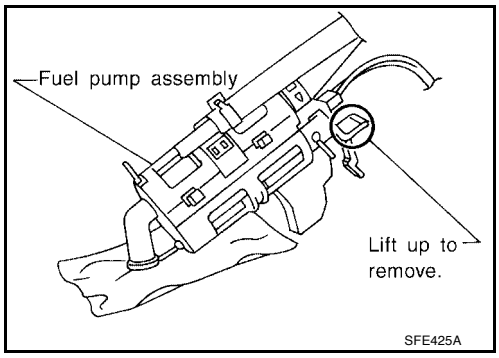
Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Fuel pump control	Fuel pump relay
Ignition switch	Start signal		

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 180° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to perform. If the 180° 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 5 seconds.
Engine running and cranking	Operates.
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

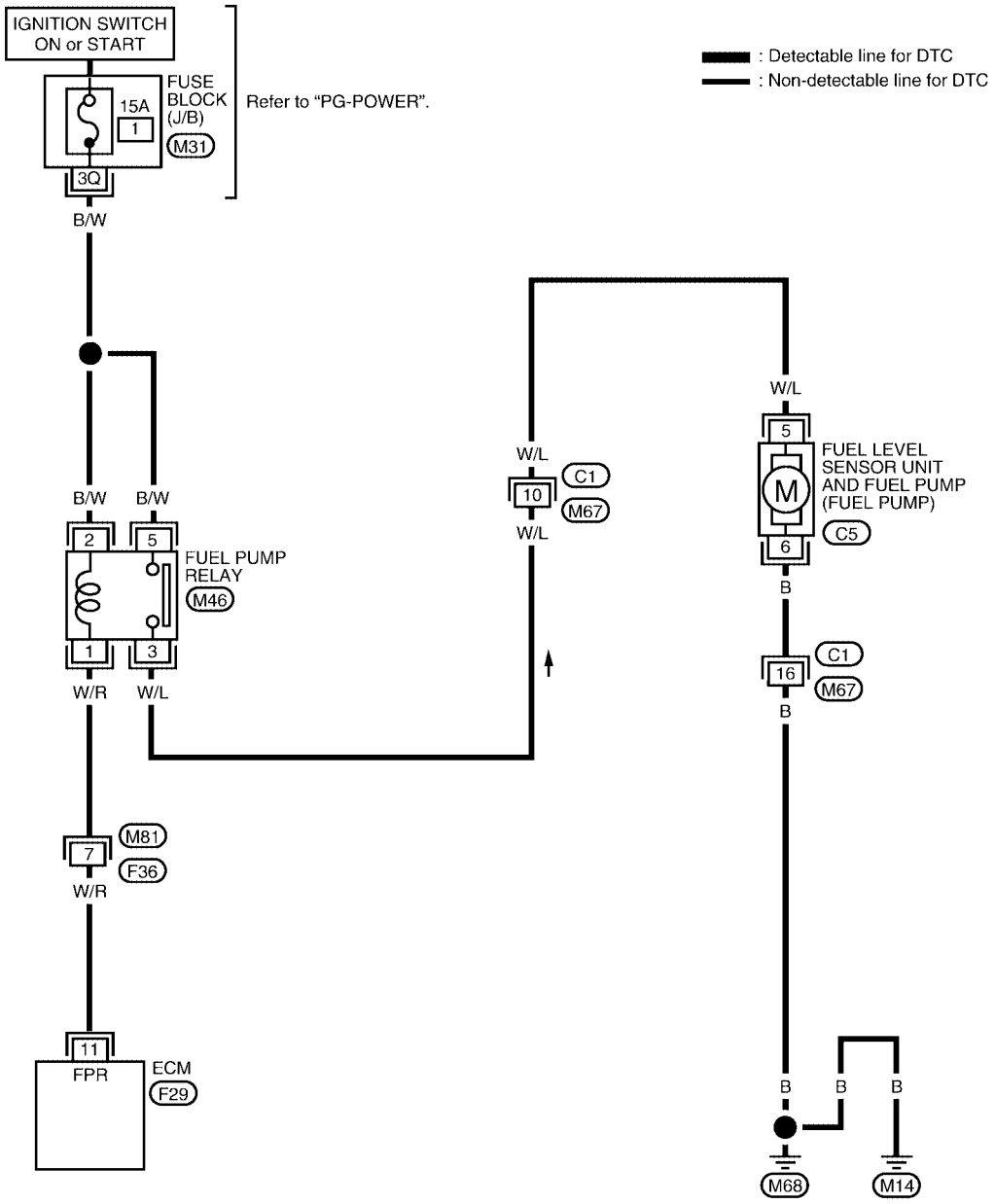
UBS00DDD

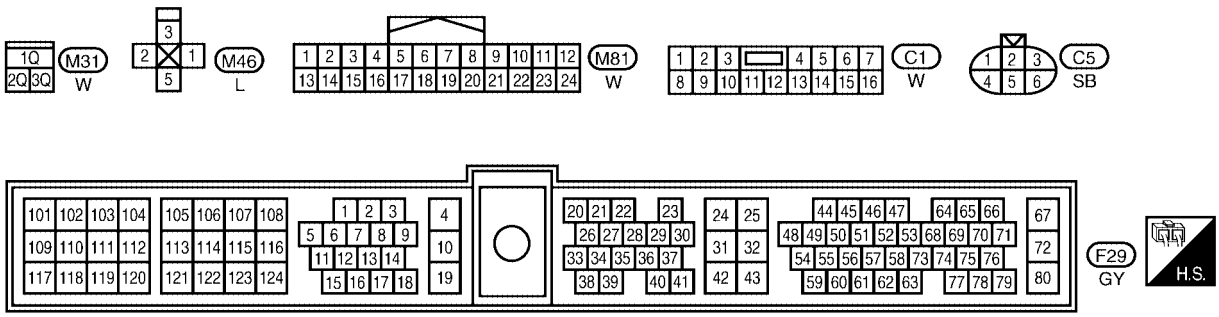
MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running and cranking	ON
	● Except as shown above	OFF

Wiring Diagram

UBS00DDE

EC-F/PUMP-01





BBWA1071E

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

CAUTION:

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

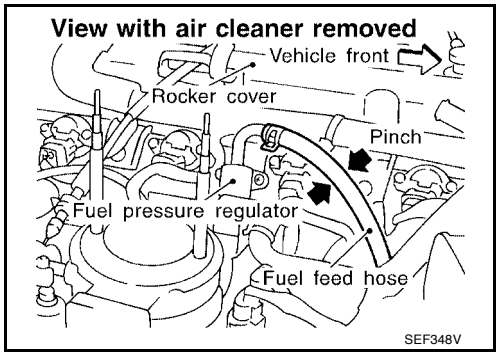
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	W/R	Fuel pump relay	**[Ignition switch: ON]** ● For a few seconds after turning ignition switch ON **[Engine is running]**	0 - 1V
			[Ignition switch: ON] ● More than a few seconds after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00DDF

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 seconds after ignition switch is turned ON.

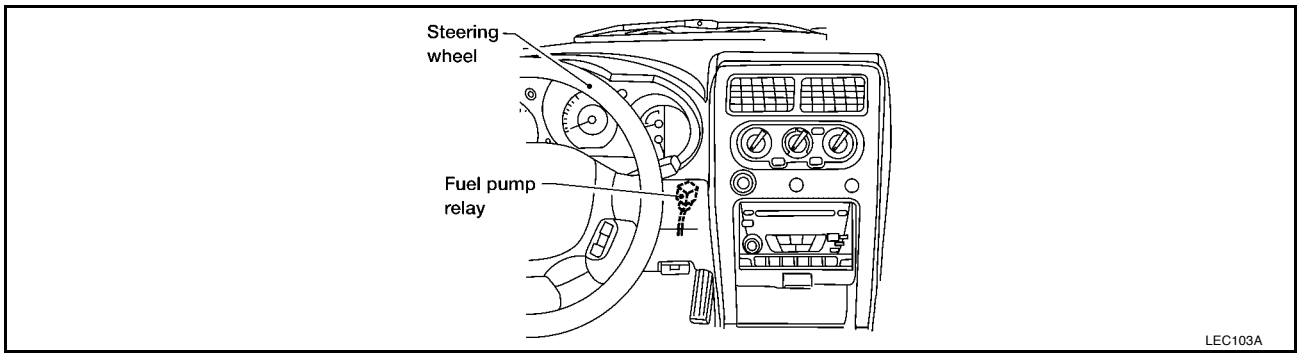


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

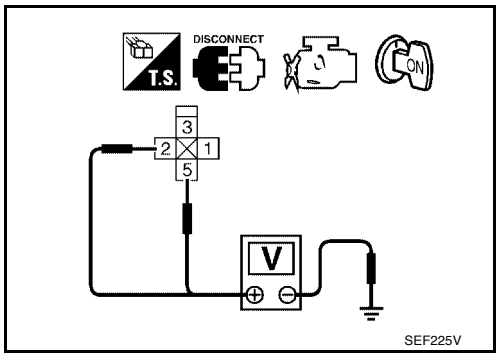
2. CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect fuel pump relay.



3. Turn ignition switch ON.
4. Check voltage between terminals 2, 5 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.

- Fuse block (J/B) connector M31
- 15A fuse
- Harness for open or short between fuse and fuel pump relay

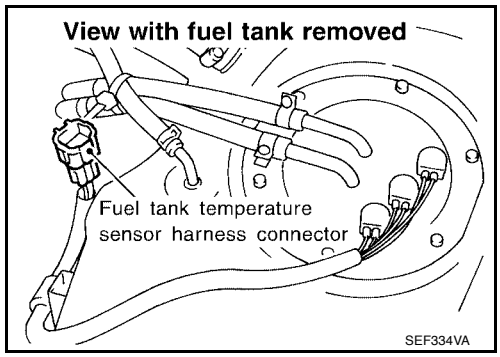
>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK POWER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Check harness continuity between the following;
   fuel level sensor unit and fuel pump terminal 6 and ground,
   fuel level sensor unit and fuel pump terminal 5 and fuel pump relay terminal 3.
   Refer to Wiring Diagram.

Continuity should exist.

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



OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, M67
- Harness for open or short between fuel pump and ground
- Harness for open or short between fuel pump and fuel pump relay

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

6. CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 11 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 F36, M81
- 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 FUEL PUMP RELAY

With CONSULT-II

1. Reconnect fuel pump relay, fuel level sensor unit and fuel pump harness connector and ECM harness connector.
2. Turn ignition switch ON.
3. Turn fuel pump relay “ON” and “OFF” in “ACTIVE TEST” mode with CONSULT-II and check operating sound.

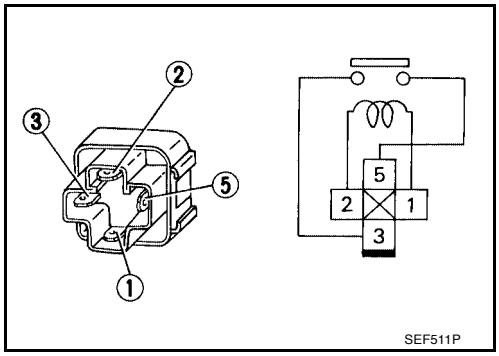
ACTIVE TEST	
FUEL PUMP RELAY	ON
MONITOR	
ENG SPEED	XXX rpm

SEF724Z

Without CONSULT-II

Check continuity between fuel pump relay terminals 3 and 5.

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



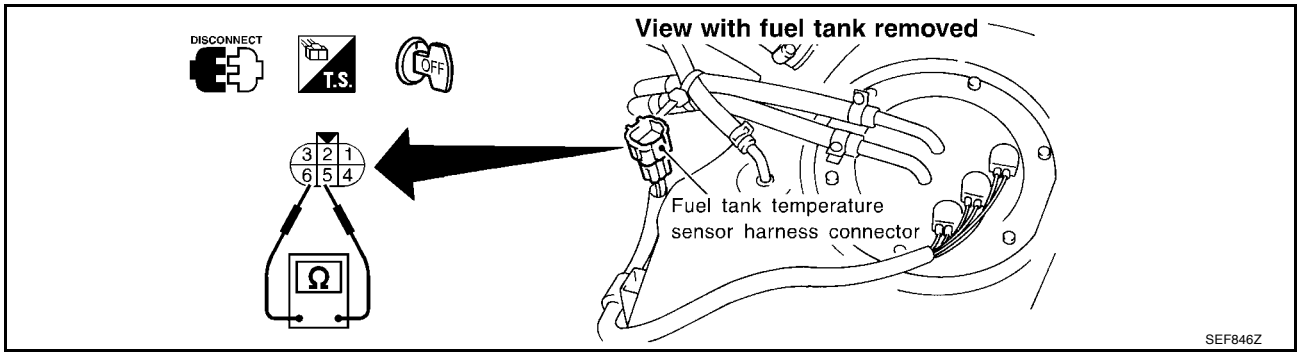
SEF511P

OK or NG

OK >> GO TO 9.
NG >> Replace fuel pump relay.

9. CHECK FUEL PUMP

1. Disconnect fuel level sensor and fuel pump harness connector.



SEF846Z

2. Check resistance between terminals 5 and 6.

Resistance : 0.2 - 5.0Ω [at 25°C (77°F)]

OK or NG

OK >> GO TO 10.
NG >> Replace fuel pump.

10. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00DDG

FUEL PUMP

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

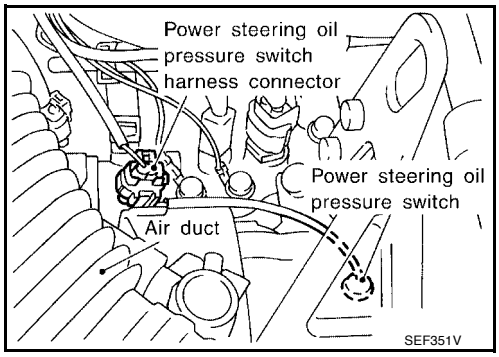
POWER STEERING OIL PRESSURE SWITCH

PFP:49761

Component Description

UBS00DDH

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load. When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DDI

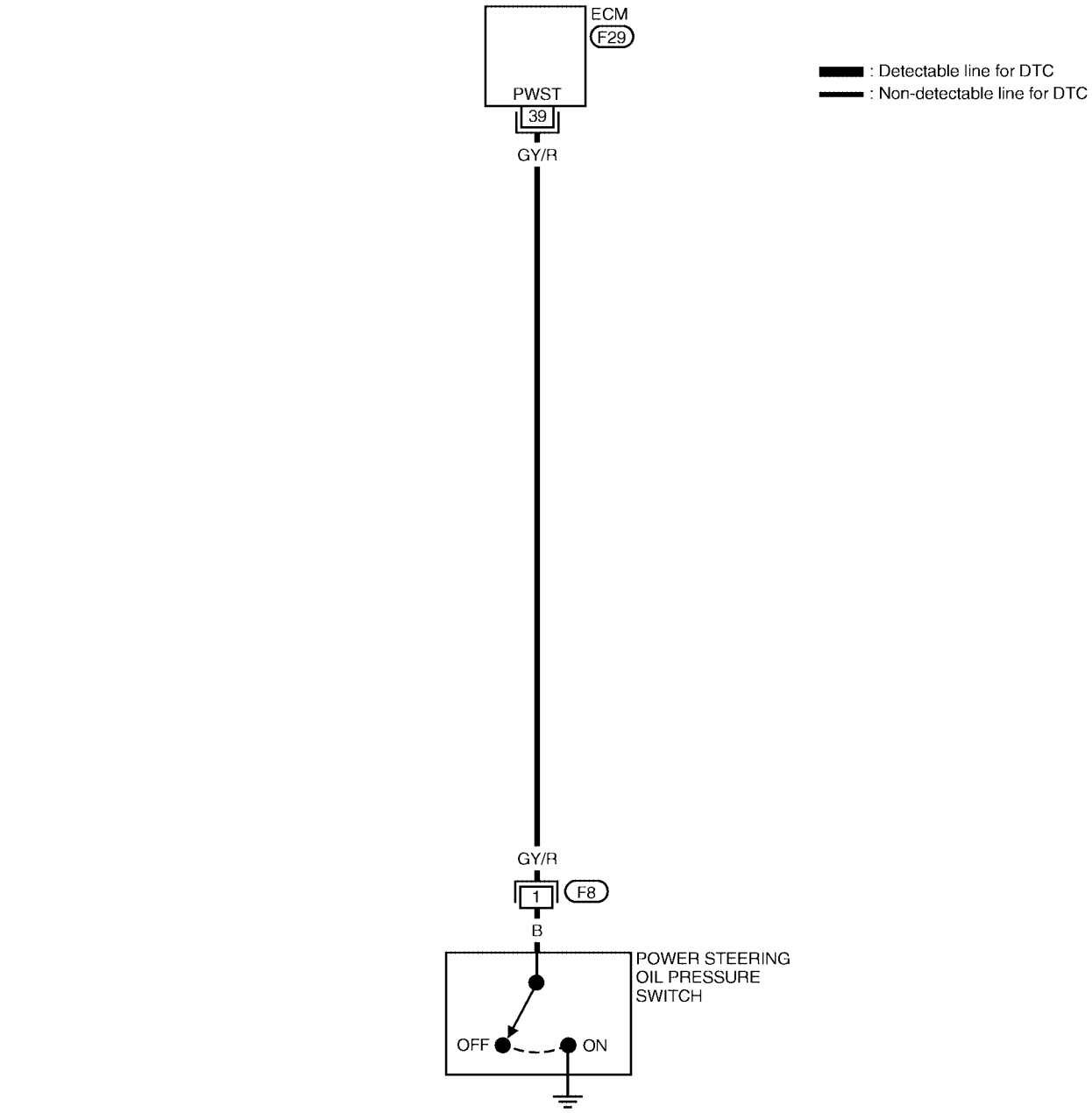
Specification data are reference values.

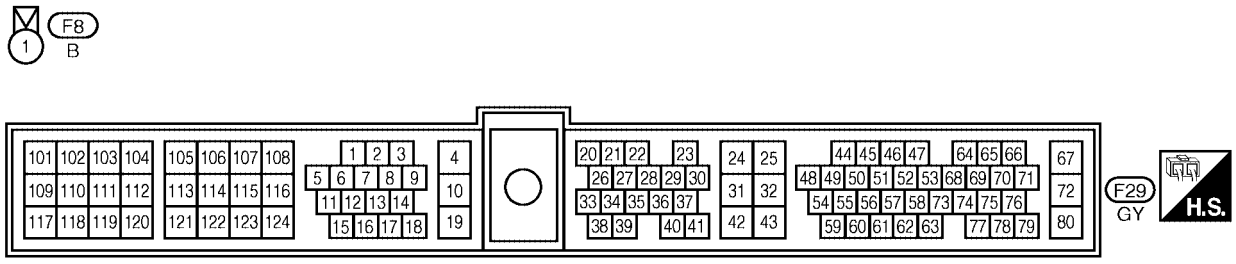
MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON

Wiring Diagram

UBS00DDJ

EC-PST/SW-01





AEC012B

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	GY/R	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is turned	Approximately 0V
			[Engine is running] ● Steering wheel is not turned	Approximately 5V

Diagnostic Procedure

UBS00DDK

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. Start engine.
2. Check “PW/ST SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

DATA MONITOR	
MONITOR	NO DTC
PW/ST SIGNAL	OFF

Conditions	PW/ST SIGNAL indication
Steering is in neutral position	OFF
Steering is turned	ON

LEC065A

OK or NG

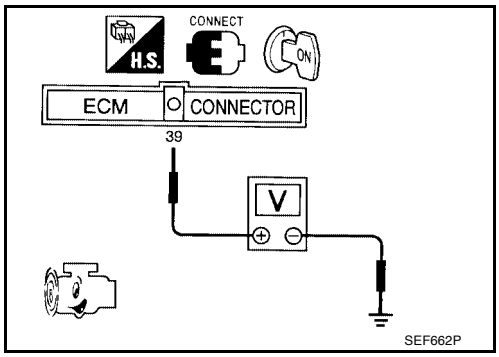
OK >> **INSPECTION END**
NG >> GO TO 4.

3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 39 and ground under the following conditions.

Condition	Voltage [V]
Steering wheel is turned	Approx. 0
Steering wheel is not turned	Approx. 5



SEF662P

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect power steering oil pressure switch harness connector.
4. Check harness continuity between ECM terminal 39 and power steering oil pressure switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

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

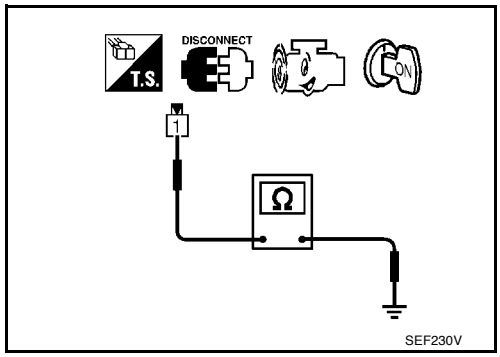
OK or NG

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

5. CHECK POWER STEERING OIL PRESSURE SWITCH

1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between power steering oil pressure switch terminal 1 and ground.

Conditions	Continuity
Steering wheel is being turned	Yes
Steering wheel is not being turned	No



OK or NG

OK >> GO TO 6.
NG >> Replace power steering oil pressure switch.

6. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00EM1

POWER STEERING OIL PRESSURE SWITCH

Refer to PS-17, "POWER STEERING OIL PUMP" .

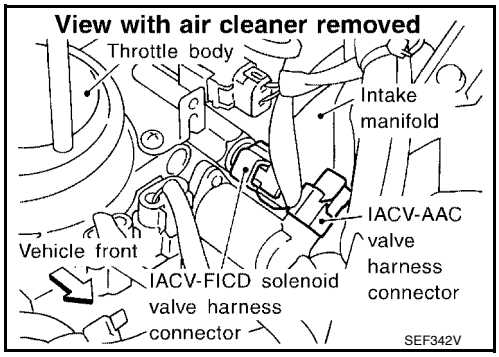
IACV-FICD SOLENOID VALVE

PFP:23781

Component Description

UBS00DDL

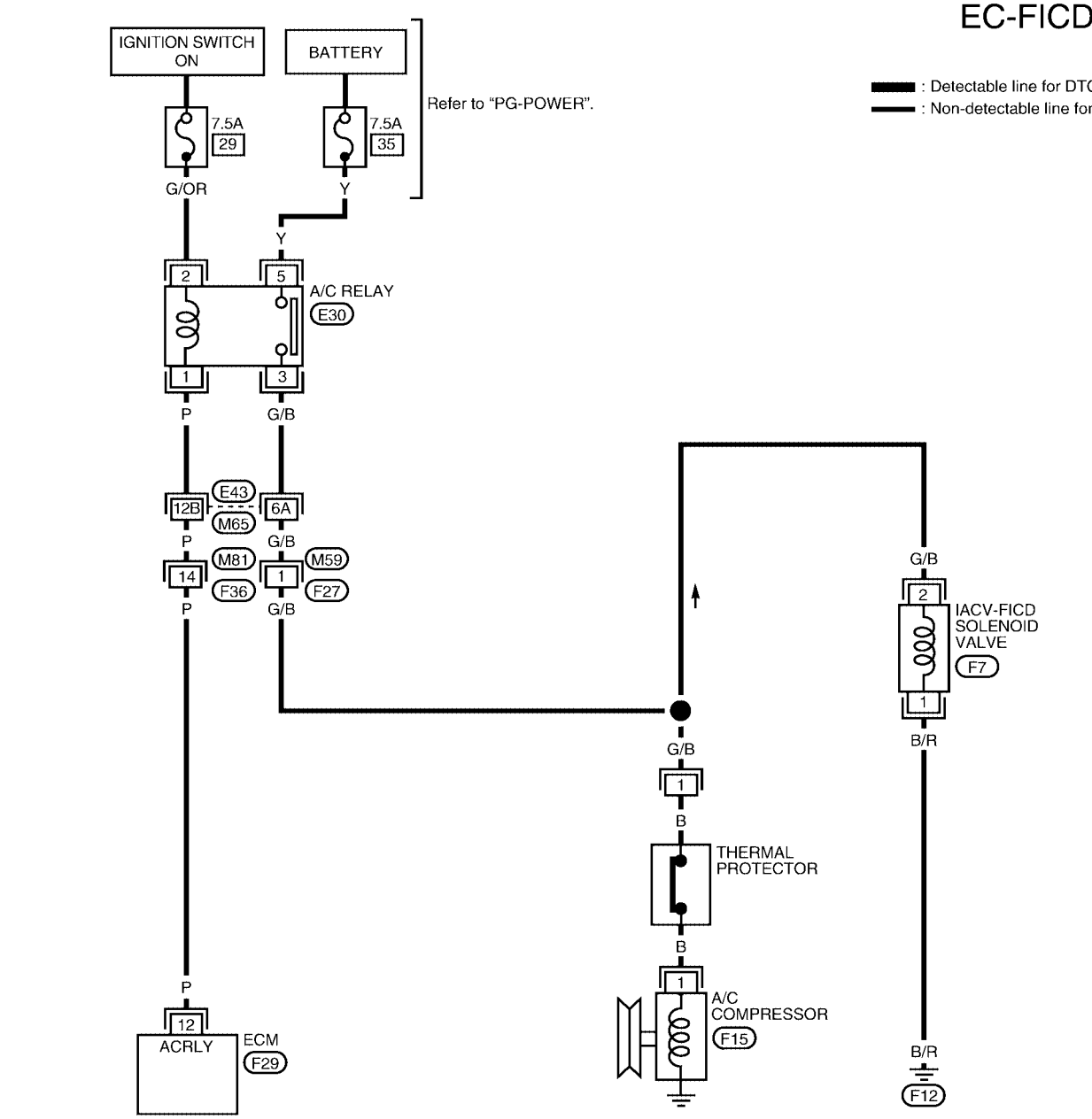
When the air conditioner is ON, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load.

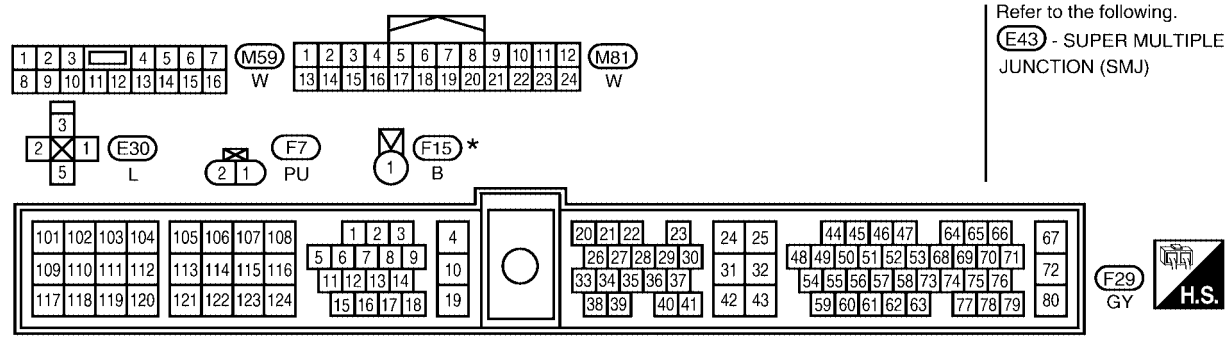


Wiring Diagram

UBS00DDM

EC-FICD-01





★ : This connector is not shown in "HARNESS LAYOUT" of PG section.

BBWA1072E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	P	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are ON*	Approximately 0V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)

*: Ambient air temperature above 10°C (50°F) and in any mode except OFF.

Diagnostic Procedure

UBS00DDN

1. CHECK OVERALL FUNCTION

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

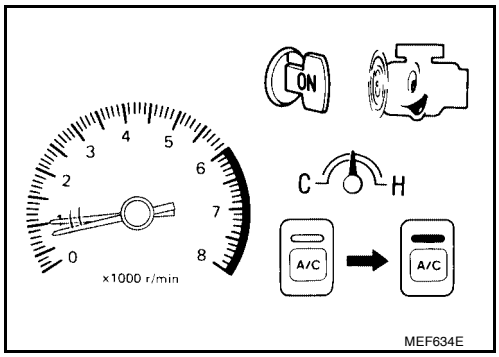
   M/T: 800±50 rpm (in Neutral position)

   A/T: 800±50 rpm (in P or N position)

   If NG, adjust idle speed.
3. Push air conditioner switch ON and turn fan switch to 4-speed.
4. Recheck idle speed.

   M/T: 875 rpm or more (in Neutral position)

   A/T: 875 rpm or more (in P or N position)



OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 2.

2. CHECK AIR CONDITIONER FUNCTION

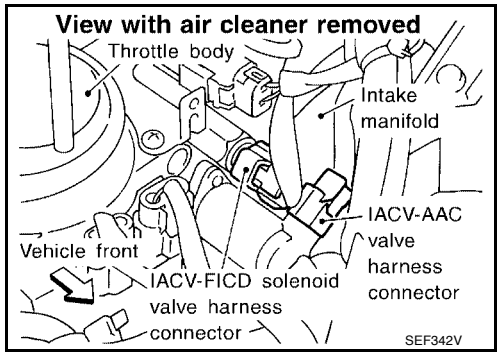
Check if air conditioner compressor functions normally.

OK or NG

OK >> GO TO 3.
NG >> Refer to MTC-22, "TROUBLE DIAGNOSIS" .

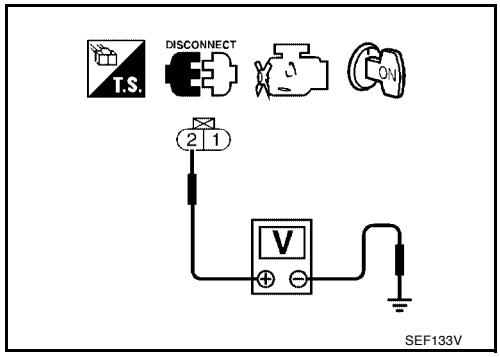
3. CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect IACV-FICD solenoid valve harness connector.
3. Start engine, then push A/C switch ON and turn fan switch to 4-speed.



4. Check voltage between terminal 2 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 M65, E43
- Harness connectors M59, E27
- Harness for open or short between IACV-FICD solenoid valve and A/C relay

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

5. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between solenoid valve terminal 1 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

6. DETECT MALFUNCTIONING PART

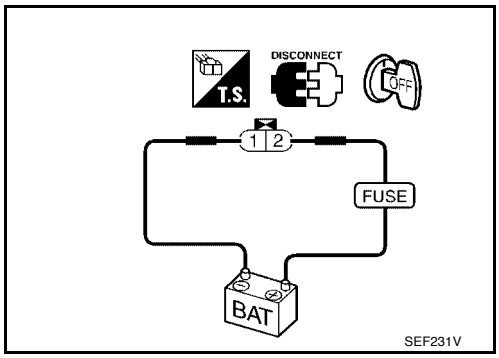
Check the harness for open or short between IACV-FICD solenoid valve and ground.

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

7. CHECK IACV-FICD SOLENOID VALVE

Disconnect IACV-FICD solenoid valve harness connector.

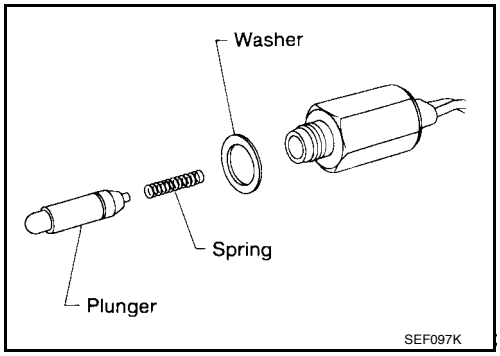
- Check for clicking sound when applying 12V direct current to terminals.
- Check plunger for seizing or sticking.



- Check for broken spring.

OK or NG

OK >> GO TO 8.
NG >> Replace IACV-FICD solenoid valve.



8. CHECK INTERMITTENT INCIDENT

Perform EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

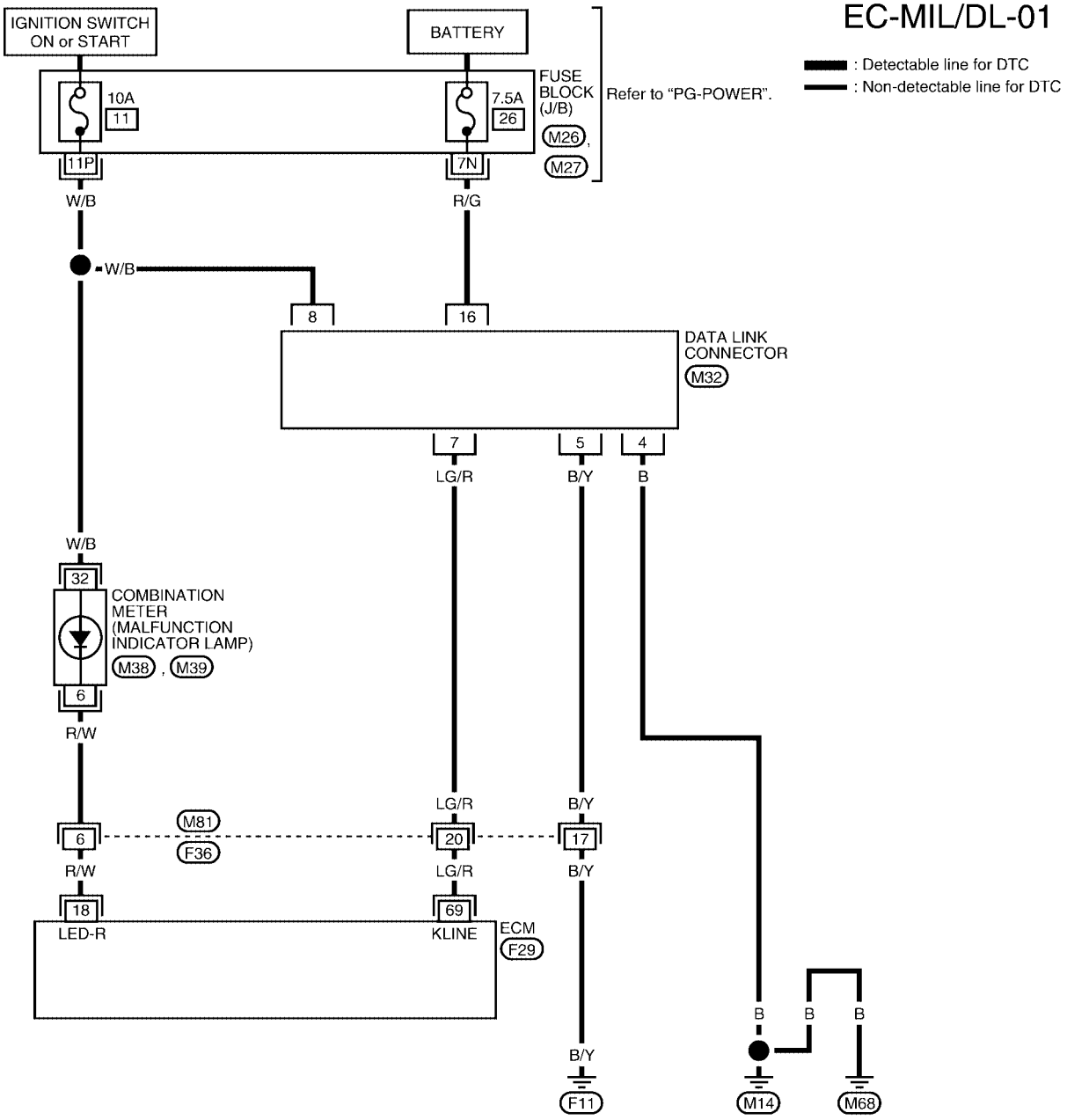
>> **INSPECTION END**

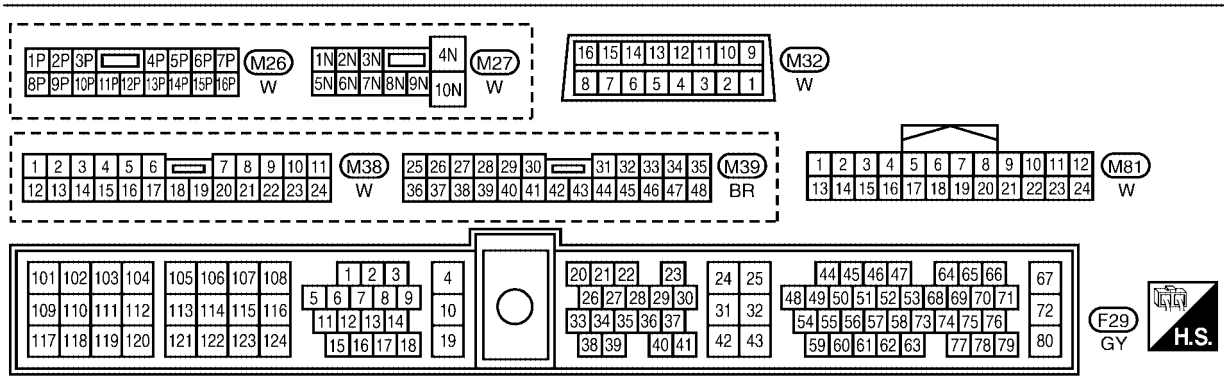
DATA LINK CONNECTOR

PFP:24814

Wiring Diagram

UBS00DDO





BBWA1073E

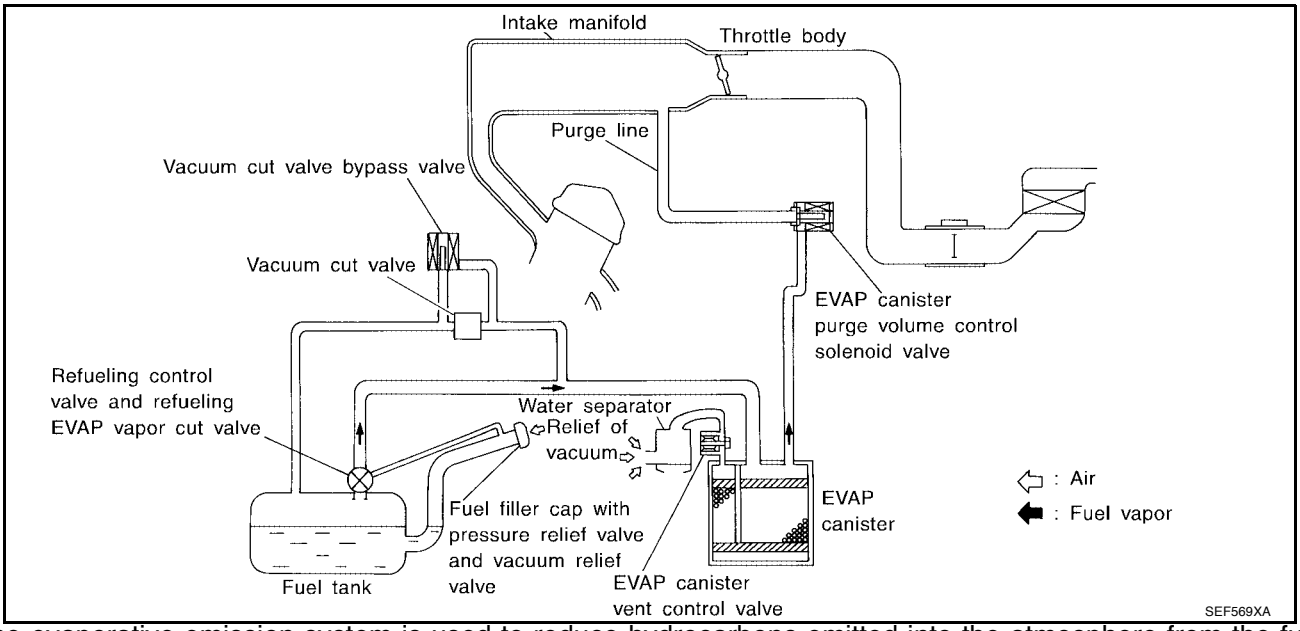
EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description

UBS00DDP

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.

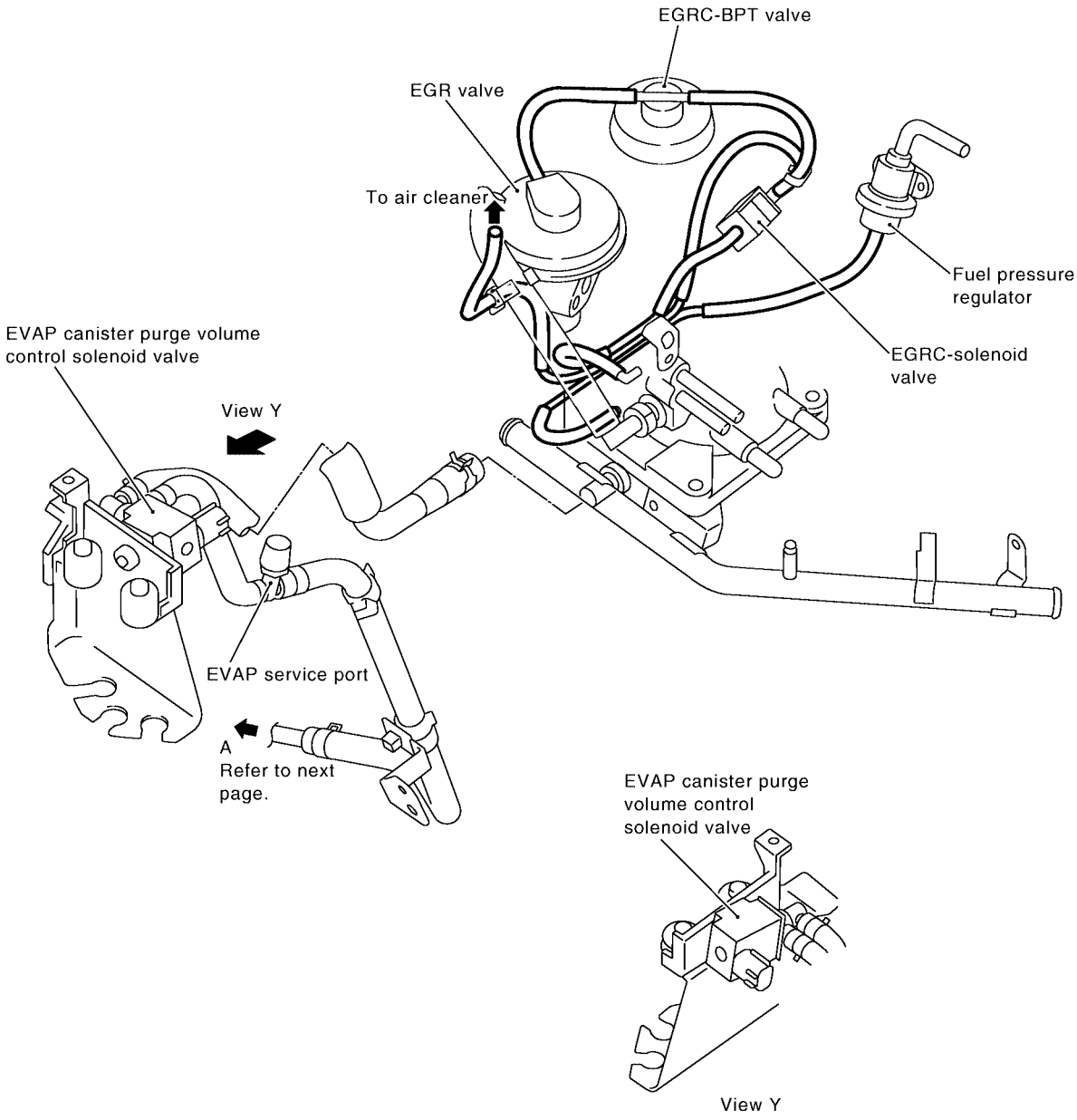
EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

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

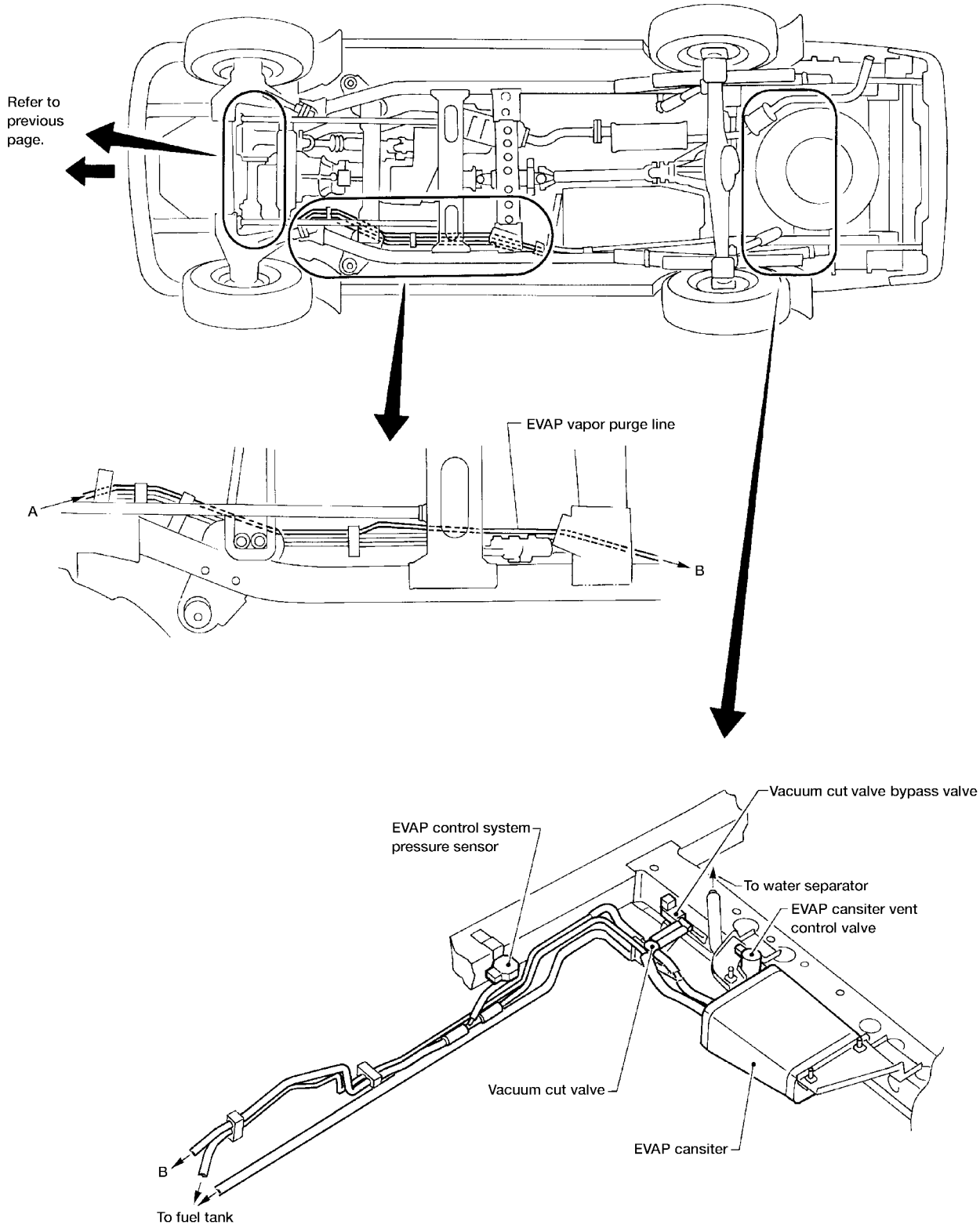
EVAPORATIVE EMISSION LINE DRAWING

NOTE:

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



SEF712Z


Refer to previous page.
EVAP vapor purge line
A
B
Vacuum cut valve bypass valve
EVAP control system pressure sensor
To water separator
EVAP cansiter vent control valve
Vacuum cut valve
EVAP cansiter
B
To fuel tank
WEC555

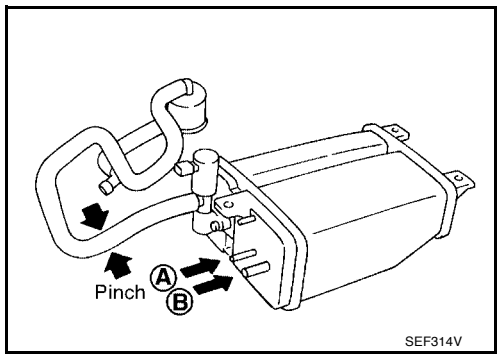
Component Inspection

UBS00DDQ

EVAP CANISTER

Check EVAP canister as follows:

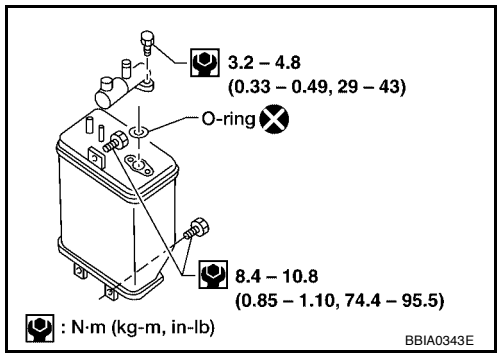
1. Pinch the fresh air hose.
2. Blow air into port **A** and check that air flows freely through port **B** .



Tightening Torque

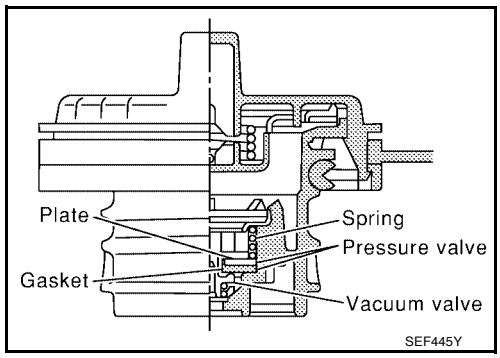
Tighten EVAP canister as shown in the figure.

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 FILLER CAP)

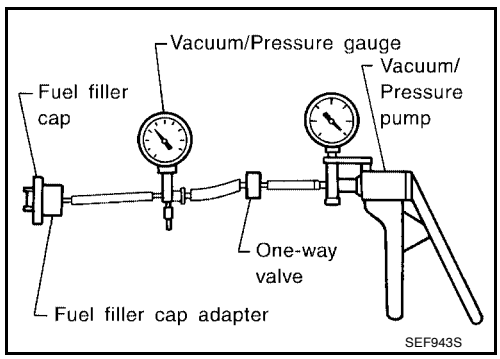
1. Wipe clean valve housing.



2. Check valve opening pressure and vacuum.

Pressure : 16.0 - 20.0 kPa
(0.163 - 0.204 kg/cm^2 , 2.32 - 2.90 psi)
Vacuum : −6.0 to −3.5 kPa
(−0.061 to −0.036 kg/cm^2 , −0.87 to −0.51 psi)

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



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.

VACUUM CUT VALVE AND VACUUM CUT VALVE BYPASS VALVE

Refer to EC-513 .

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

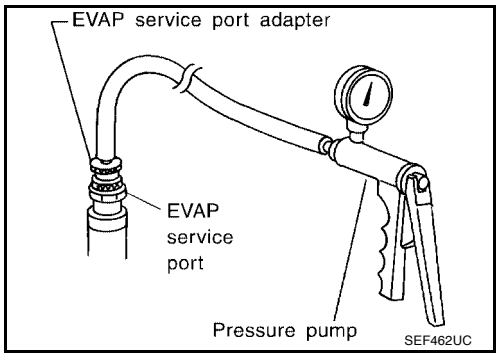
Refer to EC-474 .

FUEL TANK TEMPERATURE SENSOR

Refer to EC-244 .

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

UBS00DDR

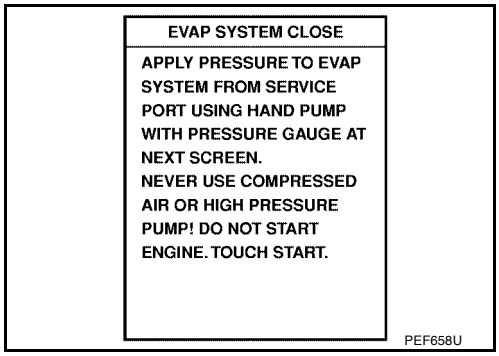
CAUTION:

- **Never use compressed air or a high pressure pump.**
- **Do not start engine.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in EVAP system.**

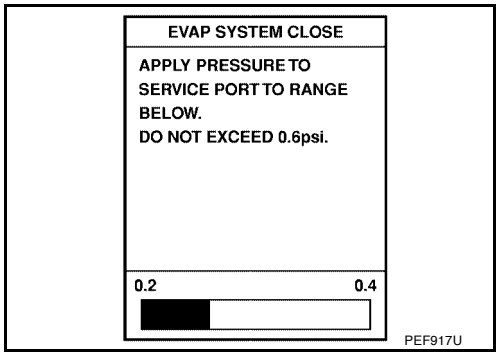
NOTE:
Improper installation of adapter to the service port may cause a leak.

WITH CONSULT-II

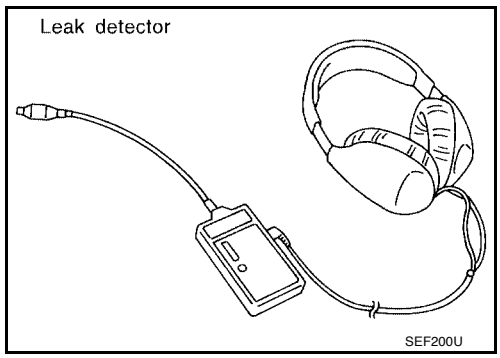
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose.
3. Turn ignition switch ON.
4. Select the “EVAP SYSTEM CLOSE” of “WORK SUPPORT MODE” with CONSULT-II.
5. Touch “START”. A bar graph (Pressure indicating display) will appear on the screen.



6. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7. Remove the EVAP service port adapter and hose with pressure pump.

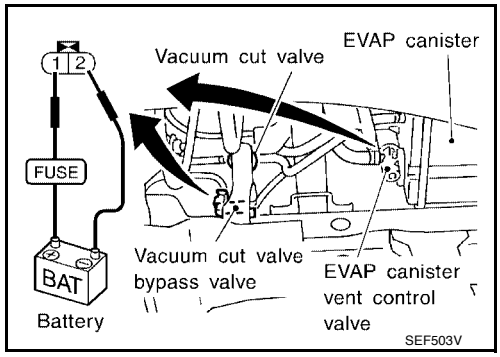


8. Locate the leak using a leak detector. Refer to EC-571, "EVAPORATIVE EMISSION LINE DRAWING" .

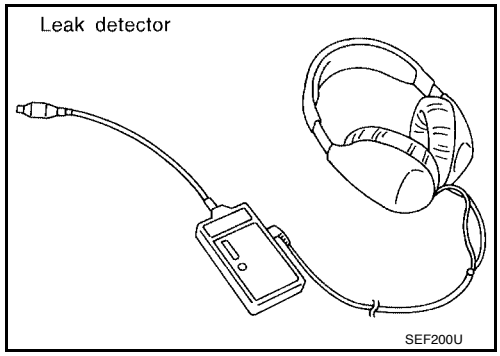


WITHOUT CONSULT-II

1. Attach the EVAP service port adapter securely to the EVAP service port and pressure pump with pressure gauge to the EVAP service port.
2. 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.
3. 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).
4. Remove the EVAP service port adapter and hose with pressure pump.



5. Locate the leak using a leak detector. Refer to EC-571, "EVAPORATIVE EMISSION LINE DRAWING" .

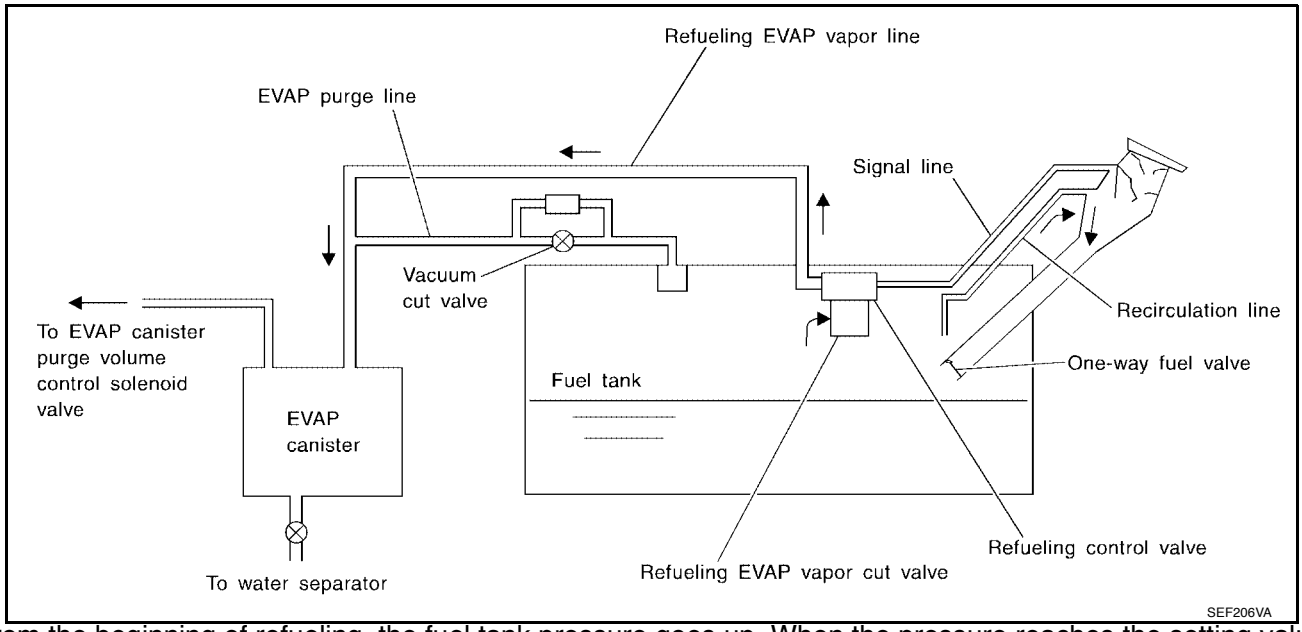


ON BOARD REFUELING VAPOR RECOVERY (ORVR)

PFP:00032

System Description

UBS00DDS



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 EC-46, "FUEL PRESSURE RELEASE" .**
  - **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

UBS00DDT

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

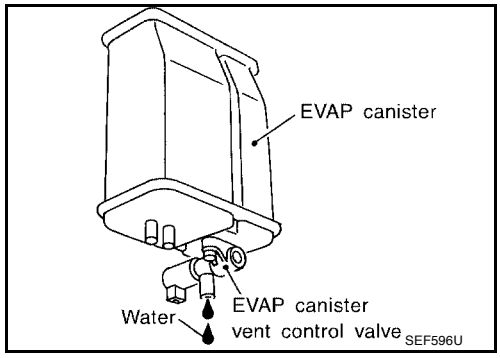
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

- Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No (With CONSULT-II)>>GO TO 6.
No (Without CONSULT-II)>>GO TO 7.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. CHECK WATER SEPARATOR

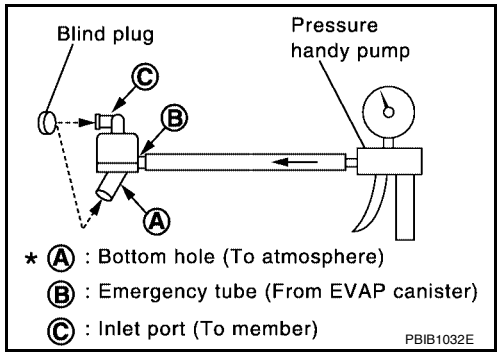
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

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

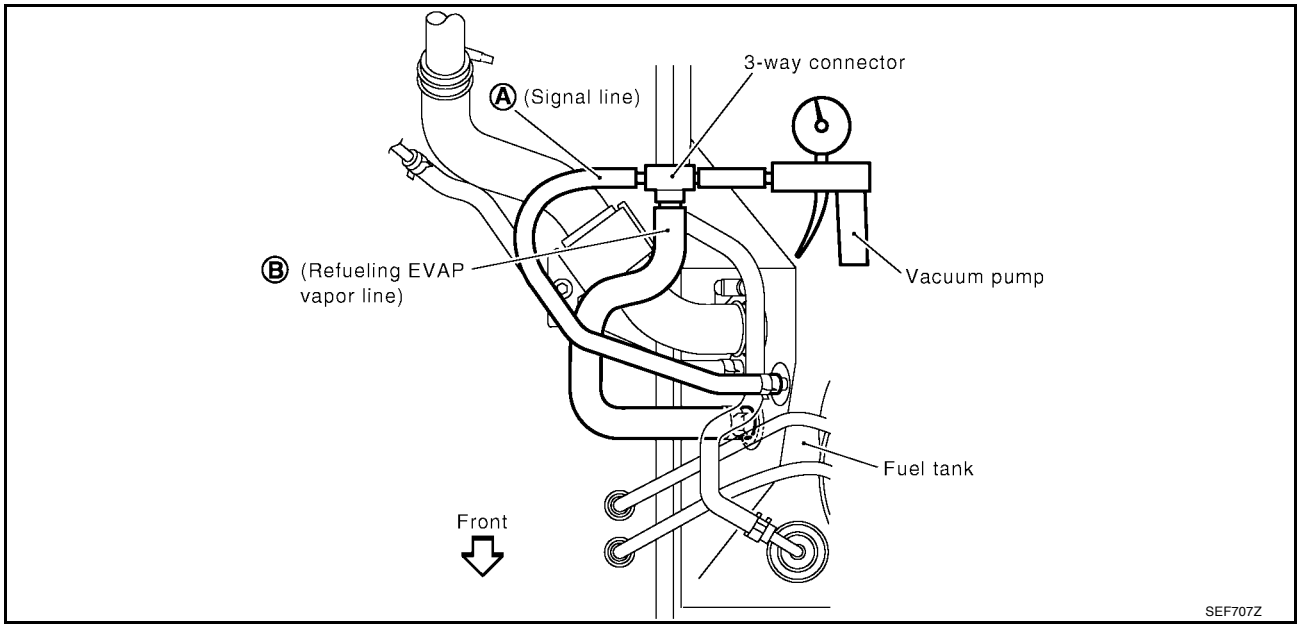
With CONSULT-II

1. Remove fuel tank. Refer to FL-3, "FUEL TANK" .
2. Drain fuel from the tank as follows:

- Remove fuel feed hose located on the fuel gauge retainer.
- Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
- 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.

- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel gauge retainer with fuel gauge unit.
Always replace O-ring with new one.
- Put fuel tank upside down.
- 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.



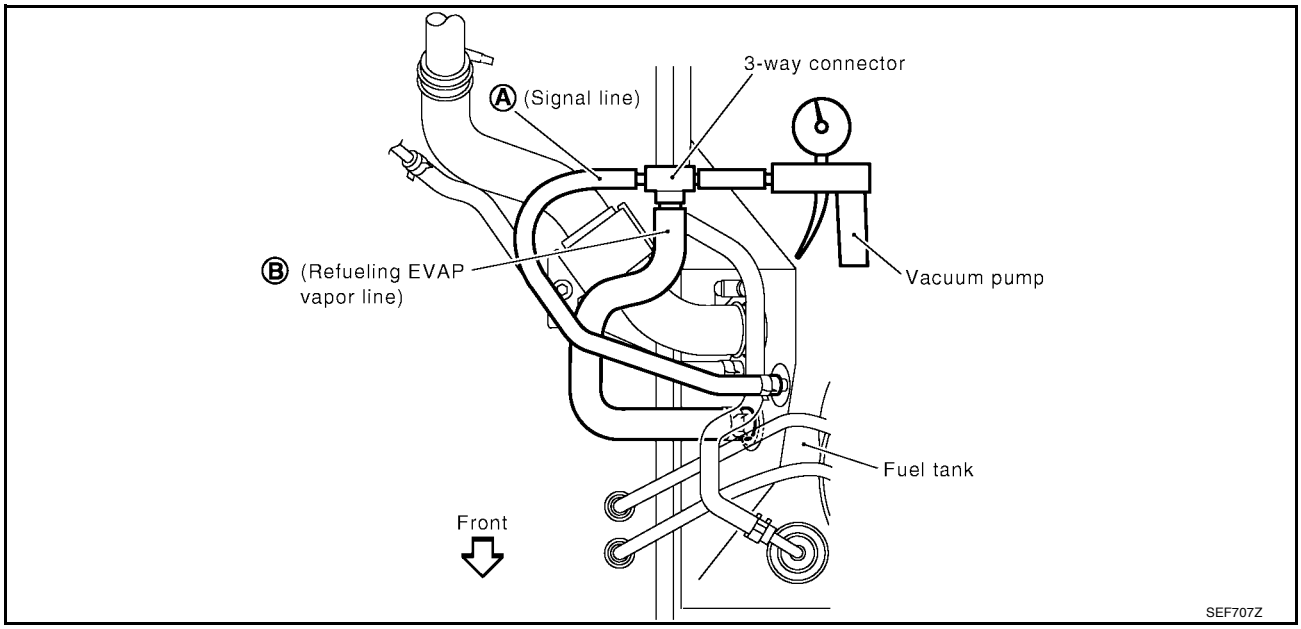
OK or NG

OK >> GO TO 8.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

7. CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT-II

1. Remove fuel tank. Refer to FL-3, "FUEL TANK" .
2. Drain fuel from the tank as follows:
- Remove fuel gauge retainer.
- 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.
- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel gauge retainer with fuel gauge unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- 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.

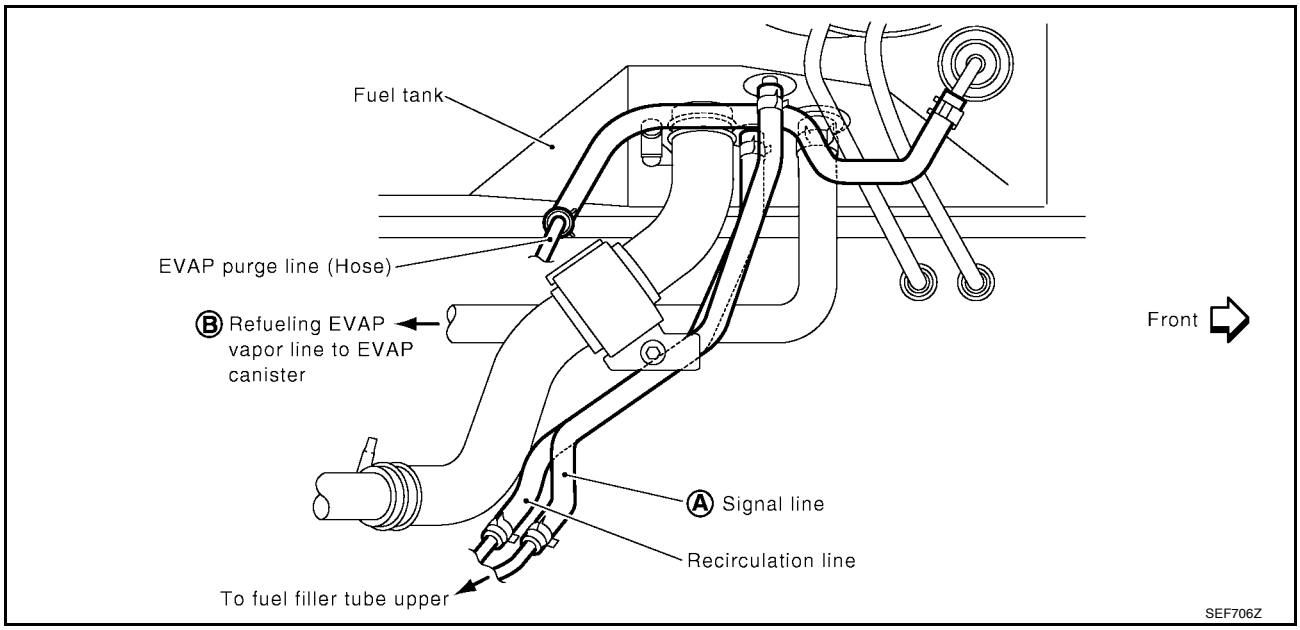


OK or NG

OK >> GO TO 8.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

8. CHECK 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.



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

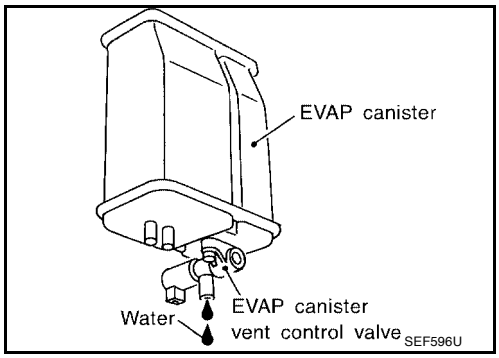
OK >> GO TO 2.
NG >> GO TO 3.

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.



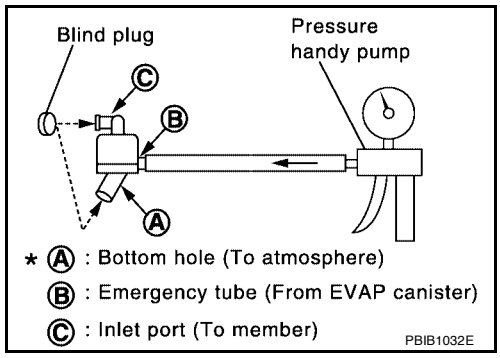
3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. CHECK WATER SEPARATOR

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.

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

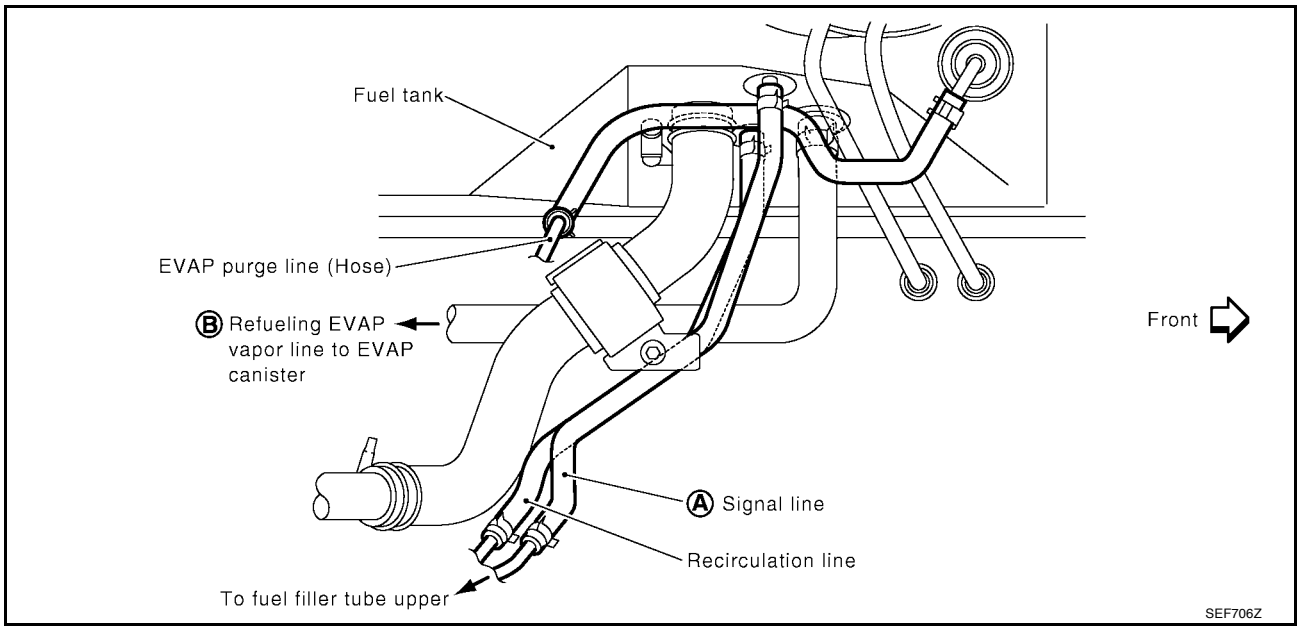
Check signal line and recirculation line for clogging, dents and cracks.

OK or NG

OK >> GO TO 8.
NG >> Replace filler neck tube.

8. CHECK REFUELING CONTROL VALVE

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.



OK or NG

OK (With CONSULT-II)>>GO TO 9.
OK (Without CONSULT-II)>>GO TO 10.
NG >> Replace refueling control valve with fuel tank.

9. CHECK REFUELING EVAP VAPOR CUT VALVE

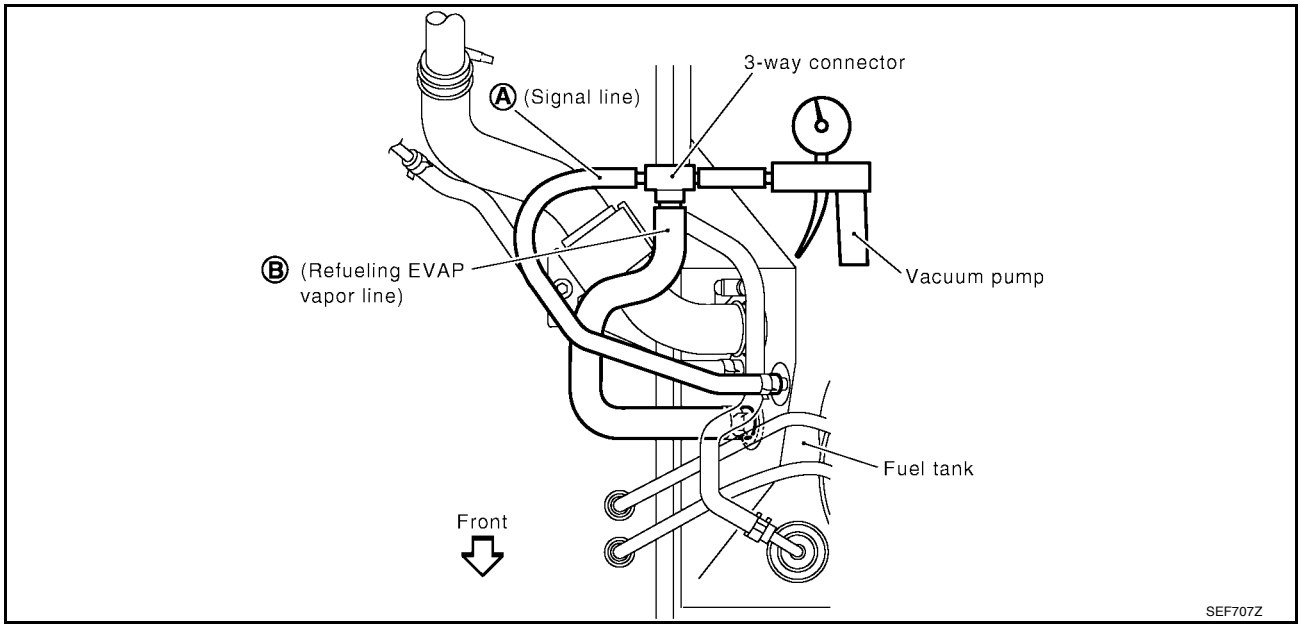
With CONSULT-II

1. Remove fuel tank. Refer to FL-3, "FUEL TANK" .
2. Drain fuel from the tank as follows:

- Remove fuel feed hose located on the fuel gauge retainer.
- Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
- 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.

- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel gauge retainer with fuel gauge unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- 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.



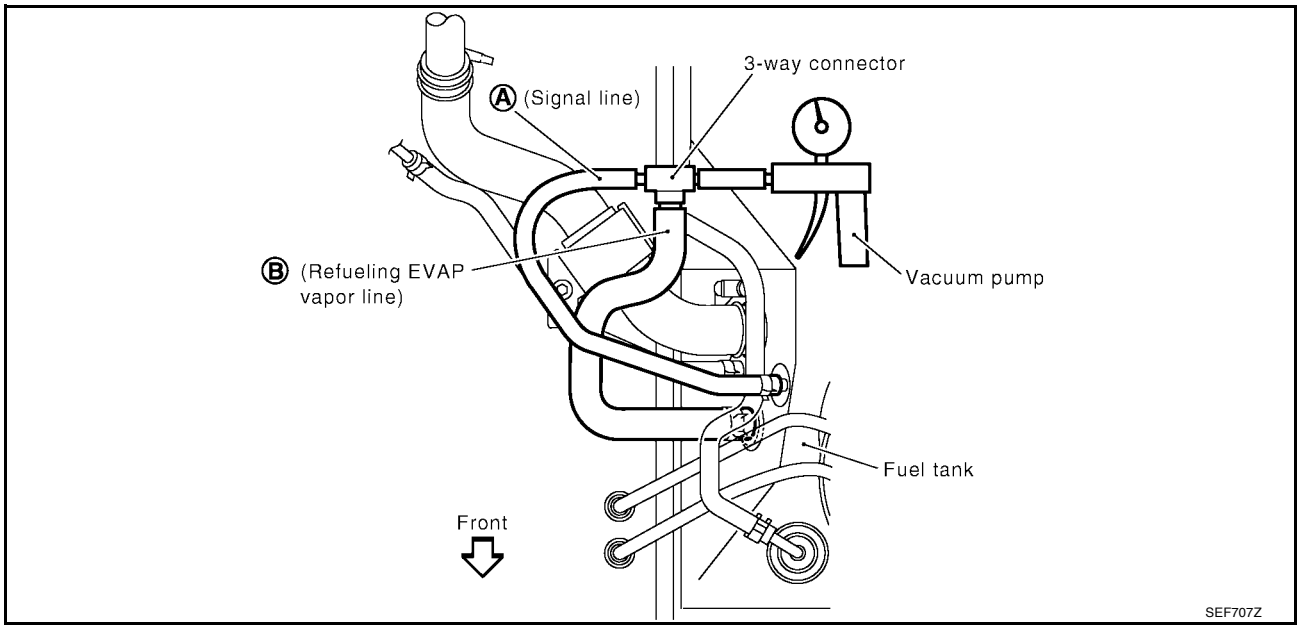
OK or NG

OK >> GO TO 11.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

10. CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT-II

1. Remove fuel tank. Refer to FL-3, "FUEL TANK" .
2. Drain fuel from the tank as follows:
- Remove fuel gauge retainer.
- 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.
- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel gauge retainer with fuel gauge unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- 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.



OK or NG

OK >> GO TO 11.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

11. 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 12.
NG >> Replace fuel filler tube.

12. CHECK ONE-WAY FUEL VALVE-I

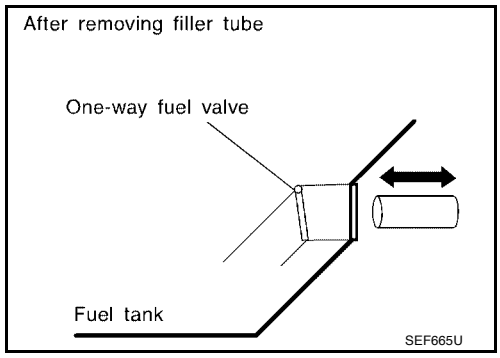
Check one-way valve for clogging.

OK or NG

OK >> GO TO 13.
NG >> Repair or replace one-way fuel valve with fuel tank.

13. 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

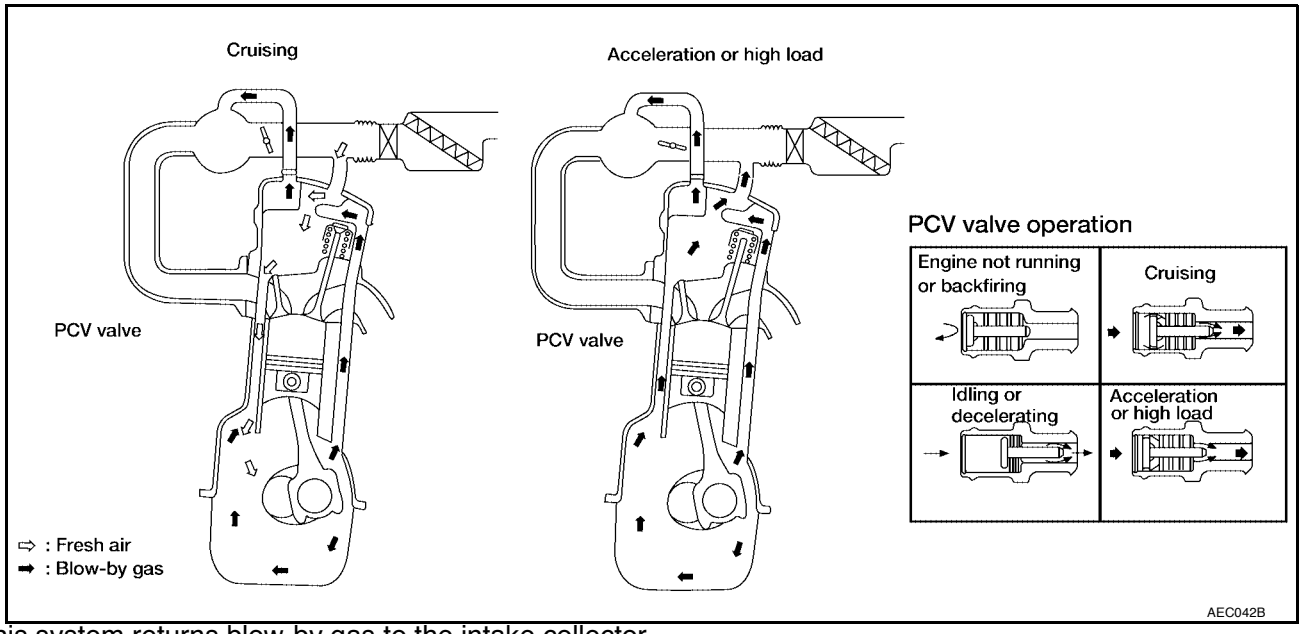
OK >> **INSPECTION END**.
NG >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.

POSITIVE CRANKCASE VENTILATION

PFP:11810

Description

UBS00DDU



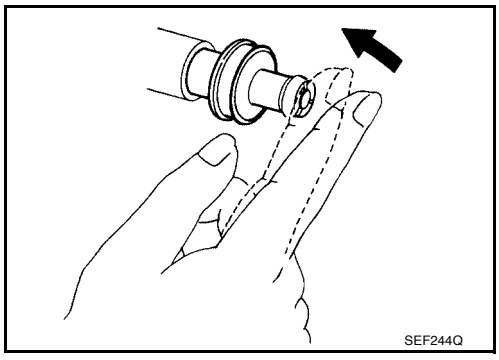
This system returns blow-by gas to the intake collector.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the 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 duct 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 intake collector under all conditions.

Inspection

UBS00DDV

PCV (POSITIVE CRANKCASE VENTILATION) VALVE

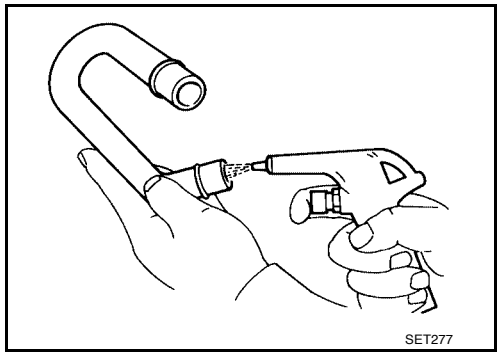
With engine running at idle, remove PCV valve from breather separator. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over the valve inlet.



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.


SET277

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Fuel Pressure Regulator

UBS00DDW

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

UBS00DDX

Base idle speed*1	A/T	No-load*3 (in P or N position)	750±50 rpm
	M/T	No-load*3 (in Neutral position)	
Target idle speed*2	A/T	No-load*3 (in P or N position)	800±50 rpm
	M/T	No-load*3 (in Neutral position)	
Air conditioner: ON	A/T	In P or N position	875 rpm or more
	M/T	In Neutral position	
Ignition timing*1	A/T	In P or N position	20°±5° BTDC
	M/T	In Neutral position	

*1: Throttle position sensor harness connector disconnected or using CONSULT-II “WORK SUPPORT” mode
*2: Throttle position sensor harness connector connected
*3: Under the following conditions:

- Air conditioner switch: OFF
- Electrical load: OFF (Lighting switch, heater fan and rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Coil

UBS00DDY

Primary voltage V	Battery voltage 12
Primary resistance [at 20°C (68°F)] Ω	Approximately 1.0
Secondary resistance [at 20°C (68°F)] kΩ	Approximately 10

Mass Air Flow Sensor

UBS00DDZ

Supply voltage V	Battery voltage (11 - 14)
Output voltage V	0.9 - 1.8*
Mass air flow (Using CONSULT-II or GST) g·m/sec	0.9 - 5.8 at idle* 7.5 - 13.2 at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and idling under no-load.

Engine Coolant Temperature Sensor

UBS00DE0

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

EGR Temperature Sensor

UBS00DE1

EGR temperature °C (°F)	Voltage (V)	Resistance (MΩ)
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

Fuel Pump

UBS00DE2

Resistance [at 25°C (77°F)] Ω	0.2 - 5.0

IACV-AAC Valve

UBS00DE3

Resistance [at 25°C (77°F)] Ω	Approximately 10.0

Injector

UBS00DE4

Resistance [at 10 - 60°C (50 - 140°F)] Ω	7.4 - 10.9

Resistor

UBS00DE5

Resistance [at 25°C (77°F)] Ω	Approximately 2.2

Throttle Position Sensor

UBS00DE6

Throttle valve conditions	Voltage (at normal operating temp., engine off, ignition switch on)
Completely closed (a)	0.2 - 0.8V
Partially open	Between (a) and (b)
Completely open (b)	3.5 - 4.5V

Heated Oxygen Sensor 1 Heater

UBS00DE7

Resistance [at 25°C (77°F)] Ω	3.3 - 4.0

Calculated Load Value

UBS00DE8

	Calculated load value % (Using CONSULT-II or GST)
At idle	9.5 - 34.0%
At 2,500 rpm	13.9 - 24.9%

Intake Air Temperature Sensor

UBS00DE9

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

Heated Oxygen Sensor 2 Heater

UBS00DEA

Resistance [at 25°C (77°F)] Ω	3.3 - 4.0

Crankshaft Position Sensor (OBD)

UBS00DEB

Resistance [at 20°C (68°F)] Ω	512 - 632

Fuel Tank Temperature Sensor

UBS00DEC

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

INDEX FOR DTC

PFP:00024

Alphabetical Index

UBS00DED

×: Applicable —: Not applicable

Item (CONSULT-II screen terms)	DTC*1 *2 CONSULT-II GST	Trip	MIL Lighting up	Reference page
Unable to access ECM	—	—	—	EC-652
A/T 1ST GR FNCTN	P0731	2	×	AT-270
A/T 2ND GR FNCTN	P0732	2	×	AT-276
A/T 3RD GR FNCTN	P0733	2	×	AT-281
A/T 4TH GR FNCTN	P0734	2	×	AT-286
A/T COMM LINE	P0600*3	2	—	EC-1006
A/T DIAG COMM LINE	P1605	2	×	EC-1129
A/T TCC S/V FNCTN	P0744	2	×	AT-298
ATF TEMP SEN/CIRC	P0710	2	×	AT-255
CKP SEN/CIRCUIT	P0335	2	×	EC-869
CKP SENSOR (COG)	P1336	2	×	EC-1054
CLOSED LOOP-B1	P1148	1	×	EC-1048
CLOSED LOOP-B2	P1168	1	×	EC-1048
CLOSED TP SW/CIRC	P0510	2	×	EC-999
CMP SEN/CIRCUIT	P0340	2	×	EC-875
CYL1 MISFIRE	P0301	2	×	EC-857
CYL2 MISFIRE	P0302	2	×	EC-857
CYL3 MISFIRE	P0303	2	×	EC-857
CYL4 MISFIRE	P0304	2	×	EC-857
CYL5 MISFIRE	P0305	2	×	EC-857
CYL6 MISFIRE	P0306	2	×	EC-857
ECM	P0605	2	×	EC-1012
ECT SEN/CIRCUIT	P0117	1	×	EC-748
ECT SEN/CIRCUIT	P0118	1	×	EC-748
ECT SENSOR	P0125	2	×	EC-770
EGRC-BPT VALVE	P0402	2	×	EC-891
EGR SOLENOID/V	P1400	2	×	EC-1060
EGR SYSTEM	P0400	2	×	EC-882
EGR SYSTEM	P1402	2	×	EC-1065
EGR TEMP SEN/CIRC	P0405	2	×	EC-897
EGR TEMP SEN/CIRC	P0406	2	×	EC-897
ENG OVER TEMP	P0217	1	×	EC-852
ENG OVER TEMP	P1217	1	×	EC-1050
ENG SPEED SIG	P0725	2	×	AT-266
EVAP GROSS LEAK	P0455	2	×	EC-955
EVAP PURG FLOW/MON	P0441	2	×	EC-908
EVAP SMALL LEAK	P0442	2	×	EC-916
EVAP SMALL LEAK	P1442	2	×	EC-1073
EVAP SYS PRES SEN	P0452	2	×	EC-941

Item (CONSULT-II screen terms)	DTC*1 *2 CONSULT-II GST	Trip	MIL Lighting up	Reference page
EVAP SYS PRES SEN	P0453	2	×	EC-947
EVAP VERY SML LEAK	P0456	2	×	EC-966
EVAP VERY SML LEAK	P1456	2	×	EC-1098
FTT SEN/CIRCUIT	P0182	2	×	EC-848
FTT SEN/CIRCUIT	P0183	2	×	EC-848
FTT SENSOR	P0181	2	×	EC-843
FUEL LEV SEN SLOSH	P0460	2	×	EC-977
FUEL LEVEL SEN/CIRC	P1464	2	×	EC-1108
FUEL LEVEL SENSOR	P0461	2	×	EC-981
FUEL LEVL SEN/CIRC	P0462	2	×	EC-983
FUEL LEVL SEN/CIRC	P0463	2	×	EC-983
FUEL SYS-LEAN-B1	P0171	2	×	EC-828
FUEL SYS-LEAN-B2	P0174	2	×	EC-828
FUEL SYS-RICH-B1	P0172	2	×	EC-836
FUEL SYS-RICH-B2	P0175	2	×	EC-836
HO2S1 (B1)	P0132	2	×	EC-778
HO2S1 (B1)	P0133	2	×	EC-787
HO2S1 (B1)	P0134	2	×	EC-799
HO2S1 (B1)	P1143	2	×	EC-1014
HO2S1 (B1)	P1144	2	×	EC-1020
HO2S1 (B2)	P0152	2	×	EC-778
HO2S1 (B2)	P0153	2	×	EC-787
HO2S1 (B2)	P0154	2	×	EC-799
HO2S1 (B2)	P1163	2	×	EC-1014
HO2S1 (B2)	P1164	2	×	EC-1020
HO2S1 HTR (B1)	P0031	2	×	EC-711
HO2S1 HTR (B1)	P0032	2	×	EC-711
HO2S1 HTR (B2)	P0051	2	×	EC-711
HO2S1 HTR (B2)	P0052	2	×	EC-711
HO2S2 (B1)	P0138	2	×	EC-809
HO2S2 (B1)	P0139	2	×	EC-818
HO2S2 (B1)	P1146	2	×	EC-1027
HO2S2 (B1)	P1147	2	×	EC-1038
HO2S2 (B2)	P0158	2	×	EC-809
HO2S2 (B2)	P0159	2	×	EC-818
HO2S2 (B2)	P1166	2	×	EC-1027
HO2S2 (B2)	P1167	2	×	EC-1038
HO2S2 HTR (B1)	P0037	2	×	EC-719
HO2S2 HTR (B1)	P0038	2	×	EC-719
HO2S2 HTR (B2)	P0057	2	×	EC-719
HO2S2 HTR (B2)	P0058	2	×	EC-719
IAT SEN/CIRCUIT	P0112	2	×	EC-742

Item (CONSULT-II screen terms)	DTC*1 *2 CONSULT-II GST	Trip	MIL Lighting up	Reference page
IAT SEN/CIRCUIT	P0113	2	×	EC-742
IAT SENSOR	P0127	2	×	EC-773
ISC SYSTEM/CIRC	P0505	2	×	EC-992
KNOCK SEN/CIRC-B1	P0327	2	—	EC-865
KNOCK SEN/CIRC-B1	P0328	2	—	EC-865
L/PRESS SOL/CIRC	P0745	2	×	AT-306
MAF SEN/CIRCUIT	P0101	2	×	EC-727
MAF SEN/CIRCUIT	P0102	1	×	EC-735
MAF SEN/CIRCUIT	P0103	2	×	EC-735
MULTI CYL MISFIRE	P0300	2	×	EC-857
NO DTC IS DETECTED. FORTHER TESTING MAY BE REQUIRED.	**P0000**	—	—	**—**
O/R CLTCH SOL/CIRC	P1760	2	×	AT-329
P-N POS SW/CIRCUIT	P1706	2	×	EC-1135
PNP SW/CIRC	P0705	2	×	AT-249
PURG VOLUME CONT/V	P0444	2	×	EC-928
PURG VOLUME CONT/V	P0445	2	×	EC-928
PURG VOLUME CONT/V	P1444	2	×	EC-1075
SFT SOL A/CIRC	P0750	2	×	AT-311
SFT SOL B/CIRC	P0755	2	×	AT-316
TCC SOLENOID/CIRC	P0740	2	×	AT-293
THERMSTAT FNCTN	P0128	2	×	EC-776
TP SEN/CIRC A/T	P1705	1	×	AT-321
TP SEN/CIRCUIT	P0121	2	×	EC-753
TP SEN/CIRCUIT	P0122	1	×	EC-762
TP SEN/CIRCUIT	P0123	1	×	EC-762
TW CATALYST SYS-B1	P0420	2	×	EC-903
TW CATALYST SYS-B2	P0430	2	×	EC-903
VC CUT/V BYPASS/V	P1491	2	×	EC-1117
VC/V BYPASS/V	P1490	2	×	EC-1111
VEH SPEED SEN/CIRC AT	P0720	2	×	AT-261
VEH SPEED SEN/CIRC	P0500	2	×	EC-987
VENT CONTROL VALVE	P0447	2	×	EC-935
VENT CONTROL VALVE	P1446	2	×	EC-1084
VENT CONTROL VALVE	P1448	2	×	EC-1090

*1: 1st trip DTC No. 1 is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: This DTC is displayed with CONSULT-II only.

DTC No. Index

UBS00DEE

×: Applicable —: Not applicable

DTC*1 *2 CONSULT-II GST	Items (CONSULT-II screen terms)	Trip	MIL Lighting up	Reference page
—	Unable to access ECM	—	—	EC-652
P0000	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	—
P0031	HO2S1 HTR (B1)	2	×	EC-711
P0032	HO2S1 HTR (B1)	2	×	EC-711
P0037	HO2S2 HTR (B1)	2	×	EC-719
P0038	HO2S2 HTR (B1)	2	×	EC-719
P0051	HO2S1 HTR (B2)	2	×	EC-711
P0052	HO2S1 HTR (B2)	2	×	EC-711
P0057	HO2S2 HTR (B2)	2	×	EC-719
P0058	HO2S2 HTR (B2)	2	×	EC-719
P0101	MAF SEN/CIRCUIT	2	×	EC-727
P0102	MAF SEN/CIRCUIT	1	×	EC-735
P0103	MAF SEN/CIRCUIT	2	×	EC-735
P0112	IAT SEN/CIRCUIT	2	×	EC-742
P0113	IAT SEN/CIRCUIT	2	×	EC-742
P0117	ECT SEN/CIRCUIT	1	×	EC-748
P0118	ECT SEN/CIRCUIT	1	×	EC-748
P0121	TP SEN/CIRCUIT	2	×	EC-753
P0122	TP SEN/CIRCUIT	1	×	EC-762
P0123	TP SEN/CIRCUIT	1	×	EC-762
P0125	ECT SENSOR	2	×	EC-770
P0127	IAT SENSOR	2	×	EC-773
P0128	THERMSTAT FNCTN	2	×	EC-776
P0132	HO2S1 (B1)	2	×	EC-778
P0133	HO2S1 (B1)	2	×	EC-787
P0134	HO2S1 (B1)	2	×	EC-799
P0138	HO2S2 (B1)	2	×	EC-809
P0139	HO2S2 (B1)	2	×	EC-818
P0152	HO2S1 (B2)	2	×	EC-778
P0153	HO2S1 (B2)	2	×	EC-787
P0154	HO2S1 (B2)	2	×	EC-799
P0158	HO2S2 (B2)	2	×	EC-809
P0159	HO2S2 (B2)	2	×	EC-818
P0171	FUEL SYS-LEAN-B1	2	×	EC-828
P0172	FUEL SYS-RICH-B1	2	×	EC-836
P0174	FUEL SYS-LEAN-B2	2	×	EC-828
P0175	FUEL SYS-RICH-B2	2	×	EC-836
P0181	FTT SENSOR	2	×	EC-843
P0182	FTT SEN/CIRCUIT	2	×	EC-848
P0183	FTT SEN/CIRCUIT	2	×	EC-848

DTC*1 *2 CONSULT-II GST	Items (CONSULT-II screen terms)	Trip	MIL Lighting up	Reference page
P0217	ENG OVER TEMP	1	×	EC-852
P0300	MULTI CYL MISFIRE	2	×	EC-857
P0301	CYL1 MISFIRE	2	×	EC-857
P0302	CYL2 MISFIRE	2	×	EC-857
P0303	CYL3 MISFIRE	2	×	EC-857
P0304	CYL4 MISFIRE	2	×	EC-857
P0305	CYL5 MISFIRE	2	×	EC-857
P0306	CYL6 MISFIRE	2	×	EC-857
P0327	KNOCK SEN/CIRC-B1	2	—	EC-865
P0328	KNOCK SEN/CIRC-B1	2	—	EC-865
P0335	CKP SEN/CIRCUIT	2	×	EC-869
P0340	CMP SEN/CIRCUIT	2	×	EC-875
P0400	EGR SYSTEM	2	×	EC-882
P0402	EGRC-BPT VALVE	2	×	EC-891
P0405	EGR TEMP SEN/CIRC	2	×	EC-897
P0406	EGR TEMP SEN/CIRC	2	×	EC-897
P0420	TW CATALYST SYS-B1	2	×	EC-903
P0430	TW CATALYST SYS-B2	2	×	EC-903
P0441	EVAP PURG FLOW/MON	2	×	EC-908
P0442	EVAP SMALL LEAK	2	×	EC-916
P0444	PURG VOLUME CONT/V	2	×	EC-928
P0445	PURG VOLUME CONT/V	2	×	EC-928
P0447	VENT CONTROL VALVE	2	×	EC-935
P0452	EVAP SYS PRES SEN	2	×	EC-941
P0453	EVAP SYS PRES SEN	2	×	EC-947
P0455	EVAP GROSS LEAK	2	×	EC-955
P0456	EVAP VERY SML LEAK	2	×	EC-966
P0460	FUEL LEV SEN SLOSH	2	×	EC-977
P0461	FUEL LEVEL SENSOR	2	×	EC-981
P0462	FUEL LEVL SEN/CIRC	2	×	EC-983
P0463	FUEL LEVL SEN/CIRC	2	×	EC-983
P0500	VEH SPEED SEN/CIRC	2	×	EC-987
P0505	ISC SYSTEM/CIRC	2	×	EC-992
P0510	CLOSED TP SW/CIRC	2	×	EC-999
P0600*3	A/T COMM LINE	2	—	EC-1006
P0605	ECM	2	×	EC-1012
P0705	PNP SW/CIRC	2	×	AT-249
P0710	ATF TEMP SEN/CIRC	2	×	AT-255
P0720	VEH SPD SEN/CIR AT	2	×	AT-261
P0725	ENGINE SPEED SIG	2	×	AT-266
P0731	A/T 1ST GR FNCTN	2	×	AT-270
P0732	A/T 2ND GR FNCTN	2	×	AT-276

DTC*1 *2 CONSULT-II GST	Items (CONSULT-II screen terms)	Trip	MIL Lighting up	Reference page
P0733	A/T 3RD GR FNCTN	2	×	AT-281
P0734	A/T 4TH GR FNCTN	2	×	AT-286
P0740	TCC SOLENOID/CIRC	2	×	AT-293
P0744	A/T TCC S/V FNCTN	2	×	AT-298
P0745	L/PRESS SOL/CIRC	2	×	AT-306
P0750	SFT SOL A/CIRC	1	×	AT-311
P0755	SFT SOL B/CIRC	1	×	AT-316
P1143	HO2S1 (B1)	2	×	EC-1014
P1144	HO2S1 (B1)	2	×	EC-1020
P1146	HO2S2 (B1)	2	×	EC-1027
P1147	HO2S2 (B1)	2	×	EC-1038
P1148	CLOSED LOOP-B1	1	×	EC-1048
P1163	HO2S1 (B2)	2	×	EC-1014
P1164	HO2S1 (B2)	2	×	EC-1020
P1166	HO2S2 (B2)	2	×	EC-1027
P1167	HO2S2 (B2)	2	×	EC-1038
P1168	CLOSED LOOP-B2	1	×	EC-1048
P1217	ENG OVER TEMP	1	×	EC-1050
P1336	CKP SENSOR (COG)	2	×	EC-1054
P1400	EGR SOLENOID/V	2	×	EC-1060
P1402	EGR SYSTEM	2	×	EC-1065
P1442	EVAP SMALL LEAK	2	×	EC-1073
P1444	PURG VOLUME CONT/V	2	×	EC-1075
P1446	VENT CONTROL VALVE	2	×	EC-1084
P1448	VENT CONTROL VALVE	2	×	EC-1090
P1456	EVAP VERY SML LEAK	2	×	EC-1098
P1464	FUEL LEVL SEN/CIRC	2	×	EC-1108
P1490	VC/V BYPASS/V	2	×	EC-1111
P1491	VC CUT/V BYPASS/V	2	×	EC-1117
P1605	A/T DIAG COMM LINE	2	×	EC-1129
P1705	TP SEN/CIRC A/T	1	×	AT-321
P1706	P-N POS SW/CIRCUIT	2	×	EC-1135
P1760	O/R CLTCH SOL/CIRC	2	×	AT-329

*1: 1st trip DTC No. is the same as DTC No.
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*3: This DTC is displayed with CONSULT-II only.

PRECAUTIONS

PFP:00001

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

UBS00EM6

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. This system may include seat belt switch inputs and dual stage front air bag modules. If equipped with dual stage front air bag modules, the SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

The vehicle may be equipped with a passenger air bag deactivation switch. Because no rear seat exists where a rear-facing child restraint can be placed, the switch is designed to turn off the passenger air bag so that a rear-facing child restraint can be used in the front passenger seat. The switch is located in the center of the instrument panel, near the ashtray. When the switch is turned to the ON position, the passenger air bag is enabled and could inflate for certain types of collision. When the switch is turned to the OFF position, the passenger air bag is disabled and will not inflate. A passenger air bag OFF indicator on the instrument panel lights up when the passenger air bag is switched OFF. The driver air bag always remains enabled and is not affected by the passenger air bag deactivation switch.

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.**
- **The vehicle may be equipped with a passenger air bag deactivation switch which can be operated by the customer. When the passenger air bag is switched OFF, the passenger air bag is disabled and will not inflate. When the passenger air bag is switched ON, the passenger air bag is enabled and could inflate for certain types of collision. After SRS maintenance or repair, make sure the passenger air bag deactivation switch is in the same position (ON or OFF) as when the vehicle arrived for service.**

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

UBS00DEG

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

CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-4, "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 EGR 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.**

Precautions

UBS00DEH

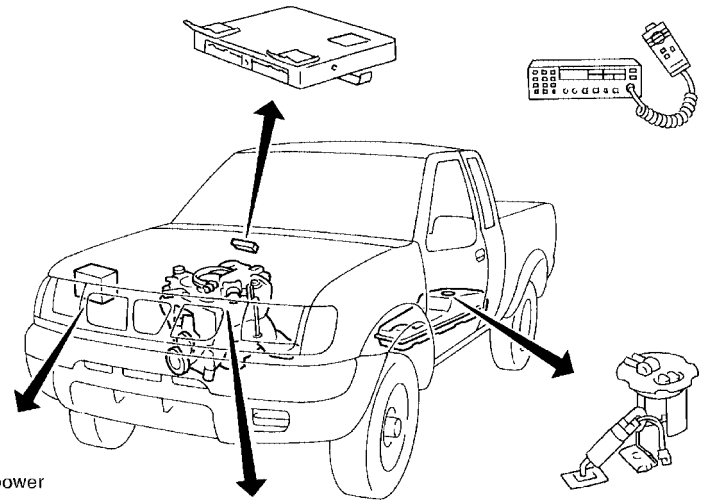
ECM

- 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.

WIRELESS EQUIPMENT

- When installing CB ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.

1) Keep the antenna as far away as possible from the electronic control units.
2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls.
   Do not let them run parallel for a long distance.
3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
4) Be sure to ground the radio to vehicle body.



BATTERY

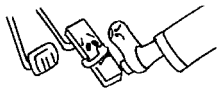
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.

WHEN STARTING

- 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.

ECM PARTS HANDLING

- 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 IACV-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the camshaft position sensor or crankshaft position sensor (OBD).



FUEL PUMP

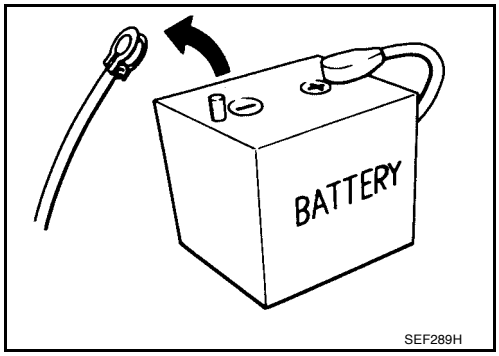
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque. (Refer to MA section.)

ECM HARNESS HANDLING

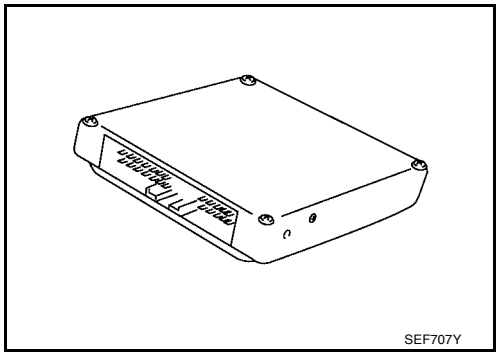
- Securely connect ECM harness connectors.
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep ECM harness at least 10 cm (3.9 in.) away from adjacent harnesses to prevent an engine control system malfunction due to recieving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

LEC027A

- 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.

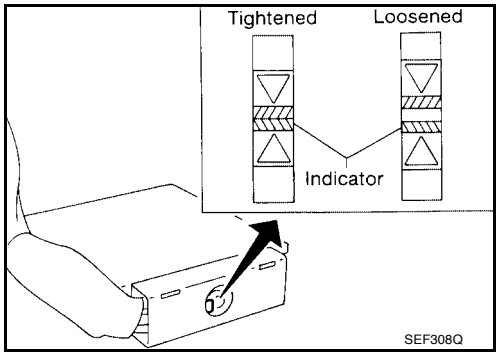


- Do not disassemble ECM.
- If a battery terminal is disconnected, the memory will return to the ECM value.
  The ECM will not start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not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

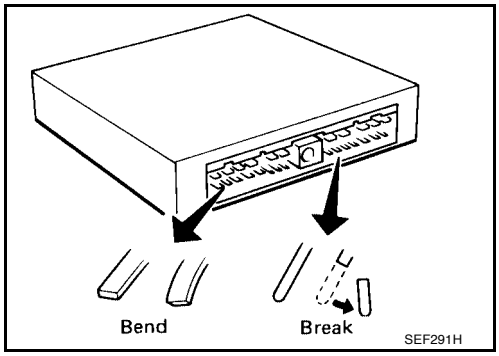


- When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.

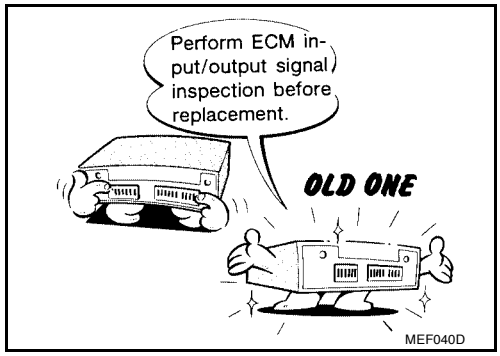
  : 3 - 5 N·m (0.3 - 0.5 kg-m, 26 - 43 in-lb)

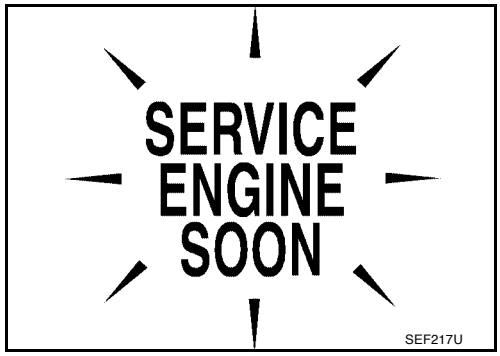


- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.
  A poor connection can cause an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

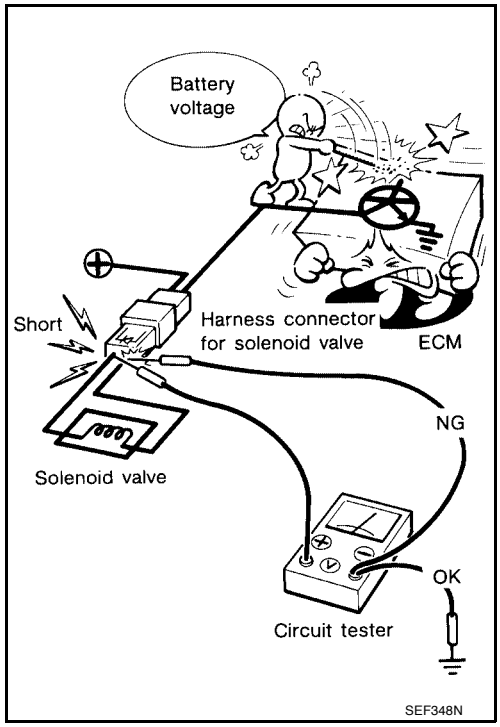


- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-673, "ECM Terminals and Reference Value" .**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor' crankshaft position sensor (OBD).**
- **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.

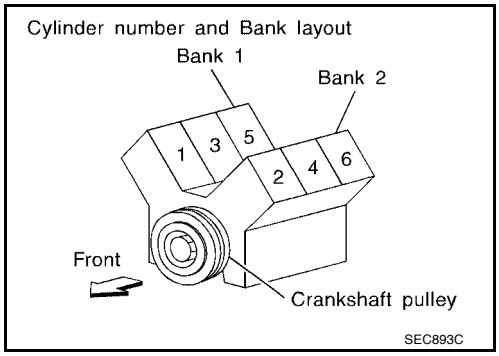




- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to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



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



Wiring Diagrams and Trouble Diagnosis

UBS00DEI

When you read Wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams"
- PG-9, "POWER SUPPLY ROUTING"

When you perform trouble diagnosis, refer to the following:

- GI-9, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident"

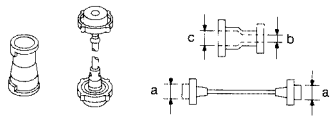
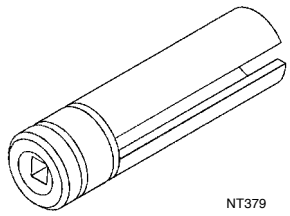
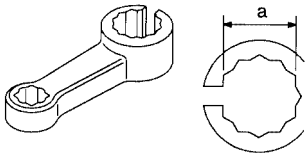
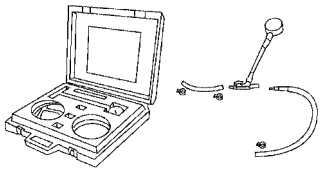
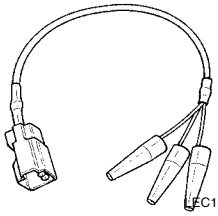
PREPARATION

PFP:00002

Special Service Tools

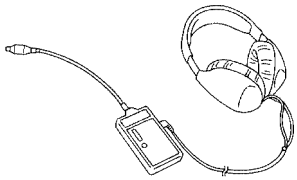
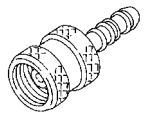
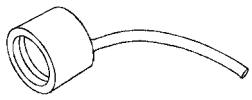
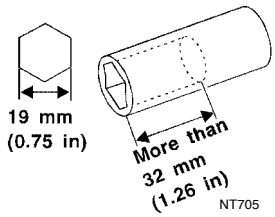
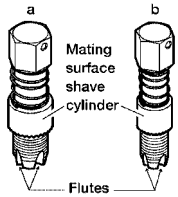
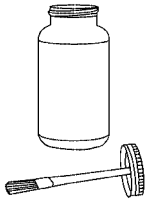
UBS00DEJ

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	
EG17650301 (J-33984-A) Radiator cap tester adapter	 S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
KV10117100 (J-36471-A) Heated oxygen sensor wrench	 NT379	Loosening or tightening heated oxygen sensor 1 with 22 mm (0.87 in) hexagon nut
KV10114400 (J-38365) Heated oxygen sensor wrench	 NT636	Loosening or tightening heated oxygen sensor 2 **a: 22 mm (0.87 in)**
(J-44321) Fuel pressure gauge kit	 LEC642	Checking fuel pressure
(J-45178) TPS test connector	 LEC120A	Used to test the throttle position sensor

Commercial Service Tools

UBS00DEK

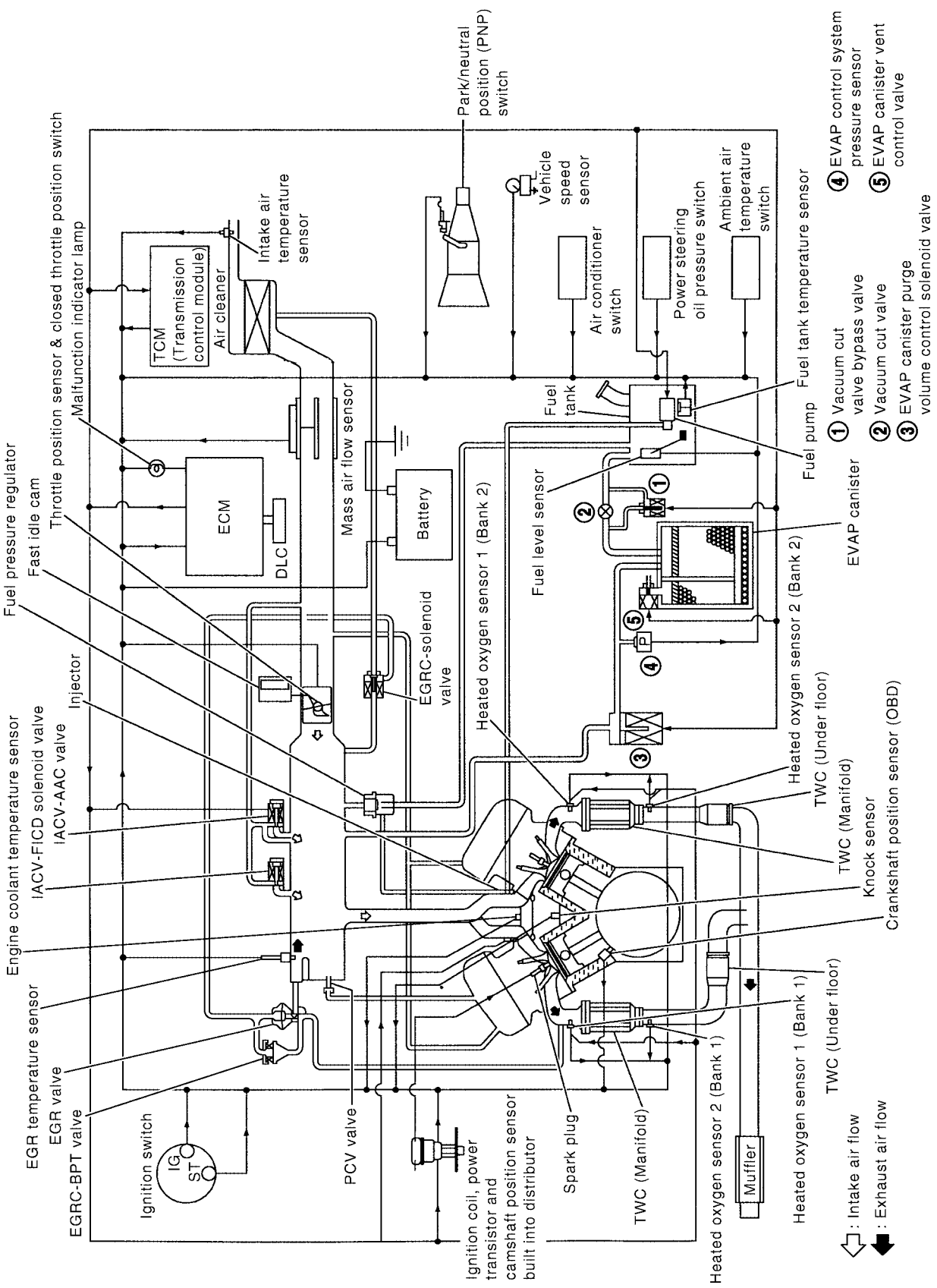
Tool name (Kent-Moore No.)	Description	
Leak detector i.e.: (J-41416)	 NT703	Locating the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)	 NT704	Applying positive pressure through EVAP service port
Fuel filler cap adapter	 NT653	Checking fuel tank vacuum relief valve opening pressure
Socket wrench	 NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	 AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown in “Commercial Service Tools”. a: J-43897-18 (18 mm diameter with pitch 1.5 mm) for Zirconia Oxygen Sensor b: J-43897-12 (12 mm diameter with pitch 1.25 mm) for Titania Oxygen Sensor
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 AEM489	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

ENGINE CONTROL SYSTEM

PFP:23710

System Diagram

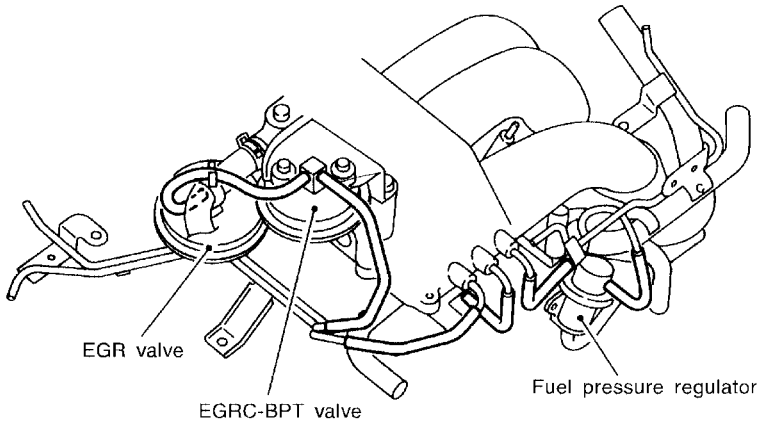
UBS00DEL

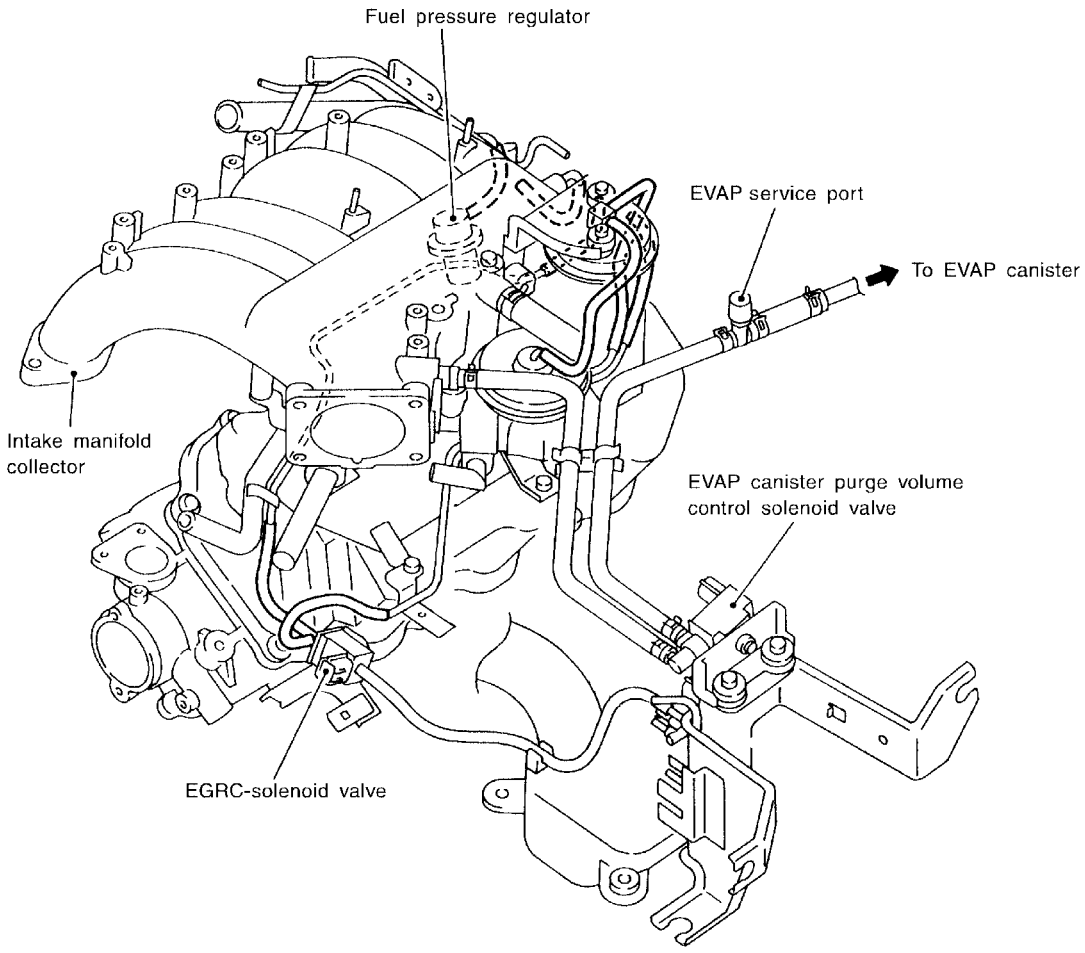


PBIB1464E

Vacuum Hose Drawing

UBS00DEM





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

BBIA0183E

Refer to EC-603, "System Diagram" for Vacuum Control System.

System Chart

UBS00DEN

Input (Sensor)	ECM Function	Output (Actuator)
• Camshaft position sensor • Mass air flow sensor • Engine coolant temperature sensor • Heated oxygen sensor 1 • Ignition switch • Throttle position sensor • Closed throttle position switch*4 • Park/neutral position (PNP) switch • Air conditioner switch • Knock sensor • Intake air temperature sensor • EVAP control system pressure sensor*1 • Battery voltage • Power steering oil pressure switch • Vehicle speed sensor • Fuel tank temperature sensor*1 • Crankshaft position sensor (OBD)*1 • Heated oxygen sensor 2*3 • TCM (Transmission control module)*2 • Ambient air temperature switch	Fuel injection & mixture ratio control	Fuel injector
	Distributor ignition system	Power transistor
	Idle air control system	IACV-AAC valve and IACV-FICD solenoid valve
	Fuel pump control	Fuel pump relay
	On board diagnostic system	MIL (On the instrument panel)
	EGR control	EGRC-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
	ON BOARD DIAGNOSIS for EVAP system	• EVAP canister vent control valve • Vacuum cut valve bypass valve

*1: This sensor is not used to control the engine system. This is used only for the on board diagnosis.
*2: The DTC related to A/T will be sent to ECM.
*3: This sensor is not used to control the engine system under normal conditions.
*4: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

Multiport Fuel Injection (MFI) System

UBS00DEO

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Fuel injection & mixture ratio control	Fuel injector
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 Throttle valve idle position		
Park/neutral position (PNP) switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2*	Density of oxygen in exhaust gas		

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

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 camshaft position sensor and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

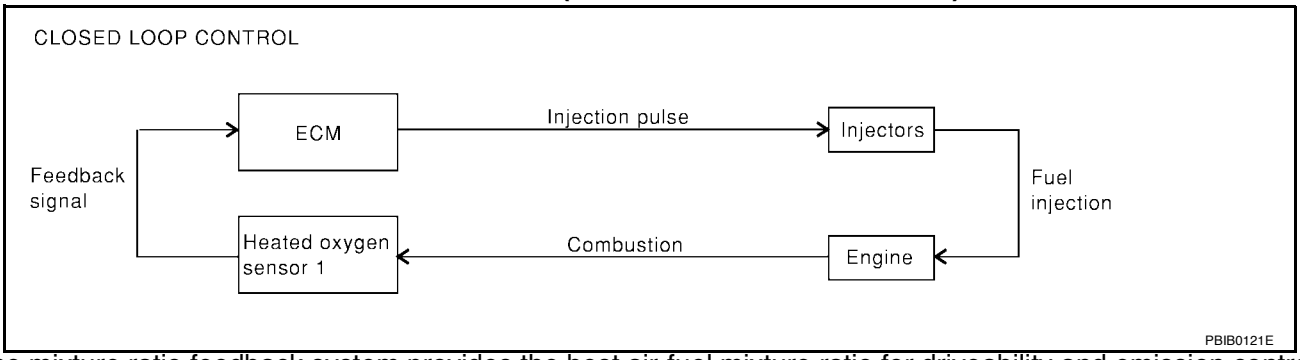
<Fuel increase>

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

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses a heated oxygen sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1, refer to EC-778 . 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 the heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from the 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.

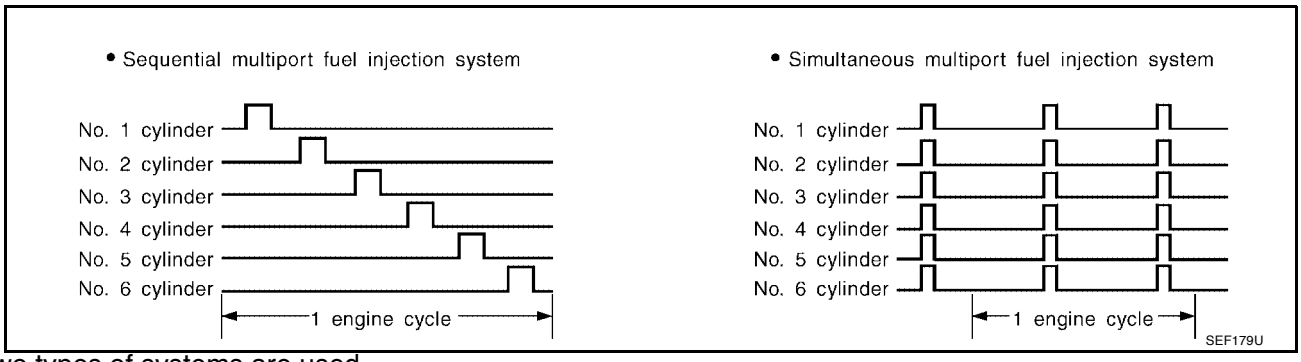
- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 or its circuit
- Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the 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 wire) 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 the 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 six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The six 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.

Distributor Ignition (DI) System

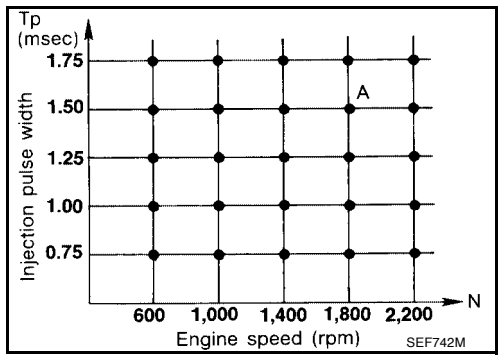
UBS00DEP

INPUT/OUTPUT SIGNAL CHART

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

SYSTEM DESCRIPTION

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM. This data forms the map shown.
The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
e.g., N: 1,800 rpm, Tp: 1.50 msec
A °BTDC



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

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

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

Air Conditioner Cut Control

UBS00DEQ

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner ON signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Camshaft position sensor	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Vehicle speed sensor	Vehicle speed		
Power steering oil pressure switch	Power steering operation		

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.

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

UBS00DER

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Fuel injector
Park/neutral position (PNP) switch	Neutral position		
Throttle position sensor	Throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Camshaft position sensor	Engine speed		

SYSTEM DESCRIPTION

If the engine speed is above 2,500 rpm under no load (for example, the shift position is neutral and engine speed is over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.
Fuel cut will be operated until the engine speed reaches 2,000 rpm, then fuel cut will be cancelled.

NOTE:
This function is different from deceleration control listed under EC-605, "Multiport Fuel Injection (MFI) System"
.

BASIC SERVICE PROCEDURE

PFP:00018

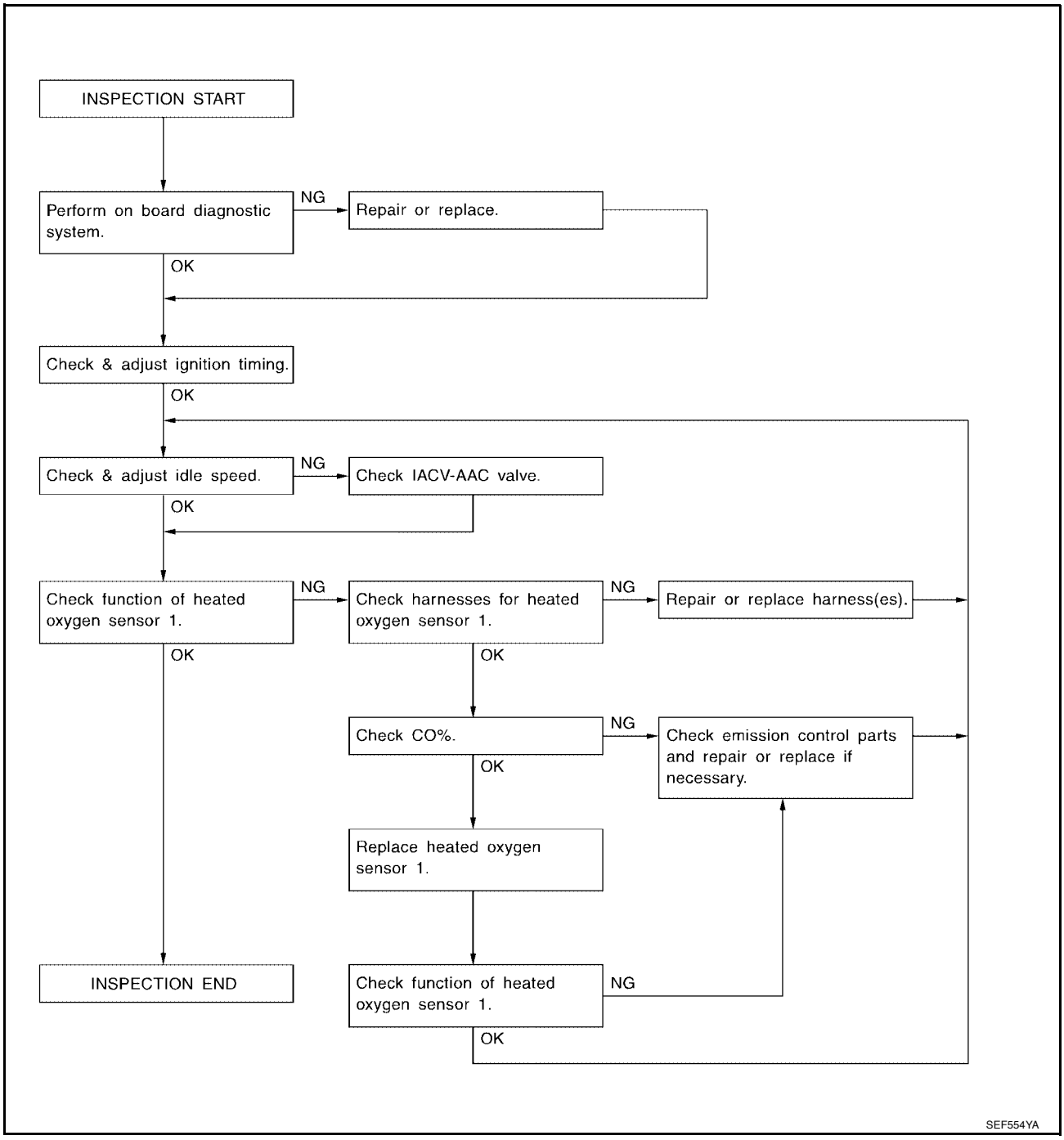
Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

UBS00DES

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 defogger.
6. Keep front wheels pointed straight ahead.
7. Make the check after the cooling fan has stopped.

OVERALL INSPECTION SEQUENCE

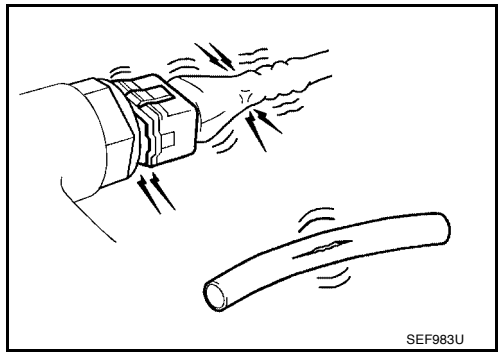


NOTE:
If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be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

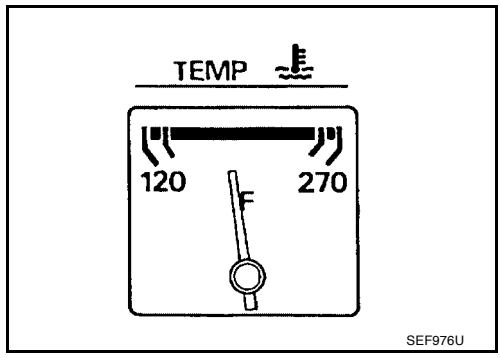
INSPECTION PROCEDURE

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket



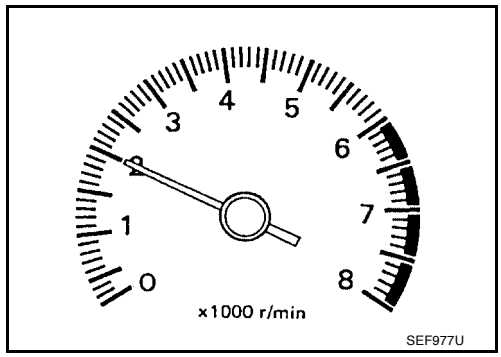
3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
4. Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- Electrical connectors
- Gasket
- Throttle valve and throttle position sensor operation
5. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge. Ensure engine stays below 1,000 rpm.



6. Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no load.
7. Make sure that no DTC is displayed with CONSULT-II or GST.

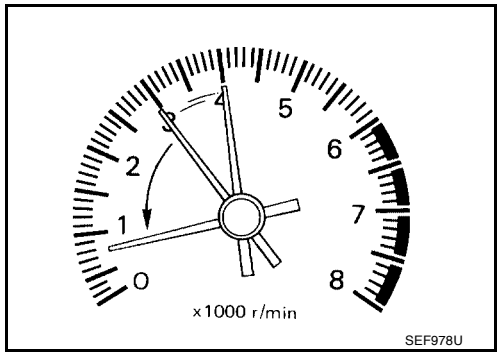
OK or NG

OK >> GO TO 2.
NG >> 1. Repair or replace components as necessary.
2. GO TO 2.

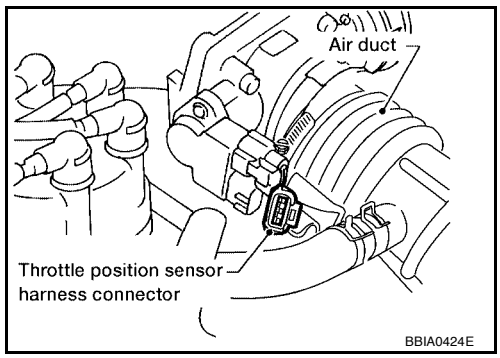


2. CHECK IGNITION TIMING

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.



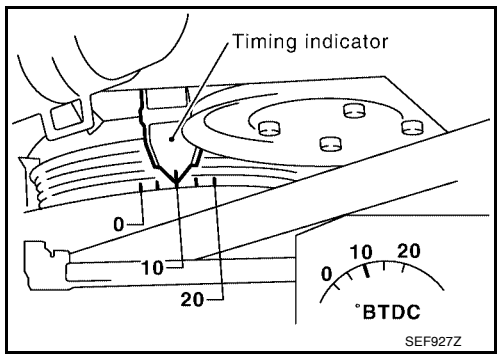
3. Stop engine and disconnect throttle position sensor harness connector.
4. Start and rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run at idle speed.



5. Check ignition timing with a timing light.

M/T: 10±5° BTDC (in Neutral position)

A/T: 10±5° BTDC (in P or N position)



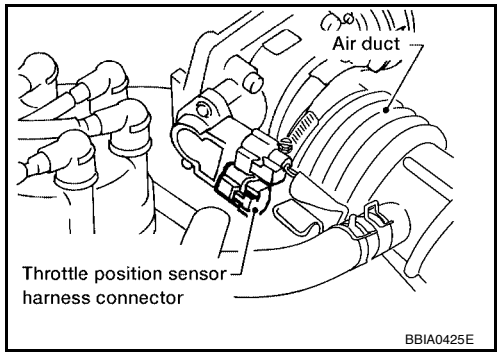
OK or NG

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

3. ADJUST IGNITION TIMING

1. Adjust ignition timing by turning distributor after loosening securing bolts.
2. Stop engine and connect throttle position sensor harness connector to throttle position sensor.

>> GO TO 2.

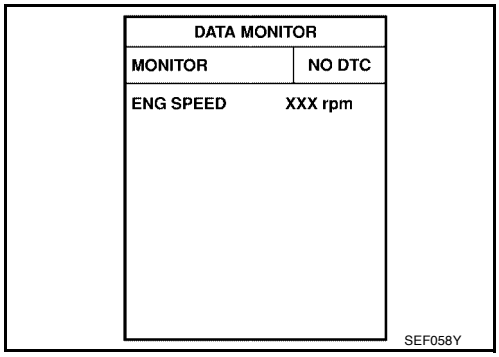


4. CHECK BASE IDLE SPEED

With CONSULT-II

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

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



Without CONSULT-II

1. Check idle speed.

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

OK or NG

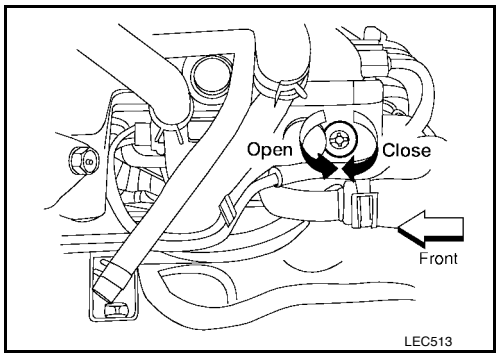
OK >> GO TO 6.
NG >> GO TO 5.

5. ADJUST BASE IDLE SPEED

1. Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run engine at idle speed.
2. Adjust idle speed by turning idle speed adjusting screw.

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

   >> GO TO 6.

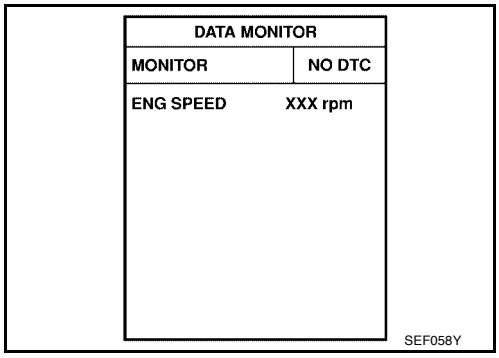


6. CHECK TARGET IDLE SPEED

With CONSULT-II

1. Stop engine and connect throttle position sensor harness connector.
2. Start and rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed.
3. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

   M/T: 750±50 rpm (in Neutral position)
   A/T: 750±50 rpm (in P or N position)



Without CONSULT-II

1. Stop engine and connect throttle position sensor harness connector.
2. Start and rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed.
3. Check idle speed.

   M/T: 750±50 rpm (in Neutral position)
   A/T: 750±50 rpm (in P or N position)

OK or NG

OK (With CONSULT-II)>>GO TO 8.
OK (Without CONSULT-II)>>GO TO 9.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

1. Check IACV-AAC valve and replace if necessary. Refer to EC-992 .
2. Check IACV-AAC valve harness and repair if necessary. Refer to EC-992 .
3. Check ECM function by substituting another known-good ECM.
   (ECM may be the cause of an incident, but this is a rare case.)

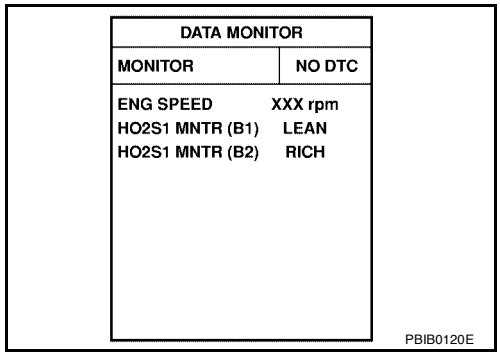
With CONSULT-II>>GO TO 8.
Without CONSULT-II>>GO TO 9.

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

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no load.
2. See “HO2S1 MNTR (B2)” in “DATA MONITOR” mode.
3. Running engine at 2,000 rpm under no-load (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



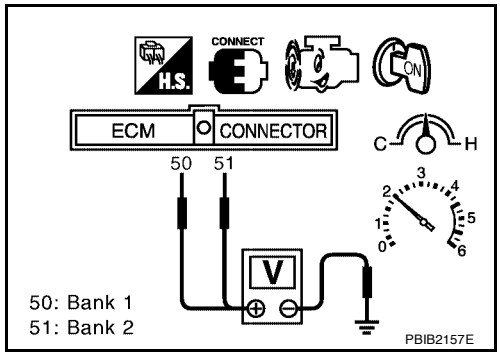
OK or NG

OK >> GO TO 12.
NG (Monitor does not fluctuate.)>>GO TO 17.
NG (Monitor fluctuates less than 5 times.)>>GO TO 10.

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

Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no load.
2. Set voltmeter probe between ECM terminal 51 and ground.
3. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   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



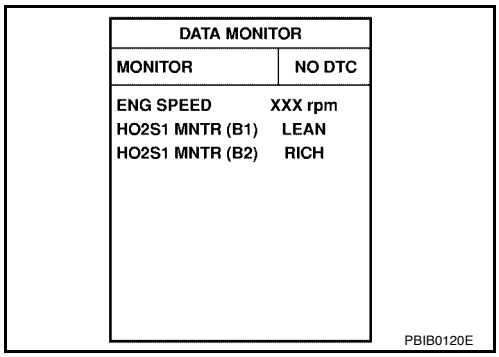
OK or NG

OK >> GO TO 12.
NG (Voltage does not fluctuate.)>>GO TO 17.
NG (Voltage fluctuates less than 5 times.)>>GO TO 10.

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

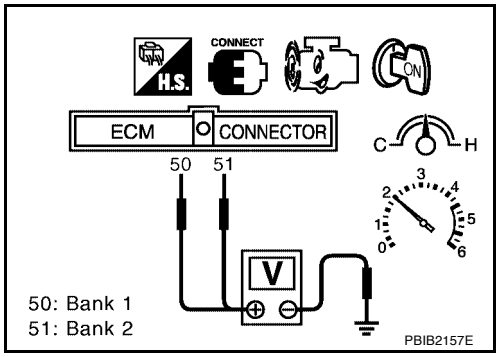
With CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (bank 2).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
5. See “HO2S1 MNTR (B2)” in “DATA MONITOR” mode.
6. Running engine at 2,000 rpm under no load (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



Without CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (bank 2).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no load.
5. Set voltmeter probe between ECM terminal 51 and ground.
6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   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



OK or NG

OK (With CONSULT-II)>>GO TO 12.
OK (Without CONSULT-II)>>GO TO 13.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

1. Check fuel pressure regulator. Refer to EC-623 .
2. Check mass air flow sensor and its circuit. Refer to EC-727 .
3. Check injector and its circuit. Refer to EC-1148 .
   Clean or replace if necessary.
4. Check engine coolant temperature sensor and its circuit. Refer to EC-748 .
5. Check ECM function by substituting another known-good ECM.
   (ECM may be the cause of an incident, but this is a rare case.)

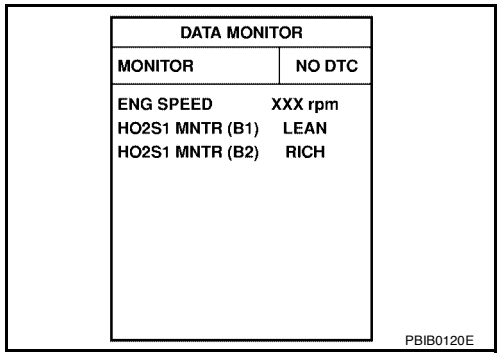
>> GO TO 2.

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

With CONSULT-II

1. See “HO2S1 (B1)” in “DATA MONITOR” mode.
2. Maintaining engine at 2,000 rpm under no load (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



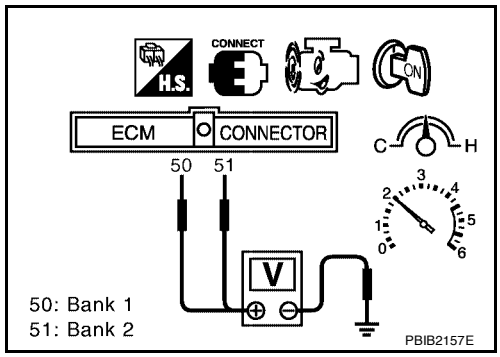
OK or NG

OK >> **INSPECTION END**.
NG (Monitor does not fluctuate.)>>GO TO 16.
NG (Monitor fluctuates less than 5 times.)>>GO TO 14.

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

Without CONSULT-II

1. Set voltmeter probe between ECM terminal 50 and ground.
2. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   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



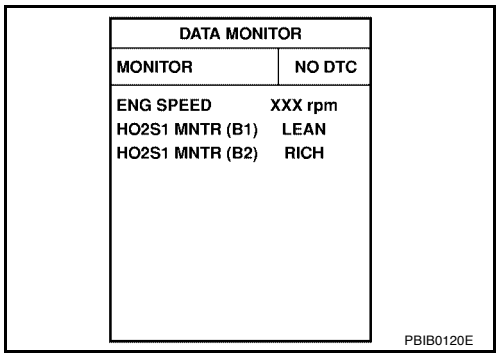
OK or NG

OK >> **INSPECTION END**.
NG (Voltage does not fluctuate.)>>GO TO 16.
NG (Voltage fluctuates less than 5 times.)>>GO TO 14.

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

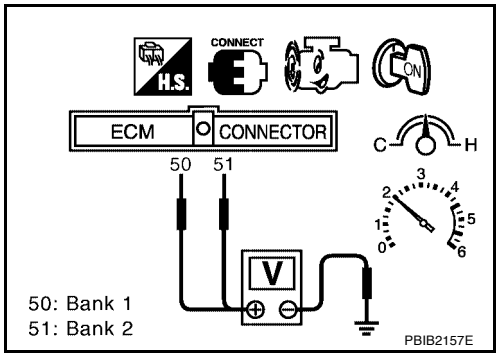
With CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (bank 1).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no load.
5. See “HO2S1 MNTR (B1)” in “DATA MONITOR” mode.
6. Maintaining engine at 2,000 rpm under no-load (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



Without CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (bank 1).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no load.
5. Set voltmeter probe between ECM terminal 50 and ground.
6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   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



OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.

1. Check fuel pressure regulator. Refer to EC-623 .
2. Check mass air flow sensor and its circuit. Refer to EC-727 .
3. Check injector and its circuit. Refer to EC-1148 .
   Clean or replace if necessary.
4. Check engine coolant temperature sensor and its circuit. Refer to EC-748 .
5. Check ECM function by substituting another known-good ECM.
   (ECM may be the cause of an incident, but this is a rare case.)

>> GO TO 2.

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

1. Stop engine 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 50 and heated oxygen sensor 1 (bank 1) harness connector.

Continuity should exist.

OK or NG

OK >> 1. Connect ECM harness connector.
2. GO TO 18.

NG >> 1. Repair or replace harness.
2. GO TO 8 (With CONSULT-II).
GO TO 9 (Without CONSULT-II).

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

1. Stop engine 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 51 and heated oxygen sensor 1 (bank 2) harness connector.

Continuity should exist.

OK or NG

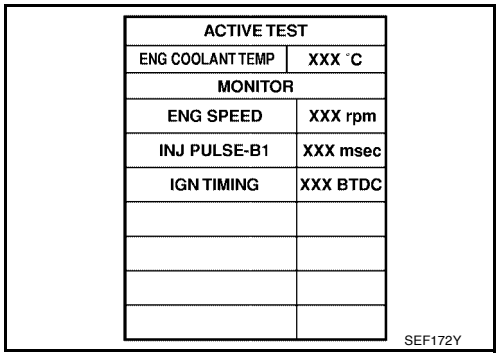
OK >> 1. Connect ECM harness connector.
2. GO TO 18.

NG >> 1. Repair or replace harness.
2. GO TO 8 (With CONSULT-II).
GO TO 9 (Without CONSULT-II).

18. PREPARATION FOR CO% CHECK

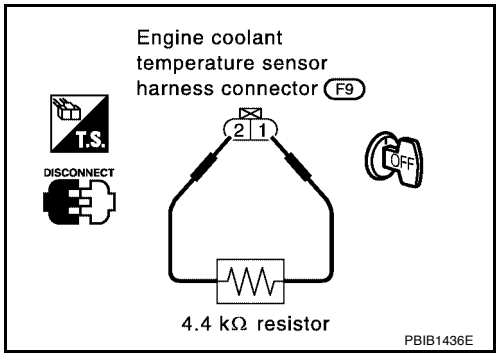
With CONSULT-II

1. Select “ENG COOLANT TEMP” in “ACTIVE TEST” mode.
2. Set “ENG COOLANT TEMP” to 5°C (41°F) by touching “DWN” and “Qd”.



Without CONSULT-II

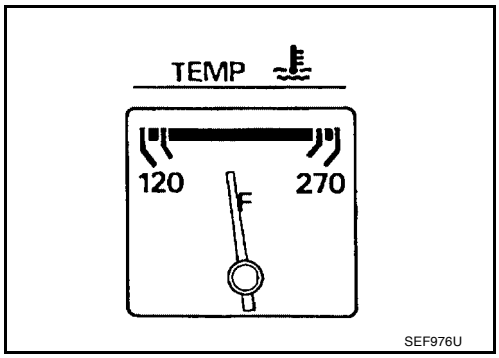
1. Disconnect engine coolant temperature sensor harness connector.
2. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.



>> GO TO 19.

19. CHECK CO%

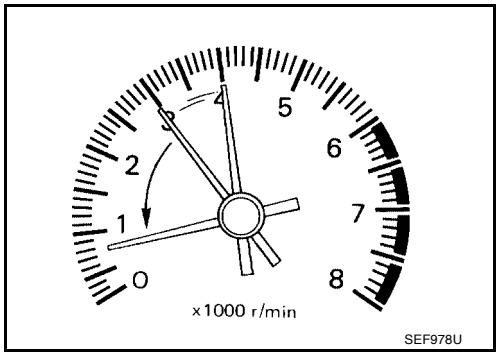
1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.



2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
3. Check CO%.

Idle CO: 1.5 - 9.5%

4. **Without CONSULT-II**
   After checking CO%,



- Disconnect the resistor from terminals of engine coolant temperature sensor.
- Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.

OK or NG

OK >> GO TO 10.
NG >> GO TO 20.

20. DETECT MALFUNCTIONING PART

Check the following.

1. Connect heated oxygen sensor 1 harness connectors to heated oxygen sensors 1.
2. Check fuel pressure regulator. Refer to EC-623 .
3. Check mass air flow sensor and its circuit. Refer to EC-727 .
4. Check injector and its circuit. Refer to EC-1148 .
   Clean or replace if necessary.
5. Check engine coolant temperature sensor and its circuit. Refer to EC-748 .
6. Check ECM function by substituting another known-good ECM.
   (ECM may be the cause of an incident, but this is a rare case.)

>> GO TO 2.

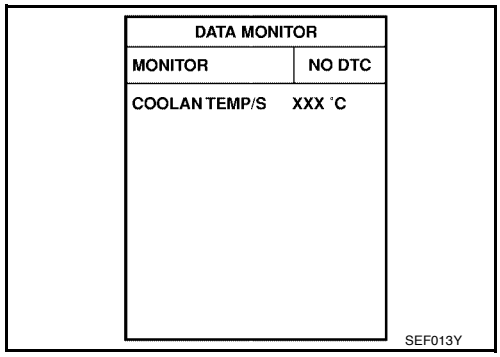
Fast Idle Cam (FIC) Inspection and Adjustment

UBS00DET

OPERATION PROCEDURE

With CONSULT-II

1. Turn ignition switch ON.
2. See “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.



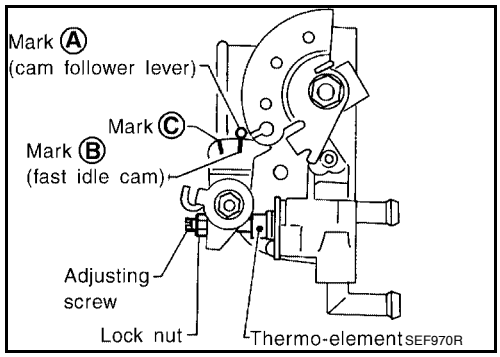
3. When engine coolant temperature is 20 to 30°C (68 to 86°F), make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.

- If NG, adjust by turning adjusting screw.

Lock nut

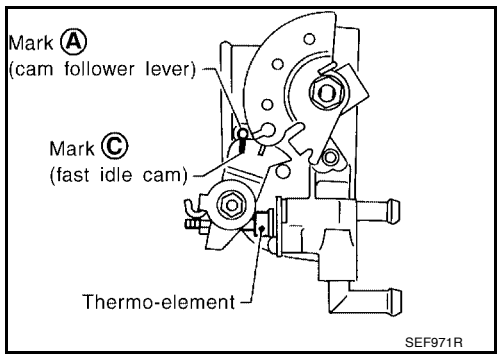
: 0.98 - 1.96 N·m (10 - 20 kg-cm, 8.7 - 17.4 in-lb)

4. Start engine and warm it up.



5. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.
   - The center of mark **A** is aligned with mark **C** .
   - The cam follower lever's roller is not touching the fast idle cam.

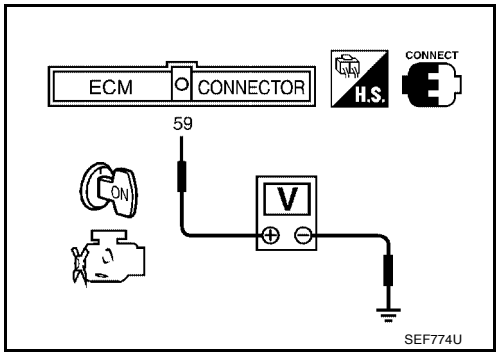
- If NG, replace thermo-element and perform the above inspection and adjustment again.



With GST

1. Turn ignition switch ON.

2. Check voltage between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.

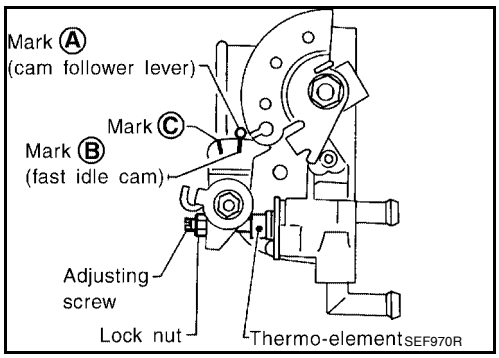


3. When the voltage is between 3.12 to 3.52V, make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.
- If NG, adjust by turning adjusting screw.

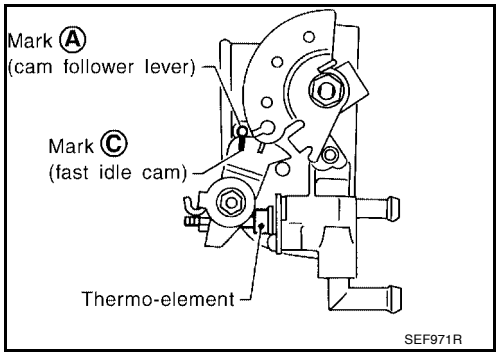
Lock nut

: 0.98 - 1.96 N·m (10 - 20 kg-cm, 8.7 - 17.4 in-lb)

4. Start engine and warm it up.



5. When the voltage is between 1.10 to 1.36V, check the following.
   - The center of mark **A** is aligned with mark **C** .
   - The cam follower lever's roller is not touching the fast idle cam.
- If NG, replace thermo-element and perform the above inspection and adjustment again.



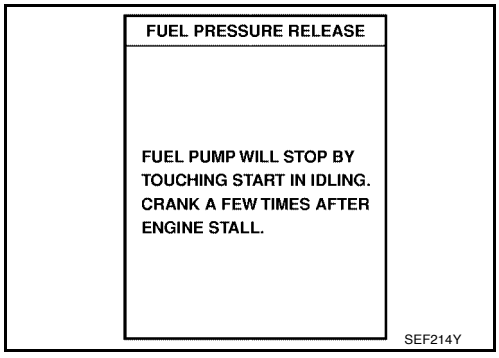
Fuel Pressure Check

UBS00DEU

FUEL PRESSURE RELEASE

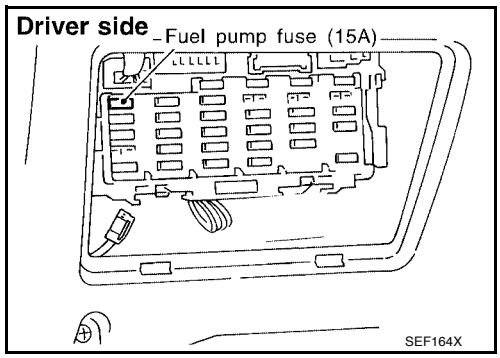
With CONSULT-II

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.



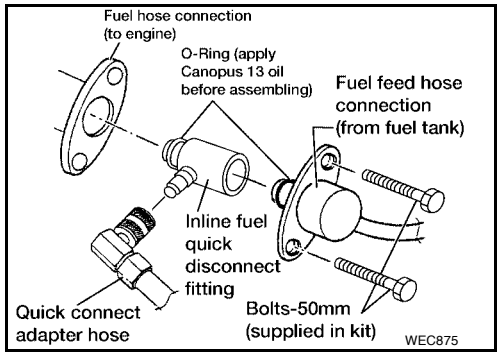
FUEL PRESSURE CHECK

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

NOTE:

- **Use Fuel Pressure Gauge Kit J-44321 to check fuel pressure.**
- **Do not perform fuel pressure check with electrical system operating (i.e. lights, A/C etc.). Fuel pressure gauge may indicate false readings due to varying engine loads and changes in manifold vacuum.**

1. Release fuel pressure to zero.
2. Install the inline fuel quick disconnect fitting between the connection of the fuel feed hose (from tank) and the fuel hose (to engine).
3. Connect the fuel pressure test gauge (quick connect adapter hose) to the quick disconnect fitting.
4. Turn ignition switch ON and check for fuel leakage.
5. Start engine and check for fuel leakage.
6. Read the indication of fuel pressure gauge.



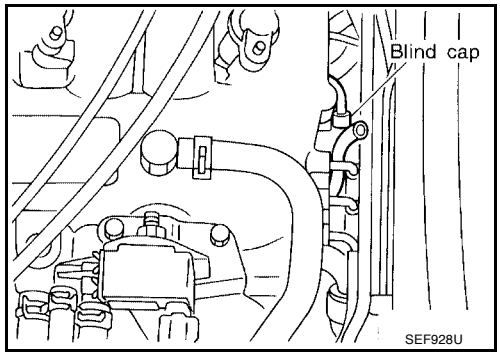
At idling:	
With vacuum hose connected	**Approximately 235 kPa (2.4 kg/cm^2 , 34 psi)**
With vacuum hose disconnected	**Approximately 294 kPa (3.0 kg/cm^2 , 43 psi)**

If results are unsatisfactory, perform Fuel Pressure Regulator Check.

Fuel Pressure Regulator Check

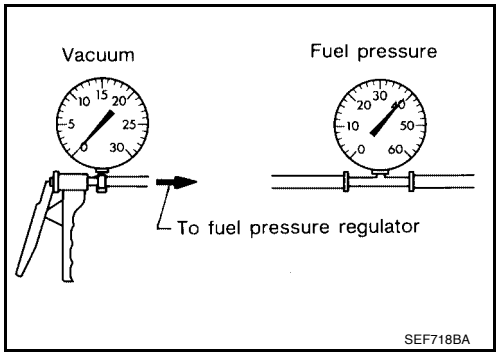
UBS00DEV

1. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
2. Plug intake manifold 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

UBS00DEW

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.

X: Applicable —: Not applicable

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

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

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-652 .)

Two Trip Detection Logic

UBS00DEX

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.

X: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip display-ing	2nd trip display-ing	1st trip display-ing	2nd trip display-ing
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	×	—	—	—	—	—	X	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnosis (refer to EC-590 .)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

Emission-related Diagnostic Information

UBS00DEY

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1 *2 CONSULT-II GST	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	—	—	—	—
HO2S1 HTR (B1)	P0031	×	×	×*4	EC-711
HO2S1 HTR (B1)	P0032	×	×	×*4	EC-711
HO2S2 HTR (B1)	P0037	×	×	×*4	EC-719
HO2S2 HTR (B1)	P0038	×	×	×*4	EC-719
HO2S1 HTR (B2)	P0051	×	×	×*4	EC-711
HO2S1 HTR (B2)	P0052	×	×	×*4	EC-711
HO2S2 HTR (B2)	P0057	×	×	×*4	EC-719
HO2S2 HTR (B2)	P0058	×	×	×*4	EC-719
MAF SEN/CIRCUIT	P0101	—	—	X	EC-727
MAF SEN/CIRCUIT	P0102	—	—	—	EC-735
MAF SEN/CIRCUIT	P0103	—	—	×	EC-735
IAT SEN/CIRCUIT	P0112	—	—	×	EC-742
IAT SEN/CIRCUIT	P0113	—	—	×	EC-742
ECT SEN/CIRCUIT	P0117	—	—	—	EC-748
ECT SEN/CIRCUIT	P0118	—	—	—	EC-748
TP SEN/CIRCUIT	P0121	—	—	×	EC-753
TP SEN/CIRCUIT	P0122	—	—	—	EC-762
TP SEN/CIRCUIT	P0123	—	—	—	EC-762
ECT SENSOR	P0125	—	—	×	EC-770
IAT SENSOR	P0127	—	—	×	EC-773
THERMSTAT FNCTN	P0128	—	—	×	EC-776
HO2S1 (B1)	P0132	—	×	×	EC-778
HO2S1 (B1)	P0133	×	×	×*4	EC-787
HO2S1 (B1)	P0134	—	×	×	EC-799
HO2S2 (B1)	P0138	—	×	×	EC-809
HO2S2 (B1)	P0139	×	×	×*4	EC-818
HO2S1 (B2)	P0152	—	×	×	EC-778
HO2S1 (B2)	P0153	×	×	×*4	EC-787
HO2S1 (B2)	P0154	—	×	×	EC-799
HO2S2 (B2)	P0158	—	×	×	EC-809
HO2S2 (B2)	P0159	×	×	×*4	EC-818
FUEL SYS-LEAN-B1	P0171	—	—	×	EC-828
FUEL SYS-RICH-B1	P0172	—	—	×	EC-836
FUEL SYS-LEAN-B2	P0174	—	—	×	EC-828
FUEL SYS-RICH-B2	P0175	—	—	×	EC-836
FTT SENSOR	P0181	—	—	×	EC-843

Items (CONSULT-II screen terms)	DTC*1 *2 CONSULT-II GST	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
FTT SEN/CIRCUIT	P0182	—	—	×	EC-848
FTT SEN/CIRCUIT	P0183	—	—	×	EC-848
ENG OVER TEMP	P0217	—	—	—	EC-852
MULTI CYL MISFIRE	P0300	—	—	×	EC-857
CYL1 MISFIRE	P0301	—	—	×	EC-857
CYL2 MISFIRE	P0302	—	—	×	EC-857
CYL3 MISFIRE	P0303	—	—	×	EC-857
CYL4 MISFIRE	P0304	—	—	×	EC-857
CYL5 MISFIRE	P0305	—	—	×	EC-857
CYL6 MISFIRE	P0306	—	—	×	EC-857
KNOCK SEN/CIRC-B1	P0327	—	—	×	EC-865
KNOCK SEN/CIRC-B1	P0328	—	—	×	EC-865
CKP SEN/CIRCUIT	P0335	—	—	×	EC-869
CMP SEN/CIRCUIT	P0340	—	—	×	EC-875
EGR SYSTEM	P0400	×	×	×*4	EC-882
EGRC-BPT VALVE	P0402	×	×	×*4	EC-891
EGR TEMP SEN/CIRC	P0405	—	—	×	EC-897
EGR TEMP SEN/CIRC	P0406	—	—	×	EC-897
TW CATALYST SYS-B1	P0420	×	×	×*4	EC-903
TW CATALYST SYS-B2	P0430	×	×	×*4	EC-903
EVAP PURG FLOW/MON	P0441	×	×	×*4	EC-908
EVAP SMALL LEAK	P0442	×	×	×*4	EC-916
PURG VOLUME CONT/V	P0444	—	—	×	EC-928
PURG VOLUME CONT/V	P0445	—	—	×	EC-928
VENT CONTROL VALVE	P0447	—	—	×	EC-935
EVAP SYS PRES SEN	P0452	—	—	×	EC-941
EVAP SYS PRES SEN	P0453	—	—	×	EC-947
EVAP GROSS LEAK	P0455	—	×	×	EC-955
EVAP VERY SML LEAK	P0456	×*3	×	×*4	EC-966
FUEL LEV SEN SLOSH	P0460	—	—	×	EC-977
FUEL LEVEL SENSOR	P0461	—	—	×	EC-981
FUEL LEVL SEN/CIRC	P0462	—	—	×	EC-983
FUEL LEVL SEN/CIRC	P0463	—	—	×	EC-983
VEH SPEED SEN/CIRC	P0500	—	—	×	EC-987
ISC SYSTEM/CIRC	P0505	—	—	×	EC-992
CLOSED TP SW/CIRC	P0510	—	—	×	EC-999
A/T COMM LINE	P0600	—	—	×	EC-1006
ECM	P0605	—	—	×	EC-1012
PNP SW/CIRC	P0705	—	—	×	AT-249
ATF TEMP SEN/CIRC	P0710	—	—	×	AT-255
VEH SPD SEN/CIR AT	P0720	—	—	×	AT-261

Items (CONSULT-II screen terms)	DTC*1 *2 CONSULT-II GST	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
ENGINE SPEED SIG	P0725	—	—	×	AT-266
A/T 1ST GR FNCTN	P0731	—	—	×	AT-270
A/T 2ND GR FNCTN	P0732	—	—	×	AT-276
A/T 3RD GR FNCTN	P0733	—	—	×	AT-281
A/T 4TH GR FNCTN	P0734	—	—	×	AT-286
TCC SOLENOID/CIRC	P0740	—	—	×	AT-293
A/T TCC S/V FNCTN	P0744	—	—	×	AT-298
L/PRESS SOL/CIRC	P0745	—	—	×	AT-306
SFT SOL A/CIRC	P0750	—	—	—	AT-311
SFT SOL B/CIRC	P0755	—	—	—	AT-316
HO2S1 (B1)	P1143	×	×	×*4	EC-1014
HO2S1 (B1)	P1144	×	×	×*4	EC-1020
HO2S2 (B1)	P1146	×	×	×*4	EC-1027
HO2S2 (B1)	P1147	×	×	×*4	EC-1038
CLOSED LOOP-B1	P1148	—	—	—	EC-1048
HO2S1 (B2)	P1163	×	×	×*4	EC-1014
HO2S1 (B2)	P1164	×	×	×*4	EC-1020
HO2S2 (B2)	P1166	×	×	×*4	EC-1027
HO2S2 (B2)	P1167	×	×	×*4	EC-1038
CLOSED LOOP-B2	P1168	—	—	—	EC-1048
ENG OVER TEMP	P1217	—	—	—	EC-1050
CKP SENSOR (COG)	P1336	—	—	×	EC-1054
EGR SOLENOID/V	P1400	—	—	×	EC-1060
EGR SYSTEM	P1402	×	×	×*4	EC-1065
EVAP SMALL LEAK	P1442	×	×	×*4	EC-1073
PURG VOLUME CONT/V	P1444	—	—	×	EC-1075
VENT CONTROL VALVE	P1446	—	—	×	EC-1084
VENT CONTROL VALVE	P1448	—	—	×	EC-1090
EVAP VERY SML LEAK	P1456	×*3	×	×*4	EC-1098
FUEL LEVEL SEN/CIRC	P1464	—	—	×	EC-1108
VC/V BYPASS/V	P1490	—	—	×	EC-1111
VC CUT/V BYPASS/V	P1491	—	—	×	EC-1117
A/T DIAG COMM LINE	P1605	—	—	×	EC-1129
TP SEN/CIRC A/T	P1705	—	—	—	AT-321
P-N POS SW/CIRCUIT	P1706	—	—	×	EC-1135
O/R CLTCH SOL/CIRC	P1760	—	—	×	AT-329

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: SRT code will not be set if the self-diagnostic result is NG.
*4: This is not displayed with GST.

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 EC-638, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
For malfunctions in which 1st trip DTCs are displayed, refer to EC-626 . 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 malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step II, refer to EC-647 . Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

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

With CONSULT-II

With GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P0705, P0750, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

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

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.
If the DTC is being detected currently, the time data will be [0].
If a 1st trip DTC is stored in the ECM, the time data will be [1t].

DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	1t

PBIB0911E

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed and absolute pressure 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-685 .
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 - P0306 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 EC-638, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.
As part of enhanced emissions test for Inspection and Maintenance (I/M), certain states require that 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 and 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 following table shows required self-diagnostic items to set the SRT to “CMPLT”.

SRT item (CONSULT-II indication)	Performance Priority *	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	3	Three way catalyst function	P0420, P0430
EVAPRAITIVE SYSTEM	2	EVAP control system	P0442, P1442
	3	EVAP control system	P0456, P1456
	3	EVAP control system purge flow monitoring	P0441

SRT item (CONSULT-II indication)	Performance Priority *	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
HO2S	3	Heated oxygen sensor 1	P0133, P0153
		Heated oxygen sensor 1	P1143, P1163
		Heated oxygen sensor 1	P1144, P1164
		Heated oxygen sensor 2	P0139, P0157
		Heated oxygen sensor 2	P1146, P1166
		Heated oxygen sensor 2	P1147, P1167
HO2S HEATER	3	Heated oxygen sensor 1 heater	P0031, P0032, P0051, P0052
		Heated oxygen sensor 2 heater	P0037, P0038, P0057, P0058
EGR SYSTEM	3	EGR function	P0400
		EGRC-BPT valve function	P0402
	1	EGR function	P1402

*: 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 OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF
All OK	Case 1	P0400	OK (1)	– (1)	OK (2)	– (2)
		P0402	OK (1)	– (1)	– (1)	OK (2)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"
	Case 2	P0400	OK (1)	– (1)	– (1)	– (1)
		P0402	– (0)	– (0)	OK (1)	– (1)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"
NG exists	Case 3	P0400	OK	OK	–	–
		P0402	–	–	–	–
		P1402	NG	–	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	–	1st trip DTC	DTC (=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 OK.
–: Self-diagnosis is not carried out.

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

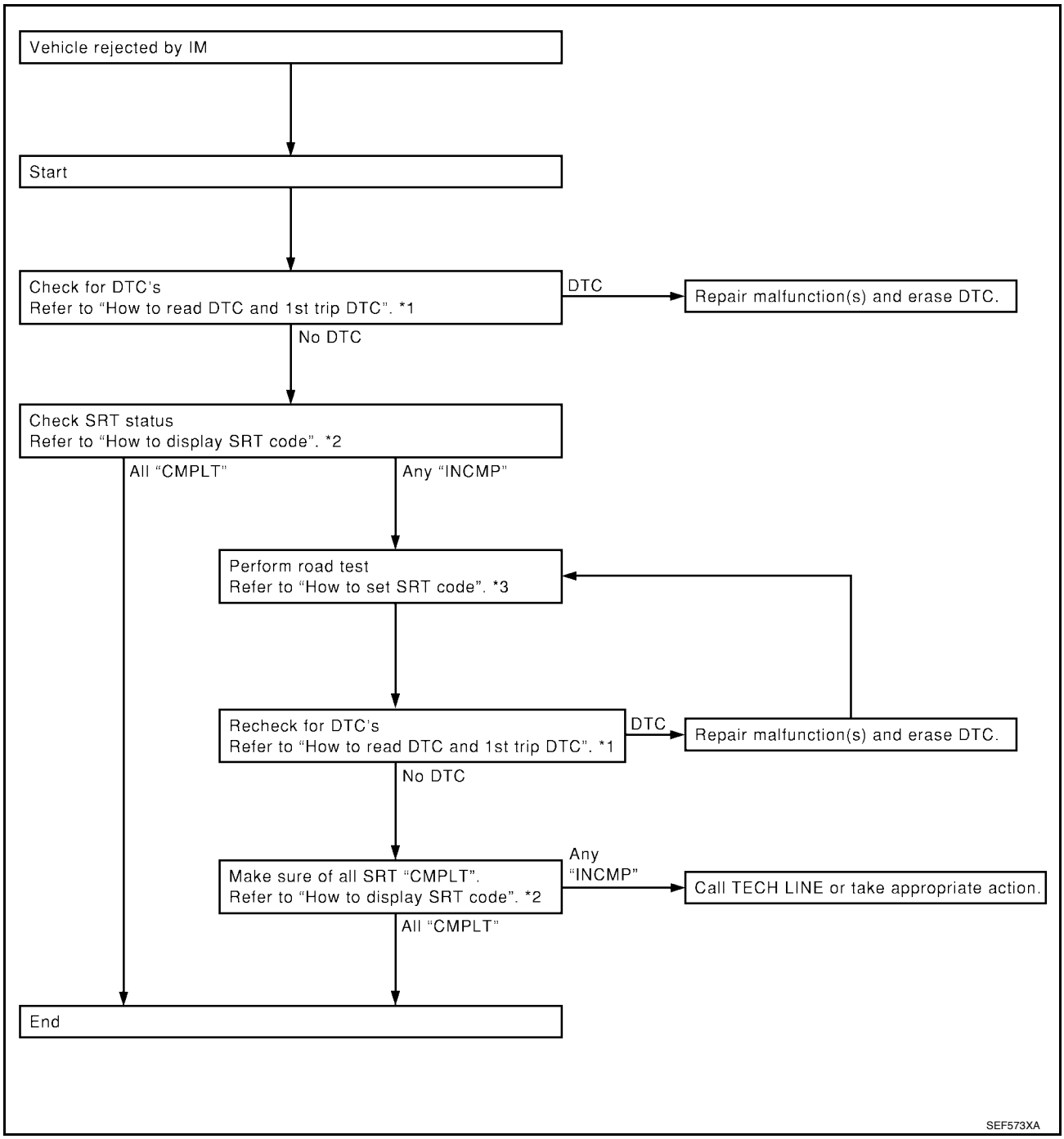
The table above shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 and 2) or two (2) for one self-diagnosis (Case 3). However, in preparation for the State emissions inspection, it is unnecessary of each self-diagnosis to be executed twice (Case 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 result.
- 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 following flowchart diagnostic sequence on the next page.

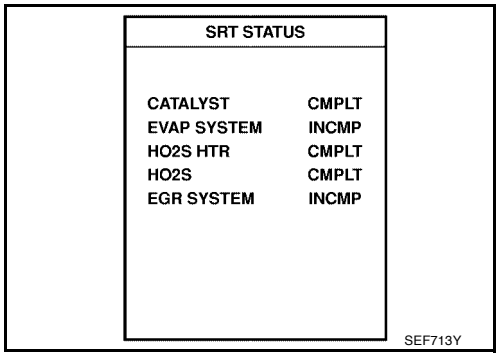


*1 EC-629 *2 EC-634 *3 EC-634

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 below.
“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.

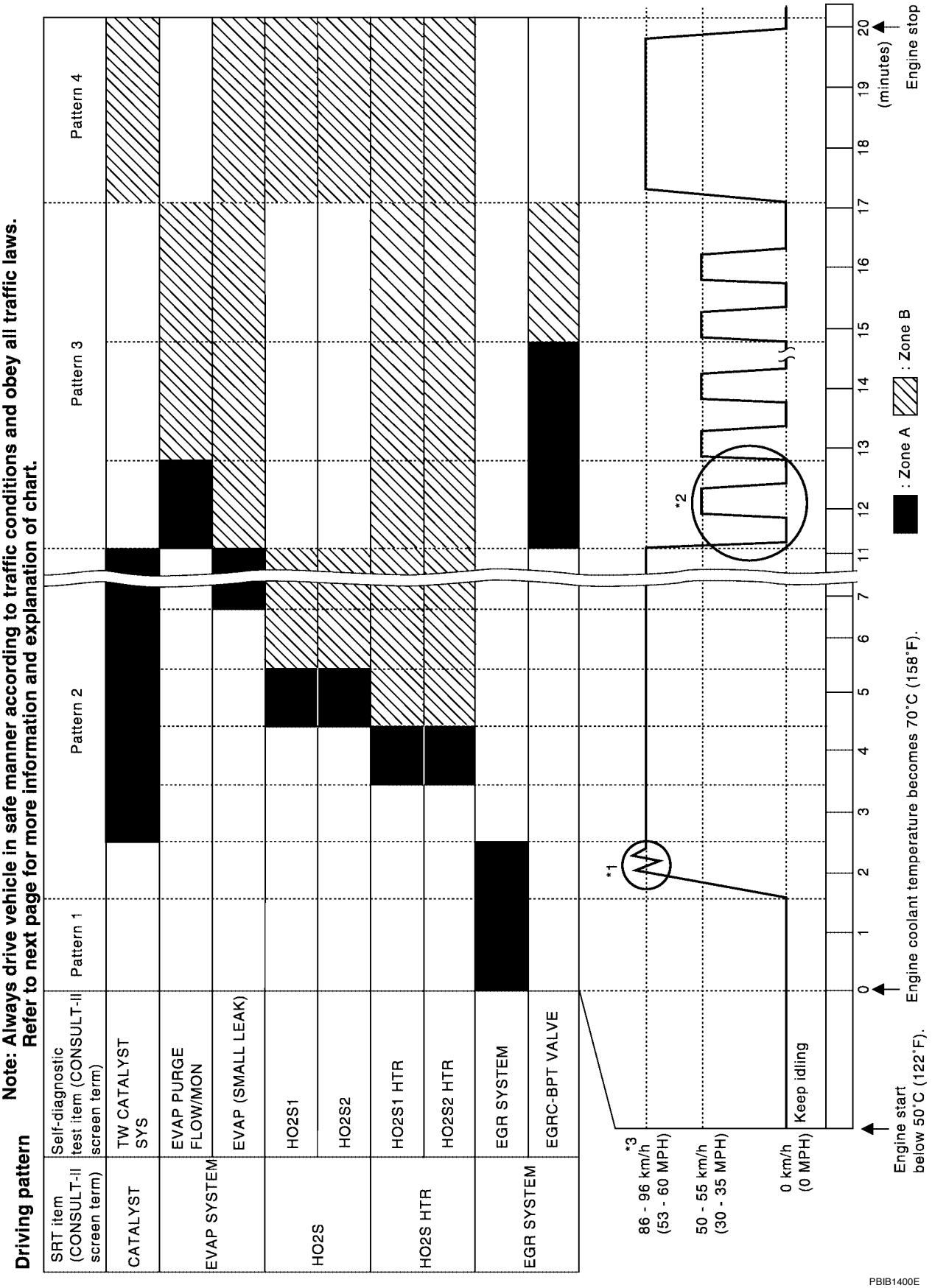
With CONSULT-II

Perform corresponding DTC confirmation procedure one by one based on Performance Priority in the table on EC-630 .

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 59 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 59 and ground is lower than 1.4V).**
- **The engine is started at the tank fuel temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 60 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:

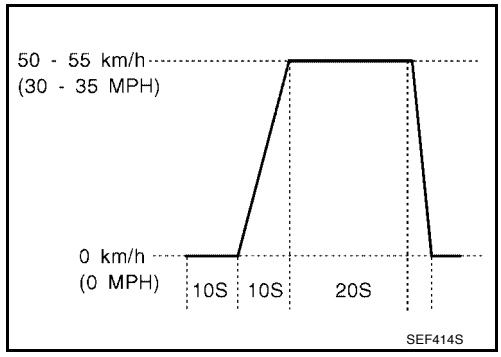
- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

*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 below at least 10 times.

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

*3: Checking the vehicle speed with CONSULT-II or 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.
Suggested upshift speeds for M/T models
Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:	For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	24 (15)
2nd to 3rd	40 (25)	40 (25)
3rd to 4th	64 (40)	64 (40)
4th to 5th	72 (45)	72 (45)

Suggested Maximum Speed in Each Gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.
Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	km/h (MPH) 2WD (AUTO mode)
1st	50 (30)
2nd	95 (60)

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.
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.

Item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit	Conversion
			TID	CID		
CATALYST	Three way catalyst function (Bank 1)	P0420	01H	01H	Max.	1/128
		P0420	02H	81H	Min.	1
	Three way catalyst function (Bank 2)	P0430	03H	02H	Max.	1/128
		P0430	04H	82H	Min.	1
EVAP SYSTEM	EVAP control system (Small leak)	P0442	05H	03H	Max.	1/128mm^2
	EVAP control system purge flow monitoring	P0441	06H	83H	Min.	20mV
	EVAP control system (Very small leak)	P0456	07H	03H	Max.	1/128mm^2
		P1456	07H	03H	Max.	1/128mm^2

Item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit	Conversion
			TID	CID		
HO2S	Heated oxygen sensor 1 (bank 1)	P0133	09H	04H	Max.	16ms
		P1143	0AH	84H	Min.	10mV
		P1144	0BH	04H	Max.	10mV
		P0132	0CH	04H	Max.	10mV
		P0134	0DH	04H	Max.	1s
	Heated oxygen sensor 1 (bank 2)	P0153	11H	05H	Max.	16ms
		P1163	12H	85H	Min.	10mV
		P1164	13H	05H	Max.	10mV
		P0152	14H	05H	Max.	10mV
		P0154	15H	05H	Max.	1s
	Heated oxygen sensor 2 (bank 1)	P0139	19H	86H	Min.	10mV/500ms
		P1147	1AH	86H	Min.	10mV
		P1146	1BH	06H	Max.	10mV
		P0138	1CH	06H	Max.	10mV
	Heated oxygen sensor 2 (bank 2)	P0159	21H	87H	Min.	10mV/500ms
		P1167	22H	87H	Min.	10mV
		P1166	23H	07H	Max.	10mV
		P0158	24H	07H	Max.	10mV
HO2S HEATER	Heated oxygen sensor 1 (bank 1)	P0032	29H	08H	Max.	20mV
		P0031	2AH	88H	Min.	20mV
	Heated oxygen sensor 1 (bank 2)	P0052	2BH	09H	Max.	20mV
		P0051	2CH	89H	Min.	20mV
	Heated oxygen sensor 2 (bank 1)	P0038	2DH	0AH	Max.	20mV
		P0037	2EH	8AH	Min.	20mV
	Heated oxygen sensor 2 (bank 2)	P0058	2FH	0BH	Max.	20mV
		P0057	30H	8BH	Min.	20mV
EGR SYSTEM	EGR function	P0400	31H	8CH	Min.	1°C
		P0400	32H	8CH	Min.	1°C
		P0400	33H	8CH	Min.	1°C
		P0400	34H	8CH	Min.	1°C
		P1402	35H	0CH	Max.	1°C
	EGRC-BPT valve function	P0402	36H	0CH	Max.	1count
		P0402	37H	8CH	Min.	1count

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC

WITH CONSULT-II

NOTE:
If the DTC is not for A/T related items (see EC-590), skip steps 2 through 4.

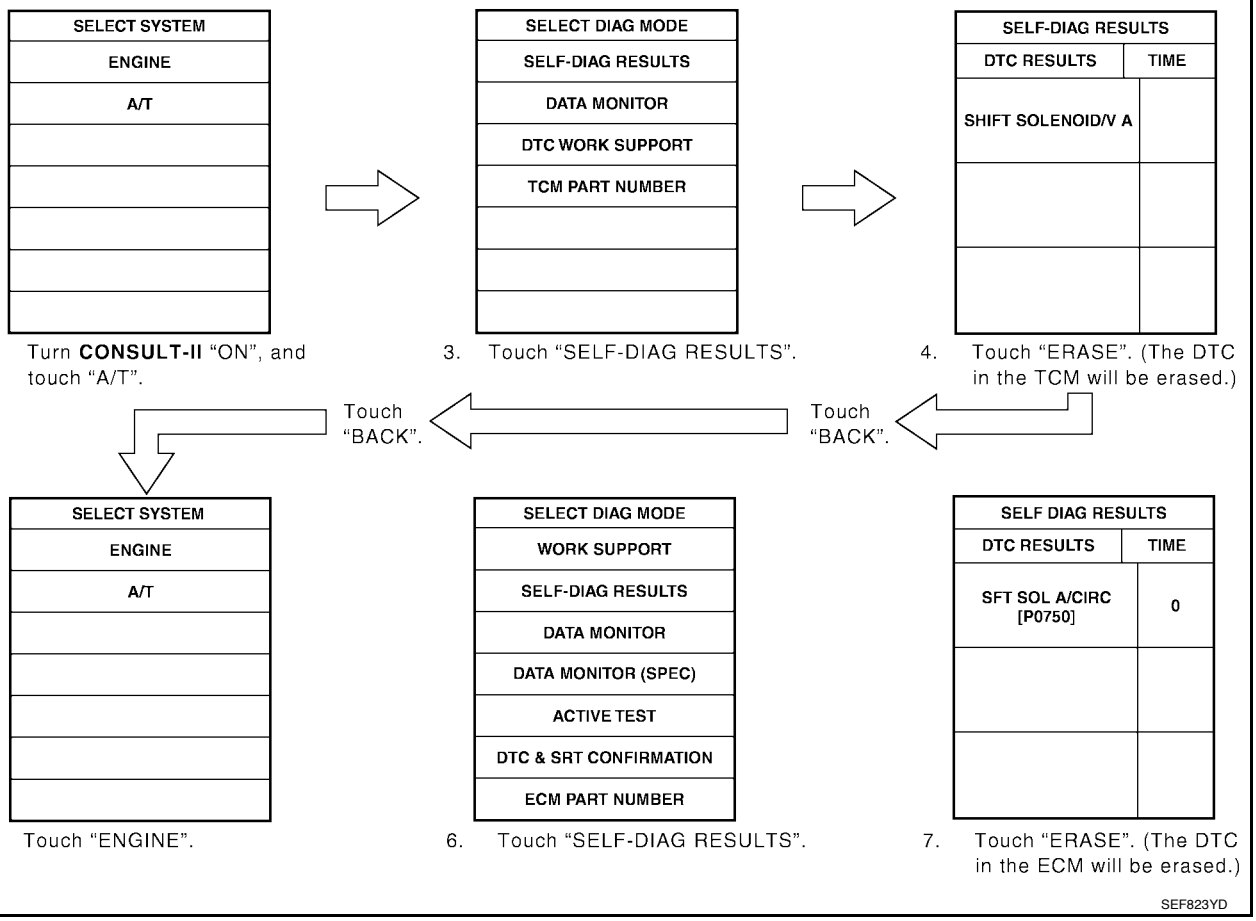
1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Turn CONSULT-II “ON” and touch “A/T”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. [The DTC in the TCM (Transmission control module) 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.)

- 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).

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 5 seconds and then turn it “ON” (engine stopped) again.



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

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-590), skip step 2.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Perform AT-188 . (The DTC in TCM will be erased.)
3. Select MODE 4 with GST (Generic Scan Tool).

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

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

– 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.

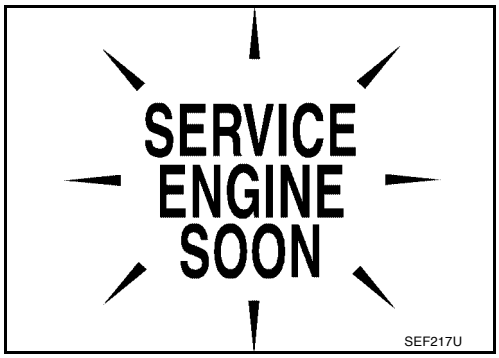
Malfunction Indicator Lamp (MIL)

UBS00DEZ

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-25, "WARNING LAMPS" , or see EC-1172 .
2. When the engine is started, the MIL should go OFF.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following two 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. (See EC-1172 .)
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. ● Misfire (Possible three way catalyst damage) ● One trip detection diagnoses

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-25, "WARNING LAMPS" , or see EC-1172 .

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

MIL	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

OBD System Operation Chart

UBS00DF0

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-625, "Two Trip Detection Logic" .

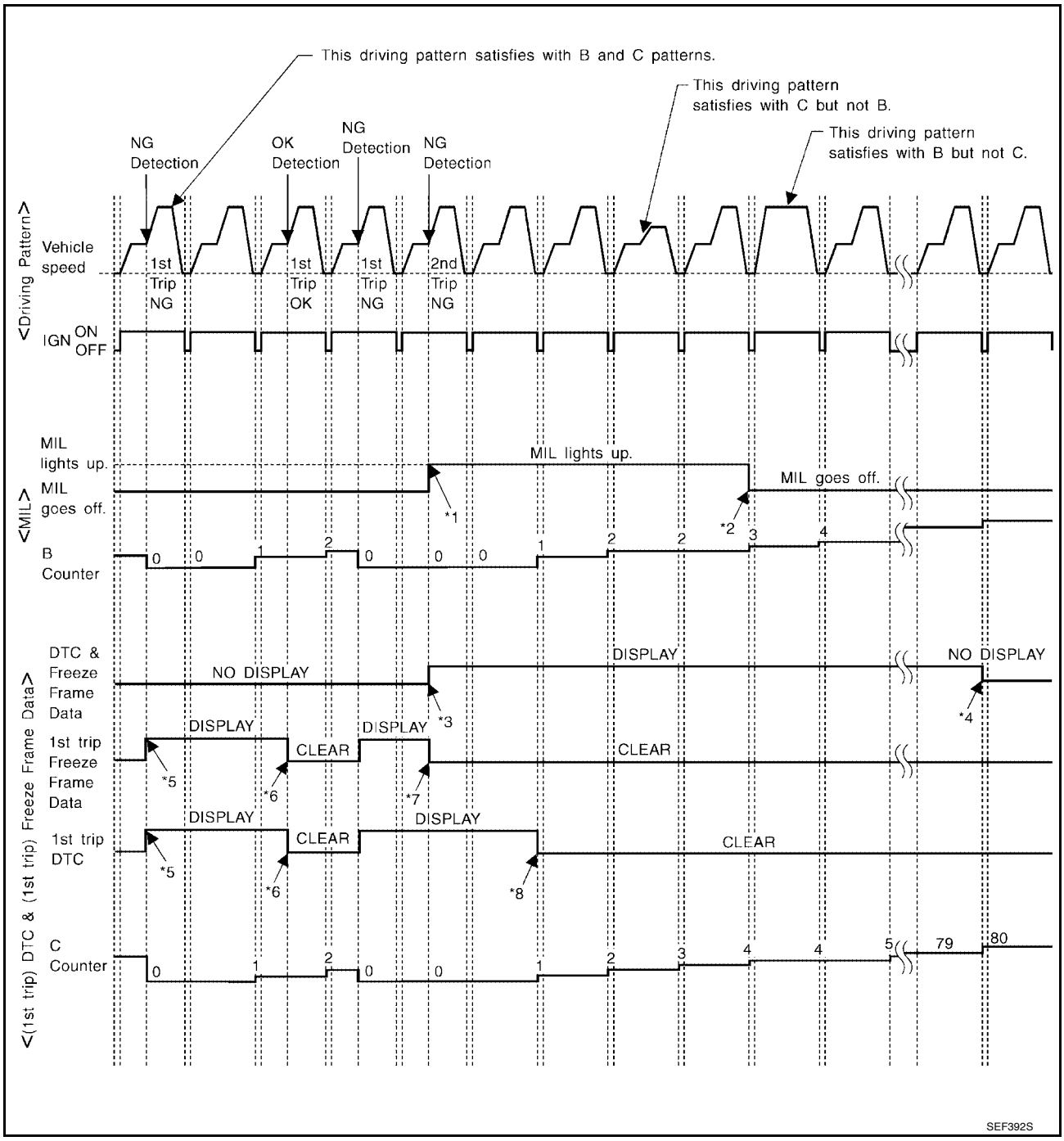
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the 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-643 .
For details about patterns A and B under “Other”, see EC-645 .
*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>

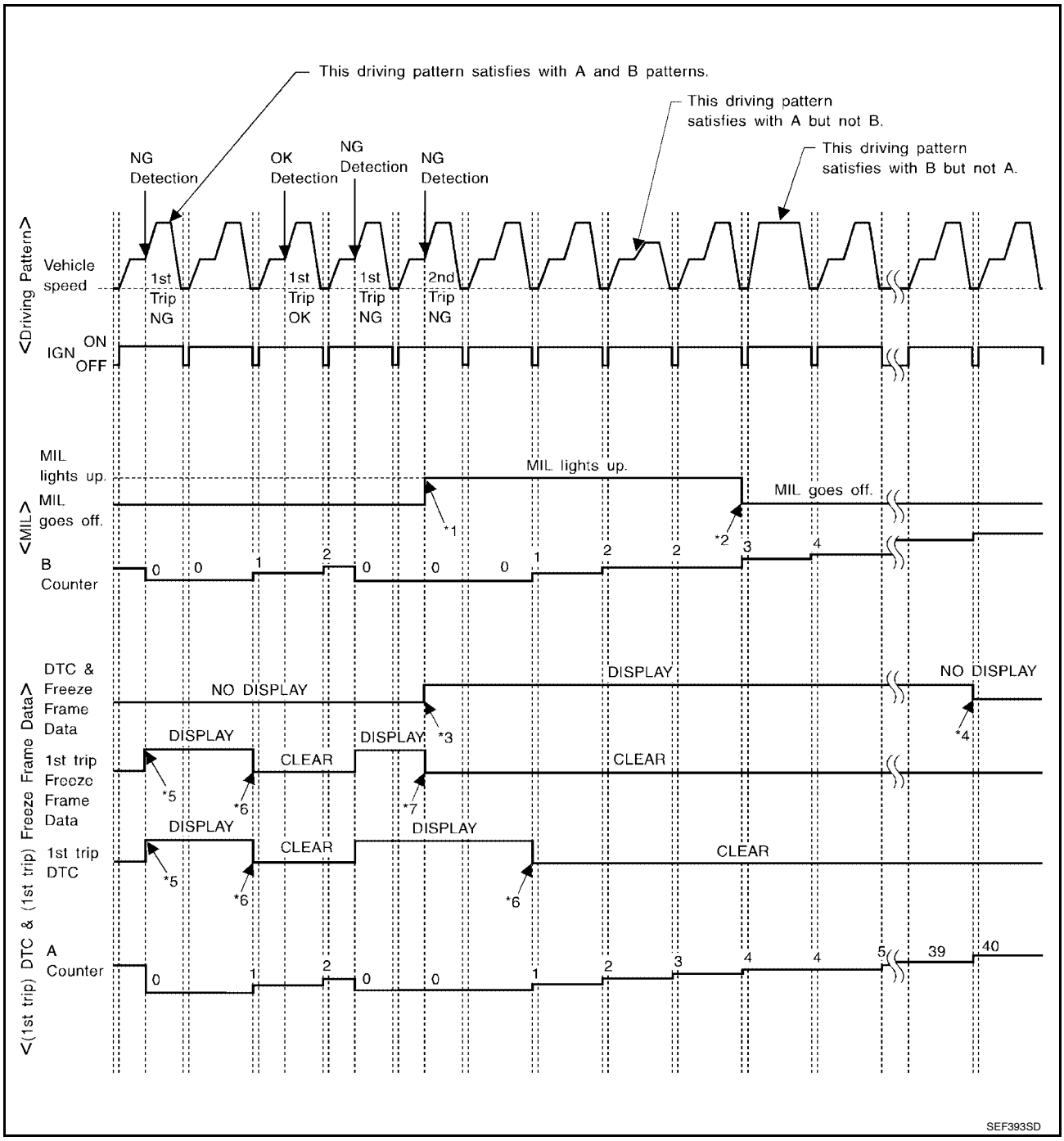
Driving pattern C means the vehicle operation as follows:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature (T) 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 the vehicle conditions described above.
- The C counter will be counted up when the vehicle conditions described above is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

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



*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.)

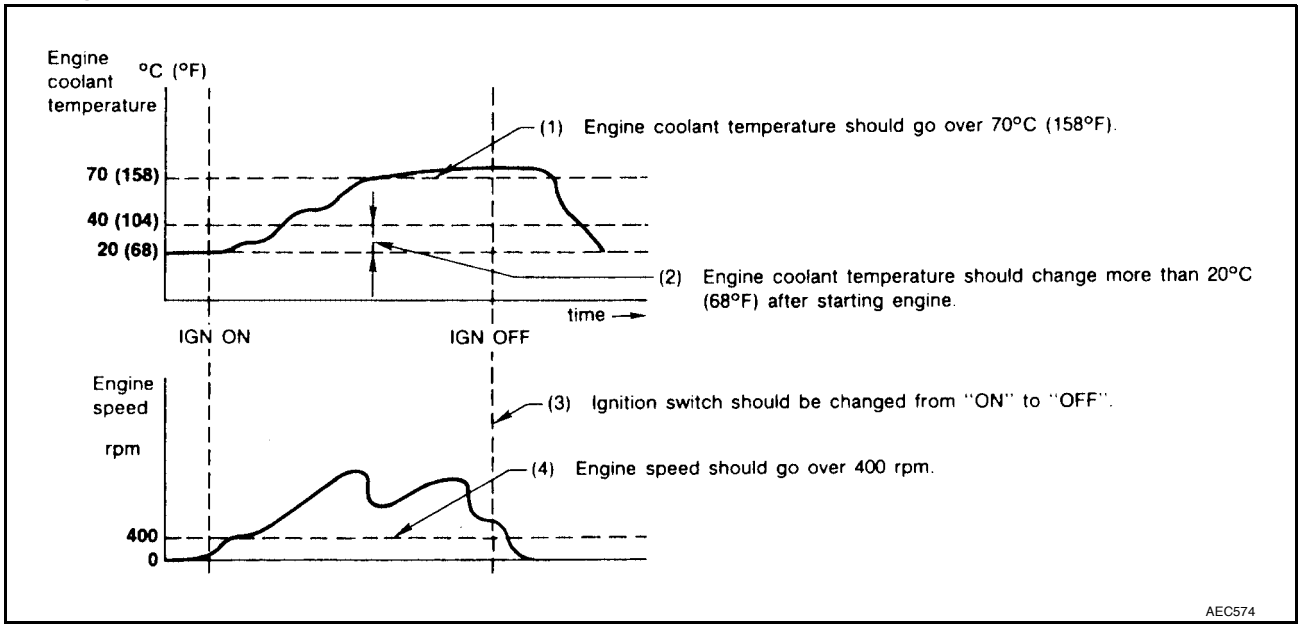
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*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

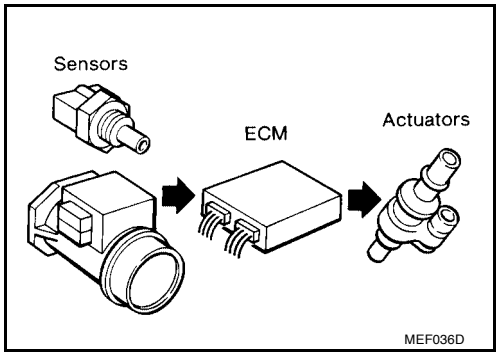
PFP:00004

Trouble Diagnosis Introduction

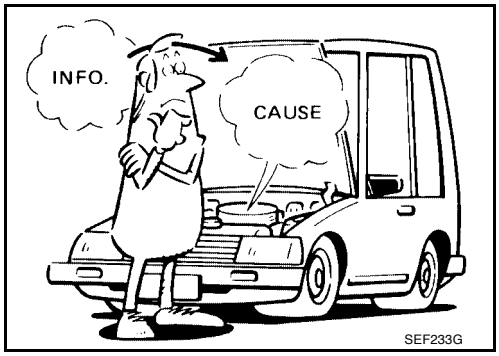
UBS00DF1

INTRODUCTION

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



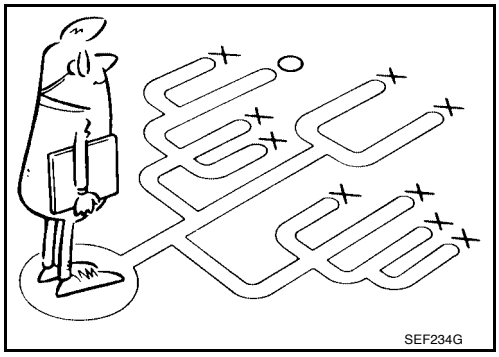
It is much more difficult to diagnose a incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



A visual check only may not find the cause of the incidents. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the EC-647, "WORK FLOW" .

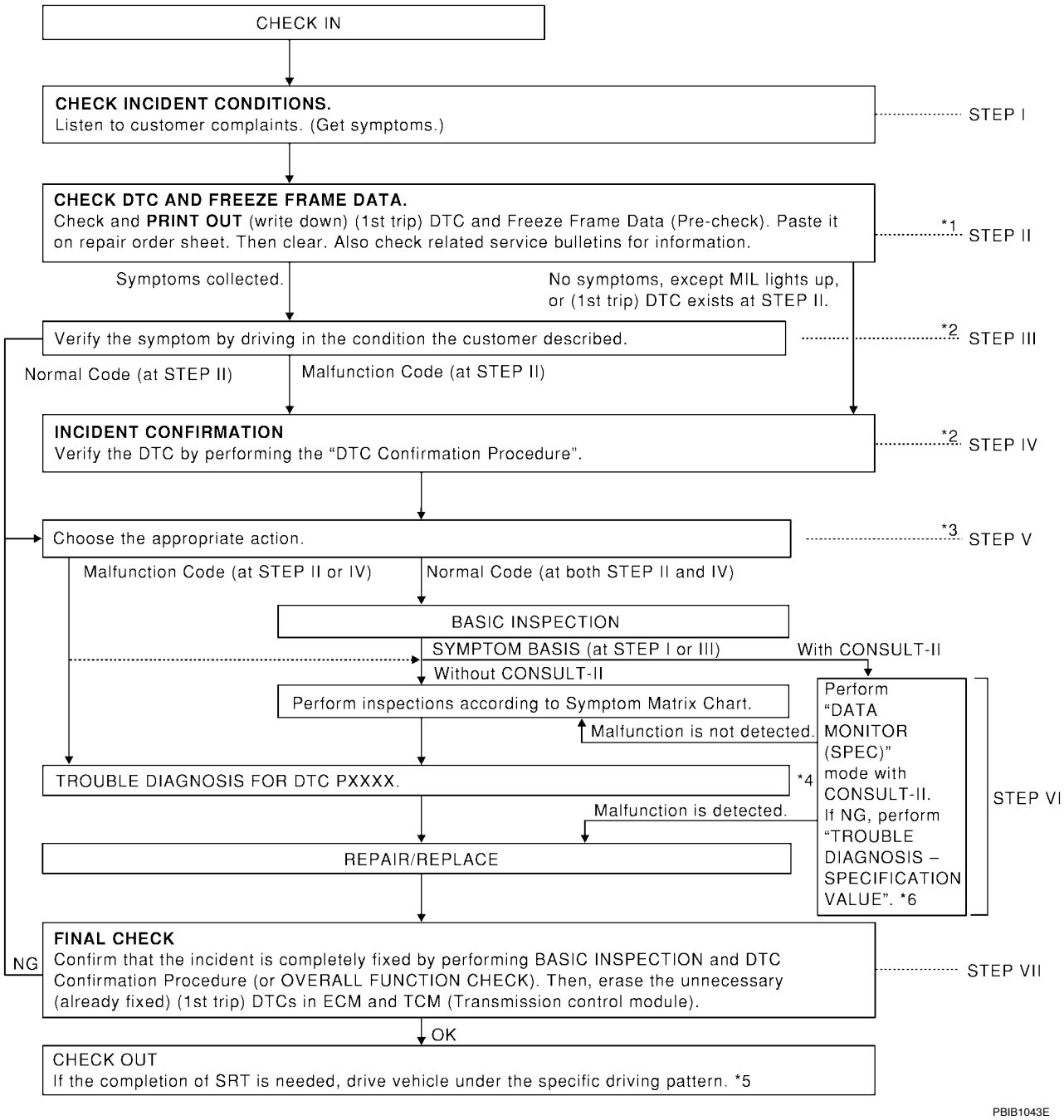
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic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

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



WORK FLOW

Flow Chart



PBIB1043E

*1 If time data of "SELF-DIAG RESULTS" is other than [0] or [1t], perform EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*2 If the incident cannot be verified, perform EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*3 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-704, "POWER SUPPLY AND GROUND CIRCUIT" .

*4 If malfunctioning part cannot be detected, perform EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*5 EC-635, "Driving Pattern".

*6 EC-699, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE".

Description For Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the EC-649, "DIAGNOSTIC WORKSHEET" .
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-638 .) 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-703, "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-665 .) 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-703, "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-703, "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-652 .) If CONSULT-II is available, perform “DATA MONITOR (SPEC)” mode with CONSULT-II and proceed to the EC-699, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" . (If malfunction is detected, proceed to REPAIR/REPLACE.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-665 .)
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-673 , EC-694 . 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 GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident" . Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform EC-703, "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 different method 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-638 and AT-187 .)

DIAGNOSTIC WORKSHEET

Description

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make trouble-shooting faster and more accurate.
In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.
Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

KEY POINTS

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

SEF907L

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	

LEC031A

DTC Inspection Priority Chart

UBS00DF2

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

Priority	Detected items (DTC)
1	● P0101, P0102, P0103 Mass air flow sensor ● P0112, P0113, P0127 Intake air temperature sensor ● P0117, P0118, P0125 Engine coolant temperature sensor ● P0121, P0122, P0123 Throttle position sensor ● P0181, P0182, P0183 Fuel tank temperature sensor ● P0327, P0328 Knock sensor ● P0335 P1336 CKP sensor (OBD) ● P0340 CMP sensor ● P0460 P0461 P1464 Fuel level sensor ● P0500 VSS ● P0600 A/T control ● P0605 ECM ● P1400 EGRC-solenoid valve ● P1605 A/T diagnosis communication line ● P1706 PNP switch
2	● P0132-P0134, P1143, P1144/P0152-P0154, P1163, P1164 HO2S1 ● P0031, P0032/P0051, P0052 HO2S1 heater ● P0138, P0139, P1146, P1147/P0158, P0159, P1166, P1167 HO2S2 ● P0037, P0038/P0057, P0058 HO2S2 heater ● P0217 Engine coolant overtemperature enrichment protection ● P0405, P0406 EGR temperature sensor ● P0441 EVAP control system purge flow monitoring ● P0444, P0445, P1444 EVAP canister purge volume control solenoid valve ● P0447, P1446, P1448 EVAP canister vent control valve ● P0452, P0453 EVAP control system pressure sensor ● P0456, P1456 EVAP control system ● P0510 CTP switch ● P0705-P0755, P1705, P1760 A/T related sensors, solenoid valves and switches ● P1490 P1491 Vacuum cut valve bypass valve
3	● P0171, P0172, P0174, P0175 Fuel injection system function ● P0306 - P0300 Misfire ● P0400, P1402 EGR function ● P0402 EGRC-BPT valve function ● P0420, P0430 Three way catalyst function ● P0442/P1442 EVAP control system ● P0455 EVAP control system ● P0505 ISC valve ● P0731-P0734 P0744 A/T function ● P1148, P1168 Closed loop control

Fail-safe Chart

UBS00DF3

When the DTC listed below is detected, the ECM enters the fail-sate mode and the MIL illuminates.

<table>
<tr><th>DTC No.</th><th>Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td>P0102
P0103</td><td>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">P0117
P0118</td><td 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="4">P0122
P0123</td><td rowspan="4">Throttle position sensor circuit</td><td colspan="2">Throttle position will be determined based on the injected fuel amount and the engine speed.
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 rowspan="9">Unable to access ECM</td><td rowspan="9">ECM</td><td colspan="2">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 IACV-AAC valve operation are controlled under certain limitations.</td></tr>
<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 value</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>IACV-AAC valve</td><td>Full open</td></tr>
<tr><td colspan="2">Replace ECM, if ECM fail-safe condition is confirmed.</td></tr>
</table>

Basic Inspection

UBS00DF4

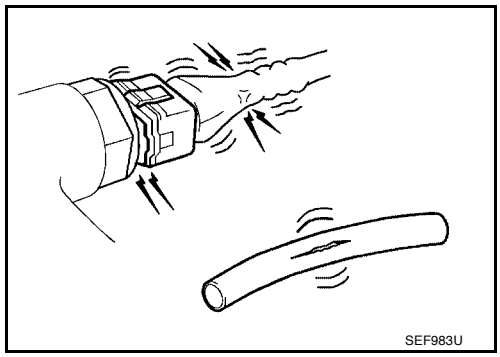
Precaution:
Perform Basic Inspection without electrical or mechanical loads applied;

- Headlamp switch is OFF,
- Air conditioner switch is OFF,
- Rear window defogger switch is OFF,
- Steering wheel is in the straight-ahead position, etc.

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or the current need for scheduled maintenance.
2. Open engine hood and check the following:

- Harness connectors for improper connections
- Vacuum hoses for splits, kinks, or improper connections
- Wiring for improper connections, pinches, or cuts



With CONSULT-II>>GO TO 2.
With GST>>GO TO 2.
With No Tools>> GO TO 15.

2. CONNECT CONSULT-II OR GST TO THE VEHICLE

With CONSULT-II
Connect CONSULT-II to the data link connector for CONSULT-II and select “ENGINE” from the menu. Refer to EC-683, "INSPECTION PROCEDURE" .

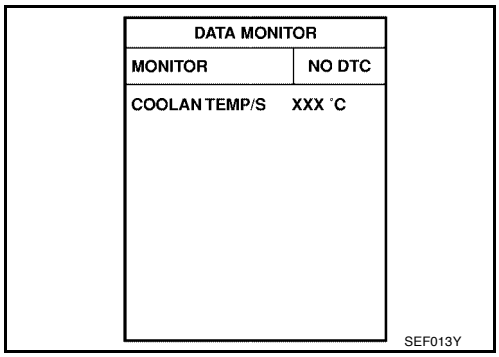
With GST
Connect GST to the data link connector for GST.
Refer to EC-693, "INSPECTION PROCEDURE" .

With CONSULT-II>>GO TO 3.
With GST>>GO TO 14.

3. CHECK FI CAM FUNCTION

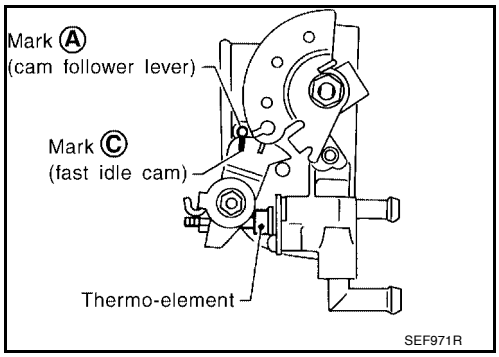
With CONSULT-II

1. Turn ignition switch ON.
2. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
3. Start engine and warm it up.



4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

- The center of mark **A** is aligned with mark **C** .
- The cam follower lever's roller is not touching the fast idle cam.



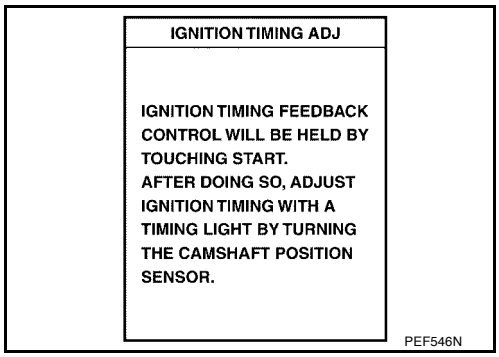
OK or NG

OK >> GO TO 4.
NG >> 1. Check FI cam. Refer to EC-621, "Fast Idle Cam (FIC) Inspection and Adjustment" .
2. GO TO 4.

4. CHECK IGNITION TIMING

With CONSULT-II

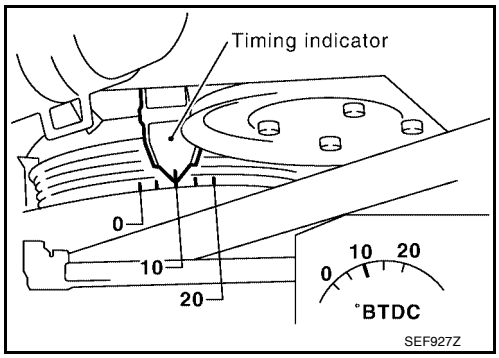
1. Warm up engine to normal operating temperature.
2. Select “IGNITION TIMING ADJ” in “WORK SUPPORT” mode and touch “START”.



3. Check ignition timing at idle using a timing light.

M/T: 10±5° BTDC (in Neutral position)

A/T: 10±5° BTDC (in P or N position)



OK or NG

OK >> GO TO 5.
NG >> 1. Adjust ignition timing by turning distributor. Refer to EC-610, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" .
2. GO TO 5.

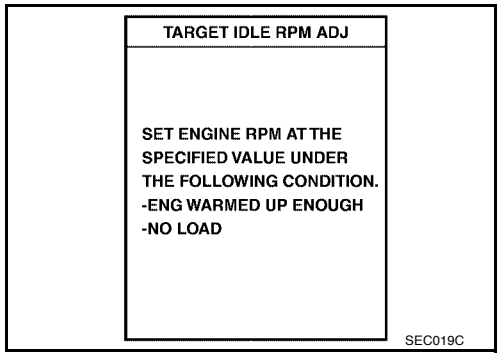
5. CHECK BASE IDLE SPEED

With CONSULT-II

1. Select “TARGET IDLE RPM ADJ” in “WORK SUPPORT” mode and touch “START”.
2. Check idle speed.

M/T: 700±50 rpm (in Neutral position)

A/T: 700±50 rpm (in P or N position)



OK or NG

OK >> GO TO 6.

NG >> 1. Adjust engine speed by turning idle speed adjusting screw. Refer to EC-610, "Idle Speed/Ignition Timing/ Idle Mixture Ratio Adjustment" .
2. GO TO 6.

6. CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I

With CONSULT-II

NOTE:
Always check ignition timing and base idle speed before performing the following.

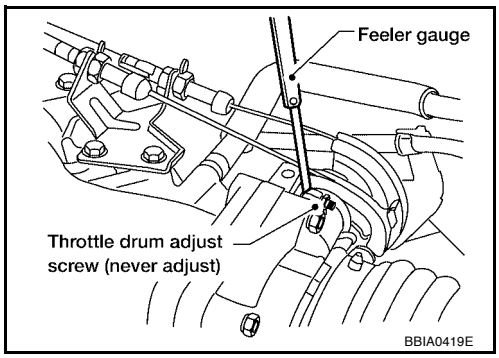
1. Warm up engine to normal operating temperature.
2. Check FI cam, refer to procedure 3.
3. Stop engine.

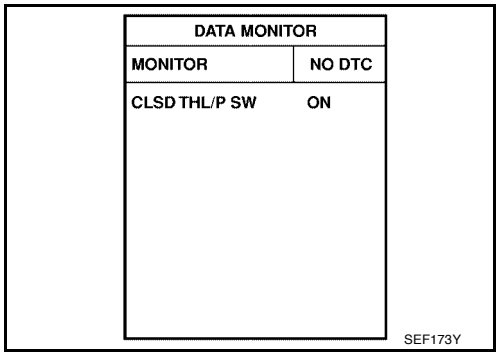
>> GO TO 7.

7. CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Turn ignition switch ON.
2. Select “TP SW/TP SEN IDLE POSI ADJ” in “WORK SUPPORT” mode.
3. Read “CLSD THL/P SW” signal under the following conditions.

- Insert a 0.3 mm (0.012 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure and check the signal.





“CLSD THL/P SW” signal should remain “ON” while inserting 0.3 mm (0.012 in) feeler gauge.
“CLSD THL/P SW” signal should remain “OFF” while inserting 0.4 mm (0.016 in) feeler gauge.

OK or NG

OK >> GO TO 12.
NG >> GO TO 8.

8. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

With CONSULT-II

NOTE:

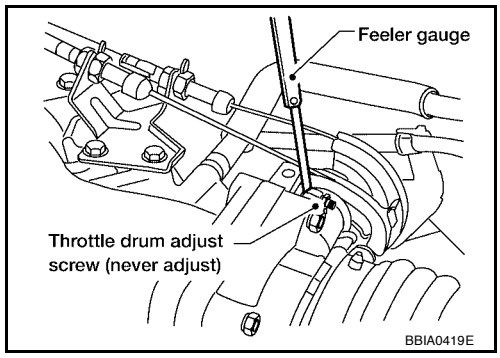
- **Never adjust throttle adjust screw (TAS).**
- **Do not touch throttle drum when checking “CLSD THL/P SW” signal, doing so may cause an incorrect adjustment.**

1. Warm up engine to normal operating temperature.
2. Check FI cam. Refer to procedure 3.
3. Stop engine.
4. Loosen throttle position sensor fixing bolts.

>> GO TO 9.

9. ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

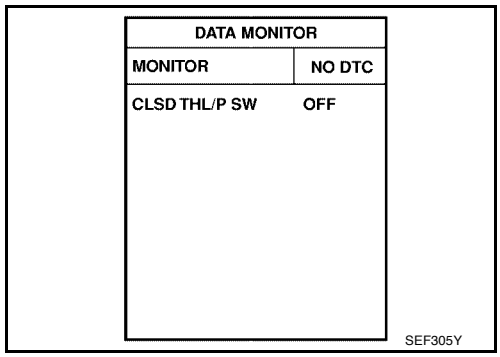
1. Turn ignition switch ON.
2. Select “TP SW/TP SEN IDLE POSI ADJ” in “WORK SUPPORT” mode.
3. Insert 0.35 mm (0.0138 in) feeler gauge between throttle adjust screw and throttle drum as shown in the figure.
4. Open throttle valve and then close.



5. Check “CLSD THL/P SW” signal.
   “CLSD THL/P SW” signal should remain “OFF” when the throttle valve is closed.

OK or NG

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

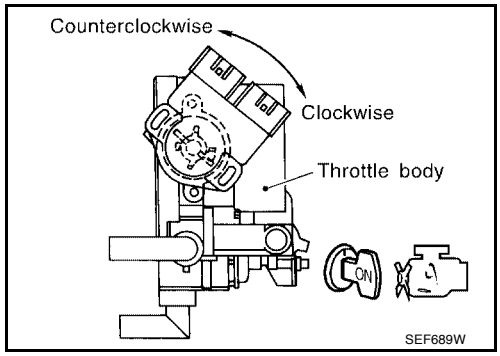


10. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

With CONSULT-II

Turn throttle position sensor body counterclockwise until “CLSD THL/P SW” signal switches to “OFF”.

>> GO TO 11.



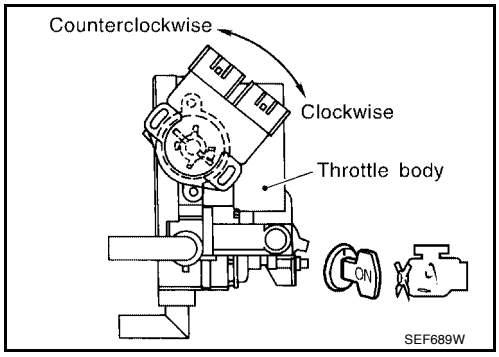
11. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV

With CONSULT-II

1. Remove 0.35 mm (0.0138 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
2. Temporarily tighten sensor body fixing bolts as follows.

- **Gradually move the sensor body clockwise and stop it when "CLSD THL/P SW" signal switches from "OFF" to "ON", then temporarily tighten sensor body fixing bolts.**

3. Make sure two or three times that the signal is "ON" when the throttle valve is closed and "OFF" when it is opened.
4. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge.
5. Make sure two or three times that the signal remains "OFF" when the throttle valve is closed.
6. Tighten throttle position sensor.
7. Check the "CLSD THL/P SW" signal again.
   The signal remains "OFF" while closing throttle valve.



OK or NG

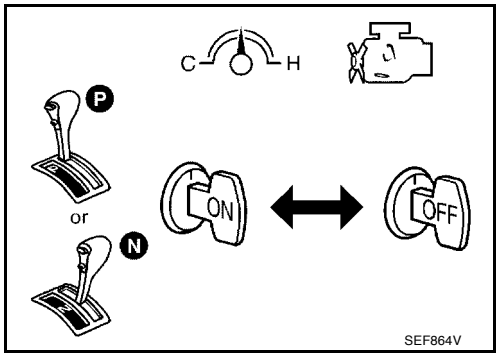
OK >> GO TO 12.
NG >> GO TO 8.

12. RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

With CONSULT-II

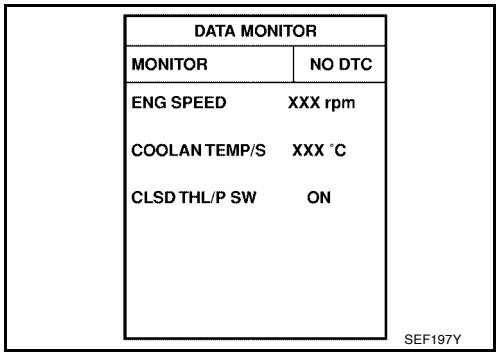
NOTE:
Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.

1. Remove feeler gauge.
2. Start engine.
3. Warm up engine to normal operating temperature.
4. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode.
5. Stop engine. (Turn ignition switch OFF.)
6. Turn ignition switch ON and wait at least 5 seconds.
7. Turn ignition switch OFF and wait at least 5 seconds.



8. Repeat steps 5 and 6 until "CLSD THL POS" signal changes to "ON".

>> GO TO 13.



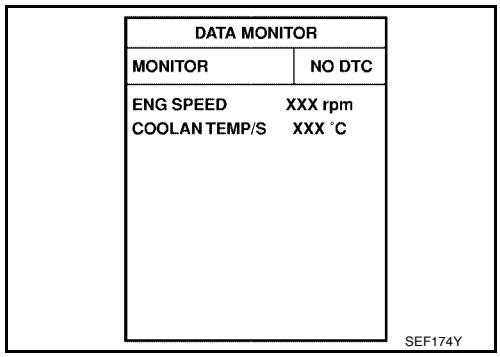
13. CHECK TARGET IDLE SPEED

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “ENG SPEED” in “DATA MONITOR” mode.
3. Check idle speed.

M/T: 750±50 rpm (in Neutral position)

A/T: 750±50 rpm (in P or N position)



OK or NG

OK >> **INSPECTION END**.

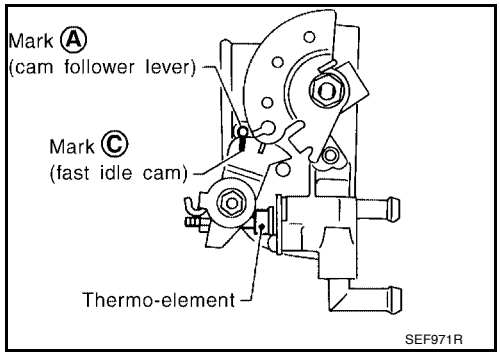
NG >> 1. Adjust idle speed. Refer to EC-610, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" .
2. GO TO 27.

14. CHECK FI CAM FUNCTION

With GST

1. Turn ignition switch ON.
2. Select MODE 1 with GST.
3. Start engine and warm it up.
4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

- The center of mark **A** is aligned with mark **C** .
- The cam follower lever's roller is not touching the fast idle cam.



OK or NG

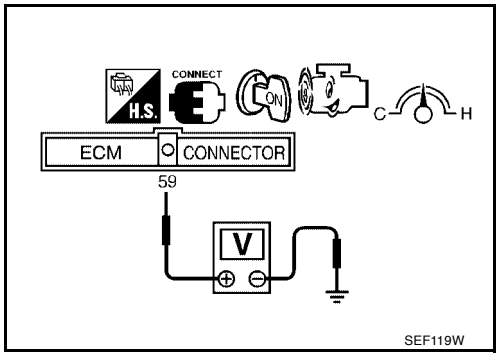
OK >> GO TO 16.

NG >> 1. Check FI cam. Refer to EC-621, "Fast Idle Cam (FIC) Inspection and Adjustment" .
2. GO TO 16.

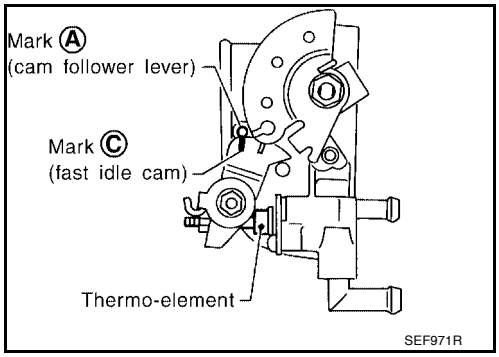
15. CHECK FI CAM FUNCTION

No Tools

1. Set the voltmeter between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.
2. Start engine and warm it up.



3. When the voltage is between 1.10 to 1.36V, check the following.
- The center of mark **A** is aligned with mark **C** .
- The cam follower lever's roller is not touching the fast idle cam.



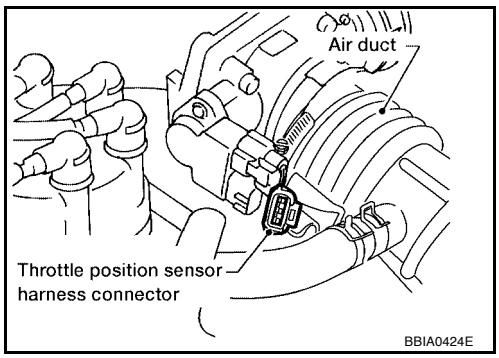
OK or NG

OK >> GO TO 16.
NG >> 1. Check FI cam. Refer to EC-621, "Fast Idle Cam (FIC) Inspection and Adjustment" .
2. GO TO 16.

16. CHECK IGNITION TIMING

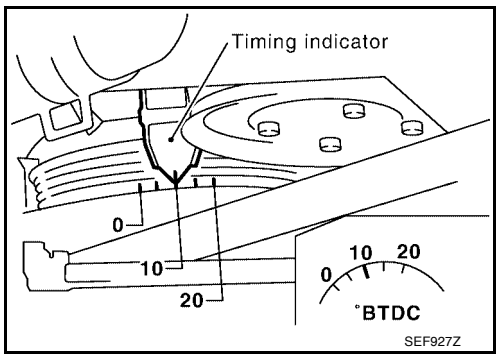
Without CONSULT-II

1. Warm up engine to normal operating temperature.
2. Stop engine and disconnect throttle position sensor harness connector.
3. Start engine.



4. Check ignition timing at idle using a timing light.

M/T: 10±5° BTDC (in Neutral position)
A/T: 10±5° BTDC (in P or N position)



OK or NG

OK >> GO TO 17.
NG >> 1. Adjust ignition timing by turning distributor. Refer to EC-610, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" .
2. GO TO 17.

17. CHECK BASE IDLE SPEED

Without CONSULT-II

1. Make sure that throttle position sensor harness connector remain disconnected.
2. Does engine speed fall to the following speed?

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

OK or NG

OK >> GO TO 18.
NG >> 1. Adjust engine speed by turning idle speed adjusting screw. Refer to EC-610, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" .
2. GO TO 18.

18. CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION

Without CONSULT-II

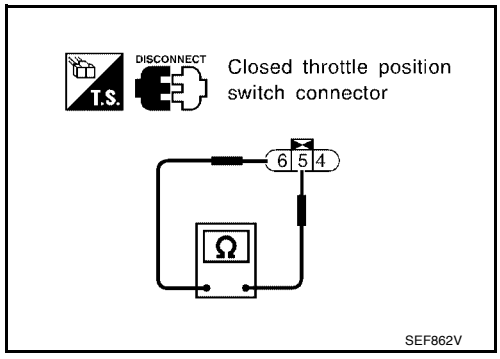
NOTE:
Always check ignition timing and base idle speed before performing the following.

1. Warm up engine to normal operating temperature.
2. Check FI cam, refer to procedure 14 or 15.
3. Stop engine.

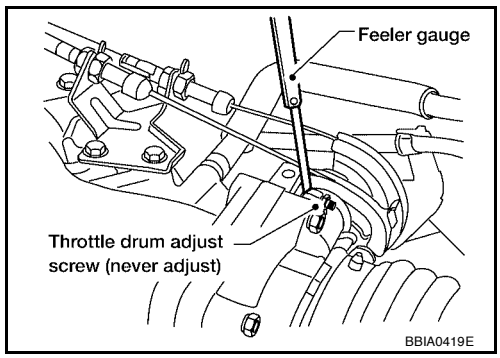
>> GO TO 19.

19. CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I

1. Disconnect closed throttle position switch harness connector.
2. Check continuity between closed throttle position switch terminals 5 and 6 under the following conditions.



- Insert the 0.3 mm (0.012 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure.
  Continuity should exist while inserting 0.3 mm (0.012 in) feeler gauge.
  Continuity should not exist while inserting 0.4 mm (0.016 in) feeler gauge.



OK or NG

OK >> GO TO 24.
NG >> GO TO 20.

20. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

Without CONSULT-II

NOTE:

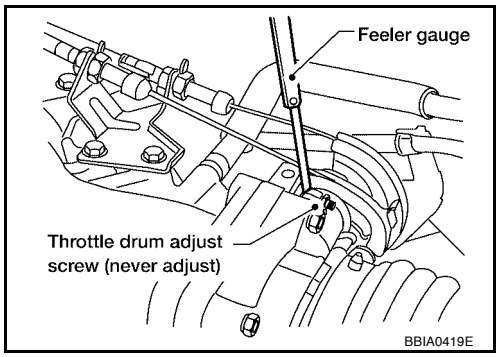
- **Never adjust throttle adjust screw (TAS).**
- **Do not touch throttle drum when checking continuity, doing so may cause an incorrect adjustment.**

1. Warm up engine to normal operating temperature.
2. Check FI cam. Refer to procedure 14 or 15.
3. Stop engine.
4. Loosen throttle position sensor fixing bolts.

>> GO TO 21.

21. ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Disconnect closed throttle position switch harness connector.
2. Insert 0.35 mm (0.0138 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure.
3. Open throttle valve then close.

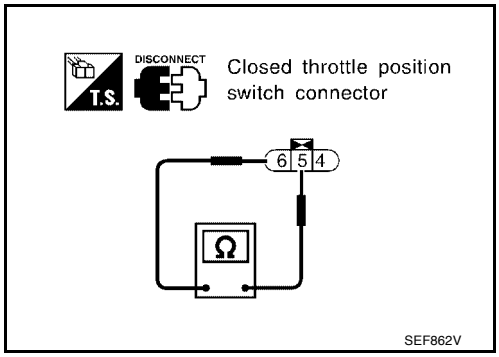


4. Check continuity between closed throttle position switch terminals 5 and 6.

Continuity should not exist while closing the throttle position sensor.

OK or NG

OK >> GO TO 23.
NG >> GO TO 22.

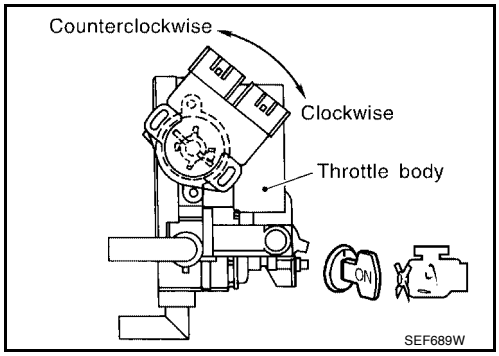


22. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

Without CONSULT-II

Turn throttle position sensor body counterclockwise until continuity does not exist.

>> GO TO 23.



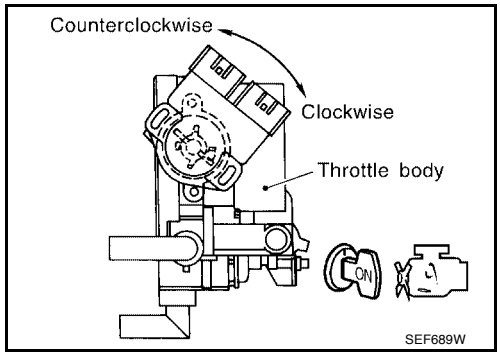
23. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV

Without CONSULT-II

1. Remove 0.35 mm (0.0138 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
2. Temporarily tighten sensor body fixing bolts as follows.

– **Gradually move the sensor body clockwise and stop it when the continuity comes to exist, then temporarily tighten sensor body fixing bolts.**

3. Make sure two or three times that the continuity exists when the throttle valve is closed and continuity does not exist when it is opened.
4. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge.
5. Make sure two or three times that the continuity does not exist when the throttle valve is closed.
6. Tighten throttle position sensor.
7. Check the continuity again.



Continuity does not exist while closing the throttle valve.

OK or NG

OK >> GO TO 24.
NG >> GO TO 20.

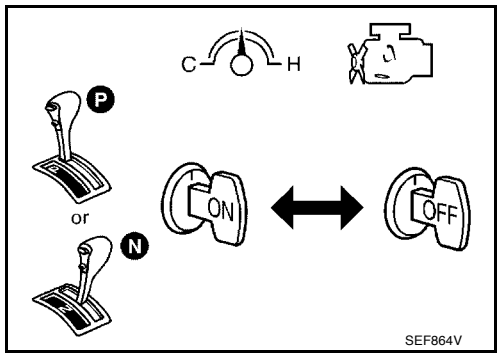
24. RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

Without CONSULT-II

NOTE:
Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.

1. Remove feeler gauge.
2. Start engine.
3. Warm up engine to normal operating temperature.
4. Stop engine. (Turn ignition switch OFF.)
5. Turn ignition switch ON and wait at least 5 seconds.
6. Turn ignition switch OFF and wait at least 5 seconds.
7. Repeat steps 4 and 5 for 20 times.

>> GO TO 25.



25. REINSTALLATION

Without CONSULT-II

1. Reconnect throttle position sensor harness connector and closed throttle position switch harness connector.
2. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no load and then run engine at idle speed.

>> GO TO 26.

26. CHECK TARGET IDLE SPEED

Without CONSULT-II

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

M/T: 750±50 rpm (in Neutral position)

A/T: 750±50 rpm (in P or N position)

OK or NG

OK >> GO TO 27.

NG >> 1. Adjust idle speed. Refer to EC-610, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" .
2. GO TO 27.

27. ERASE UNNECESSARY DTC

After this inspection, unnecessary DTC No. might be displayed.
Erase the stored memory in ECM and TCM (Transmission control module).
Refer to EC-638, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" and AT-187, "HOW TO ERASE DTC" .

>> **INSPECTION END**.

Symptom Matrix Chart

UBS00DF5

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		3	2			3		1	EC-1158
	Injector circuit							2							EC-1148
	Fuel pressure regulator system	4	4	4	4	4	4	4	3	3		4			EC-623
	Evaporative emission system														EC-1173
Air	Positive crankcase ventilation system												1		EC-1191
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-610
	IACV-AAC valve circuit	2	1	3	3	3	2	2	2	2		3		1	EC-992
	IACV-FICD solenoid valve circuit		2				3	3							EC-1167
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-610
	Ignition circuit	1	1	2	2	2		2	2			2			EC-1142
EGR	EGRC-solenoid valve circuit		2	2	3	3						3			EC-1060
	EGR system	2	1	2	3	3	3	2	2	3		3			EC-882, EC-891 , EC-1065
Main power supply and ground circuit		1	2	3	3	3		3	2		1	3		1	EC-704
Air conditioner circuit		2					3			2					MTC-22

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor circuit	1	1	2	2	2		2	2	2		2			EC-875
Mass air flow sensor circuit				3										EC-727, EC-735
Heated oxygen sensor 1 circuit														EC-778, EC-787 , EC-799 , EC-1014 , EC-1020
Engine coolant temperature sensor circuit	1	2	3		3	3			2		3			EC-748, EC-770
Throttle position sensor circuit		1	2		2	2					2			EC-753, EC-762
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-652
Vehicle speed sensor circuit		2	3		3						3			EC-987
Knock sensor circuit				3										EC-865
ECM	2	2				3	3	2	2	1				EC-1012, EC-652
Start signal circuit	1													EC-1154
Park/neutral position (PNP) switch circuit			3		3		3	2			3			EC-1135
Power steering oil pressure switch circuit		2												EC-1163

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

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													Reference section
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-3
	Fuel piping			5	5	5		5	4			5			—
	Vapor lock														
	Valve deposit	5		5	5	5		5	4			5			
	Poor fuel (Heavy weight gasoline, Low octane)														
Air	Air duct	5	5	5	5	5	5	5	4	4		5			
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)														
	Throttle body, Throttle wire														EM-80
	Air leakage from intake manifold/ Collector/Gasket				5										—
Cranking	Battery	1	1	1		1		1	1			1		1	SC-4
	Generator circuit														SC-26
	Starter circuit														SC-9
	Park/neutral position (PNP) switch														MT-46, AT-249
	Drive plate/Flywheel	6													EM-80

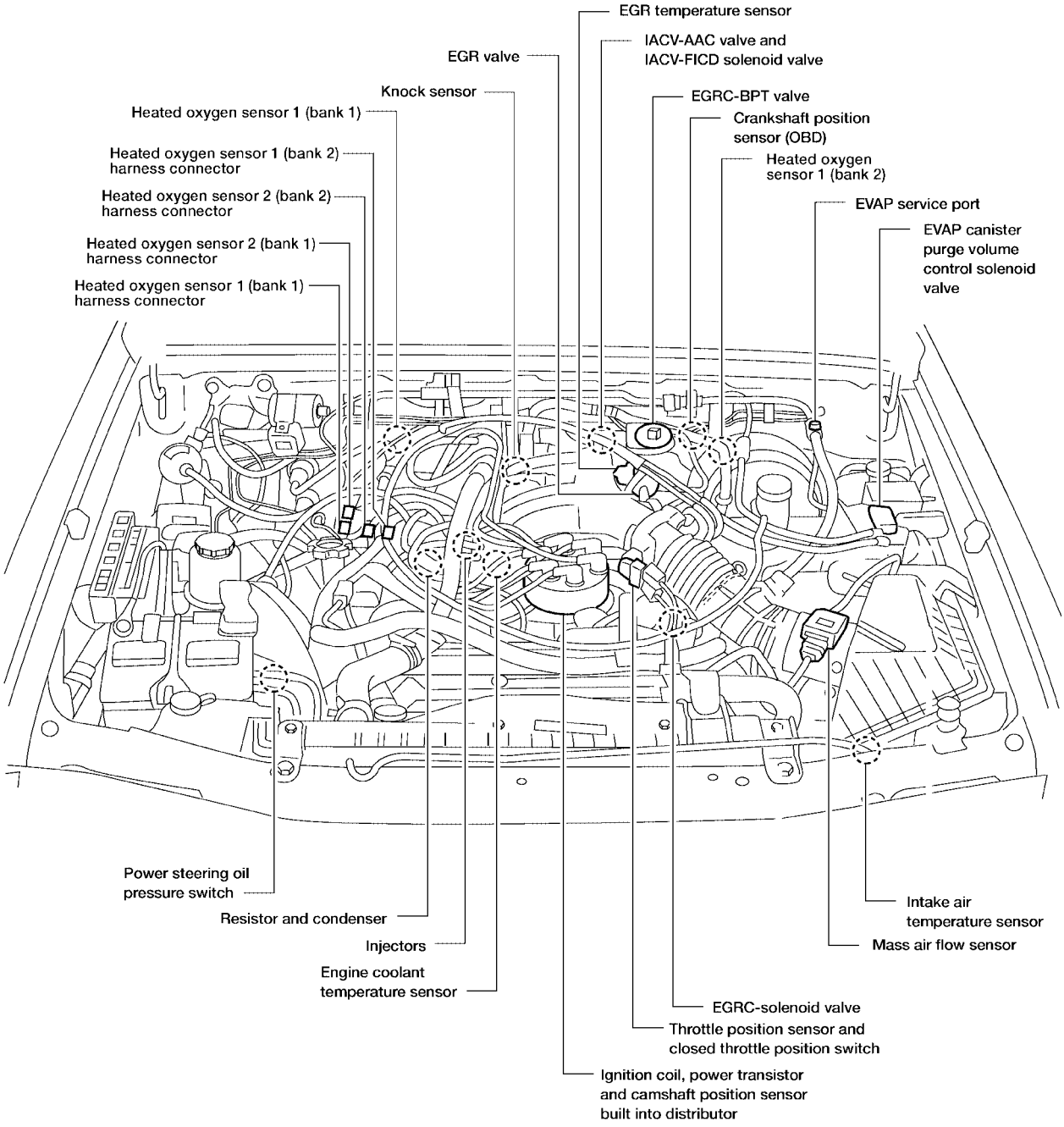
		SYMPTOM													Reference section
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-102
	Cylinder head gasket										2		2		
	Cylinder block	6	6	6	6	6		6	6			6	3		EM-131, EM-91
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain	6	6	6	6	6		6	6			6			
	Camshaft														
	Intake valve												2		
	Exhaust valve														
	Hydraulic lash adjuster														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	6	6	6	6	6		6	6			6			EX-3
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	6	6	6	6	6		6	6			6	2		EM-88, LU-14 , LU-16
	Oil level (Low/Filthy) oil														MA-30
Cooling	Radiator/Hose/Radiator filler cap	6	6	6	6	6		6	6		2	6			
	Thermostat						5			5					CO-22, CO-25 , CO-28 , CO-32 , CO-30
	Water pump														
	Water gallery														
	Cooling fan						5			5					
	Coolant level (low)/Contaminated coolant														MA-26

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

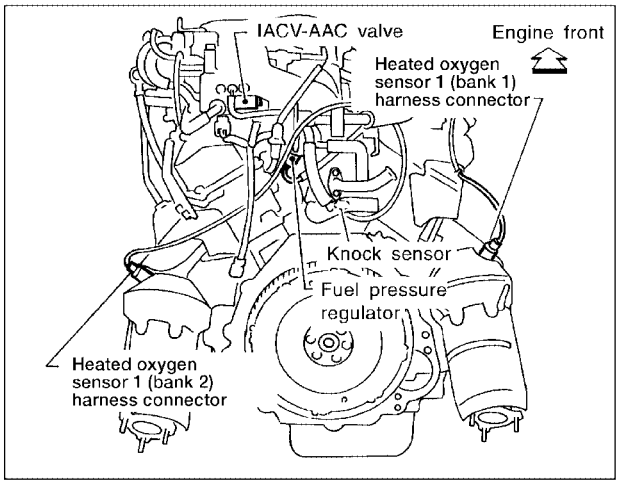
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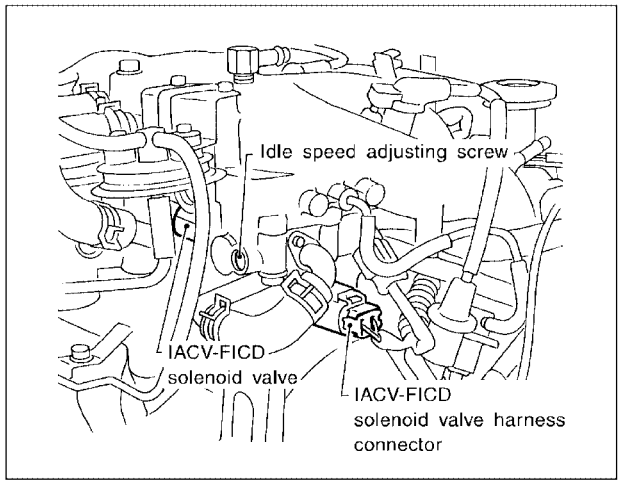
Engine Control Component Parts Location

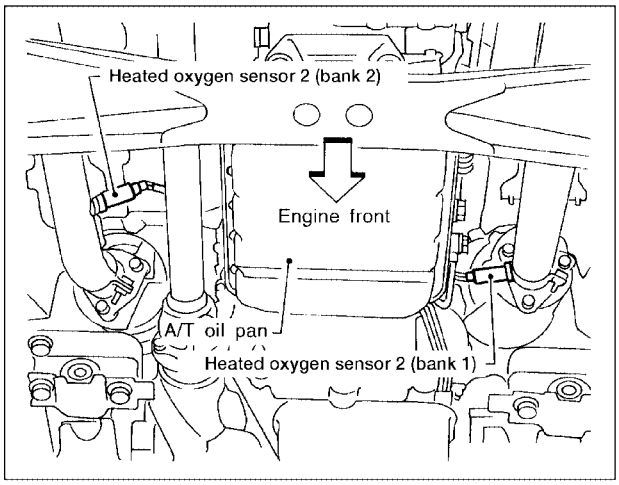
UBS00DF6

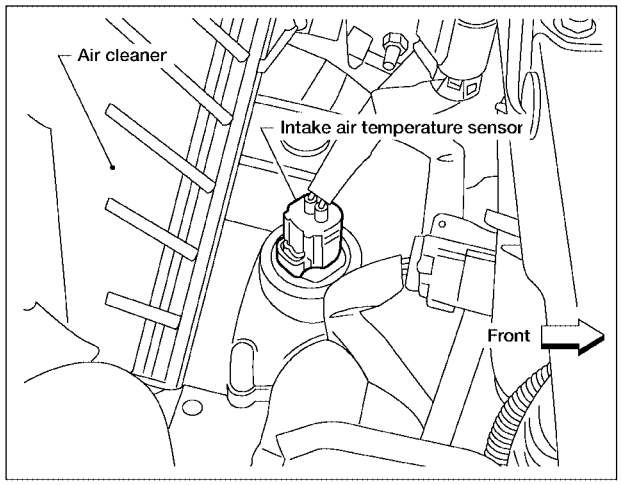


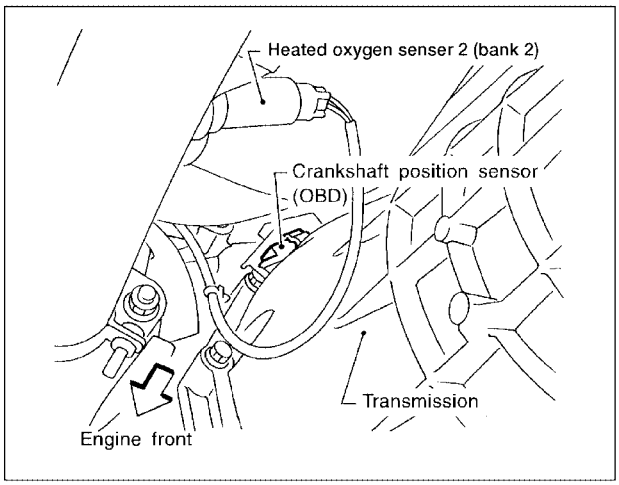
BBIA0426E

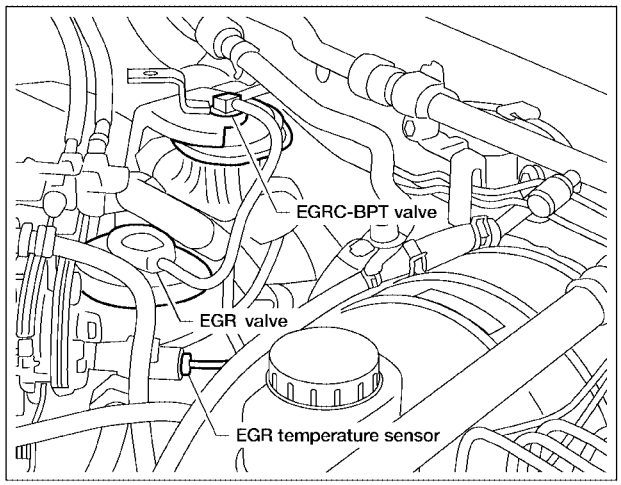

IACV-AAC valve
Engine front
Heated oxygen sensor 1 (bank 1) harness connector
Knock sensor
Fuel pressure regulator
Heated oxygen sensor 1 (bank 2) harness connector


Idle speed adjusting screw
IACV-FICD solenoid valve
IACV-FICD solenoid valve harness connector

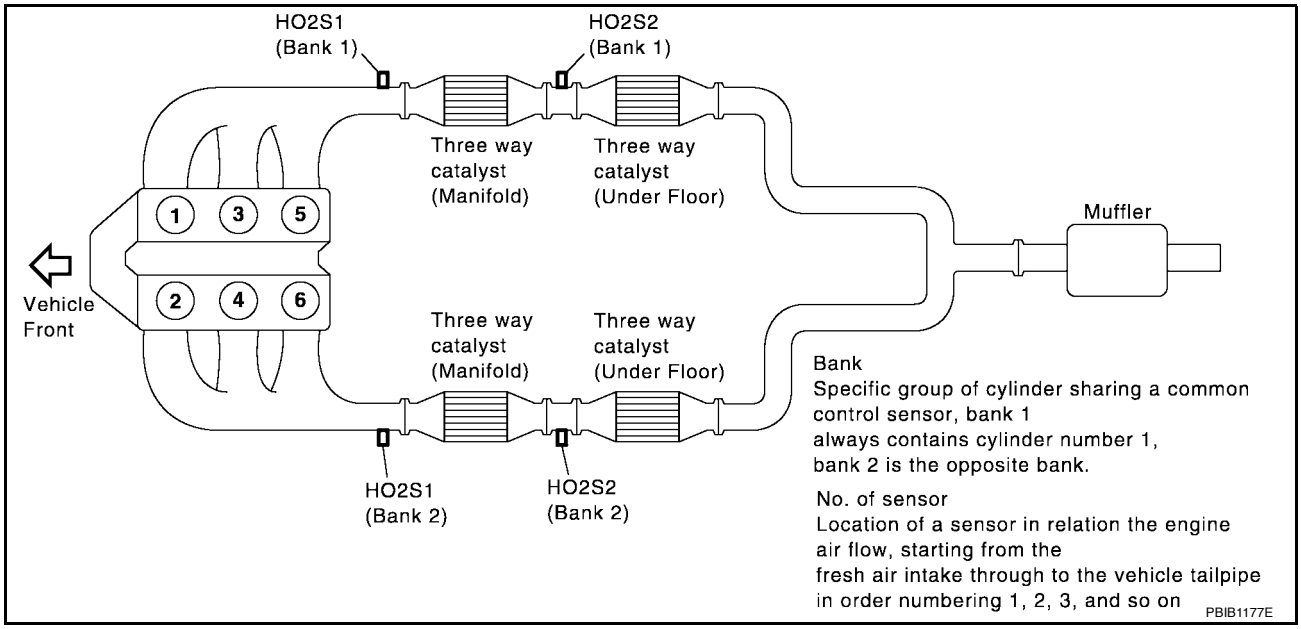

Heated oxygen sensor 2 (bank 2)
Engine front
A/T oil pan
Heated oxygen sensor 2 (bank 1)

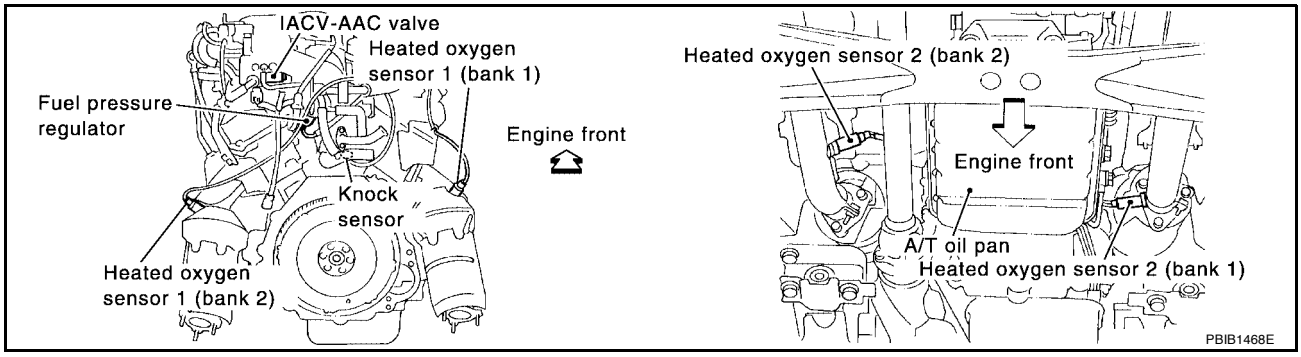

Air cleaner
Intake air temperature sensor
Front


Heated oxygen senser 2 (bank 2)
Crankshaft position sensor (OBD)
Transmission
Engine front


EGRC-BPT valve
EGR valve
EGR temperature sensor

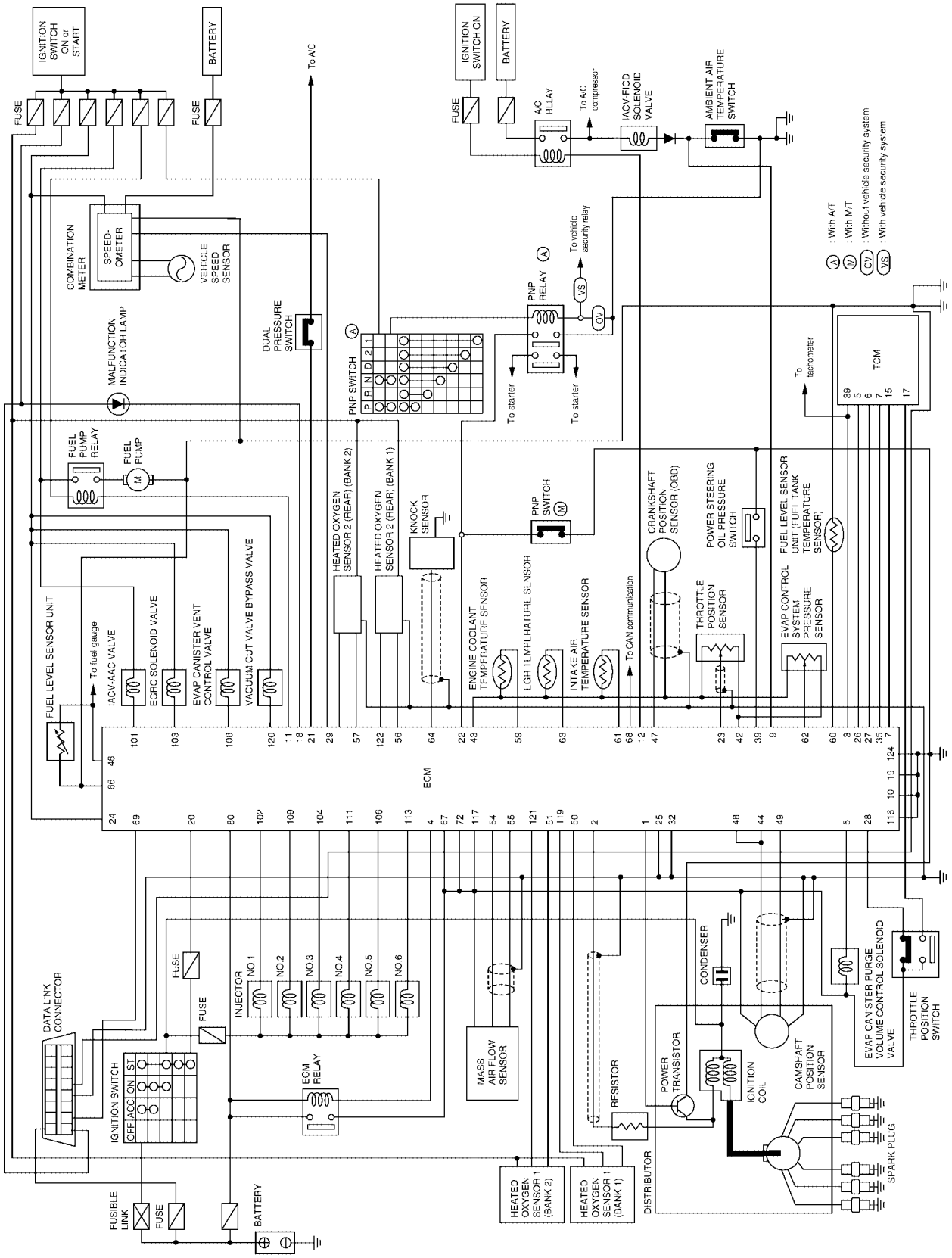
BBIA0180E


HO2S1
(Bank 1)
HO2S2
(Bank 1)
Three way
catalyst
(Manifold)
Three way
catalyst
(Under Floor)
Muffler
1
3
5
2
4
6
Vehicle
Front
Three way
catalyst
(Manifold)
Three way
catalyst
(Under Floor)
HO2S1
(Bank 2)
HO2S2
(Bank 2)
Bank
Specific group of cylinder sharing a common control sensor, bank 1
always contains cylinder number 1,
bank 2 is the opposite bank.
No. of sensor
Location of a sensor in relation the engine air flow, starting from the
fresh air intake through to the vehicle tailpipe
in order numbering 1, 2, 3, and so on
PBIB1177E


IACV-AAC valve
Heated oxygen
sensor 1 (bank 1)
Fuel pressure
regulator
Engine front
Knock
sensor
Heated oxygen
sensor 1 (bank 2)
Heated oxygen sensor 2 (bank 2)
Engine front
A/T oil pan
Heated oxygen sensor 2 (bank 1)
PBIB1468E

Circuit Diagram

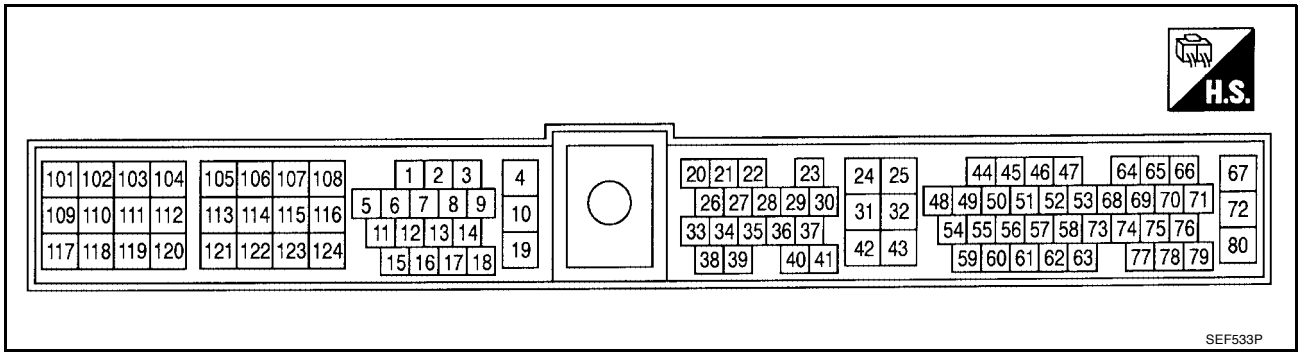
UBS00DF7



BBWA0464E

ECM Harness Connector Terminal Layout

UBS00DF8

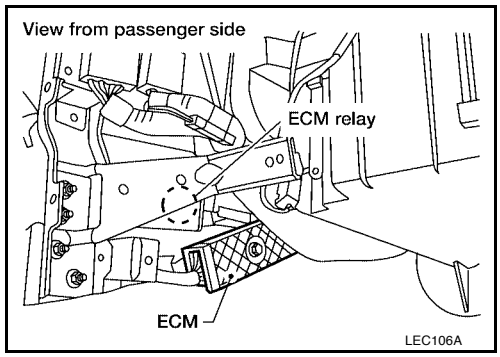


ECM Terminals and Reference Value

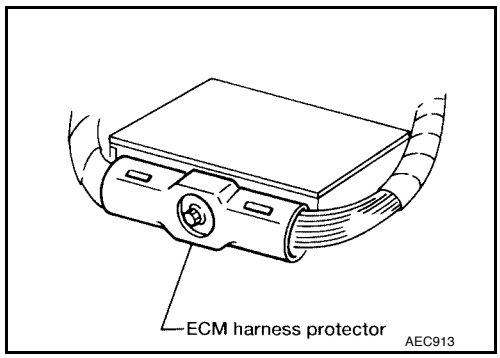
UBS00DF9

PREPARATION

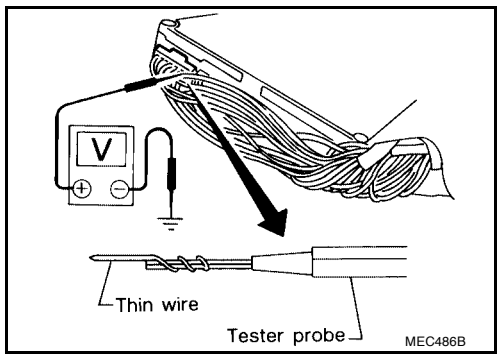
1. ECM is located behind the instrument lower cover. For this inspection:
   - Remove instrument lower cover.



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 1 time.
   - Data is for comparison and may not be exact.

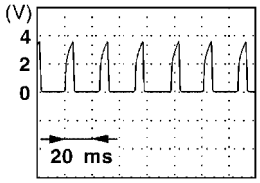
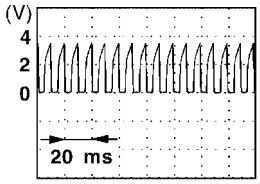
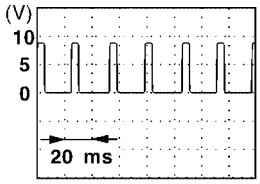
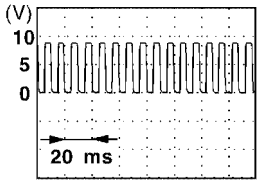


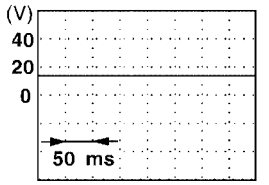
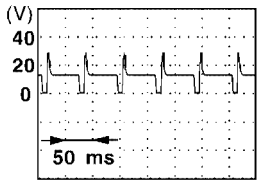
ECM INSPECTION TABLE

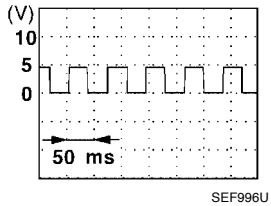
Specification data are reference values and are measured between each terminal and ground.

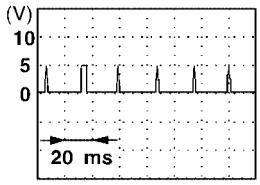
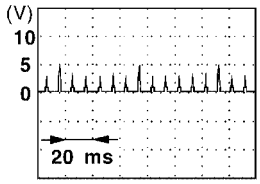
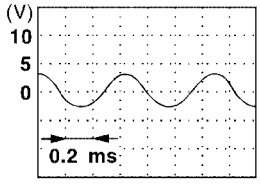
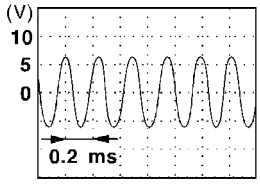
CAUTION:

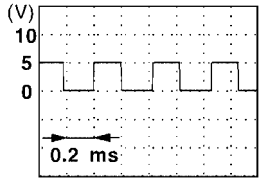
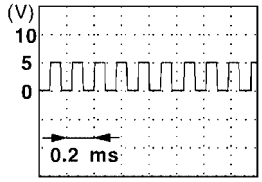
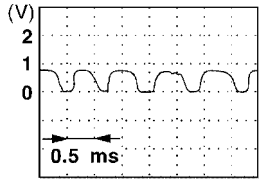
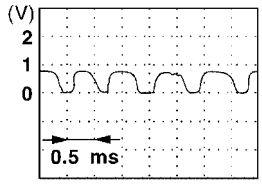
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	**[Engine is running]** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 0.7V★  SEF988U
			[Engine is running] ● Engine speed is 2,000 rpm	1.1 - 1.5V★  SEF989U
3	P/L	Tachometer	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1 - 2V★  SEF992U
			[Engine is running] ● Engine speed is 2,000 rpm	3 - 5V★  SEF993U
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)

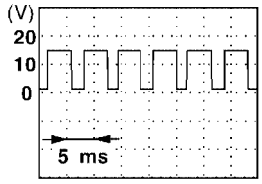
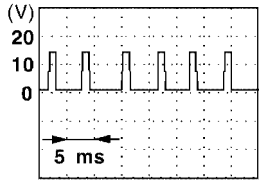
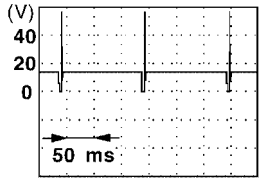
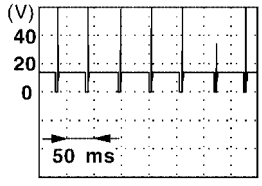
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	R/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★  SEF995U
7	Y/G	A/T check signal	**[Ignition switch: ON]** **[Engine is running]**	0 - 3.0V
9	B/Y	Ambient air temperature switch	**[Engine is running]** ● Idle speed ● Ambient air temperature is above 25°C (77°F) ● Air conditioner is operating	0V
			[Engine is running] ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is not operating	Approximately 5V
10	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
11	W/R	Fuel pump relay	**[Ignition switch: ON]** ● For a few seconds after turning ignition switch ON **[Engine is running]**	0 - 1V
			[Ignition switch: ON] ● More than a few seconds after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
12	P	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are ON*	0 - 1V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)
18	R/W	Malfunction indicator lamp	**[Ignition switch: ON]**	0 - 1V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
19	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	L/OR	Start signal	**[Ignition switch: ON]**	Approximately 0V
			[Ignition switch: START]	9 - 12V
21	G/R	Air conditioner switch	**[Engine is running]** ● Both A/C switch and blower switch are ON (Compressor operates)*	Approximately 0V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)
22	L/B	Park/neutral position (PNP) switch	**[Ignition switch: ON]** ● Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] ● Except above position	Approximately 5V
23	L	Throttle position sensor	**[Engine is running]** ● **Warm-up condition** ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump ● Accelerator pedal is fully released	0.15 - 0.85V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal is fully depressed	3.5 - 4.7V
24	W/L	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
26	PU/W	A/T signal No. 1	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
27	P/B	A/T signal No. 2	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
28	BR/W	Throttle position switch (Closed position)	**[Engine is running]** ● **Warm-up condition** ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump ● Accelerator pedal is fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal is depressed	Approximately 0V
29	G/B	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle. ● Shift lever: 2nd (M/T), D (A/T) ● Vehicle speed is 40 km/h (25 MPH)	2 - 3V★  SEF996U
32	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	G/R	A/T signal No. 3	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
39	GY/R	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being turned	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned	Approximately 5V
42	B/W	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
43	BR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
44 48	PU PU	Camshaft position sensor (Reference signal)	**[Engine is running]** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0.3 - 0.5V★  SEF997U
			[Engine is running] ● Engine speed is 2,000 rpm	0.3 - 0.5V★  SEF998U
46	OR/B	Fuel level sensor	**[Ignition switch: ON]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1 - 2V★ (AC range)  SEF690W
			[Engine is running] ● Engine speed is 2,000 rpm	3 - 4V★ (AC range)  SEF691W

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	LG	Camshaft position sensor (Position signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 2.5V★  SEF999U
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5V★  SEF001V
50	B	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V★  SEF002V
51	G	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V★  SEF002V
54	R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.7 - 2.3V
55	G	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
56	OR	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	Y	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
59	LG/R	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature
60	Y/B	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel temperature
61	PU/R	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
62	Y	EVAP control system pressure sensor	**[Ignition switch: ON]**	1.8 - 4.8V
63	G/OR	EGR temperature sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Less than 4.5V
			[Engine is running] ● **Warm-up condition** ● EGR system is operating	0 - 1.5V
64	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
66	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
68	W/G	A/T signal	**[Engine is running]** ● Idle speed	Approximately 0 - 5.0V
69	LG/R	Data link connector	**[Engine is running]** ● CONSULT-II or GST is disconnected	6 - 10V
72	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
80	SB	Power supply (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	8 - 11V★  SEF005V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 3,000 rpm	7 - 10V★  SEF692W
102 104 106 109 111 113	W/B W/R W/G W/L W/PU W	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEF007V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEF008V
103	G/W	EGRC-solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Lift up the vehicle ● Shift lever: D (A/T), 1st (M/T) ● Revving engine from idle to 3,000 rpm quickly	0 - 1V
108	R/G	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119	BR/Y	Heated oxygen sensor 1 heater (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 2,800 rpm	Approximately 0.4V
			[Engine is running] ● Engine speed is above 2,800 rpm	BATTERY VOLTAGE (11 - 14V)
120	P/B	Vacuum cut valve bypass valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
121	BR	Heated oxygen sensor 1 heater (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 2,800 rpm	Approximately 0.4V
			[Engine is running] ● Engine speed is above 2,800 rpm	BATTERY VOLTAGE (11 - 14V)
122	R/B	Heated oxygen sensor 2 heater (bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Warm-up condition – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
123	R/Y	Heated oxygen sensor 2 heater (bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Warm-up condition – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

*: Any mode except OFF, ambient air temperature is above 25°C (77°F).

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

CONSULT-II Function

UBS00DFA

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.*
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output specification of the basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.

Diagnostic test mode	Function
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.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECM part number	ECM part number can be read.

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

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

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item			DIAGNOSTIC TEST MODE						
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	DATA MONITOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUPPORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Camshaft position sensor		×	×	×	×			
		Mass air flow sensor		×		×	×			
		Engine coolant temperature sensor		×	×	×	×	×		
		Heated oxygen sensor 1		×		×	×		×	×
		Heated oxygen sensor 2		×		×	×		×	×
		Vehicle speed sensor		×	×	×	×			
		Throttle position sensor	×	×		×	×			
		Fuel tank temperature sensor		×		×	×	×		
		EVAP control system pressure sensor		×		×	×			
		EGR temperature sensor		×		×	×			
		Intake air temperature sensor		×	×	×	×			
		Crankshaft position sensor (OBD)		×						
		Knock sensor		×						
		Ignition switch (start signal)				×	×			
		Closed throttle position switch		×		×	×			
		Closed throttle position switch (throttle position sensor signal)				×	×			
		Air conditioner switch				×	×			
		Park/neutral position (PNP) switch		×		×	×			
		Power steering oil pressure switch				×	×			
		Battery voltage				×	×			
		Ambient air temperature switch				×	×			

Item			DIAGNOSTIC TEST MODE							
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	DATA MONITOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUPPORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injectors				×	×	×		
		Power transistor (Ignition timing)	×			×	×	×		
		IACV-AAC valve	×	×		×	×	×		
		EVAP canister purge volume control solenoid valve		×		×	×	×		×
		Air conditioner relay				×	×			
		Fuel pump relay	×			×	×	×		
		EGRC-solenoid valve		×		×	×	×		
		Heated oxygen sensor 1 heater		×		×	×		×	
		Heated oxygen sensor 2 heater		×		×	×		×	
		EVAP canister vent control valve	×	×		×	×	×		
		Vacuum cut valve bypass valve	×	×		×	×	×		×
		Calculated load value			×	×	×			

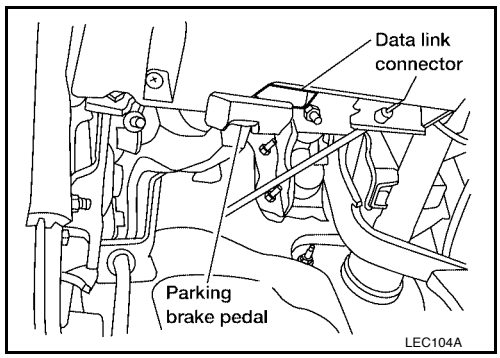
X: Applicable

*1: This item includes 1st trip DTCs.

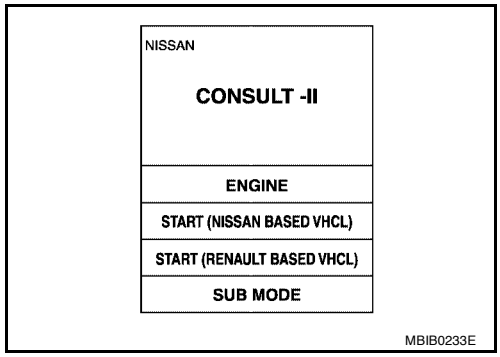
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-685, "Freeze Frame Data and 1st Trip Freeze Frame Data" .

INSPECTION PROCEDURE

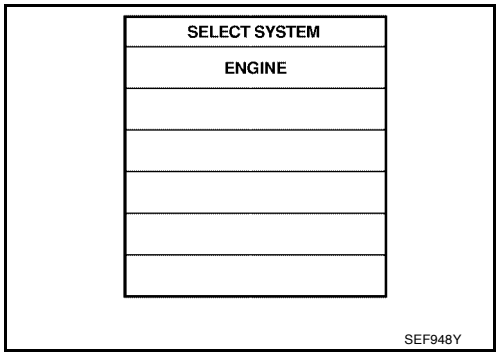
1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to data link connector which is located under LH dash panel near the fuse box cover.



3. Turn ignition switch ON.
4. Touch “START (NISSAN BASED VHCL)”.

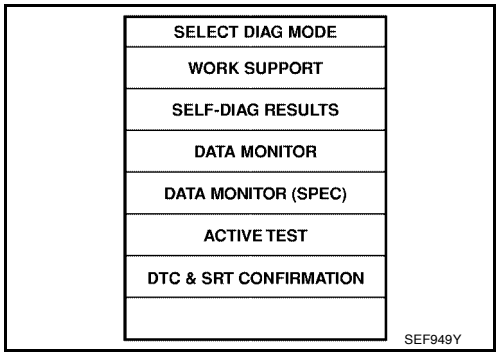


5. Touch “ENGINE”.
   If “ENGINE” is not indicated, go to GI-36, "CONSULT-II Data Link Connector (DLC) Circuit" .



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

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



WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	● FOLLOW THE BASIC INSPECTION INSTRUCTION IN THE SERVICE MANUAL.	When adjusting the idle throttle position
IGNITION TIMING ADJ	● IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING “START”. AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.	When adjusting target ignition timing After adjustment, confirm target ignition timing with a timing light by turning the distributor.
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
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clean the coefficient of self-learning control valve

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 ● FUEL TANK 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 adjusting idle speed

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

SELF-DIAGNOSTIC MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-590, "INDEX FOR DTC" .

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item *	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to EC-590, "INDEX FOR DTC" .)
FUEL SYS-B1 *	● “Fuel injection system status” at the moment a malfunction is detected is displayed.
FUEL SYS-B2 *	● One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop
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 TRM-B1 [%]	● “Short-term fuel trim” at the moment a malfunction is detected is displayed.
S-FUEL TRM-B2 [%]	● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
L-FUEL TRM-B1 [%]	● “Long-term fuel trim” at the moment a malfunction is detected is displayed.
L-FUEL TRM-B2 [%]	● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	● The throttle valve opening angle at the moment a malfunction is detected is displayed.

Freeze frame data item *	Description
B/FUEL SCHDL [msec]	● The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	● The intake air temperature at the moment a malfunction is detected is displayed.

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

DATA MONITOR MODE

Monitored Item

×: Applicable

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the REF signal (120° signal) of the camshaft position sensor.	
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor is displayed.	● When the engine is stopped, a certain value is indicated.
B/FUEL SCHDL [msec]		×	● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When the engine is stopped, a certain value is indicated. ● This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]		×		
COOLAN TEMP/S [°C] or [°F]	×	×	● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	● When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
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 sensor signal is displayed.	
BATTERY VOLT [V]	×	×	● The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	×	×	● The throttle position sensor signal voltage is displayed.	

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
FUEL T/TMP SE [°C] or [°F]	×		● The fuel temperature judged from the fuel tank temperature sensor signal voltage 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.	
EGR TEMP SEN [V]	×	×	● The signal voltage of the EGR temperature 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 throttle position sensor signal.	
CLSD THL/P SW [ON/OFF]	×		● Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.	
AIR COND SIG [ON/OFF]	×	×	● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	×	×	● [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated.	
AMB TEMP SW [ON/OFF]	×		● Indicates [ON/OFF] condition from the ambient air temperature switch signal.	
IGNITION SW [ON/OFF]	×		● Indicates [ON/OFF] condition from ignition switch.	
INJ PULSE-B1 [msec]		×	● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	● When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B2 [msec]				
IGN TIMING [BTDC]		×	● Indicates the ignition timing computed by ECM according to the input signals.	● When the engine is stopped, a certain value is indicated.
CAL/LD VALUE [%]			● Calculated load value indicates the value of the current airflow divided by peak airflow.	
ABSOL TH·P/S [%]			● Absolute throttle position sensor indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor.	
MASS AIRFLOW [g·m/s]			● Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	
IACV-AAC/V [%]		×	● Indicates the IACV-AAC valve control value computed by ECM according to the input signals.	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
PURG VOL C/V [%]			● Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
AIR COND RLY [ON/OFF]		×	● The air conditioner relay control condition (determined by ECM according to the input signal) is indicated.	
EGRC SOL/V [ON/OFF] (FLOW/CUT)		×	● Indicates the control condition of the EGRC-solenoid valve determined by ECM according to the input signals. ● ON: EGR valve is operational OFF: EGR valve operation is cut-off	
FUEL PUMP RLY [ON/OFF]		×	● Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
VENT CONT/V [ON/OFF]			● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. ● ON: Closed OFF: Open	
VC/V BYPASS/V [ON/OFF]			● The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. ● ON: Open OFF: Closed	
HO2S1 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensors 1 heater determined by ECM according to the input signals.	
HO2S1 HTR (B1) [ON/OFF]				
HO2S2 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 2 heaters determined by ECM according to the input signals.	
HO2S2 HTR (B2) [ON/OFF]				
Voltage [V]			● Voltage measured by the voltage probe.	
Frequency [msec] or [Hz] or [%]			● Pulse width, frequency or duty cycle measured by the pulse 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.

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

DATA MONITOR (SPEC) MODE

Monitored Items

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

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 connector ● Fuel injector ● 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.	● Adjust initial ignition timing
IACV-AAC/V OPENING	● Engine: After warming up, idle the engine. ● Change the IACV-AAC valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connector ● IACV-AAC valve
POWER BALANCE	● Engine: After warming up, idle the engine. ● A/C switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connector ● Compression ● Fuel injector ● Power transistor ● Spark plug ● Ignition coil
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 connector ● Engine coolant temperature sensor ● Fuel injector
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 connector ● Fuel pump relay
EGRC SOLENOID VALVE	● Ignition switch: ON ● Turn EGRC-solenoid valve "ON" and "OFF" using CONSULT-II and listen to operating sound.	EGRC-solenoid valve makes an operating sound.	● Harness and connector ● EGRC-solenoid valve

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
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 connector ● Solenoid valve
FUEL/T TEMP SEN	● Change the fuel tank temperature using CONSULT-II.		
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 connector ● Solenoid valve
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 connector ● Solenoid valve

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to EC-630, "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
EVAPRATIVE SYSTEM	EVAP SML LEAK P0442/P1442	Refer to corresponding trouble diagnosis for DTC.	EC-916/EC-1073
	EVAP V/S LEAK P0456/P1456		EC-966/EC-1098
	PURG VOL CN/V P1444		EC-1075
	PURGE FLOW P0441		EC-908
	VC CUT/V BP/V P1491		EC-1117
HO2S1	HO2S1 (B1) P0134		EC-799
	HO2S1 (B1) P1143		EC-1014
	HO2S1 (B1) P1144		EC-1020
	HO2S1 (B1) P0133		EC-787
	HO2S1 (B2) P0154		EC-799
	HO2S1 (B2) P1163		EC-1014
	HO2S1 (B2) P1164		EC-1020
	HO2S1 (B2) P0153		EC-787
HO2S2	HO2S2 (B1) P1146		EC-1027
	HO2S2 (B1) P1147		EC-1038
	HO2S2 (B1) P0139		EC-818
	HO2S2 (B2) P1166		EC-1027
	HO2S2 (B2) P1167		EC-1038
	HO2S2 (B2) P0159		EC-818
EGR SYSTEM	EGR SYSTEM P0400		EC-882
	EGR-BPT/VLV P0402		EC-891
	EGR SYSTEM P1402		EC-1065

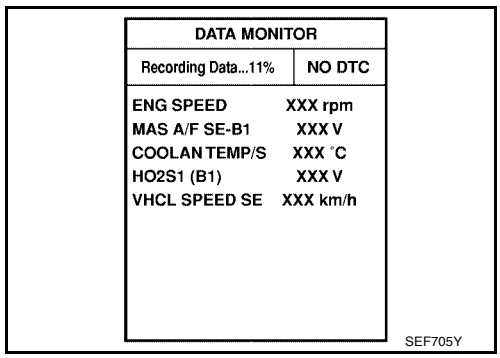
REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

Description

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

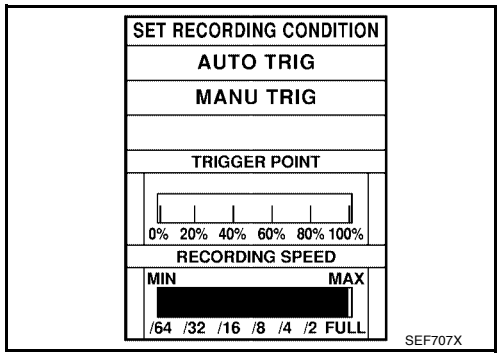
1. “AUTO TRIG” (Automatic trigger):

- 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 left, 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.



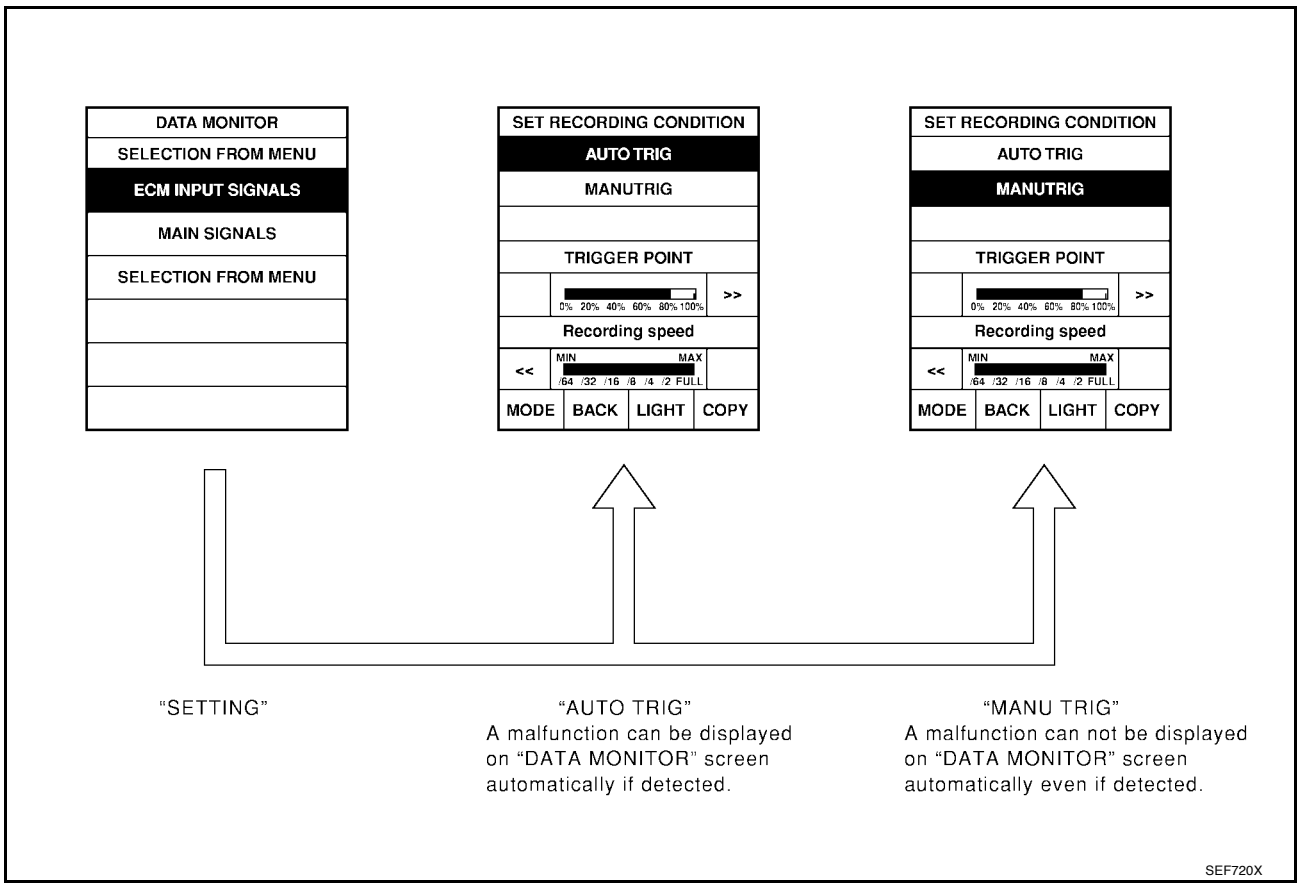
Operation

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 GI-25, "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.

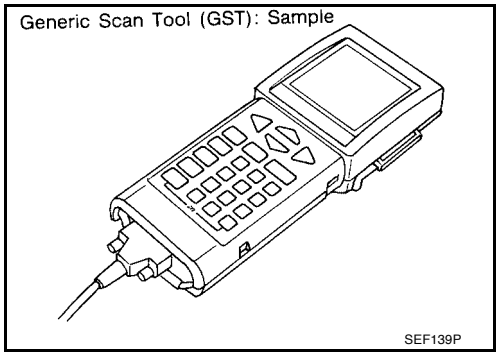


Generic Scan Tool (GST) Function

UBS00DFB

DESCRIPTION

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



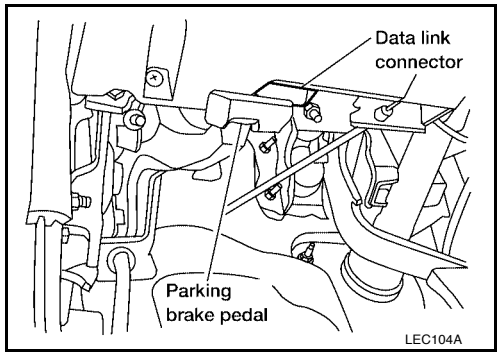
FUNCTION

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-685, "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: Closed ● Vacuum cut valve bypass valve: Open 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 is to enable the off-board to request vehicle specific vehicle information such as Vehicle Identification Number (VIN) and calibration IDs.

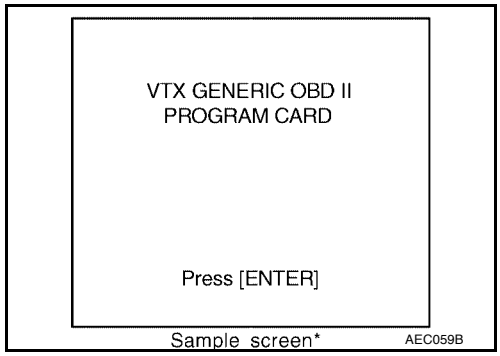
INSPECTION PROCEDURE

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



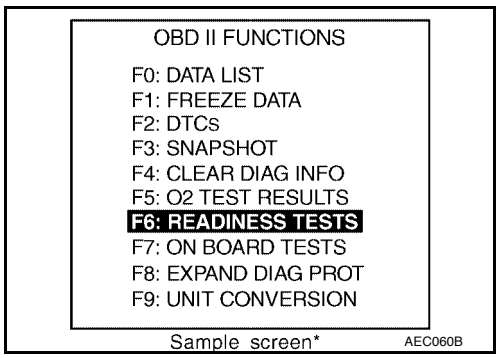
3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.

(*: 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

UBS00DFC

Remarks:
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
  * Specification data may not be directly related to their components signals/values/operations.
  i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	● Run engine and CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	1.0 - 1.7V
		2,500 rpm	1.7 - 2.3V
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
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ←→ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1) HO2S2 (B2)	● Warm-up condition ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH
VHCL SPEED SE	● Turn drive wheels and compare CONSULT-II value with the speedometer indication		Almost the same speed as the speed meter indication
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
THRTL POS SEN	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.15 - 0.85V
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	3.5 - 4.7V
EGR TEMP SEN	● Engine: After warming up		Less than 4.5V
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS CLSD THL/P SW	● Engine: After warming up, idle the engine	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Except above	OFF

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON
AMB TEMP SW	● Ignition switch: ON ● Compare ambient air temperature with the following:	Below 19°C (66°F)	OFF
		Above 25°C (77°F)	ON
IGNITION SW	● Ignition switch: ON → OFF → ON		ON → OFF → ON
INJ PULSE-B1 INJ PULSE-B2	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	2.4 - 3.7 msec
		2,000 rpm	1.9 - 3.3 msec
B/FUEL SCHDL	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.4 msec
IGN TIMING	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	10±2° BTDC
		2,000 rpm	More than 25° BTDC
IACV-AAC/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	10 - 20%
		2,000 rpm	—
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	0%
		2,000 rpm	—
A/F ALPHA-B1 A/F ALPHA-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	54 - 155%
EVAP SYS PRES	● Ignition switch: ON		1.8 – 4.8V
AIR COND RLY	● Air conditioner switch: OFF → ON		OFF → ON
FUEL PUMP RLY	● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running or cranking		ON
	Except as shown above		OFF
EGRC SOL/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	OFF
		Engine speed: Revving engine from idle to 3,000 rpm quickly.	ON
VENT CONT/V	● Ignition switch: ON		OFF
HO2S1 HTR (B1) HO2S1 HTR (B2)	● Engine: After warming up ● Engine speed: Below 2,800 rpm		ON
	● Engine speed: Above 2,800 rpm		OFF
HO2S2 HTR (B1) HO2S2 HTR (B2)	● Engine speed: Below 3,600 rpm after the following conditions are met – Engine: After warning up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
	● Engine speed: Above 3,600 rpm		OFF
VC/V BYPASS/V	Ignition switch: ON		OFF

MONITOR ITEM	CONDITION		SPECIFICATION
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%
ABSOL TH·P/S	● Engine: After warming up ● Ignition switch: ON ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.	Throttle valve: fully closed	0.0%
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	3.3 - 4.8 g·m/s
		2,500 rpm	12.0 - 14.9 g·m/s

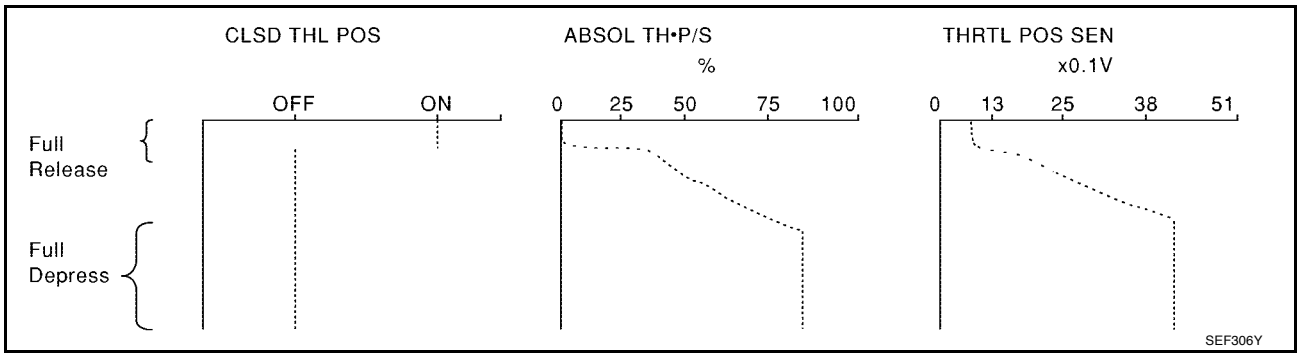
Major Sensor Reference Graph in Data Monitor Mode

UBS00DFD

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

THRTL POS SEN, ABSOL TH·P/S, CLSD THL POS

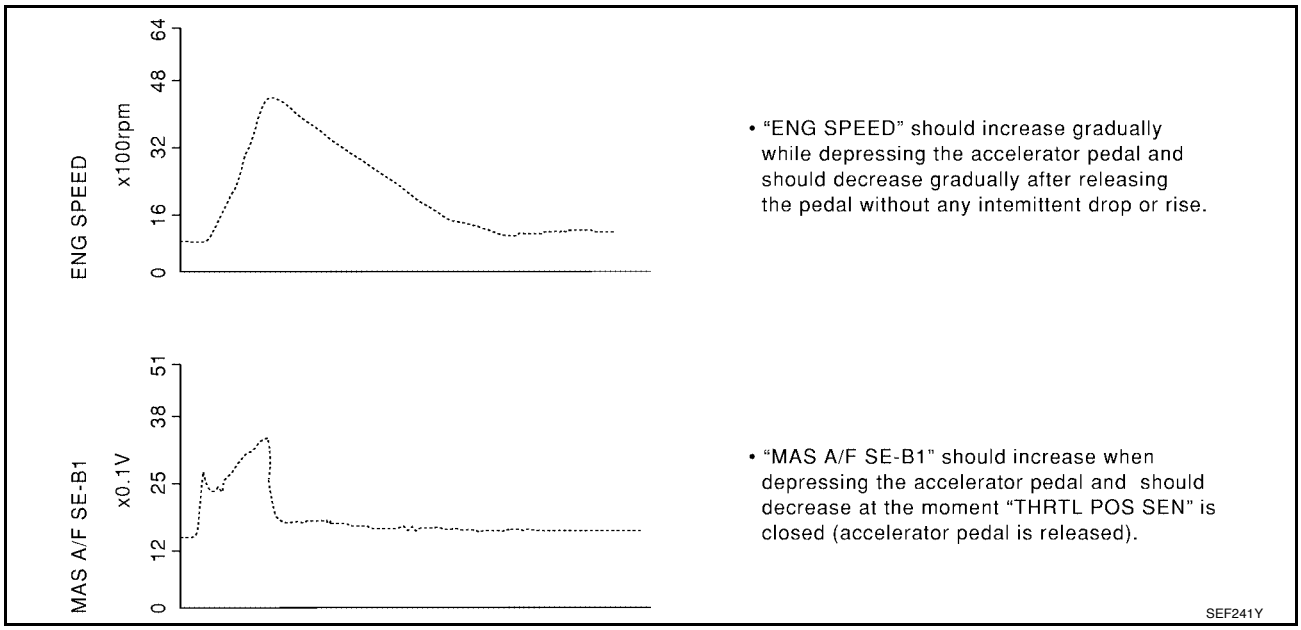
Below is the data for “THRTL POS SEN”, “ABSOL TH·P/S” and “CLSD THL POS” when depressing the accelerator pedal with the ignition switch ON.
The signal of “THRTL POS SEN” and “ABSOL TH·P/S” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from “ON” to “OFF”.

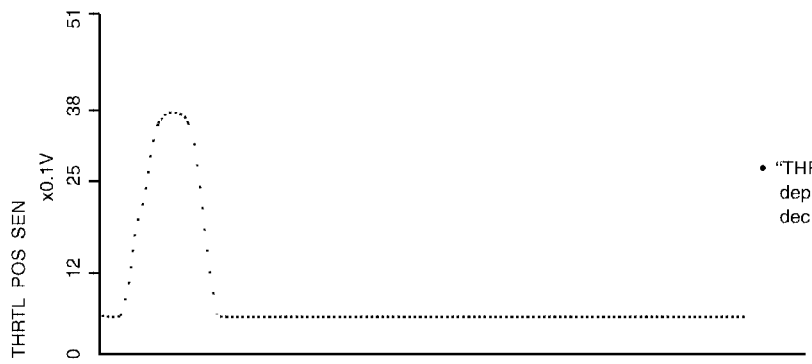


ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

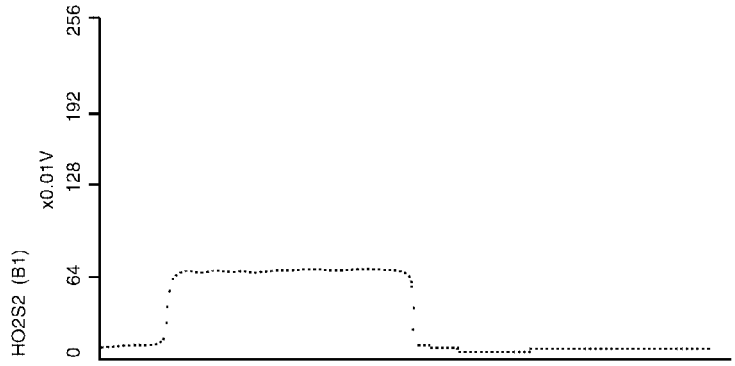
Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL POS SEN”, “HO2S2 (B1)”, “HO2S1 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.

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

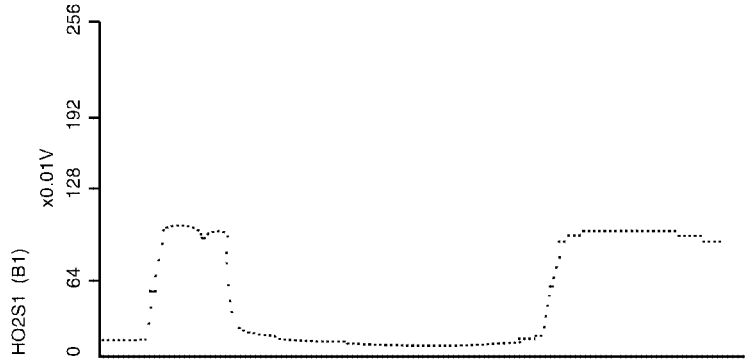




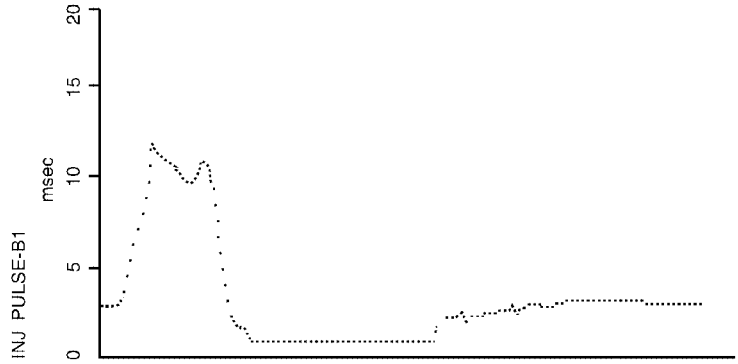
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "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.

SEF242YD

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

Description

UBS00DFE

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/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

UBS00DFF

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 101.3 kPa (760.0 mmHg, 29.92 inHg)±3 kPa (22.5 mmHg, 0.89 inHg)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up*1
- Electrical load: Not applied*2
- Engine speed: Idle

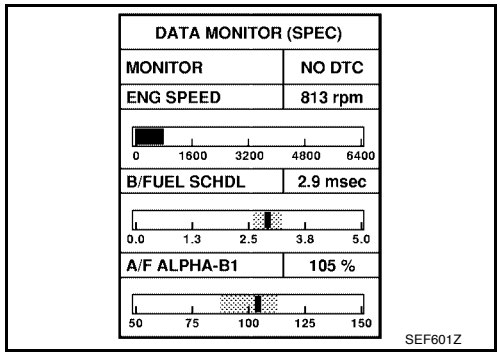
*1: For A/T models, after the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates less than 0.9V. For M/T models, drive vehicle for 5 minutes after the engine is warmed up to normal operating temperature.
*2: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

Inspection Procedure

UBS00DFG

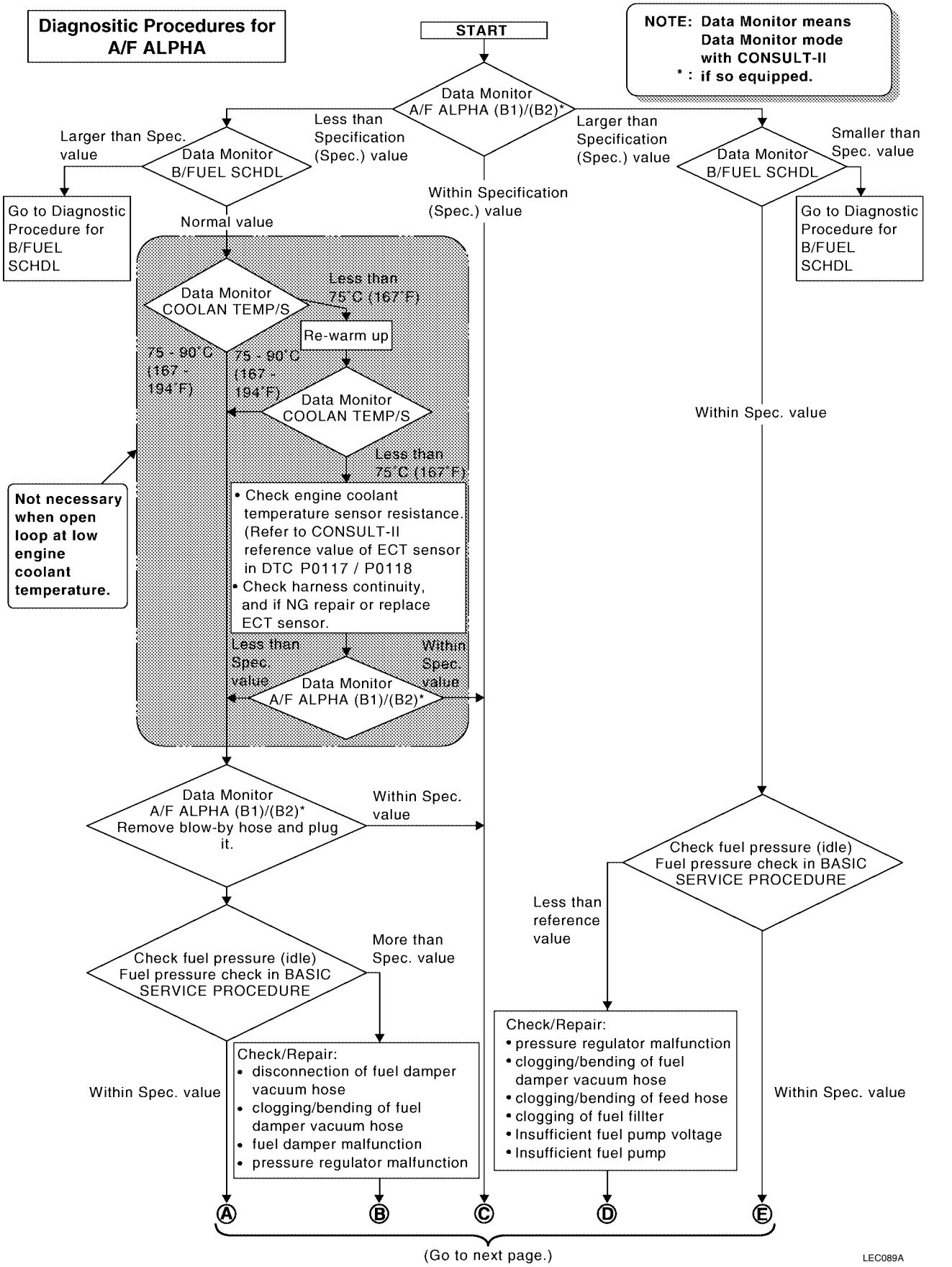
NOTE:
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

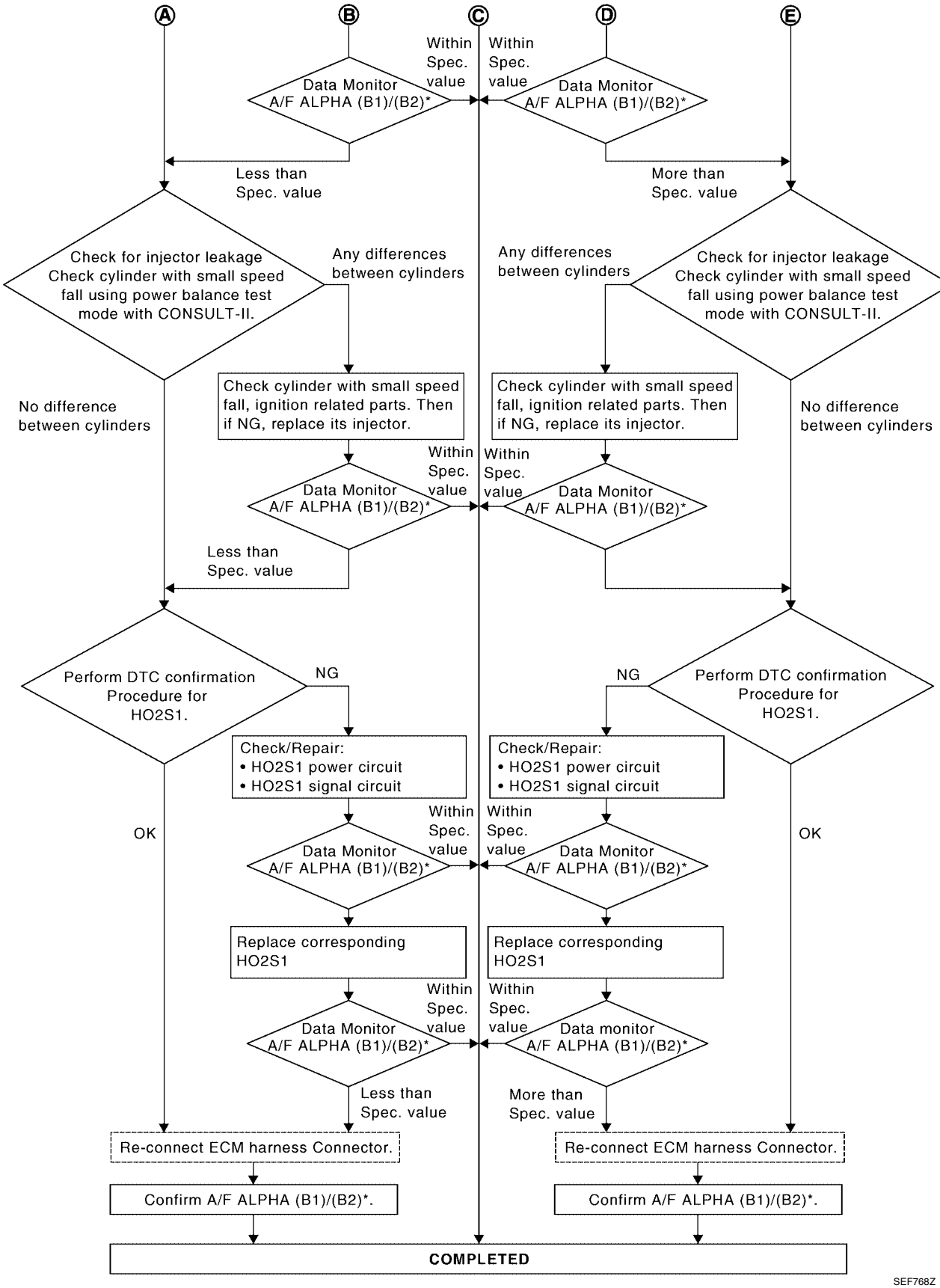
1. Perform EC-652, "Basic Inspection" .
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-700, "Diagnostic Procedure" .



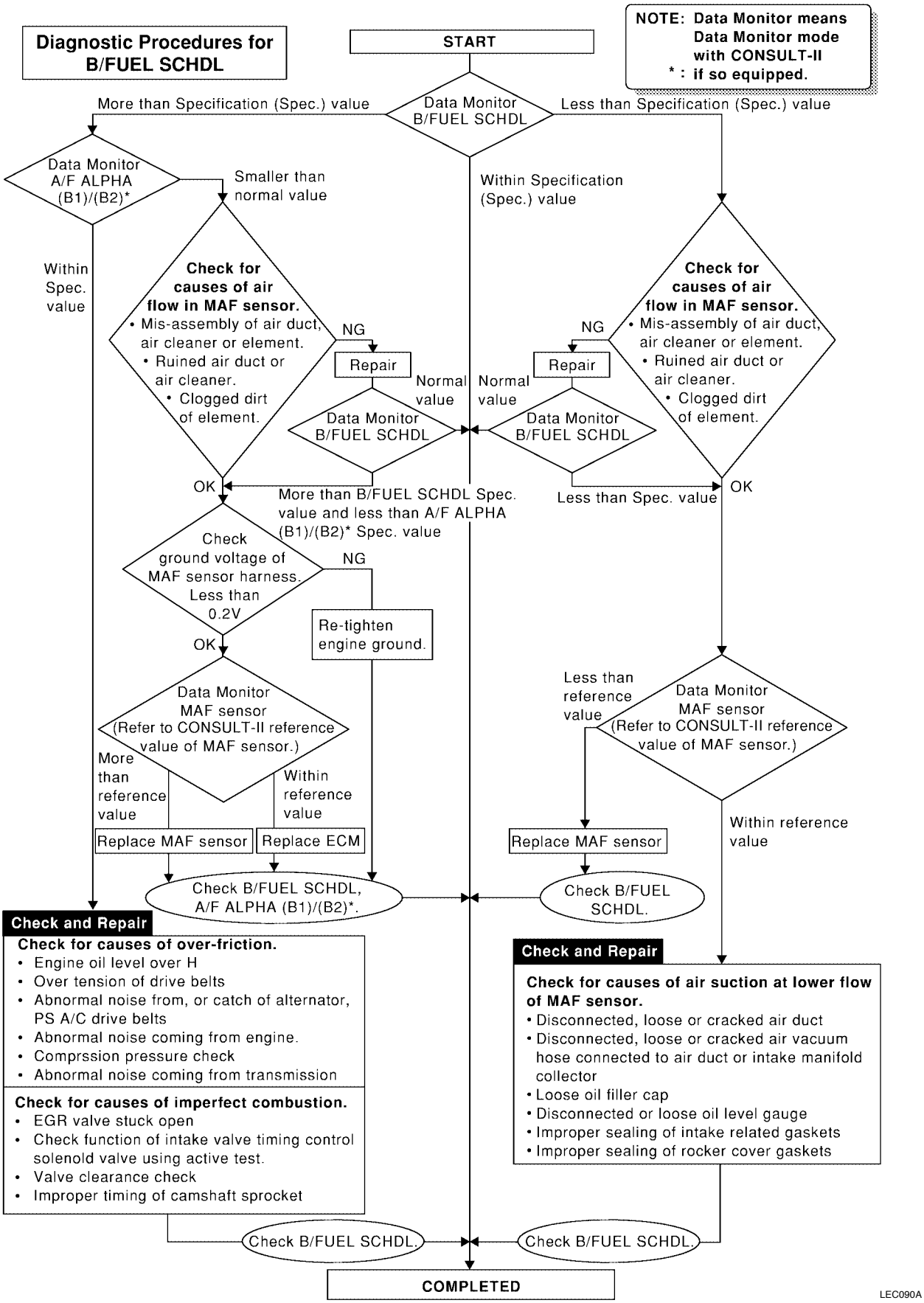
Diagnostic Procedure

UBS00DFH




Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
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.)
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
LEC090A

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

UBS00DFI

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

Common I/I Report Situations

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

Diagnostic Procedure

UBS00DFJ

1. INSPECTION START

Erase (1st trip) DTCs. Refer to EC-638, "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-25, "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-25, "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-22, "How to Check Terminal" , “HOW TO PROBE CONNECTORS”, “How to Check Enlarged Contact Spring of Terminal”.

OK or NG

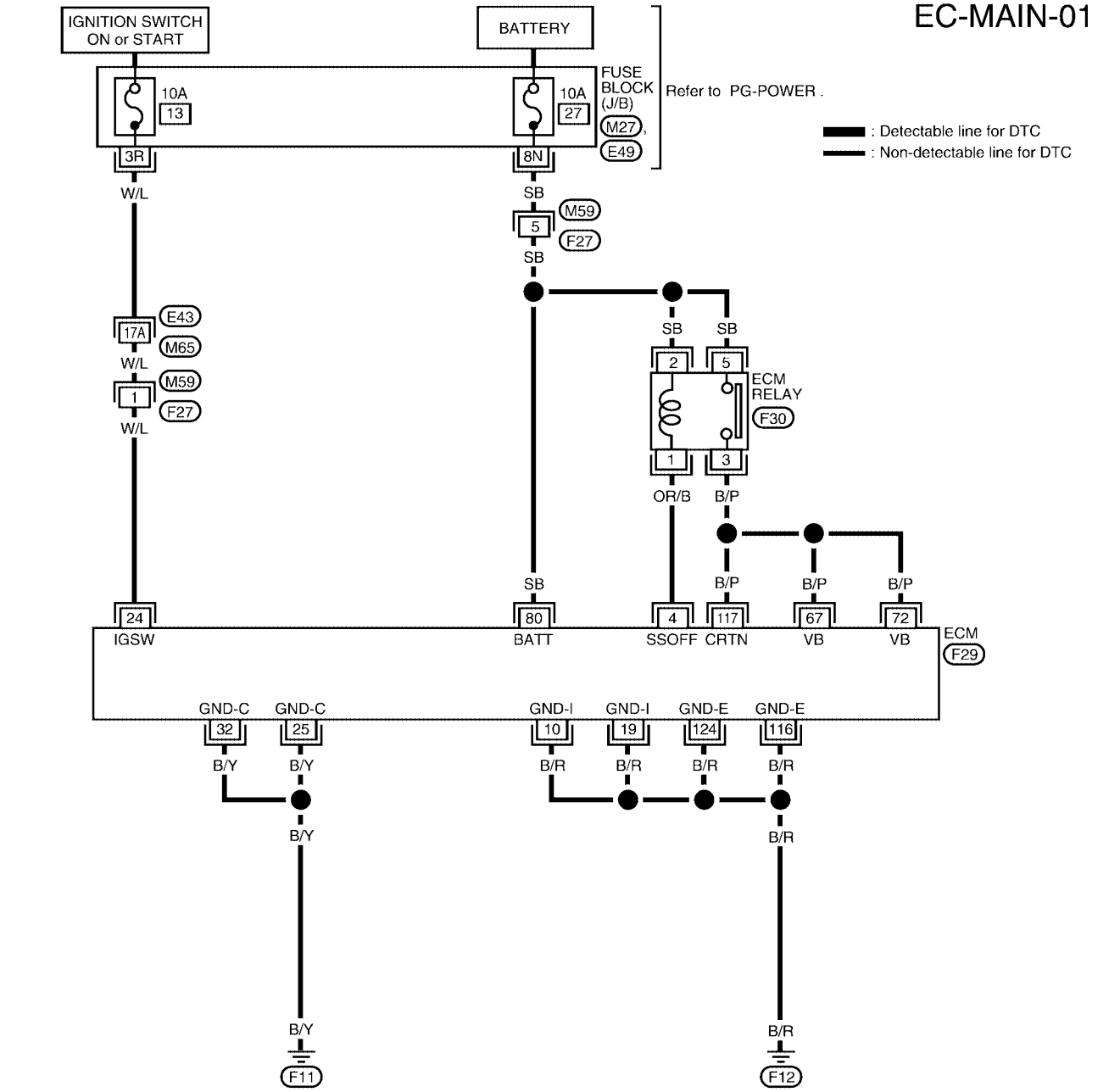
OK >> **INSPECTION END.**
NG >> Repair or replace connector.

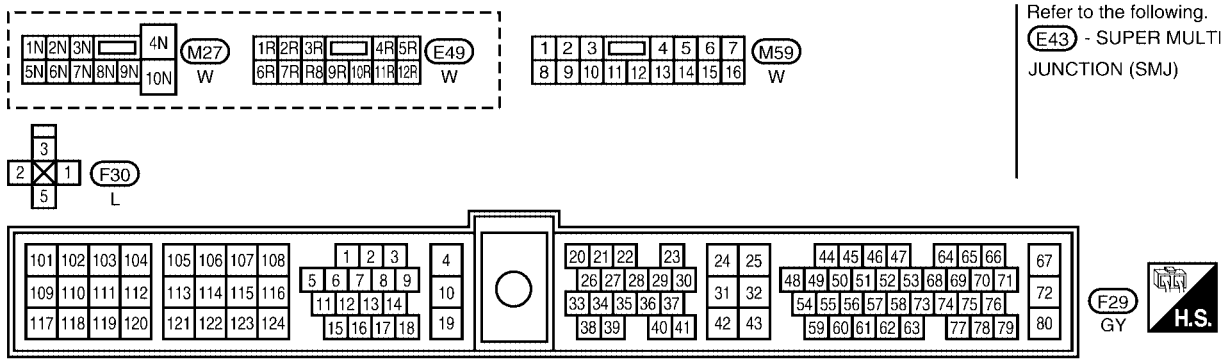
POWER SUPPLY AND GROUND CIRCUIT

PFP:24110

Wiring Diagram

UBS00DFK





BBWA0465E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
10	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
19	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
24	W/L	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
32	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
80	SB	Power supply (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

Diagnostic Procedure

UBS00DFL

1. INSPECTION START

Start engine.

Is engine running?

Yes or No

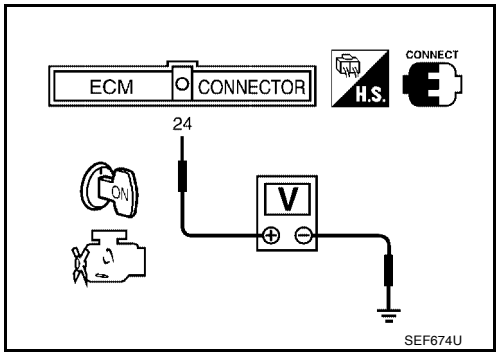
Yes >> GO TO 6.

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 24 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

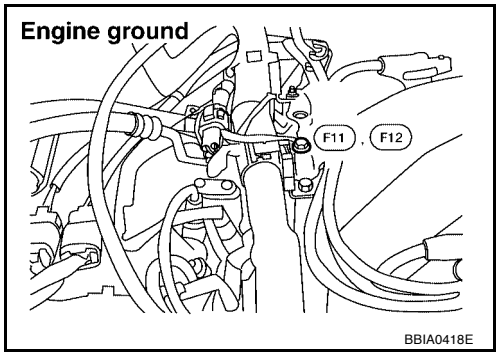
Check the following.

- Harness connectors E43, M65
- Harness connectors M59, F27
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair harness or connectors.

4. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
Refer to EC-709, "Ground Inspection" .



OK or NG

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

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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and ground.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

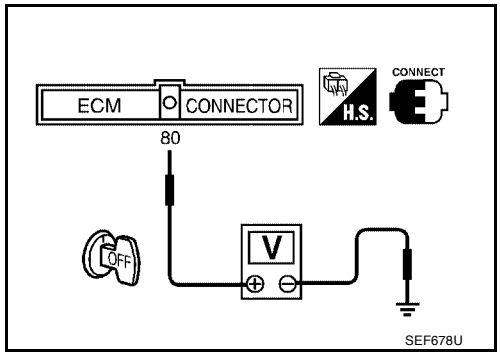
OK or NG

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

6. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Stop engine.
2. Check voltage between ECM terminal 80 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.

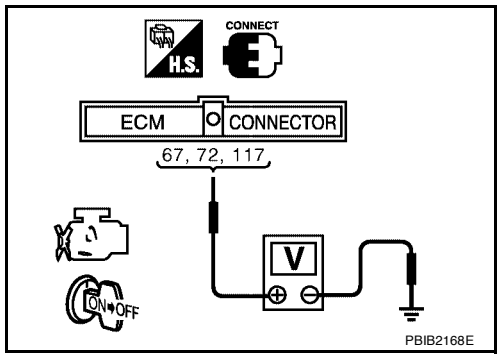
- Harness connectors M59, F27
- Fuse block (J/B) connector M27
- 10A fuse
- Harness for open or short between ECM and battery

>> Repair harness or connectors.

8. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch ON and then OFF.
2. Check voltage between ECM terminals 67, 72, 117 and ground with CONSULT-II or tester.

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

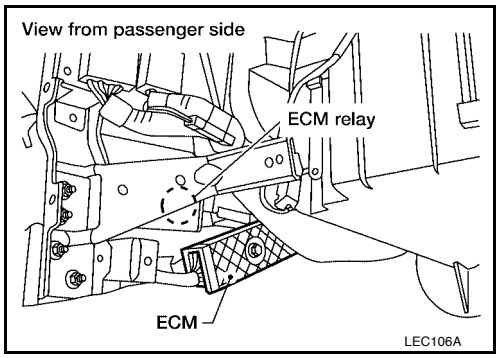


OK or NG

OK >> GO TO 14.
NG (Battery voltage does not exist.)>>GO TO 9.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 12.

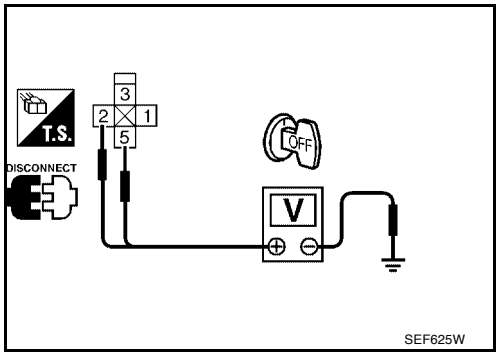
9. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM relay.



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

Voltage: Battery voltage



OK or NG

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

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM relay and harness connector F27

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

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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 67, 72, 117 and ECM relay terminal 3. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

12. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 4 and ECM relay terminal 1. Refer to Wiring Diagram.

Continuity should exist.

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

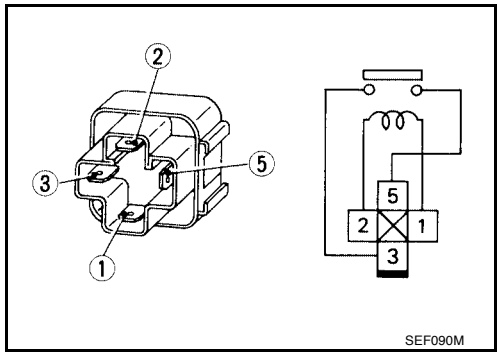
OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ECM RELAY

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

12V (1 - 2) applied : Continuity exists.
No voltage applied : No continuity

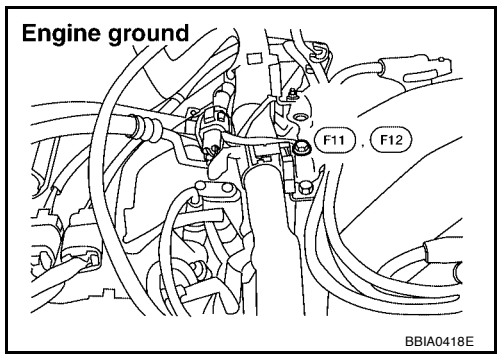


OK or NG

OK >> GO TO 14.
NG >> Replace ECM relay.

14. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .



OK or NG

OK >> GO TO 15.
NG >> Repair or replace ground connections.

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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

16. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END.**

Ground Inspection

UBS00GZ0

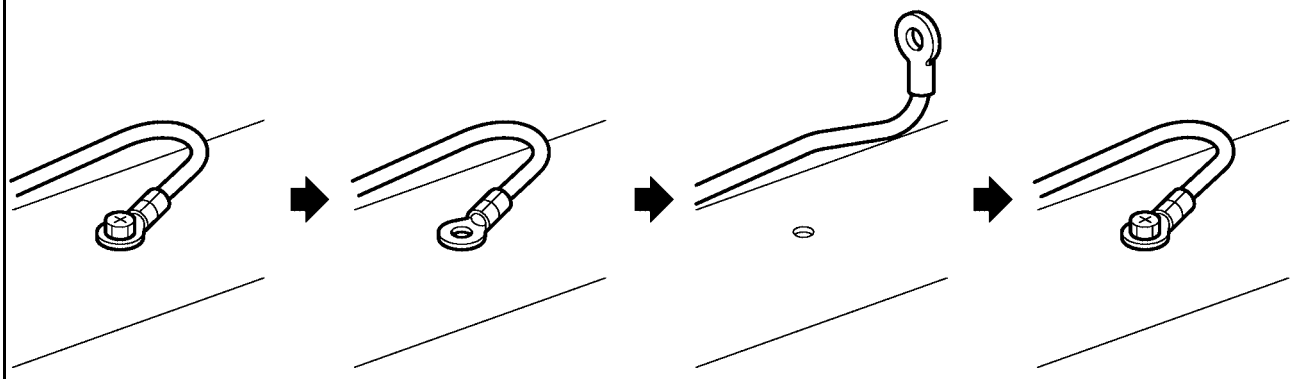
Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.

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

For detailed ground distribution information, refer to PG-17, "Ground Distribution" .

Ground Inspection



DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

PFP:22690

Description

UBS00DFM

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Engine coolant temperature sensor	Engine coolant temperature		

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

OPERATION

Engine speed rpm	Heated oxygen sensor 1 heaters
Above 2,800	OFF
Below 2,800 after warming up	ON

CONSULT-II Reference Value in Data Monitor Mode

UBS00DFN

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1) HO2S1 HTR (B2)	● Engine: After warming up ● Engine speed: Below 2,800 rpm	ON
	● Engine speed: Above 2,800 rpm	OFF

On Board Diagnosis Logic

UBS00DFO

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031 (Bank 1) P0051 (Bank 2)	Heated oxygen sensor 1 heater control circuit low	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	● Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.) ● Heater oxygen sensor 1 heater
P0032 (Bank 1) P0052 (Bank 2)	Heated oxygen sensor 1 heater control circuit high	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	● Harness or connectors (The heated oxygen sensor 1 heater circuit is shorted.) ● Heater oxygen sensor 1 heater

DTC Confirmation Procedure

UBS00DFP

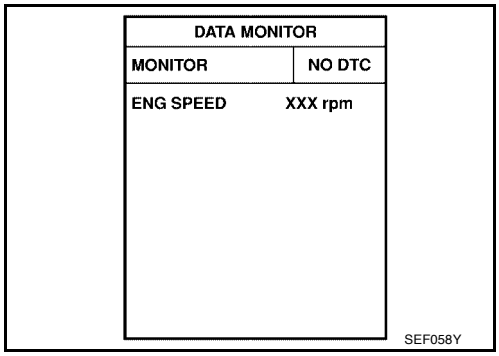
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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

WITH CONSULT-II

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

3. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and run it for at least 6 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-716, "Diagnostic Procedure" .



WITH GST

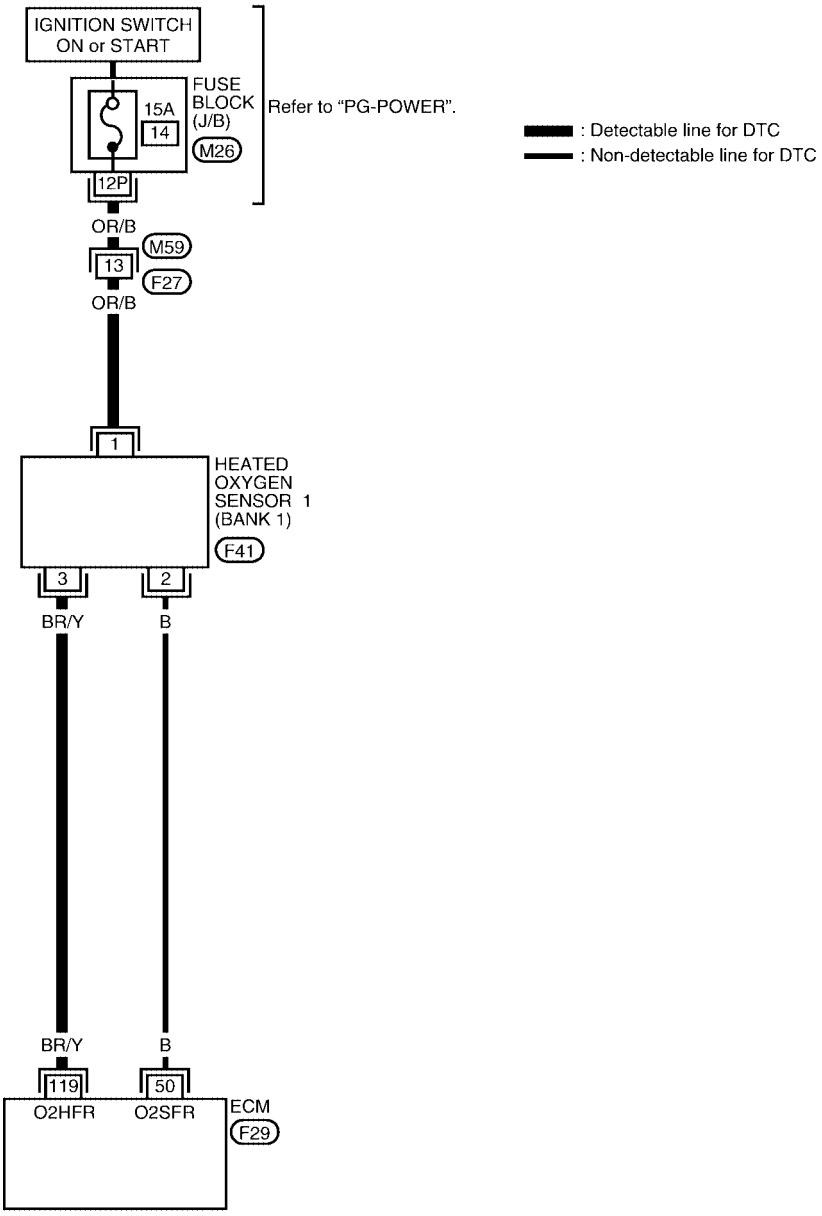
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and run it for at least 6 seconds at idle speed.
4. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
5. Start engine and run it for at 6 seconds at idle speed.
6. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
7. Start engine and run it for at 6 seconds at idle speed.
8. Select MODE 3 with GST.
9. If DTC is detected, go to EC-716, "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.**

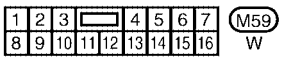
Wiring Diagram
BANK 1

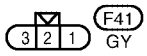
UBS00DFQ

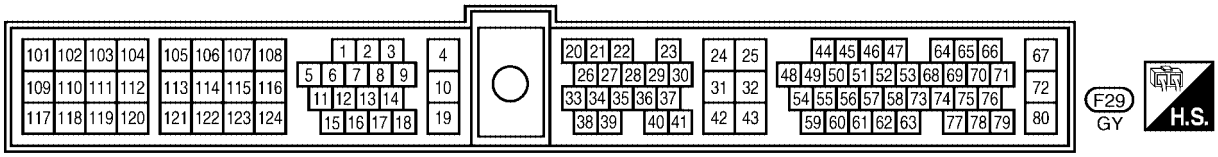
EC-O2H1B1-01











BBWA1077E

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

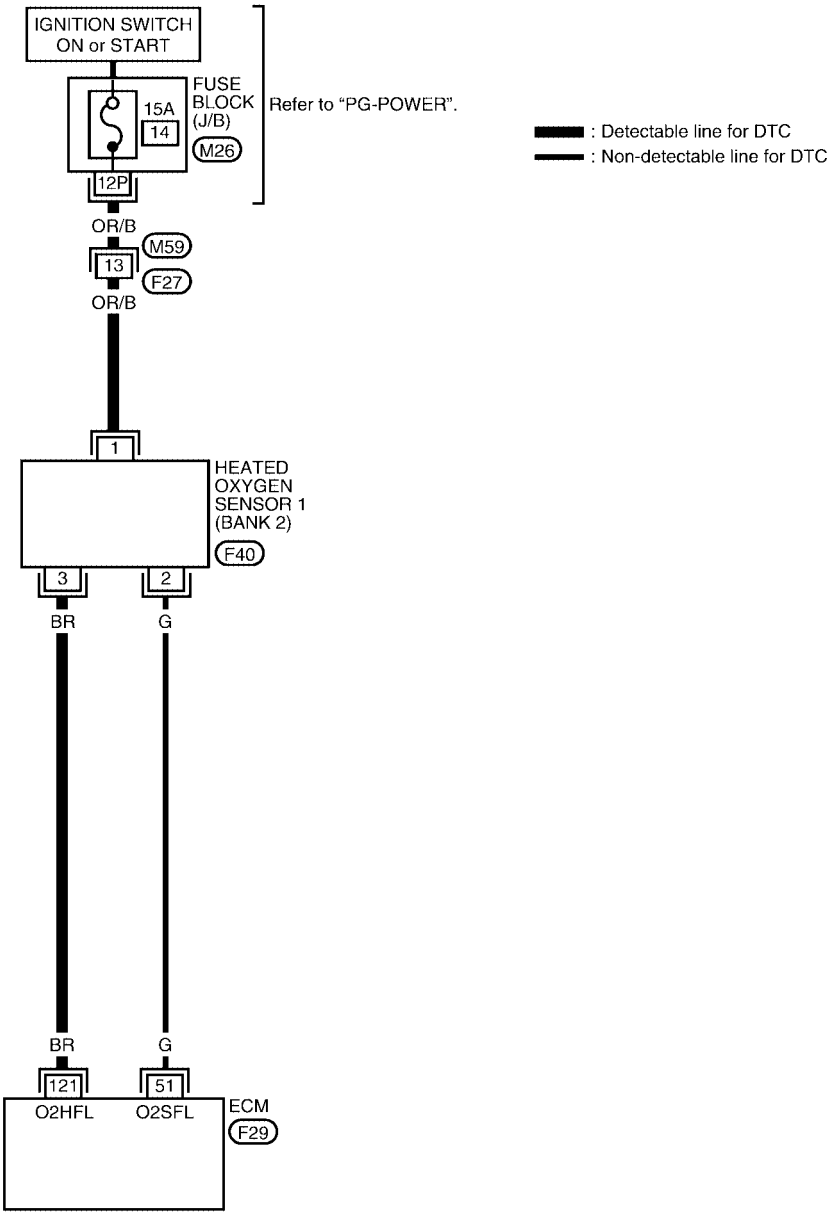
CAUTION:

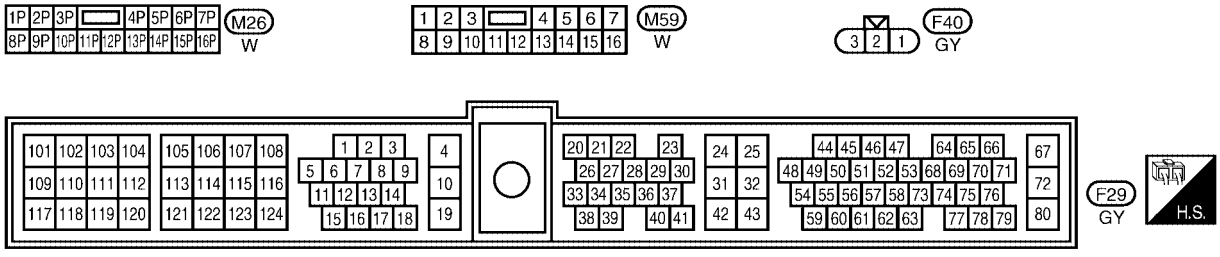
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119	BR/Y	Heated oxygen sensor 1 heater (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 2,800 rpm	Approximately 0.4V
			[Engine is running] ● Engine speed is above 2,800 rpm	BATTERY VOLTAGE (11 - 14V)

BANK 2

EC-O2H1B2-01





BBWA1078E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	BR	Heated oxygen sensor 1 heater (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 2,800 rpm	Approximately 0.4V
			[Engine is running] ● Engine speed is above 2,800 rpm	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

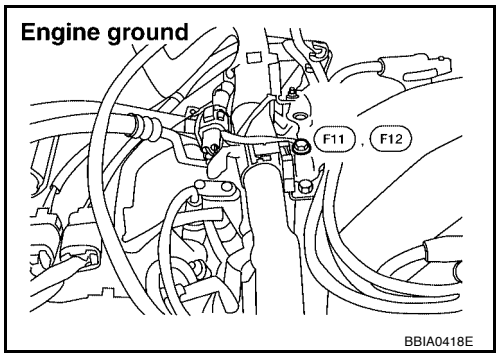
UBS00DFR

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

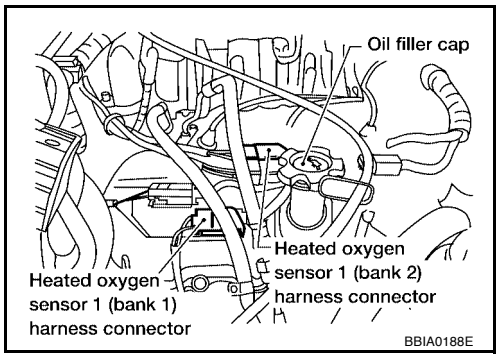
OK or NG

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



2. CHECK HO2S1 POWER SUPPLY CIRCUIT

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

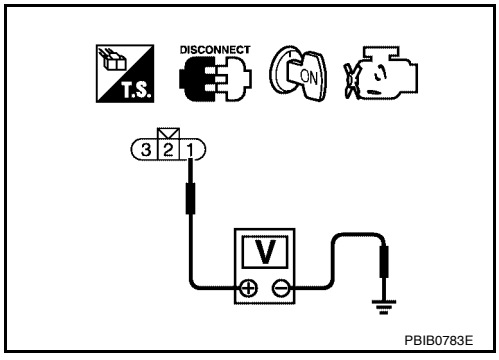


3. Check voltage between HO2S1 terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Fuse block (J/B) connector M26
- 15A fuse
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair harness or connectors.

4. CHECK HO2S1 HEATER OUTPUT 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	
P0031	119	3	Bank 1
P0051	121	3	Bank 2

Continuity should exist.

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

OK or NG

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

5. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-717, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00DFS

HEATED OXYGEN SENSOR 1 HEATER

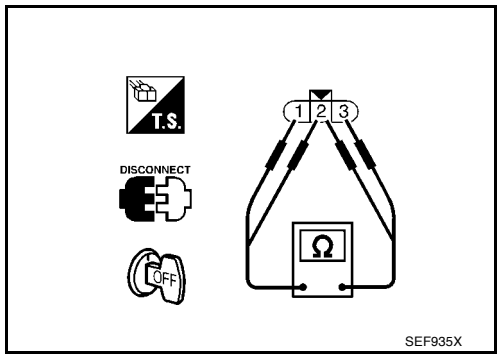
1. Check resistance between HO2S1 terminals 3 and 1.

Resistance: 3.3 - 4.0Ω [at 25°C (77°F)]

2. Check continuity between HO2S1 terminals 2 and 1, 3 and 2.

Continuity should not exist.

3. If NG, replace heated oxygen sensor 1.



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

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

Removal and Installation

UBS00DFT

HEATED OXYGEN SENSOR 1

Refer to EM-80, "OUTER COMPONENT PARTS" .

DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

PFP:226A0

Description

UBS00DFU

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heaters corresponding to the engine speed.

OPERATION

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

CONSULT-II Reference Value in Data Monitor Mode

UBS00DFV

Specification data are reference values.

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

On Board Diagnosis Logic

UBS00DFW

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

DTC Confirmation Procedure

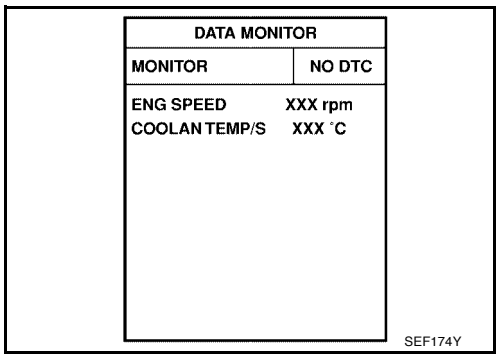
UBS00DFX

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed at between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. If 1st trip DTC is detected, go to EC-724, "Diagnostic Procedure" .



WITH GST

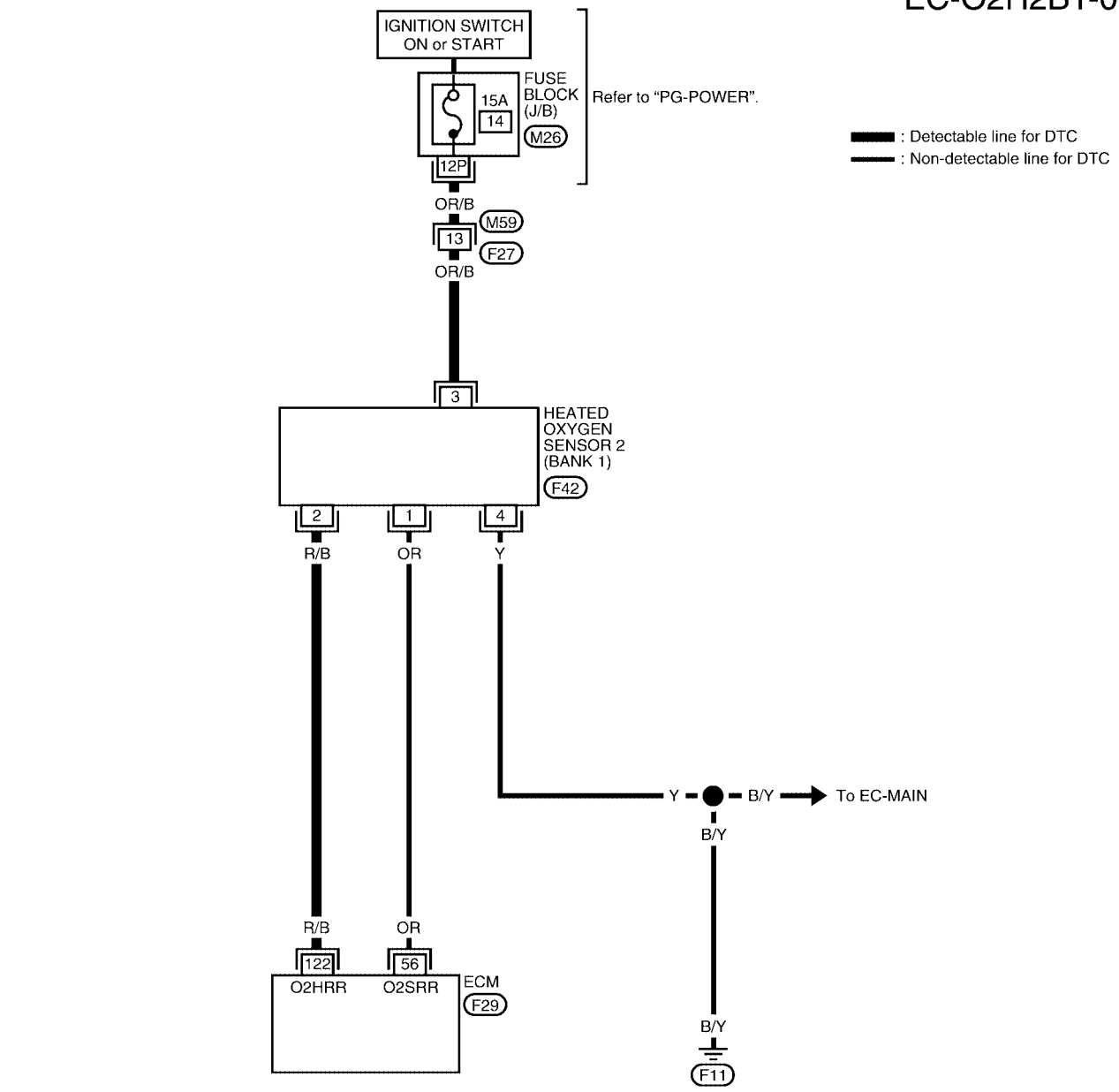
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
3. Let engine idle for 1 minute.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
6. Let engine idle for 1 minute.
7. Select MODE 3 with GST.
8. If DTC is detected, go to EC-724, "Diagnostic Procedure" .

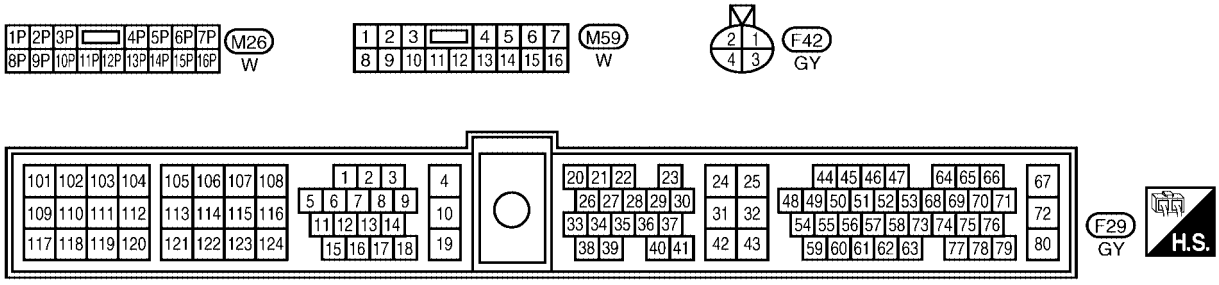
- **When using GST, DTC Confirmation Procedure should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram
BANK 1

UBS00DFY

EC-O2H2B1-01





BBWA1116E

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

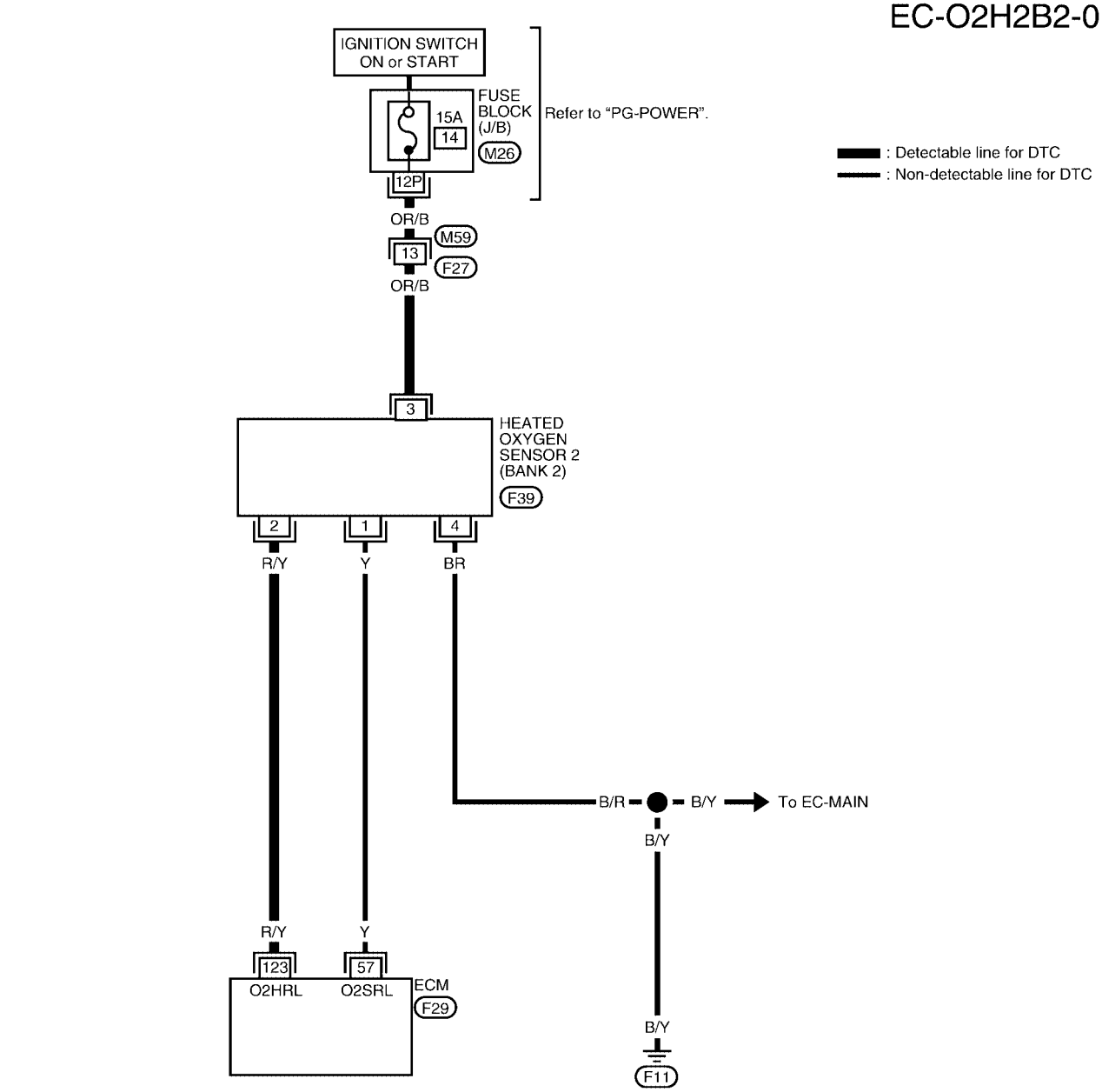
CAUTION:

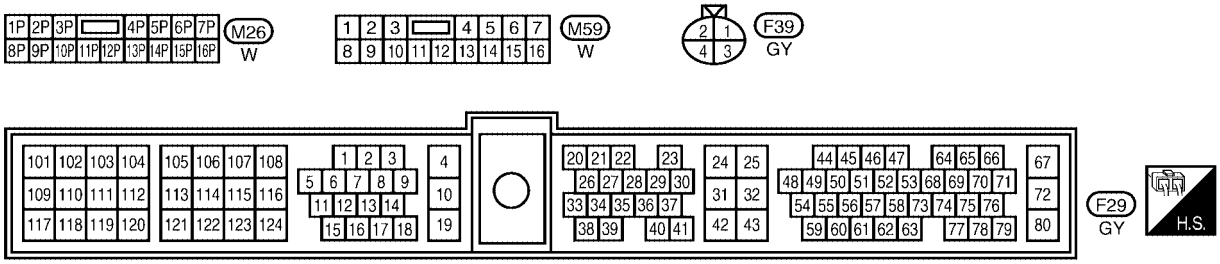
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122	R/B	Heated oxygen sensor 2 heater (bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Warm-up condition – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

BANK 2

EC-O2H2B2-01





BBWA1081E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
123	R/Y	Heated oxygen sensor 2 heater (bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Warm-up condition – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

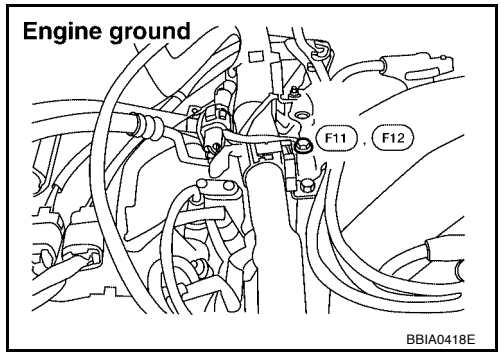
UBS00DFZ

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

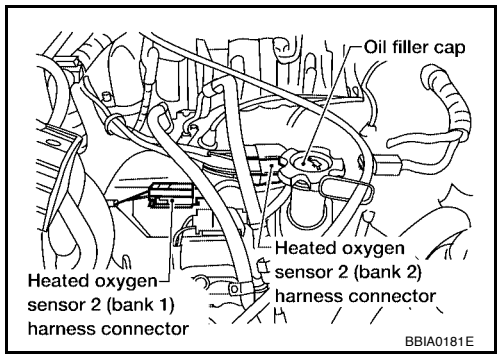
OK or NG

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



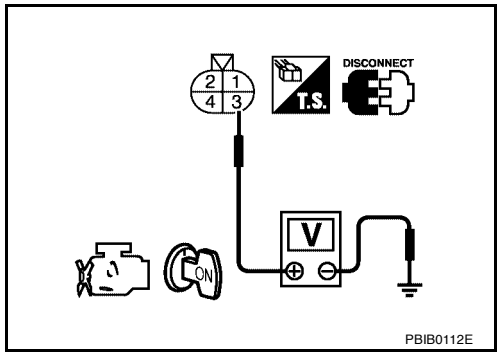
2. CHECK HO2S2 POWER SUPPLY CIRCUIT

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



3. Check voltage between HO2S2 terminal 3 and ground.

Voltage: Battery voltage



OK or NG

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

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Fuse block (J/B) connector M26
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair harness or connectors.

4. CHECK HO2S2 HEATER OUTPUT CIRCUIT FOR OPEN AND SHORT

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

DTC	Terminals		Bank
	ECM	Sensor	
P0037, P0038	122	2	Bank 1
P0057, P0058	123	2	Bank 2

Continuity should exist.

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

OK or NG

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

5. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-726, "Component Inspection" .

OK or NG

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

6. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00DG0

HEATED OXYGEN SENSOR 2 HEATER

Check the following.

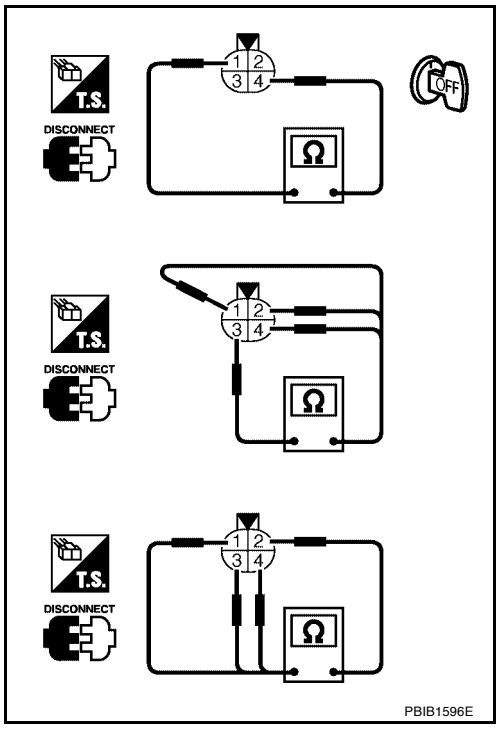
1. Check resistance between HO2S2 terminals 2 and 3.

Resistance: 3.3 - 4.0Ω [at 25°C (77°F)]

2. Check continuity.

Terminal No.	Continuity
1 and 2, 3, 4	No
4 and 1, 2, 3	

3. If NG, replace heated oxygen sensor 2.



CAUTION:

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

Removal and Installation

UBS00DG1

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

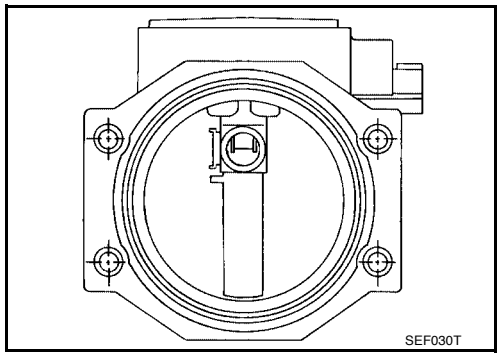
DTC P0101 MAF SENSOR

PFP:22680

Component Description

UBS00DG2

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


SEF030T

CONSULT-II Reference Value in Data Monitor Mode

UBS00DG3

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 (A/T), Neutral (M/T) ● No load	Idle	1.0 - 1.7V
		2,500 rpm	1.7 - 2.3V
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	3.3 - 4.8 g·m/s
		2,500 rpm	12.0 - 14.9 g·m/s

On Board Diagnosis Logic

UBS00DG4

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0101	Mass air flow sensor circuit range/performance problem	A)	A high voltage from the sensor is sent to ECM under light load driving condition.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor
		B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor

DTC Confirmation Procedure

UBS00DG5

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

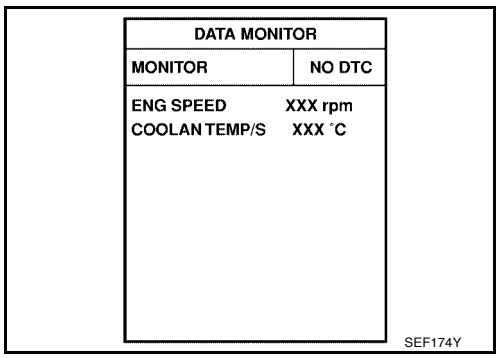
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

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-731, "Diagnostic Procedure" .



With GST

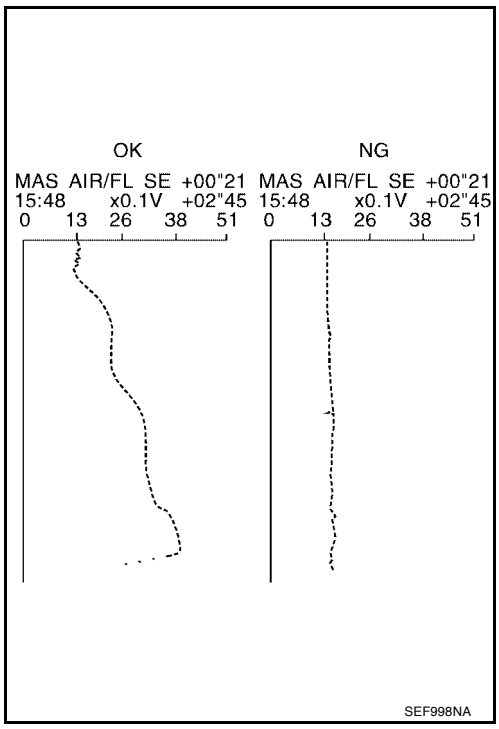
Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

CAUTION:
Always drive vehicle at a safe speed.

With CONSULT-II

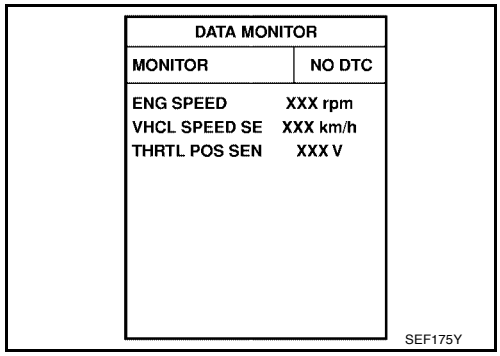
1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
   If engine cannot be started, go to EC-731, "Diagnostic Procedure" .
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Check the voltage of MAS AIR/FL SE with “DATA MONITOR”.
5. Increases engine speed to about 4,000 rpm.
6. Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to EC-731, "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 POS SEN	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-731, "Diagnostic Procedure" .



Overall Function Check

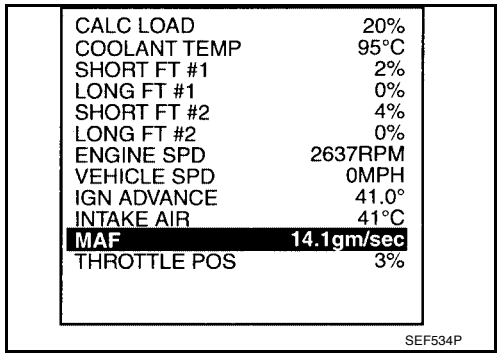
UBS00DG6

PROCEDURE FOR MALFUNCTION B

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

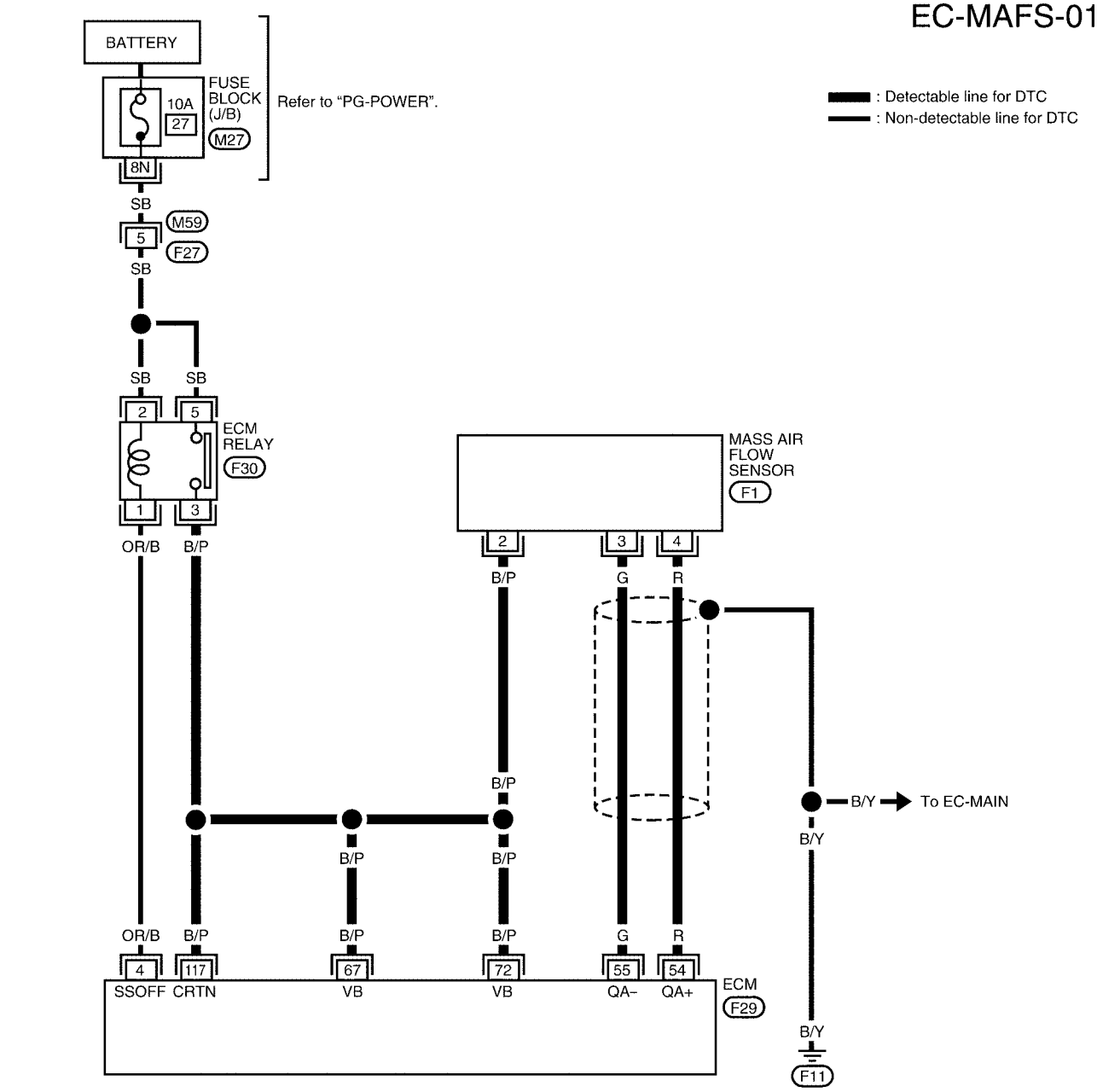
1. Start engine and warm it up to normal operating temperature.
2. Select MODE 1 with GST.
3. Check the mass air flow sensor signal with MODE 1.
4. Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
5. If NG, go to EC-731, "Diagnostic Procedure" .

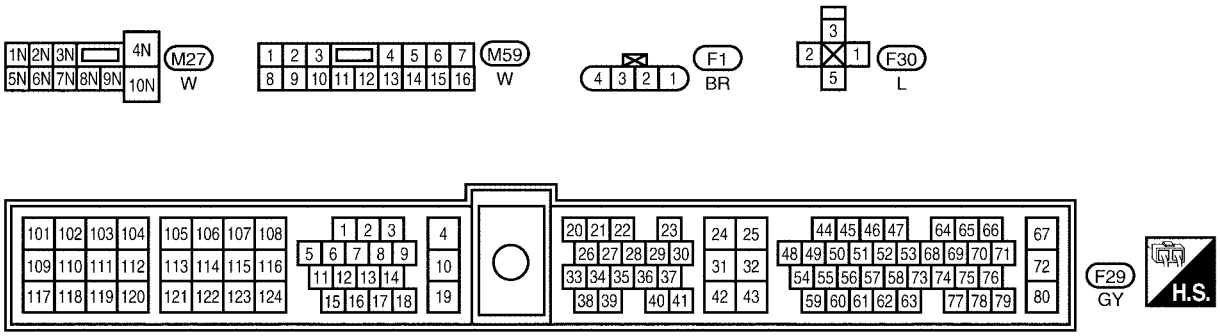


Wiring Diagram

UBS00DG7

EC-MAFS-01





BBWA0470E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
54	R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.7 - 2.3V
55	G	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	B/P	Power supply for ECM	**[Ignition: switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P	Power supply for ECM	**[Ignition: switch: ON]**	BATTERY VOLTAGE (11 - 14V)
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00DG8

1. INSPECTION START

Which malfunction (A or B) is duplicated?

A or B

A >> GO TO 3.
B >> GO TO 2.

2. CHECK INTAKE SYSTEM

Check the following for connection.

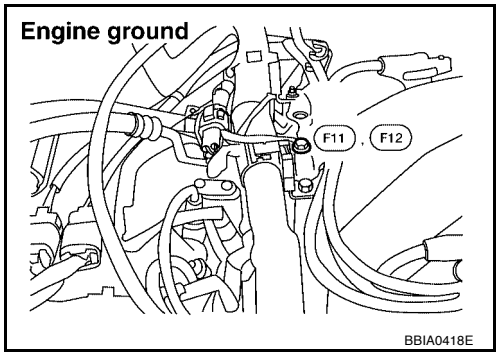
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

OK or NG

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

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

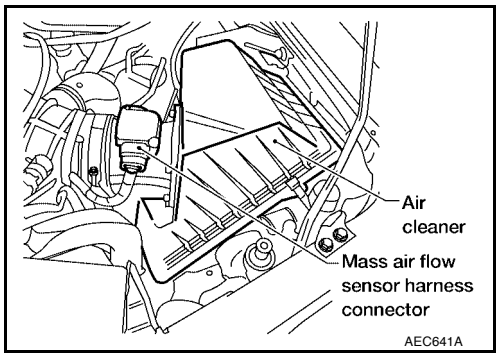


OK or NG

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

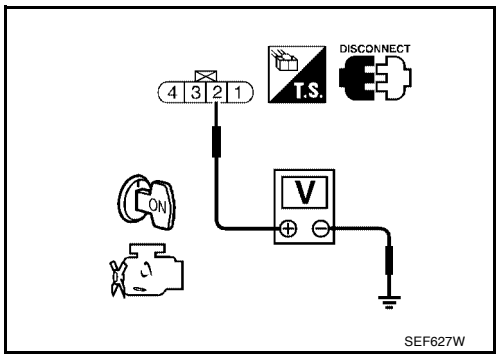
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

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



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

Voltage: Battery voltage



OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness 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 55.
   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 4 and ECM terminal 54.
   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-733, "Component Inspection" .

OK or NG

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

9. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

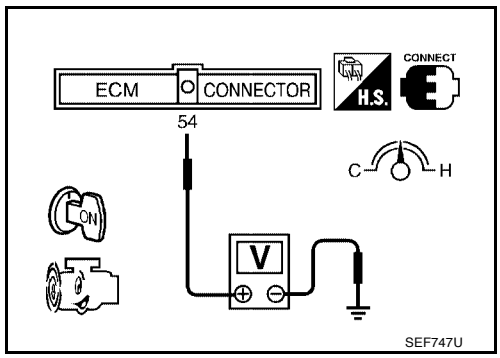
UBS00DG9

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 54 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

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



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 step 2 and 3 again.

5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.
6. If NG, clean or replace mass air flow sensor.

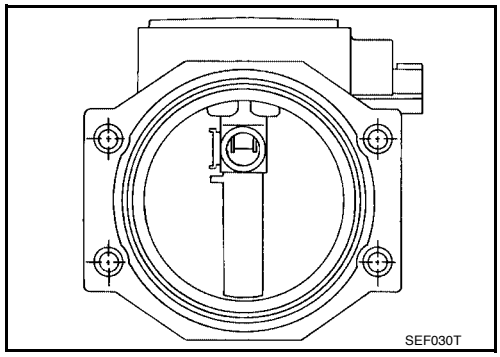
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

UBS00DGA

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



CONSULT-II Reference Value in Data Monitor Mode

UBS00DGB

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 (A/T), Neutral (M/T) ● No load	Idle	1.0 - 1.7V
		2,500 rpm	1.7 - 2.3V
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	3.3 - 4.8 g·m/s
		2,500 rpm	12.0 - 14.9 g·m/s

On Board Diagnosis Logic

UBS00DGC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM. **This self-diagnosis has the one trip detection logic.**	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor
P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor

FAIL-SAFE MODE

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

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

DTC Confirmation Procedure

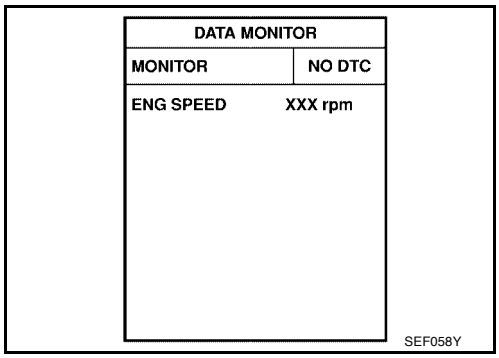
UBS00DGD

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR DTC P0102

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 at most.
4. If DTC is detected, go to EC-738, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Start engine and let it idle for at least 6 seconds.
6. If DTC is detected, go to EC-738, "Diagnostic Procedure" .



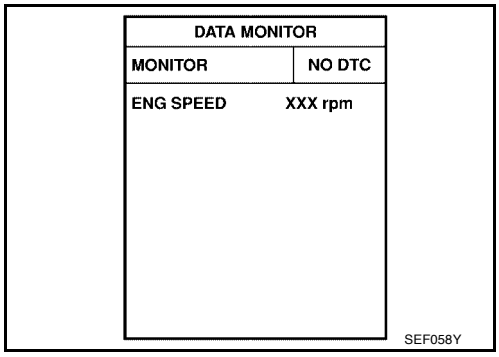
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR DTC P0103

With CONSULT-II

1. Turn ignition switch ON.
2. If 1st trip DTC is detected,
   Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 6 seconds.
4. If 1st trip DTC is detected, go to EC-738, "Diagnostic Procedure"
   .
   If 1st trip DTC is not detected, go to next step.
5. Start engine and let it idle for at least 6 seconds.
6. If 1st trip DTC is detected, go to EC-738, "Diagnostic Procedure"
   .



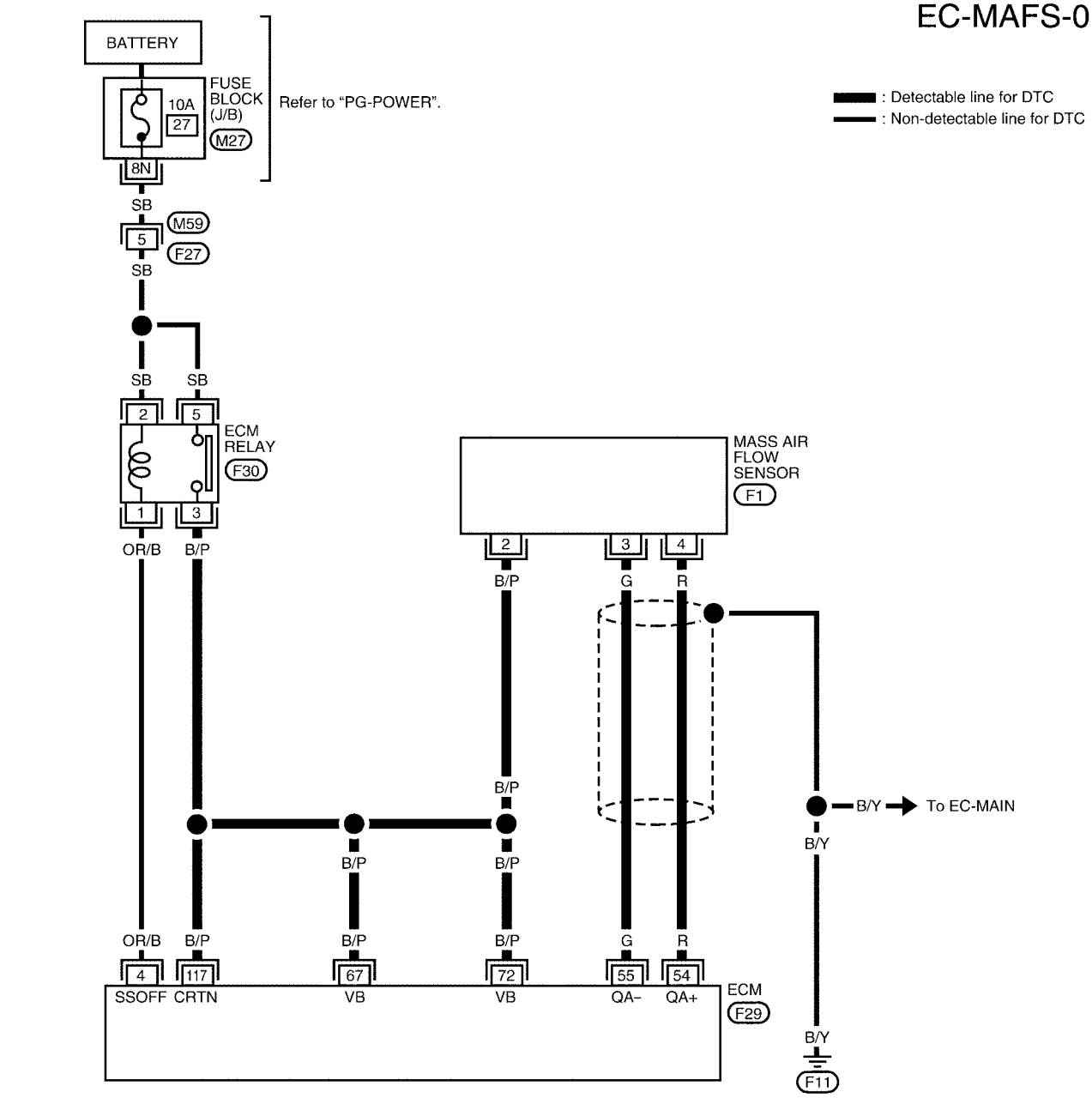
With GST

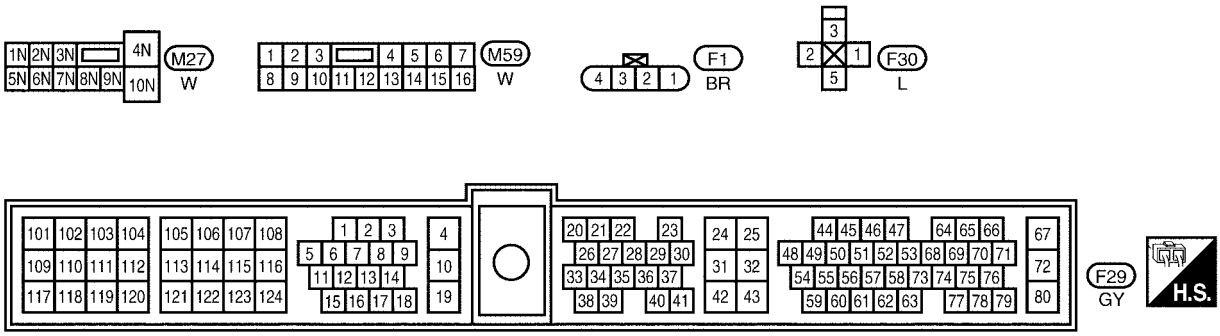
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00DGE

EC-MAFS-01





BBWA0470E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
54	R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.7 - 2.3V
55	G	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00DGF

1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2. CHECK INTAKE SYSTEM

Check the following for connection.

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

OK or NG

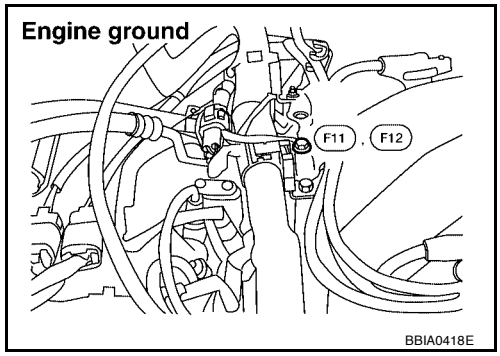
OK >> GO TO 3.
NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

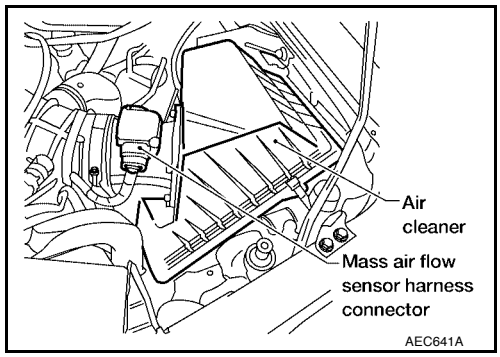
OK or NG

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



4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

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

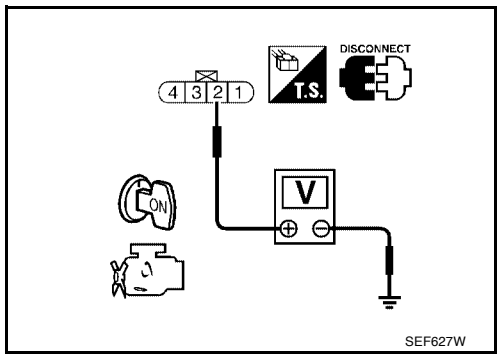


3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

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



5. DETECT MALFUNCTIONING PART

Check the following.

- Harness 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 55.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short 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 4 and ECM terminal 54.
   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-740, "Component Inspection" .

OK or NG

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

9. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Component Inspection

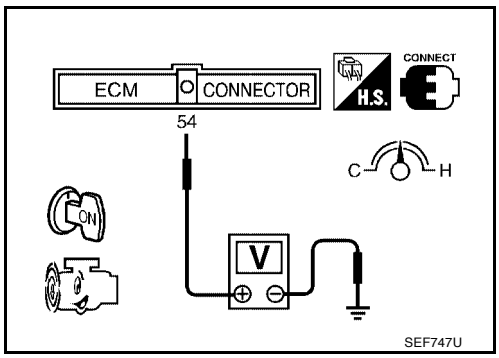
UBS00DGG

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 54 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

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



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 step 2 and 3 again.

5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.
6. If NG, clean or replace mass air flow sensor.

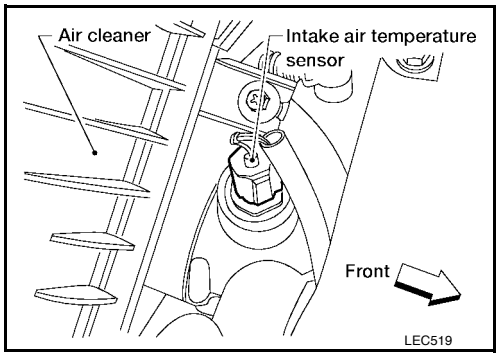
DTC P0112, P0113 IAT SENSOR

PFP:22630

Component Description

UBS00DGH

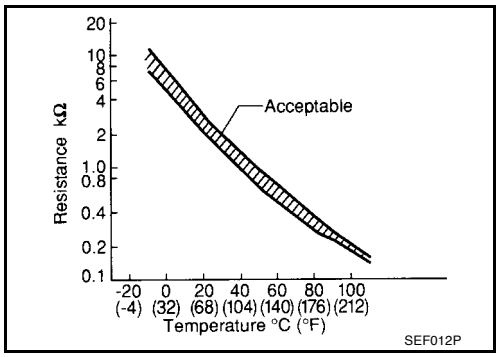
The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response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



<Reference data>

Intake air temperature °C (°F)	Voltage* (V)	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
80 (176)	1.23	0.27 - 0.38

*: These data are reference values and are measured between ECM terminal 61 (Intake air temperature sensor) and ground.



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

On Board Diagnosis Logic

UBS00DGI

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

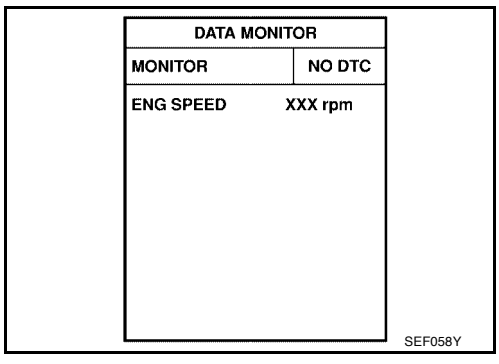
DTC Confirmation Procedure

UBS00DGJ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-745, "Diagnostic Procedure"
.



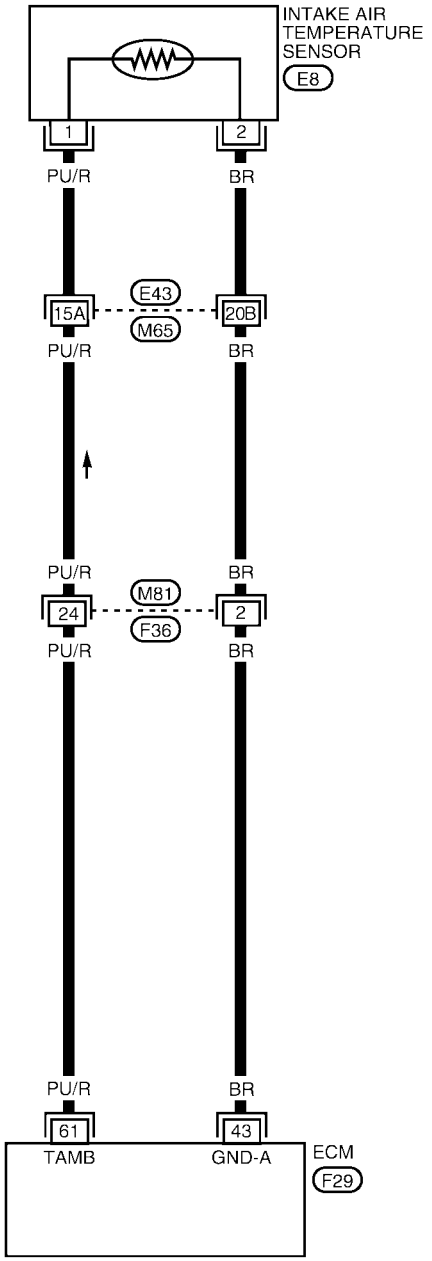
WITH GST

Follow the procedure “WITH CONSULT-II” above.

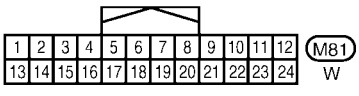
Wiring Diagram

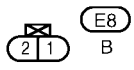
UBS00DGK

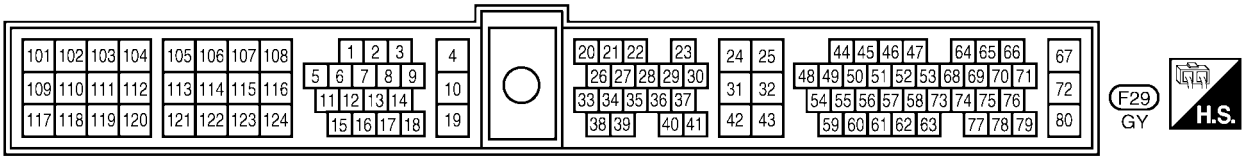
EC-IATS-01



Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)







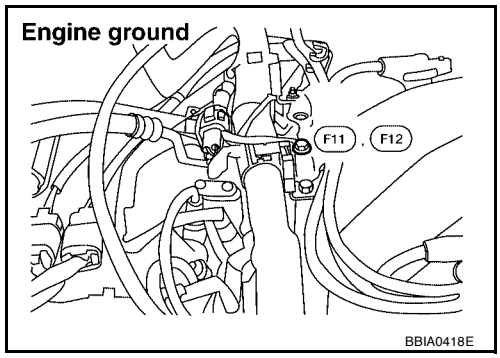
BBWA1074E

Diagnostic Procedure

UBS00DGL

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

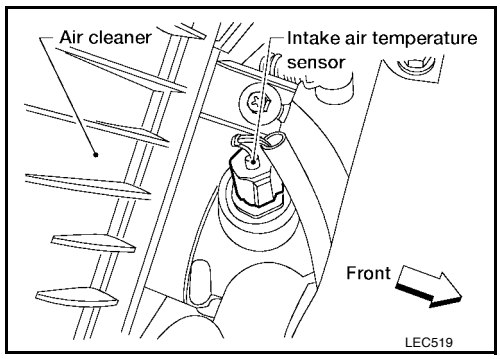


OK or NG

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

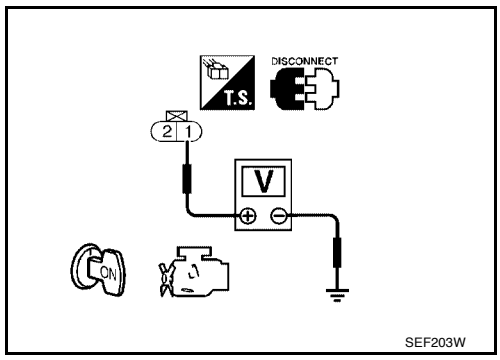
2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect intake air temperature sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between intake air temperature sensor terminal 1 and ground.

Voltage: Approximately 5V



OK or NG

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

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M81, F36
- Harness for open or short between ECM and intake air temperature sensor

>> Repair harness or connectors.

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between intake air temperature sensor terminal 2 and ECM terminal 43. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M81, F36
- Harness for open or short between ECM and intake air temperature sensor

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

6. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-747, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace intake air temperature sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

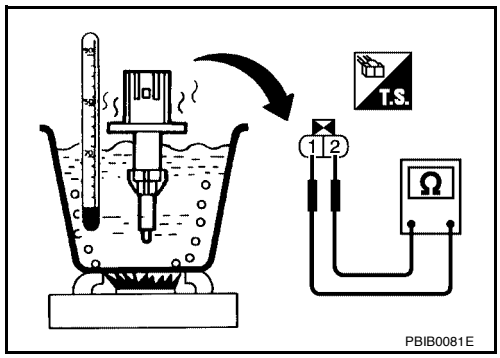
>> **INSPECTION END**.

Component Inspection

UBS00DGM

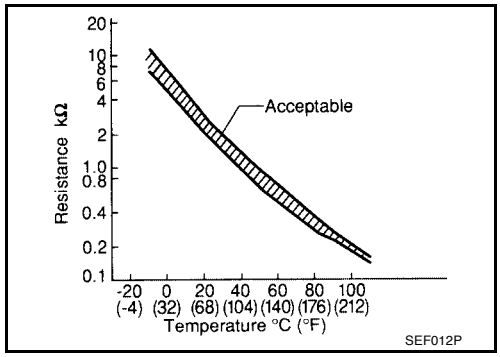
INTAKE AIR TEMPERATURE SENSOR

Check resistance between intake air temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Intake air temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 038



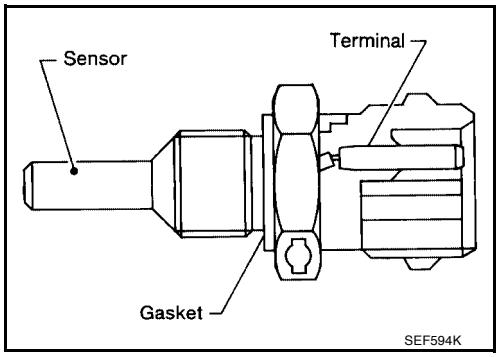
DTC P0117, P0118 ECT SENSOR

PFP:22630

Component Description

UBS00DGN

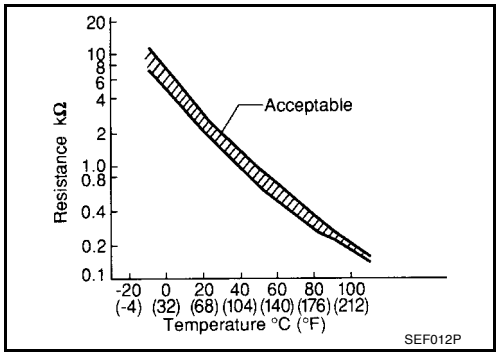
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The 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 59 (Engine coolant temperature sensor) and ground.



CAUTION:

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

On Board Diagnosis Logic

UBS00DGO

These self-diagnoses have the one trip detection logic.

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

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters in 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)
	When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	

DTC Confirmation Procedure

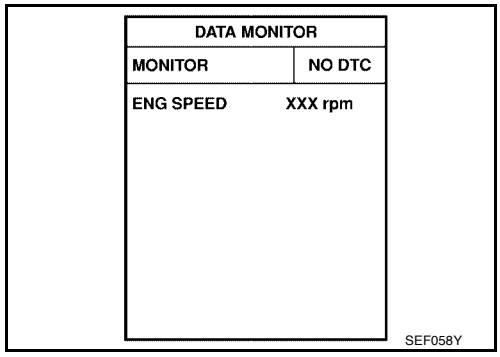
UBS00DGP

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-751, "Diagnostic Procedure" .



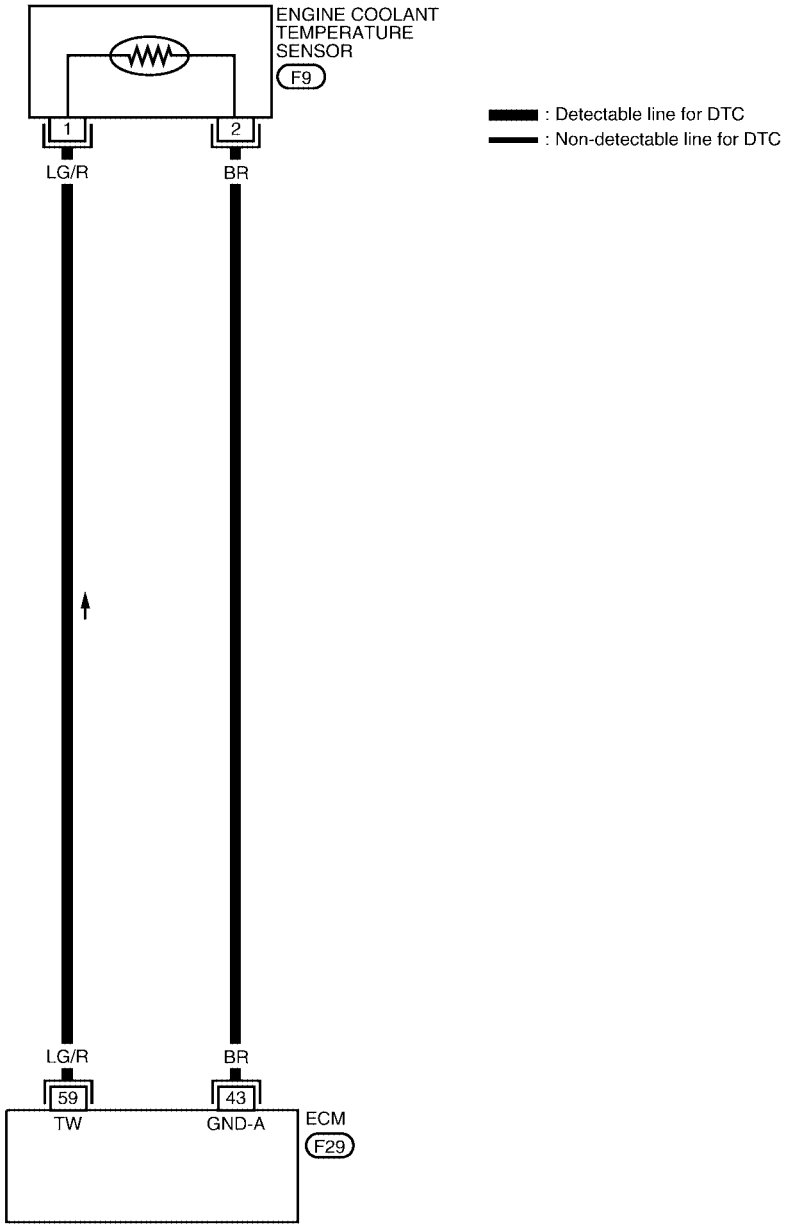
WITH GST

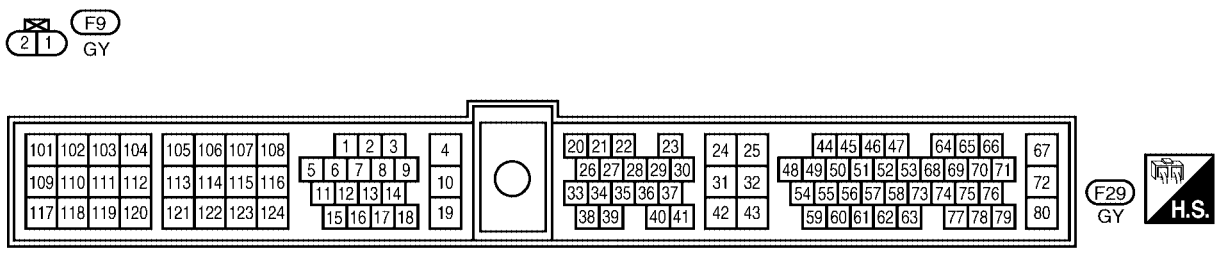
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DGQ

EC-ECTS-01





BBWA0472E

Diagnostic Procedure

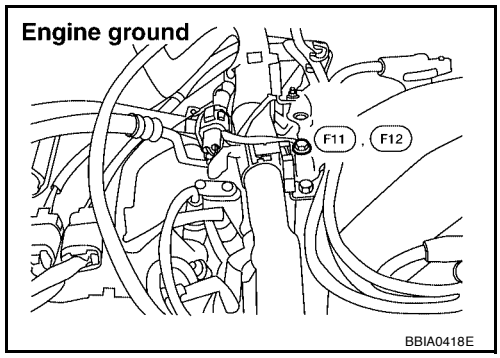
UBS00DGR

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

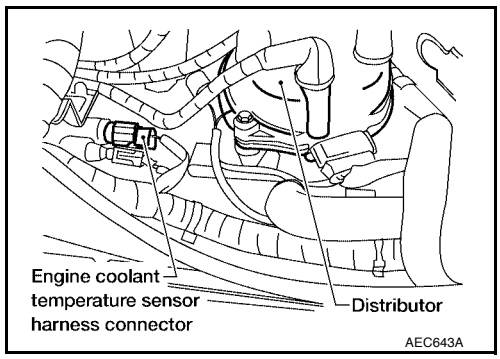
OK or NG

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



2. CHECK ECTS POWER SUPPLY CIRCUIT

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

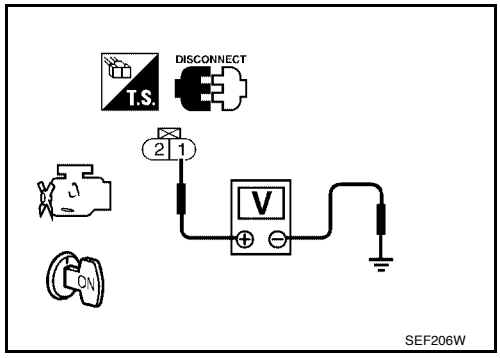


3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

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



3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECT sensor terminal 2 and ECM terminal 43.
   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 ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-752, "Component Inspection" .

OK or NG

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

5. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

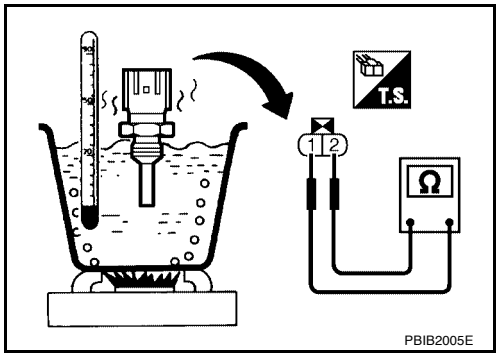
>> **INSPECTION END**

Component Inspection

UBS00DGS

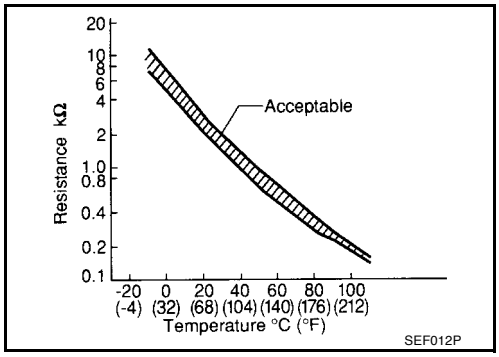
ENGINE COOLANT TEMPERATURE SENSOR

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



<Reference data>

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



Removal and Installation

UBS00DGT

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-80, "OUTER COMPONENT PARTS" .

DTC P0121 TP SENSOR

PFP:16119

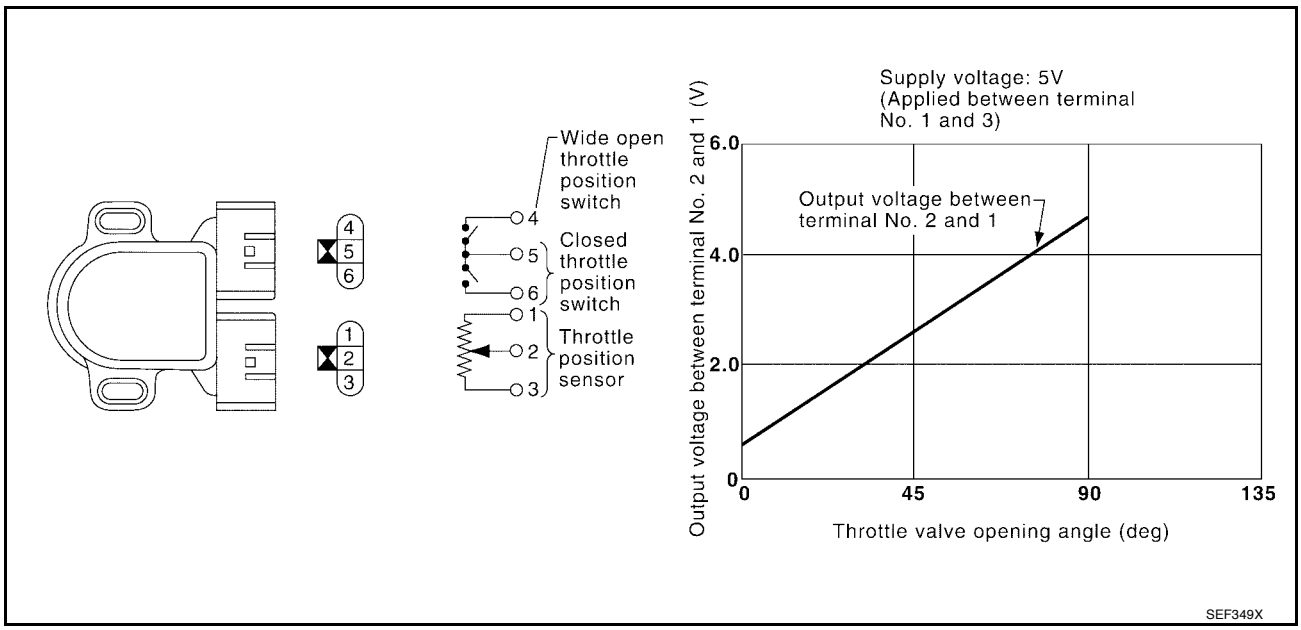
Component Description

UBS00DGU

NOTE:
If DTC P0121 is displayed with DTC P0510, first perform the trouble diagnosis for DTC P0510. Refer to EC-999 .

The throttle position sensor responds to the accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the ECM.

Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This sensor controls engine operation such as fuel cut. On the other hand, the “Wide open and closed throttle position switch”, which is built into the throttle position sensor unit, is not used for engine control.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DGV

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.15 - 0.85V
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	3.5 - 4.7V
ABSOL TH·P/S	● Engine: After warming up ● Ignition switch: ON ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.	Throttle valve: fully closed	0.0%
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80%

On Board Diagnosis Logic

UBS00DGW

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0121	Throttle position sensor circuit range/performance problem	A)	A high voltage from the sensor is sent to ECM under light load driving condition.	● Harness or connectors (The TP sensor circuit is open or shorted.) ● TP sensor ● Fuel injector ● Camshaft position sensor ● Mass air flow sensor
		B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	● Harness or connectors (The TP sensor circuit is open or shorted.) ● Intake air leaks ● TP sensor

DTC Confirmation Procedure

UBS00DGX

NOTE:

- **Perform PROCEDURE FOR MALFUNCTION A first. If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

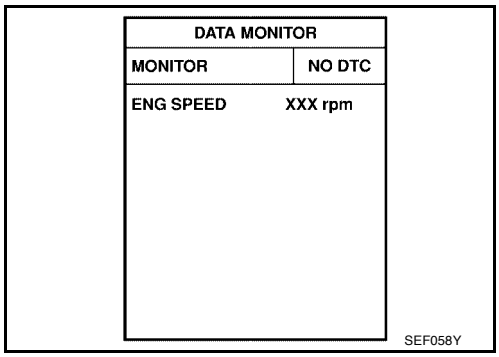
PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 10 seconds.
   If idle speed is over 1,000 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,000 rpm.

Selector lever	Suitable position except P or N (A/T), Neutral (M/T)
Brake pedal	Depressed
Vehicle speed	0 km/h (0 MPH)

4. If 1st trip DTC is detected, go to EC-757, "Diagnostic Procedure".



With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

CAUTION:

Always drive vehicle at a safe speed.

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Turn ignition switch ON.
4. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II.

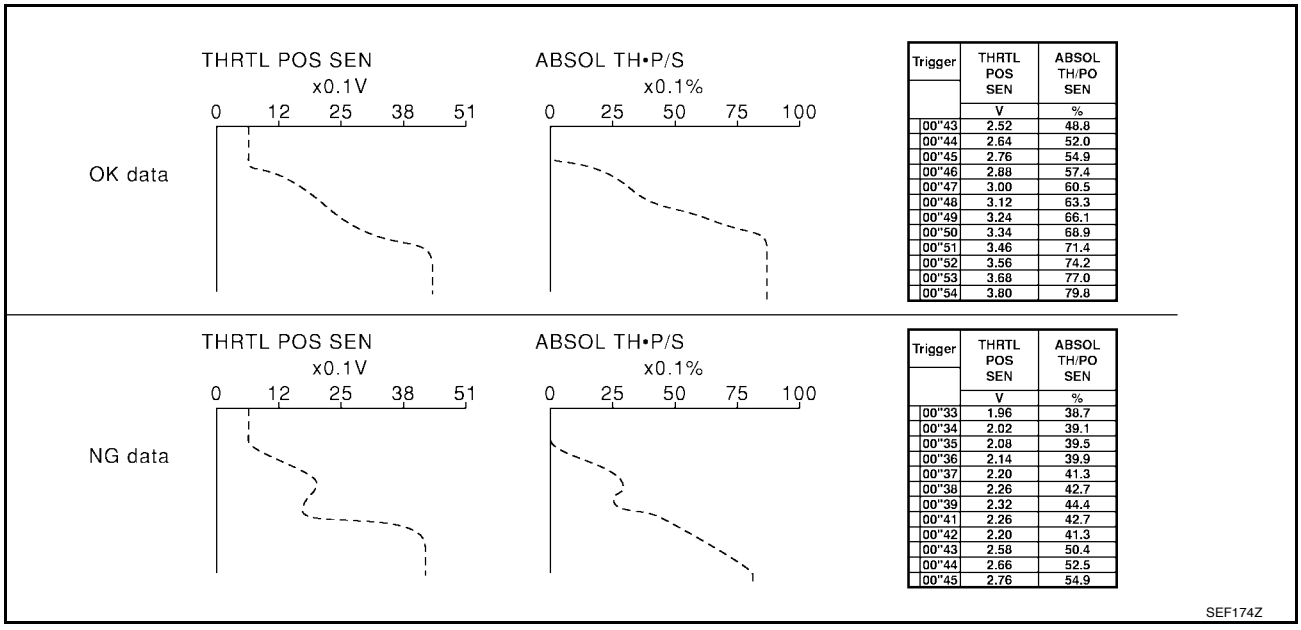
5. Select “THRTL POS SEN” and “ABSOL TH·P/S” in “DATA MONITOR” mode with CONSULT-II.
6. Press RECORD on CONSULT-II screen at the same time accelerator pedal is depressed.
7. Print out the recorded graph and check the following:

– The voltage rise is linear in response to accelerator pedal depression.
– The voltage when accelerator pedal is fully depressed is approximately 4V.

If NG, go to EC-757, "Diagnostic Procedure" .
If OK, go to following step.

DATA MONITOR	
MONITOR	NO DTC
THRTL POS SEN	XXX V
ABSOL TH-P/S	XXX %

SEF177Y



Trigger	THRTL POS SEN	ABSOL TH/PO SEN
	V	%
00"43	2.52	48.8
00"44	2.64	52.0
00"45	2.76	54.9
00"46	2.88	57.4
00"47	3.00	60.5
00"48	3.12	63.3
00"49	3.24	66.1
00"50	3.34	68.9
00"51	3.46	71.4
00"52	3.56	74.2
00"53	3.68	77.0
00"54	3.80	79.8

Trigger	THRTL POS SEN	ABSOL TH/PO SEN
	V	%
00"33	1.96	38.7
00"34	2.02	39.1
00"35	2.08	39.5
00"36	2.14	39.9
00"37	2.20	41.3
00"38	2.26	42.7
00"39	2.32	44.4
00"41	2.26	42.7
00"42	2.20	41.3
00"43	2.58	50.4
00"44	2.66	52.5
00"45	2.76	54.9

SEF174Z

8. Select “AUTO TRIG” in “DATA MONITOR” mode with CONSULT-II.
9. Maintain the following conditions for at least 10 consecutive seconds.

CMPS·RPM (REF)	More than 2,000 rpm
MAS AIR/FL SE	More than 3V
COOLAN TEMP/S	More than 70°C (158°F)
IACV-AAC/V	Less than 80%
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

DATA MONITOR	
MONITORING	NO DTC
ENG SPEED	XXX rpm
MAS AIR/FL SE	XXX V
COOLAN TEMP/S	XXX °C
IACV-AAC/V	XXX %

SEF805Z

10. If 1st trip DTC is detected, go to EC-757, "Diagnostic Procedure" .

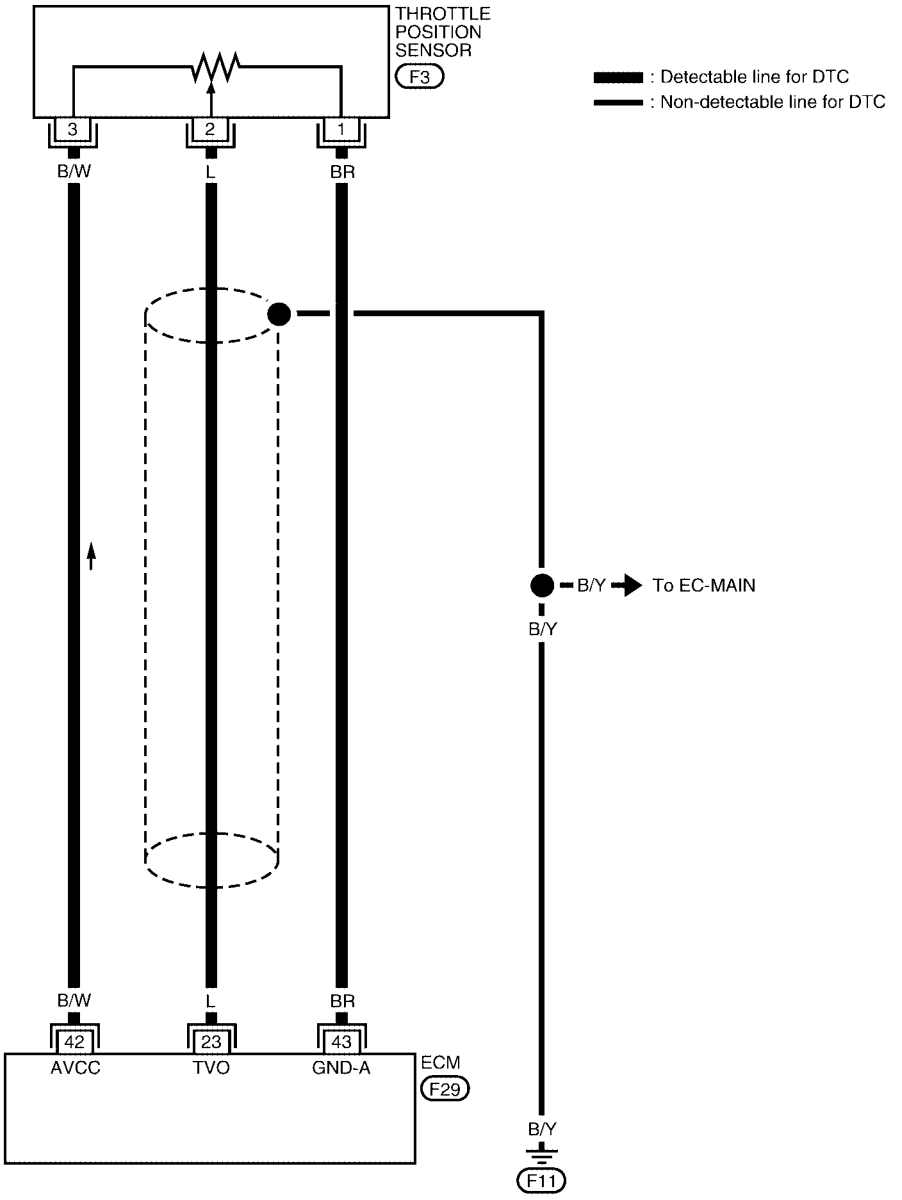
With GST

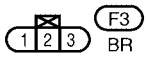
Follow the procedure “With CONSULT-II” above.

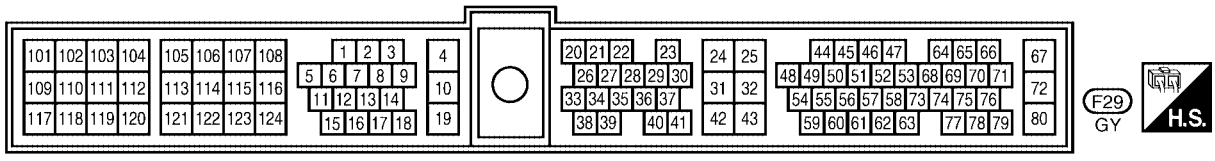
Wiring Diagram

UBS00DGY

EC-TPS-01







BBWA0473E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	L	Throttle position sensor	**[Engine is running]** ● **Warm-up condition** ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump ● Accelerator pedal is fully released	0.15 - 0.85V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal is fully depressed	3.5 - 4.7V
42	B/W	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
43	BR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00DGZ

1. INSPECTION START

Which malfunction (A or B) is duplicated?

A or B

A >> GO TO 4.

B >> GO TO 2.

2. ADJUST THROTTLE POSITION SENSOR

Check the following items. Refer to EC-652, "Basic Inspection" .

Items	Specifications
Ignitions timing	M/T: 10 ± 5° BTDC (in Neutral position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

>> GO TO 3.

3. CHECK INTAKE SYSTEM.

1. Turn ignition switch OFF.
2. Check the following for connection.

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

OK or NG

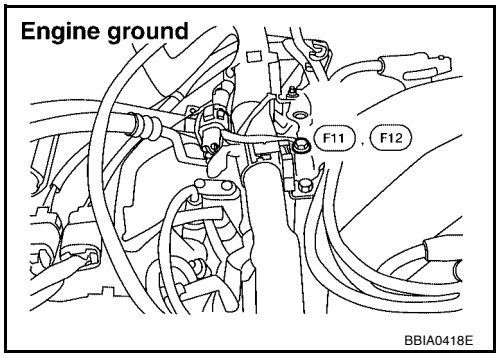
OK >> GO TO 4.
NG >> Reconnect the parts.

4. CHECK GROUND CONNECTIONS

Loosen and retighten ground screw.
Refer to EC-709, "Ground Inspection" .

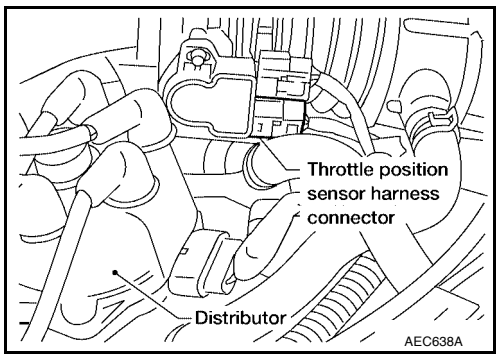
OK or NG

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



5. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect throttle position sensor harness connector.
2. Turn ignition switch ON.

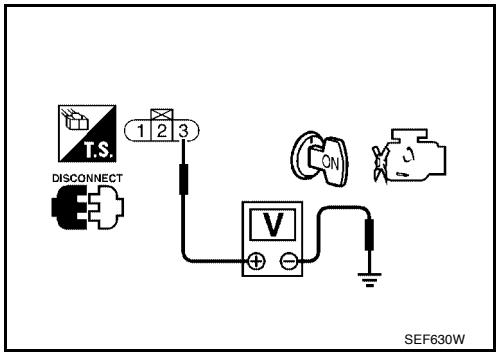


3. Check voltage between throttle position sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between throttle position sensor terminal 1 and ECM terminal 43. 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 THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 23 and throttle position sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

8. CHECK THROTTLE POSITION SENSOR

Refer to EC-761, "Component Inspection" .

OK or NG

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

9. ADJUST CLOSED THROTTLE POSITION SWITCH

Adjust closed throttle position switch. Refer to EC-652, "Basic Inspection" .

Items	Specifications
Ignitions timing	M/T: 10 ± 5° BTDC (in Neutral position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.
NG >> Replace throttle position sensor. To adjust it, perform EC-652, "Basic Inspection" .

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-733, "Component Inspection" .

OK or NG

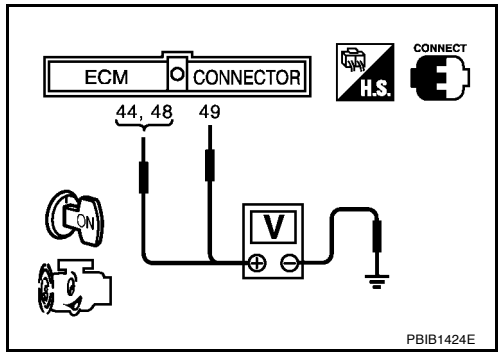
OK >> GO TO 11.
NG >> Replace mass air flow sensor.

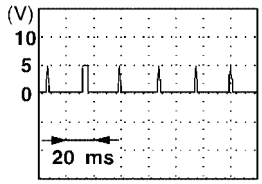
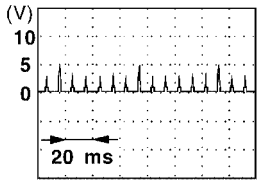
11. CHECK CAMSHAFT POSITION SENSOR

1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.

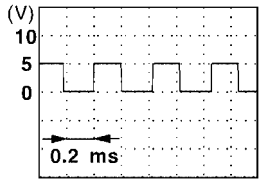
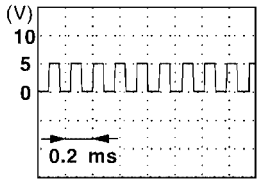
NOTE:
The pulse cycle changes depending on rpm at idle.

<Terminal 44 or 48 and ground>



Condition	Idle	2,000 rpm
Voltage	0.3 - 0.5V	0.3 - 0.5V
Pulse signal	 SEF997U	 SEF998U

<Terminal 49 and ground>

Condition	Idle	2,000 rpm
Voltage	Approximately 2.5V	Approximately 2.5V
Pulse signal	 SEF999U	 SEF001V

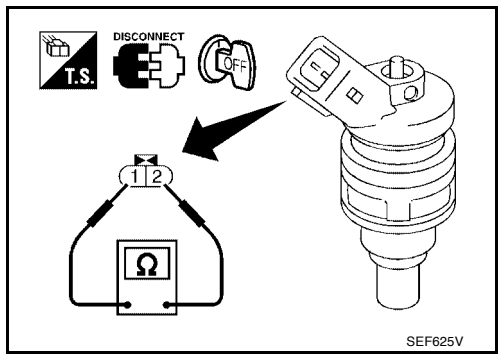
OK or NG

OK >> GO TO 12.
NG >> Replace distributor assembly with camshaft position sensor.

12. CHECK FUEL INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 10.4 - 15.3Ω [at 10 - 60°C (50 - 140°F)]



OK or NG

OK >> GO TO 13.
NG >> Replace fuel injector.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

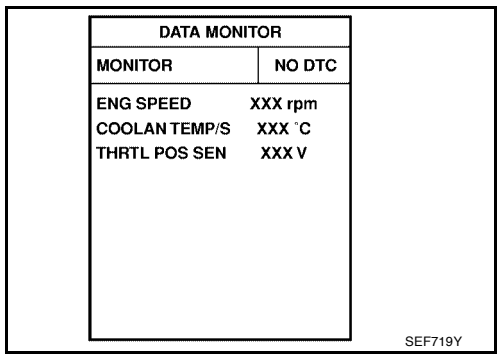
Component Inspection

UBS00DH0

THROTTLE POSITION SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Check voltage of “THRTL POS SEN” under the following conditions.
   Voltage measurement must be made with throttle position sensor installed in vehicle.



Throttle valve conditions	THRTL POS SEN
Completely closed	0.15 - 0.85V
Completely open	3.5 - 4.7V

With GST

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Turn ignition switch ON.
4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	Voltage [V]
Completely closed	0.15 - 0.85
Completely open	3.5 - 4.7

DTC P0122, P0123 TP SENSOR

PFP:16119

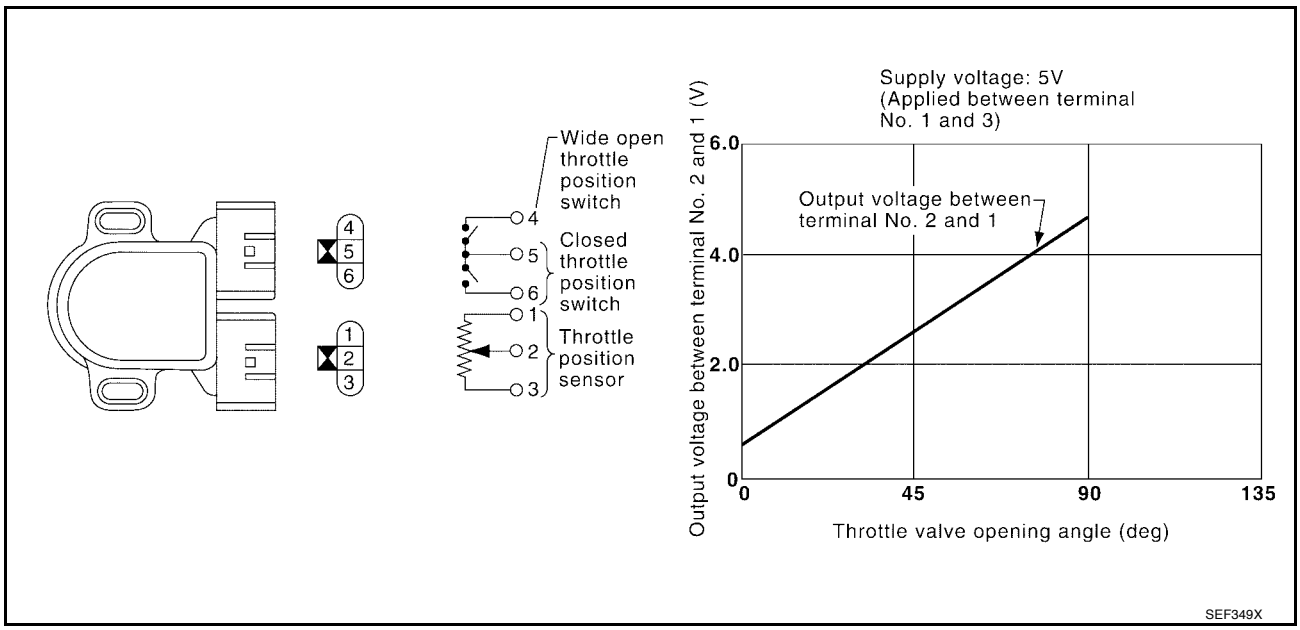
Component Description

UBS00DH1

NOTE:
If DTC P0122, P0123 is displayed with DTC P0510, first perform the trouble diagnosis for DTC P0510. Refer to EC-999 .

The throttle position sensor responds to the accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the ECM.

Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This sensor controls engine operation such as fuel cut. On the other hand, the “Wide open and closed throttle position switch”, which is built into the throttle position sensor unit, is not used for engine control.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DH2

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.15 - 0.85V
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	3.5 - 4.7V
ABSOL TH·P/S	● Engine: After warming up ● Ignition switch: ON ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.	Throttle valve: fully closed	0.0%
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80%

On Board Diagnosis Logic

UBS00DH3

these self-diagnoses have one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor circuit low input	An excessively low voltage from the sensor is sent to ECM	● Harness or connectors (The TP sensor circuit is open or shorted.) ● TP sensor
P0123	Throttle position sensor circuit high input	An excessively high voltage from the sensor is sent to ECM	

FAIL-SAFE MODE

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

Detected items	Engine operating condition in fail-safe mode	
Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
	Condition	Driving condition
	When engine is idling	Normal
	When accelerating	Poor acceleration

DTC Confirmation Procedure

UBS00DH4

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

CAUTION:

Always drive vehicle at a safe speed.

TESTING CONDITION:

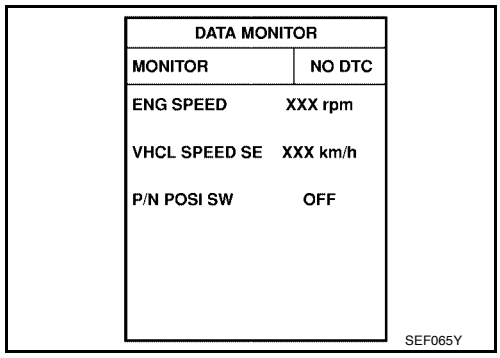
- **Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**
- **This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.**

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and maintain the following conditions for at least 5 consecutive seconds.

Vehicle speed	More than 5 km/h (3 MPH)
Selector lever	Suitable position except P or N (A/T), Neutral (M/T) position

3. If DTC is detected, go to EC-765, "Diagnostic Procedure" .



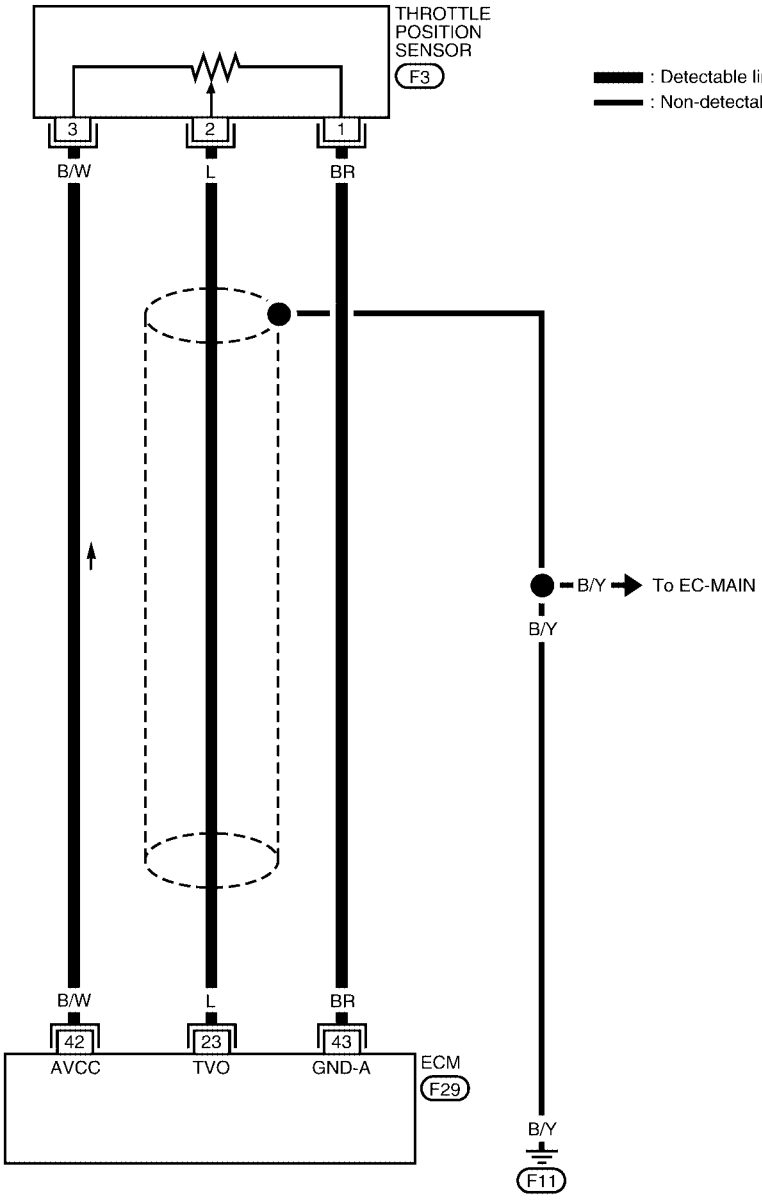
WITH GST

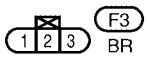
Follow the procedure “WITH CONSULT-II” above.

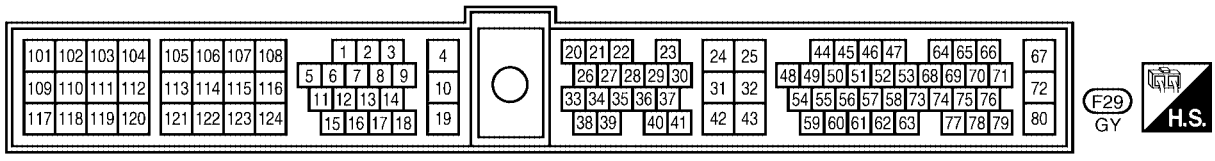
Wiring Diagram

UBS00DH5

EC-TPS-01







BBWA0473E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	L	Throttle position sensor	**[Engine is running]** ● **Warm-up condition** ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump ● Accelerator pedal is fully released	0.15 - 0.85V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal is fully depressed	3.5 - 4.7V
42	B/W	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
43	BR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

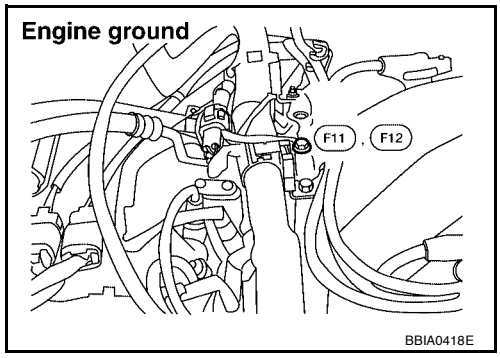
UBS00DH6

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

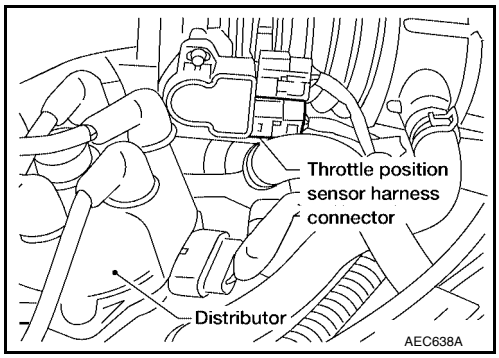
OK or NG

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



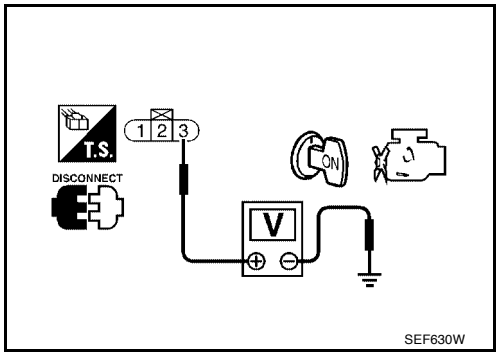
2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect throttle position sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between throttle position sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

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

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between throttle position sensor terminal 1 and ECM terminal 43. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

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

1. Check harness continuity between ECM terminal 23 and throttle position sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

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

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-769, "Component Inspection" .

OK or NG

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

6. ADJUST CLOSED THROTTLE POSITION SWITCH

Adjust closed throttle position switch. Refer to EC-652, "Basic Inspection" .

Items	Specifications
Ignitions timing	M/T: 10 ± 5° BTDC (in Neutral position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 7.
NG >> Replace throttle position sensor. To adjust it, perform EC-652, "Basic Inspection" .

7. CHECK MASS AIR FLOW SENSOR

Refer to EC-733, "Component Inspection" .

OK or NG

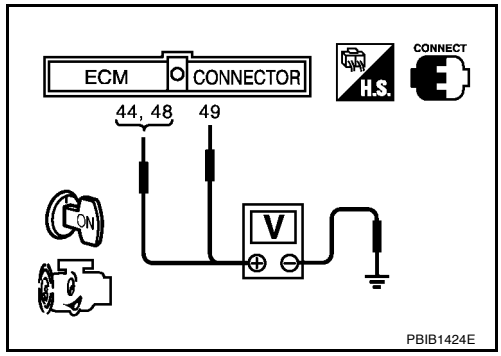
OK >> GO TO 8.
NG >> Replace mass air flow sensor.

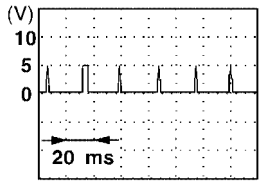
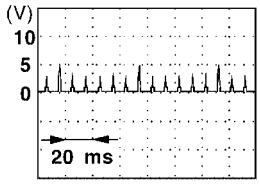
8. CHECK CAMSHAFT POSITION SENSOR

1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.

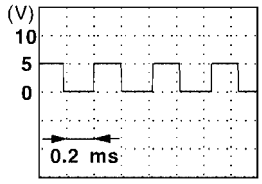
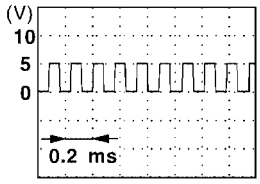
NOTE:
The pulse cycle changes depending on rpm at idle.

<Terminal 44 or 48 and ground>



Condition	Idle	2,000 rpm
Voltage	0.3 - 0.5V	0.3 - 0.5V
Pulse signal	 SEF997U	 SEF998U

<Terminal 49 and ground>

Condition	Idle	2,000 rpm
Voltage	Approximately 2.5V	Approximately 2.5V
Pulse signal	 SEF999U	 SEF001V

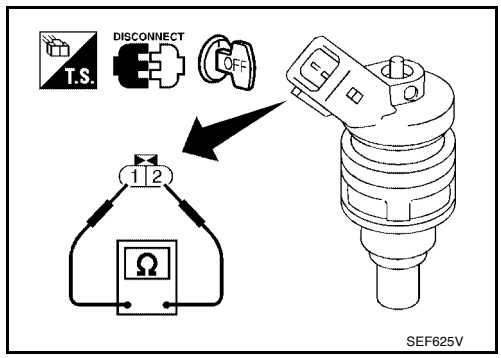
OK or NG

OK >> GO TO 9.
NG >> Replace distributor assembly with camshaft position sensor.

9. CHECK FUEL INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 10.4 - 15.3Ω [at 10 - 60°C (50 - 140°F)]



OK or NG

OK >> GO TO 10.
NG >> Replace fuel injector.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

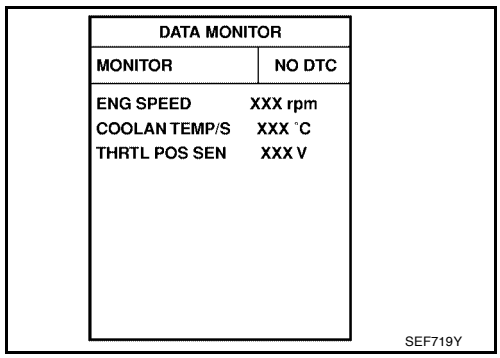
Component Inspection

UBS00DH7

THROTTLE POSITION SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Check voltage of “THRTL POS SEN” under the following conditions.
   Voltage measurement must be made with throttle position sensor installed in vehicle.



Throttle valve conditions	THRTL POS SEN
Completely closed	0.15 - 0.85V
Completely open	3.5 - 4.7V

With GST

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Turn ignition switch ON.
4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	Voltage [V]
Completely closed	0.15 - 0.85
Completely open	3.5 - 4.7

DTC P0125 ECT SENSOR

PFP:22630

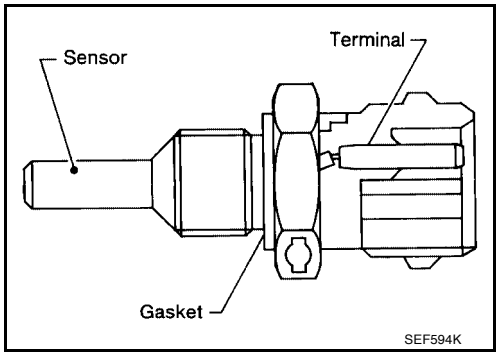
Component Description

UBS00DH8

NOTE:

If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to EC-748 .

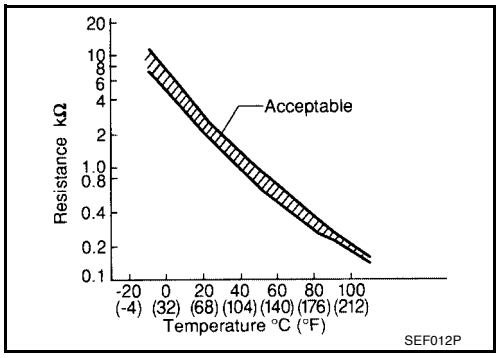
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

Engine coolant temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.4	9.2
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 59 (Engine coolant temperature sensor) and ground.



CAUTION:

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

On Board Diagnosis Logic

UBS00DH9

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125	Insufficient engine coolant temperature for closed loop fuel control	● Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. ● Engine coolant temperature is insufficient for closed loop fuel control.	● Harness or connectors (High resistance in the circuit) ● Engine coolant temperature sensor ● Thermostat

DTC Confirmation Procedure

UBS00DHA

CAUTION:

Be careful not to overheat engine.

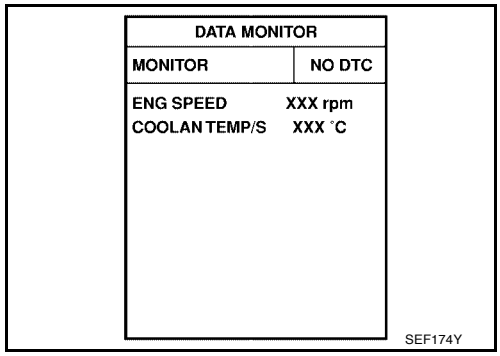
NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-771, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

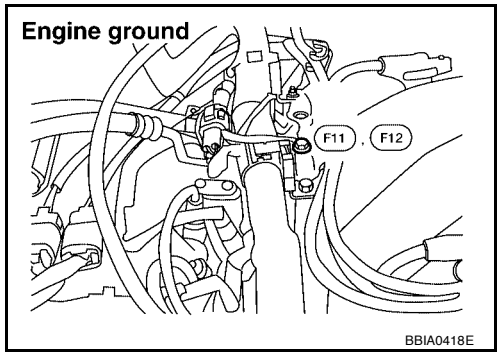
UBS00DHB

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

OK or NG

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



2. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-772, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace engine coolant temperature sensor.

3. 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 4.
NG >> Replace thermostat. Refer to CO-28, "THERMOSTAT" .

4. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

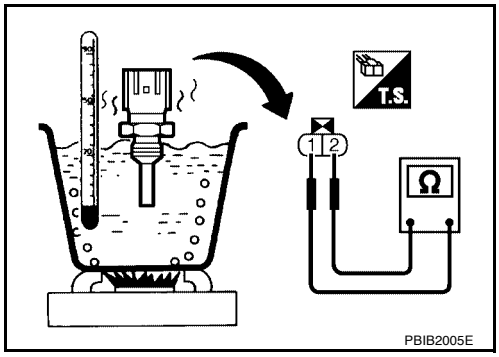
>> **INSPECTION END**

Component Inspection

UBS00DHC

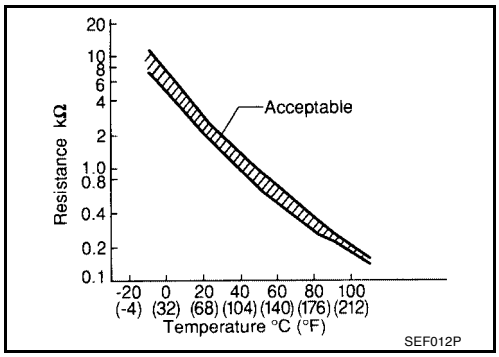
ENGINE COOLANT TEMPERATURE SENSOR

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



<Reference data>

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



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

UBS00DHD

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-80, "OUTER COMPONENT PARTS" .

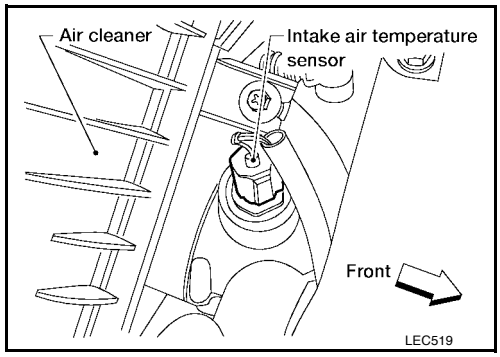
DTC P0127 IAT SENSOR

PFP:22630

Component Description

UBS00DHE

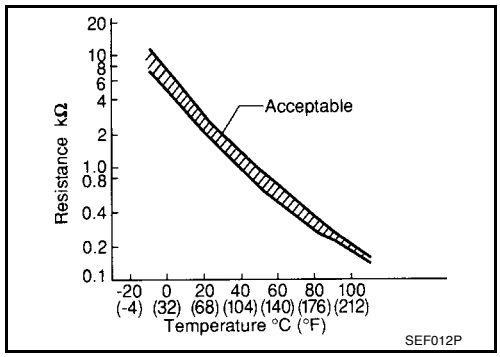
The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response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



<Reference data>

Intake air temperature °C (°F)	Voltage* (V)	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
80 (176)	1.23	0.27 - 0.38

*: These data are reference values and are measured between ECM terminal 61 (Intake air temperature sensor) and ground.



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

On Board Diagnosis Logic

UBS00DHF

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	● Harness or connectors (The sensor circuit is open or shorted) ● Intake air temperature sensor

DTC Confirmation Procedure

UBS00DHG

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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

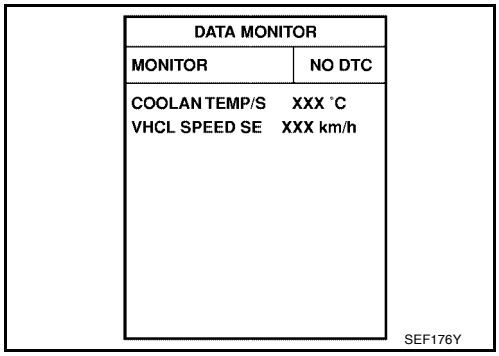
1. Wait until engine coolant temperature is less than 90°C (194°F).

a. Turn ignition switch ON.

b. Select “DATA MONITOR” mode with CONSULT-II.
c. Check the engine coolant temperature.
d. 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-774, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

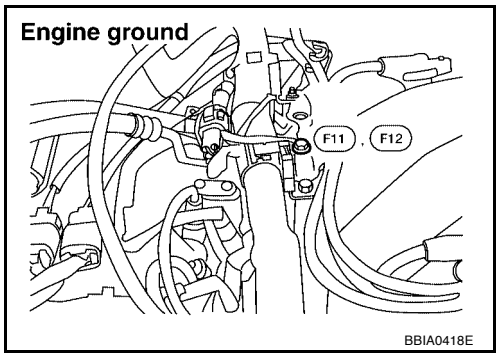
UBS00DHH

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

OK or NG

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



2. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-775, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace intake air temperature sensor.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For Wiring Diagram, refer to EC-744, "Wiring Diagram" .

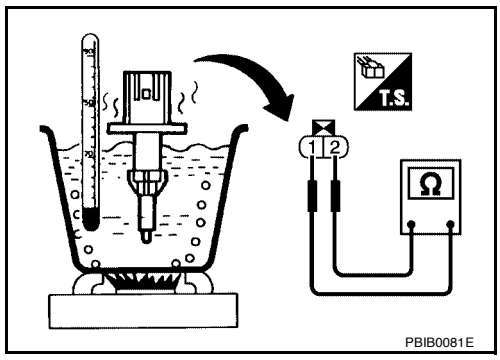
>> **INSPECTION END**

Component Inspection

UBS00DHI

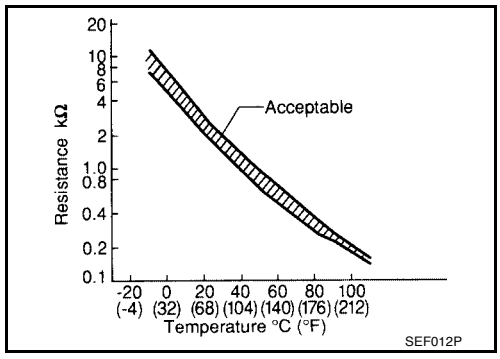
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between intake air temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Intake air temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 038



2. If NG, replace in take air temperature sensor.

DTC P0128 THERMOSTAT FUNCTION

PFP:21200

On Board Diagnosis Logic

UBS00DHJ

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.
This is due to a leak in the seal or the thermostat stuck open.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	● Thermostat ● Leakage from sealing portion of thermostat ● Engine coolant temperature sensor

DTC Confirmation Procedure

UBS00DHK

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
TESTING CONDITION:

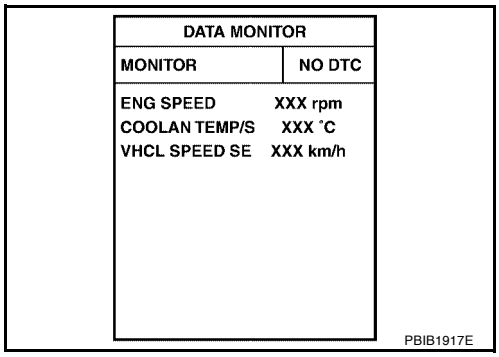
- **For best results, perform at ambient temperature of –10°C (14°F) or higher.**
- **For best results, perform at engine coolant temperature of –10°C (14°F) to 70°C (158°F).**

WITH CONSULT-II

1. Replace thermostat with new one. Refer to CO-28, "THERMOSTAT" . Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on.
2. Turn ignition switch ON.
3. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
4. Check that the “COOLAN TEMP/S” is above 70°C (158°F).
   If it is below 70°C (158°F), go to following step.
   If it is above 70°C (158°F), cool down the engine to less than 70°C (158°F), then retry from step 1.
5. Drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE	80 - 120 km/h (50 - 75 MPH)

If 1st trip DTC is detected, go to EC-776, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00DHL

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-777, "Component Inspection" .

OK or NG

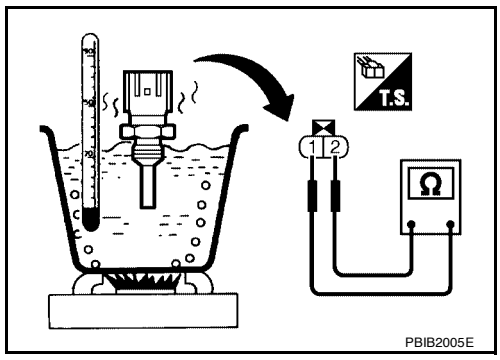
OK >> **INSPECTION END**
NG >> Replace engine coolant temperature sensor.

Component Inspection

UBS00DHM

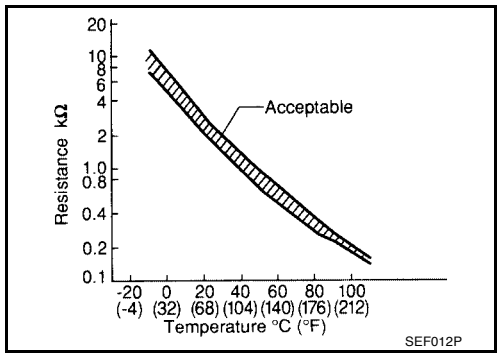
ENGINE COOLANT TEMPERATURE SENSOR

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



<Reference data>

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



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

UBS00DHN

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-80, "OUTER COMPONENT PARTS" .

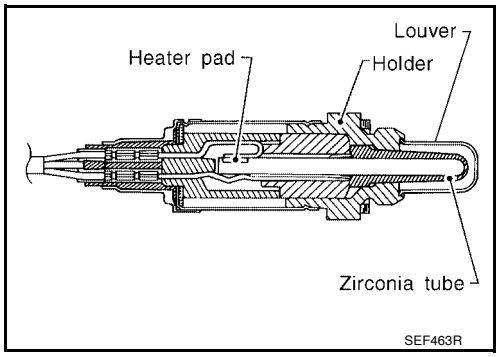
DTC P0132, P0152 HO2S1

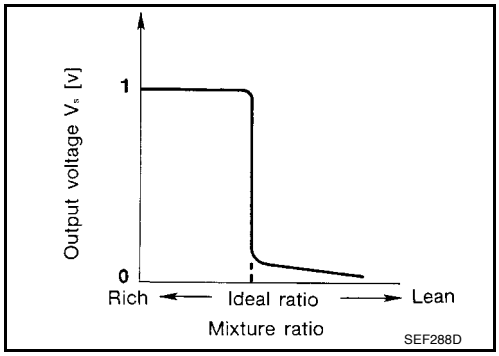
PFP:22690

Component Description

UBS00DHO

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





CONSULT-II Reference Value in Data Monitor Mode

UBS00DHP

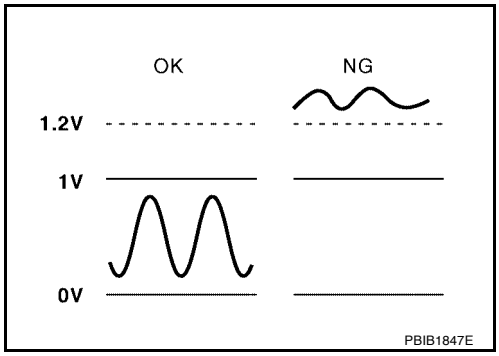
Specification data are reference values.

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

UBS00DHQ

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



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0132 (Bank 1) P0152 (Bank 2)	Heated oxygen sensor 1 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 1

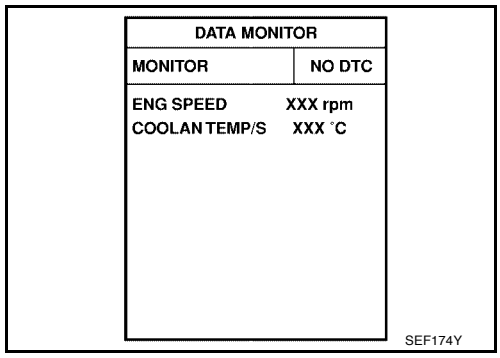
DTC Confirmation Procedure

UBS00DHR

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Restart engine and let it idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-783, "Diagnostic Procedure" .



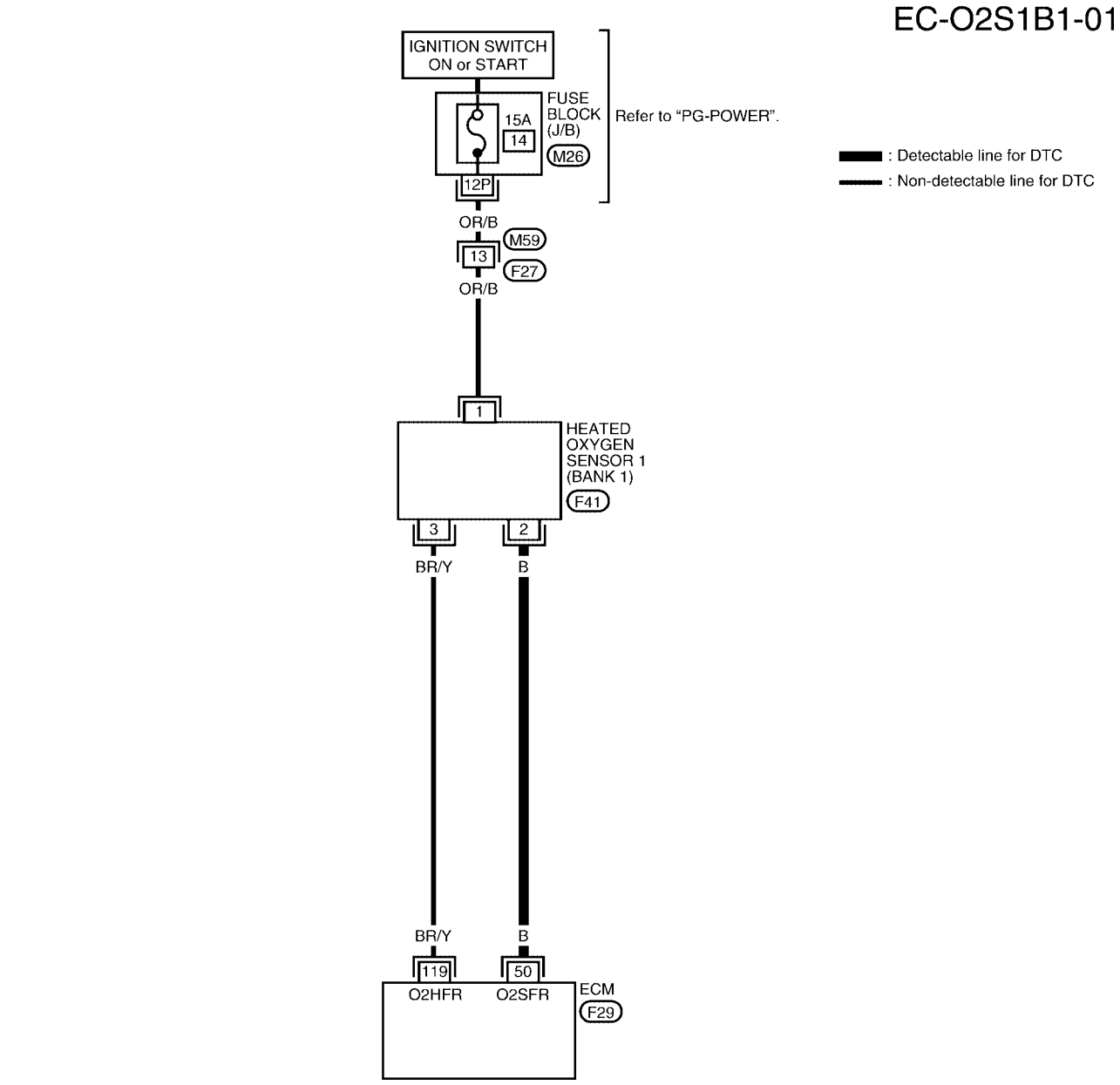
WITH GST

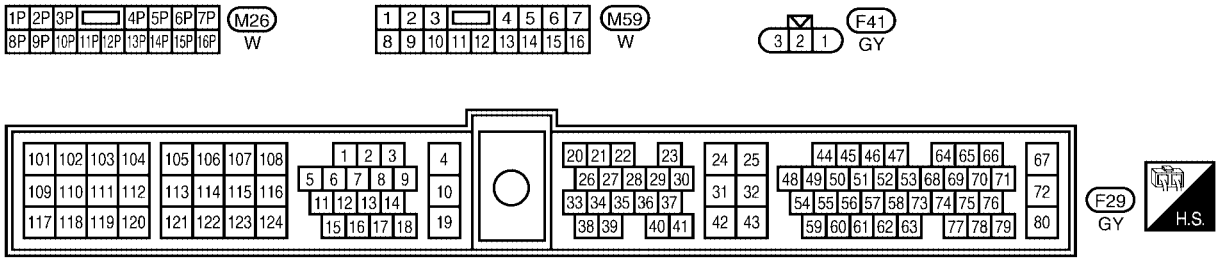
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for 2 minutes.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Restart engine and let it idle for 2 minutes.
6. Select MODE 3 with GST.
7. If DTC is detected, go to EC-783, "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

UBS00DHS



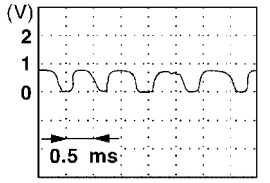


BBWA1075E

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

CAUTION:

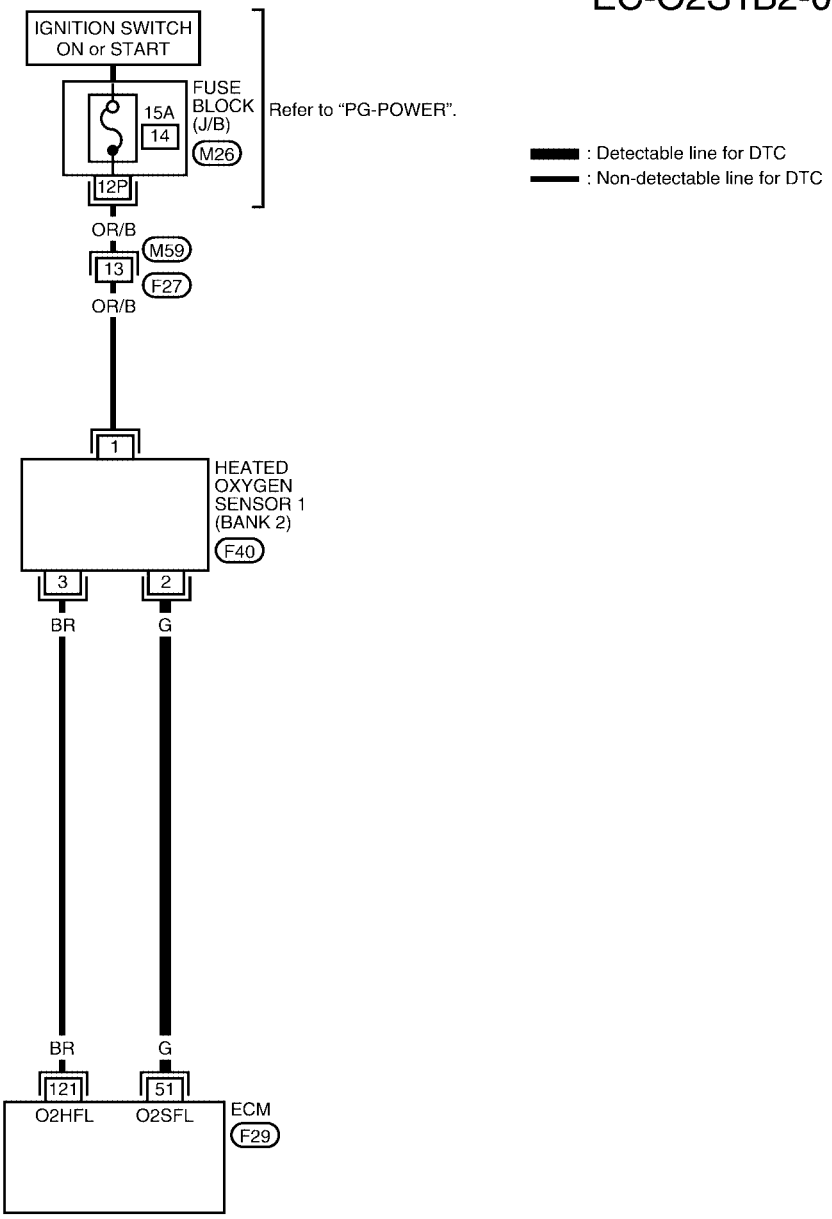
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V★  SEF002V

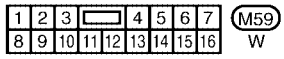
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.

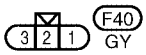
BANK 2

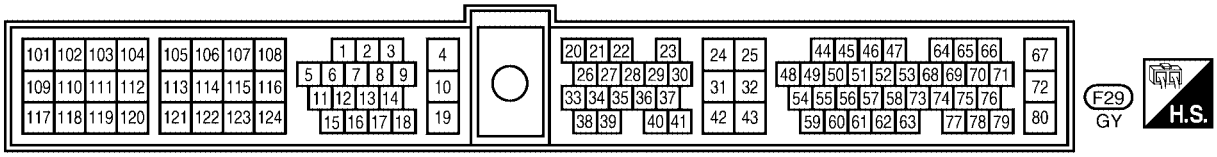
EC-O2S1B2-01









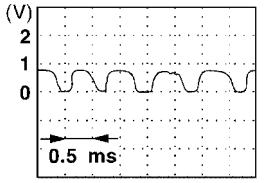


BBWA1076E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	G	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V★  SEF002V

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

Diagnostic Procedure

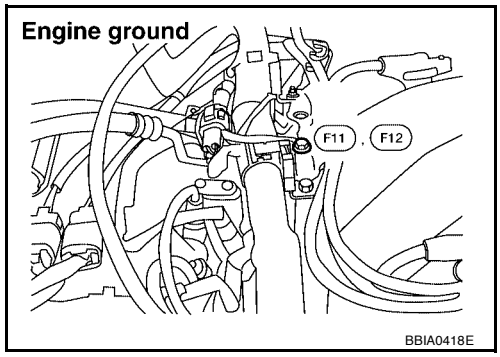
UBS00DHT

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

OK or NG

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



BBIA0418E

2. RETIGHTEN HEATED OXYGEN SENSOR 1

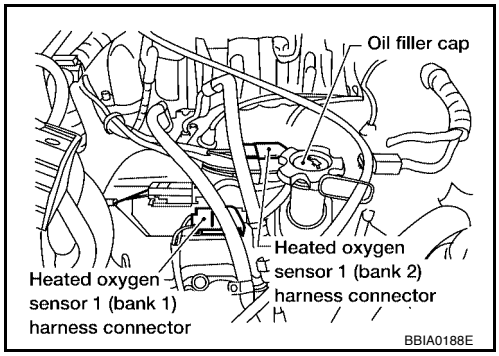
Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 3.

3. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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



DTC	Terminals		Bank
	ECM	Sensor	
P0132	50	2	Bank 1
P0152	51	2	Bank 2

Continuity should exist.

4. Check harness continuity between the following terminals and ground.

DTC	Terminals		Bank
	ECM	Sensor	
P0132	50	2	Bank 1
P0152	51	2	Bank 2

Refer to Wiring Diagram.

Continuity should not exist.

5. 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. Disconnect heated oxygen sensor 1 harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. 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 (B2)	XXX V
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

PBIB2025E

5. Check the following.

– “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
5 times (cycles) are counted as shown 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									

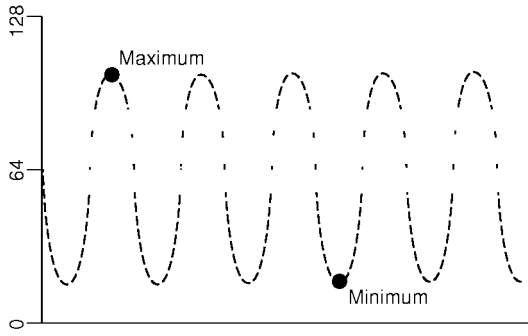
Bank 2										
cycle		1	2	3	4	5				
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R									

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

OK or NG

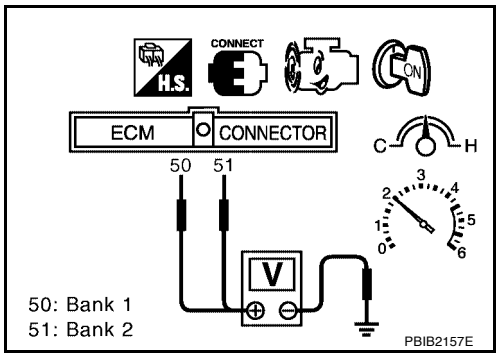
OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 1.

6. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and 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 1 time.
- The minimum voltage is below 0.3V at least 1 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 → 0 - 0.3V

CAUTION:

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

OK or NG

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

7. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DHU

HEATED OXYGEN SENSOR 1

Refer to EM-80, "OUTER COMPONENT PARTS" .

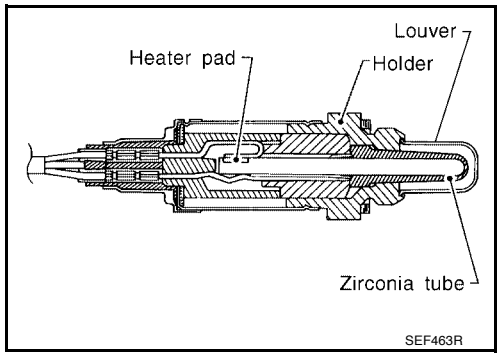
DTC P0133, P0153 HO2S1

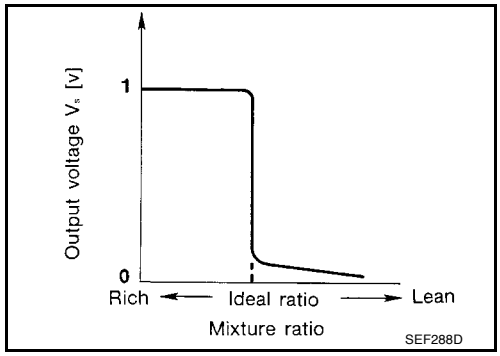
PFP:22690

Component Description

UBS00DHV

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





CONSULT-II Reference Value in Data Monitor Mode

UBS00DHW

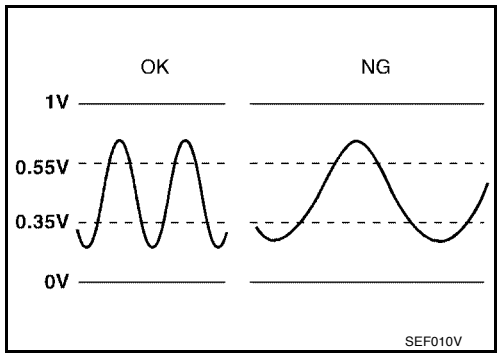
Specification data are reference values.

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

UBS00DHX

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



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0133 (Bank 1)	Heated oxygen sensor 1 circuit slow response	The response of the voltage signal from the sensor takes more than the specified time.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 1 ● Fuel pressure ● Fuel injector ● Intake air leaks ● Exhaust gas leaks ● PCV valve ● Mass air flow sensor
P0153 (Bank 2)			

DTC Confirmation Procedure

UBS00DHY

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 5 seconds before conducting the next test.

TESTING CONDITION:

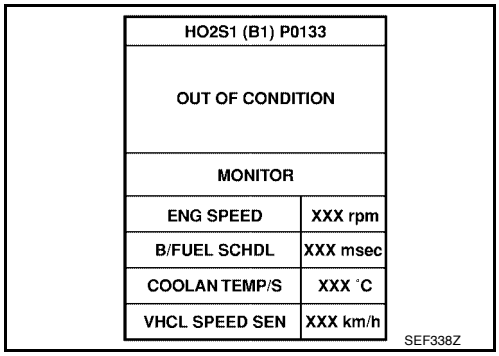
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

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)/(B2) P0133/ 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:

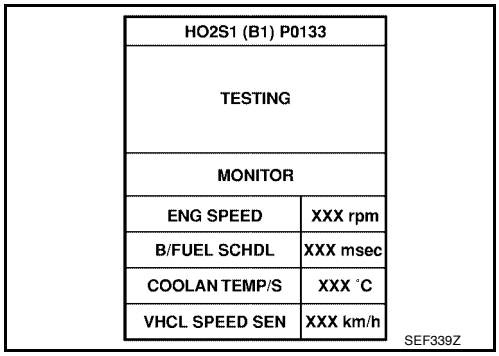
   Never raise engine speed above 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 5.



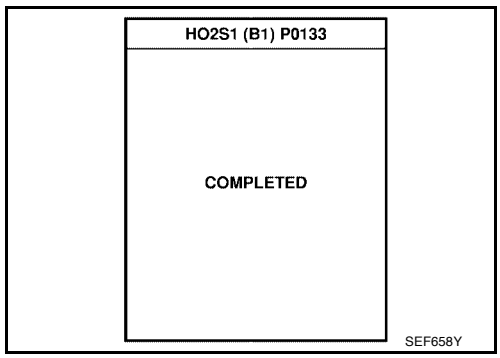
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 40 to 50 seconds.)

ENG SPEED	1,800 - 3,300 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	2.8 - 13.0 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-793, "Diagnostic Procedure" .



Overall Function Check

UBS00DHZ

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

WITH GST

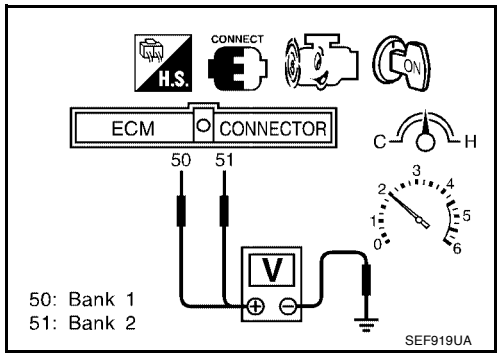
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HOS1 (B1) signal] or 51 [HOS1 (B2) signal] and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- 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

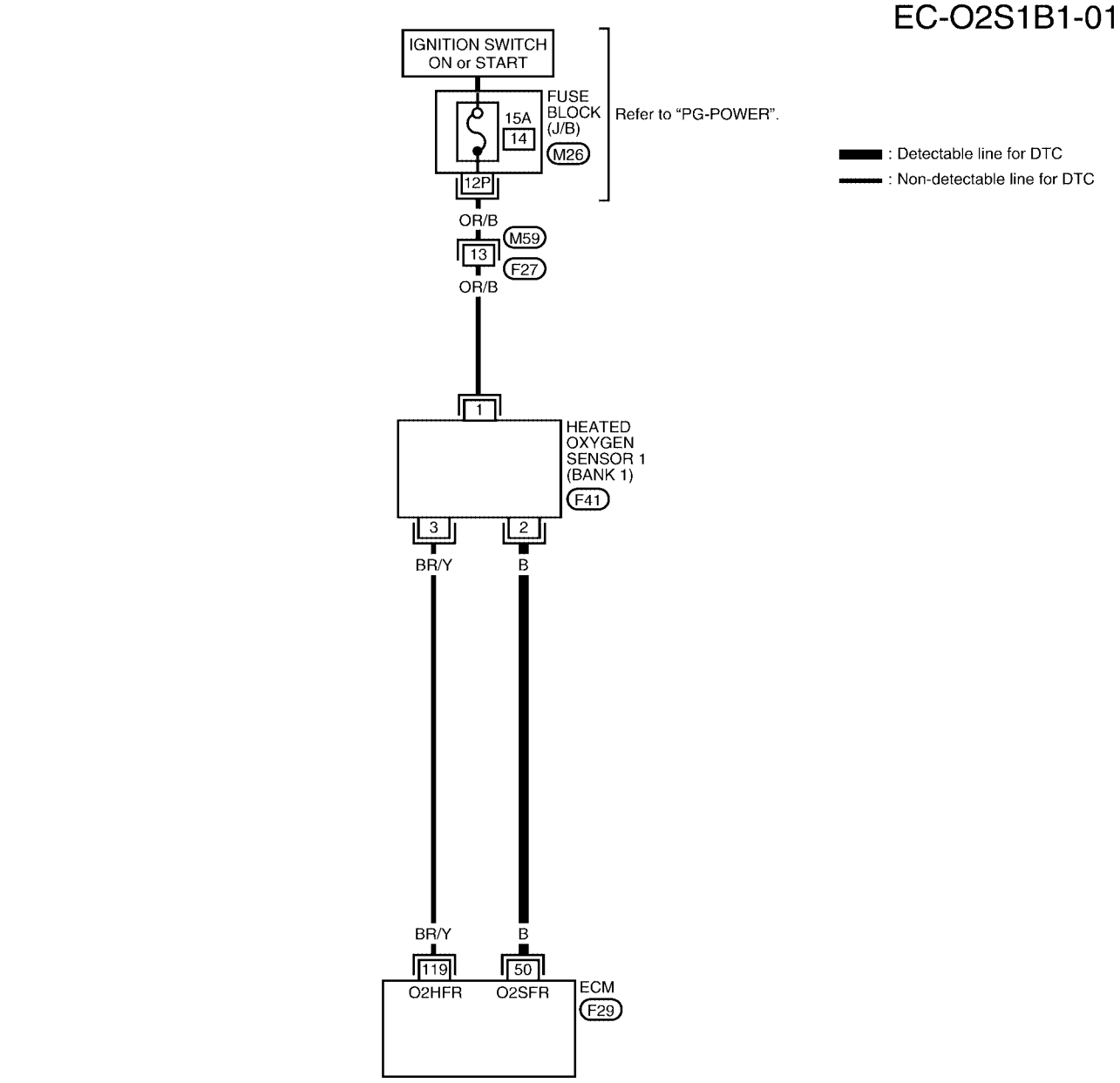
2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

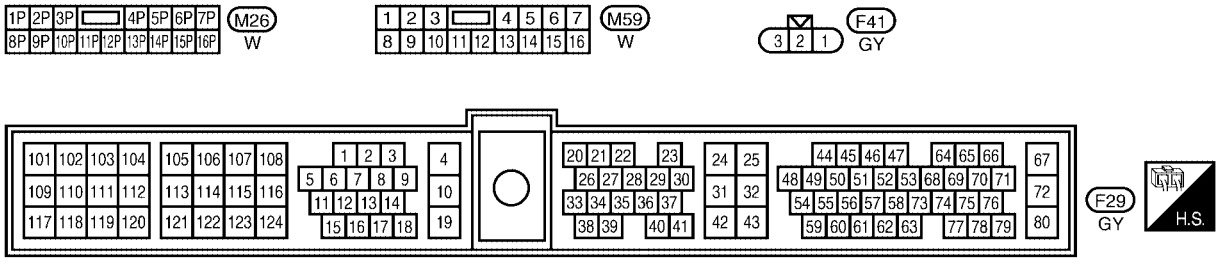
4. If NG, go to EC-793, "Diagnostic Procedure" .



Wiring Diagram
BANK 1

UBS00DI0



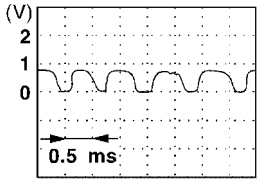


BBWA1075E

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

CAUTION:

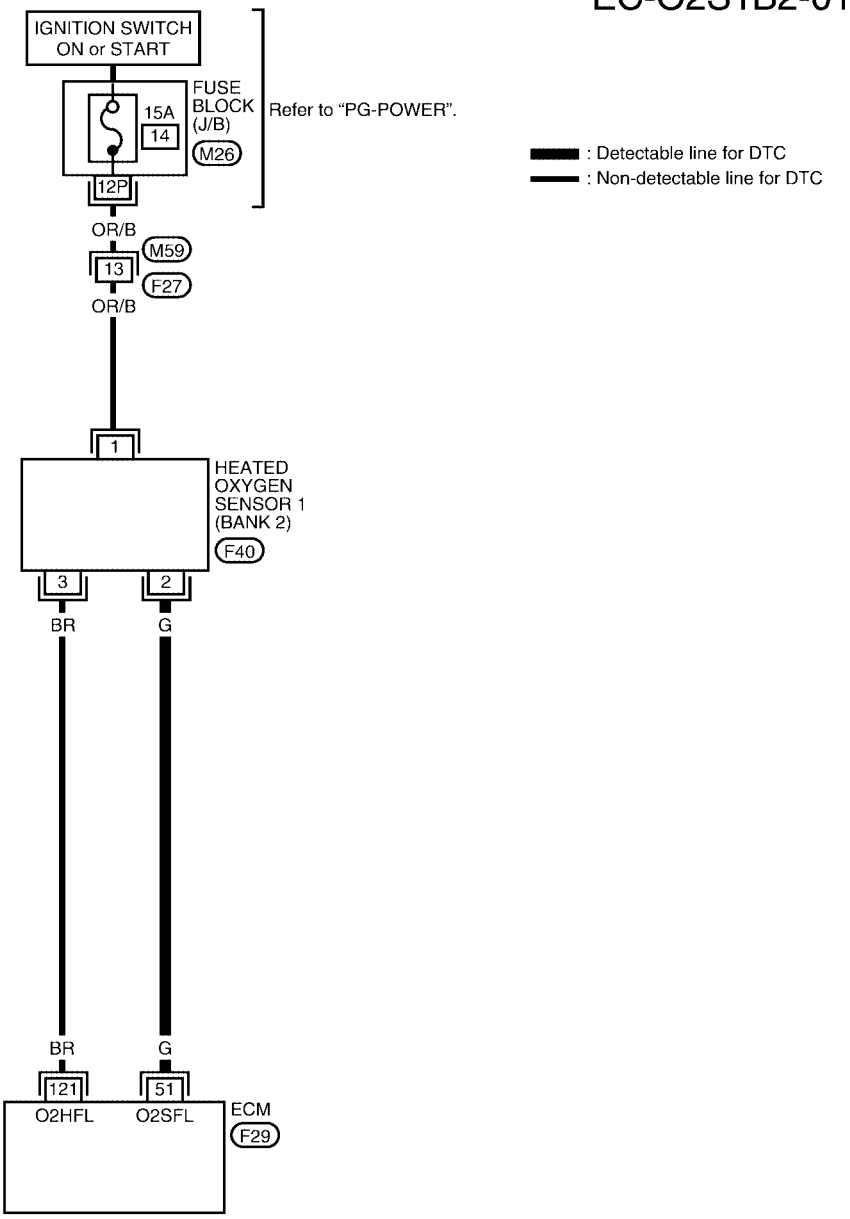
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V★  SEF002V

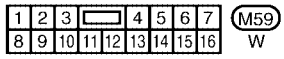
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.

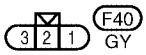
BANK 2

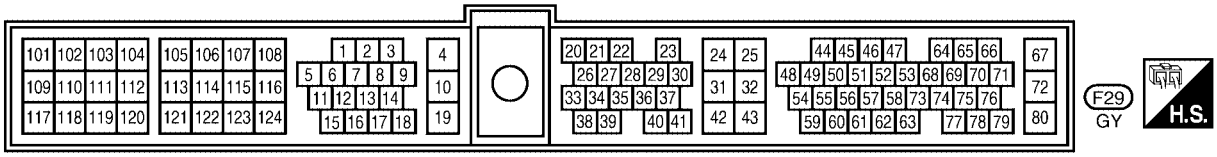
EC-O2S1B2-01









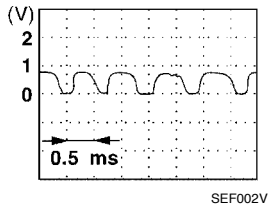


BBWA1076E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	G	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V★  SEF002V

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

Diagnostic Procedure

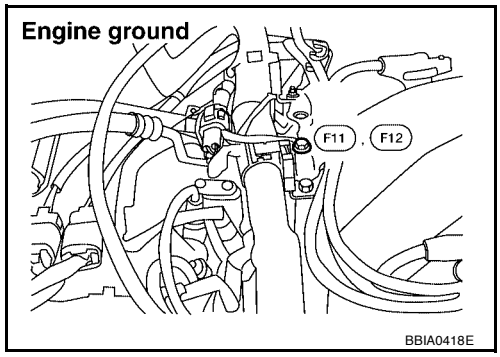
UBS00DI1

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

OK or NG

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



BBIA0418E

2. RETIGHTEN HEATED OXYGEN SENSOR 1

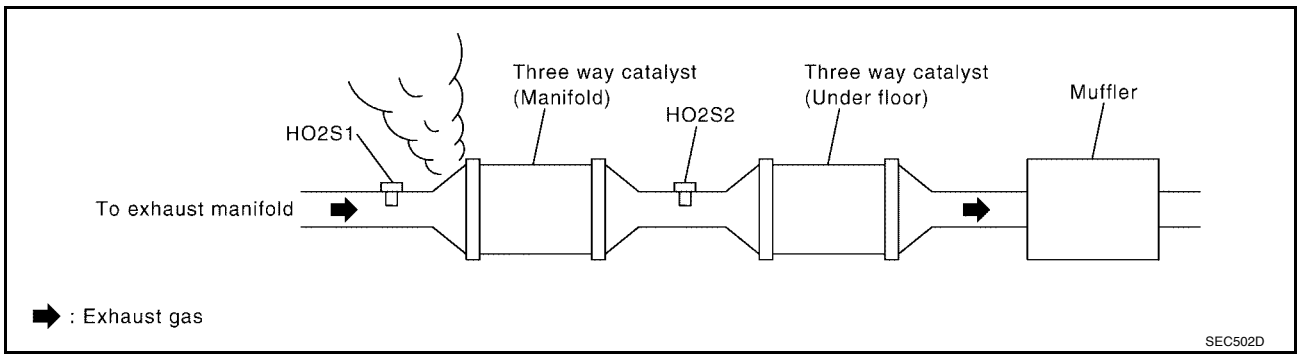
Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 3.

3. CHECK FOR EXHAUST GAS LEAK

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



OK or NG

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

4. CHECK FOR INTAKE AIR LEAK

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

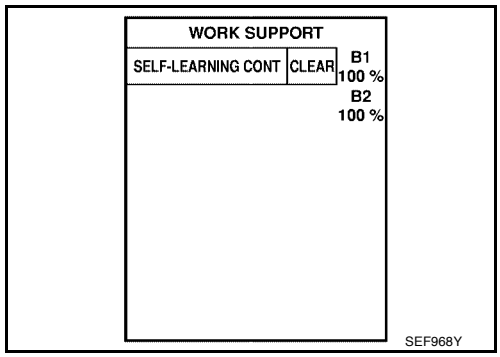
OK or NG

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, P0174 or P0172, P0175 detected?
   Is it difficult to start engine?



Without CONSULT-II

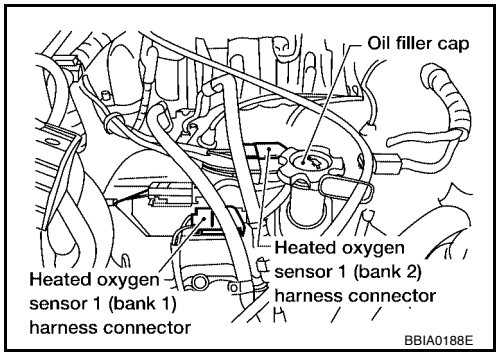
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-638, "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, P0174 or P0172, P0175 detected?
   Is it difficult to start engine?

Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-828 or EC-836 .
No >> GO TO 6.

6. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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



DTC	Terminals		Bank
	ECM	Sensor	
P0133	50	2	Bank 1
P0153	51	2	Bank 2

Continuity should exist.

5. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0133	50	2	Bank 1
P0153	51	2	Bank 2

Continuity should not exist.

6. Also check harness for 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 MASS AIR FLOW SENSOR

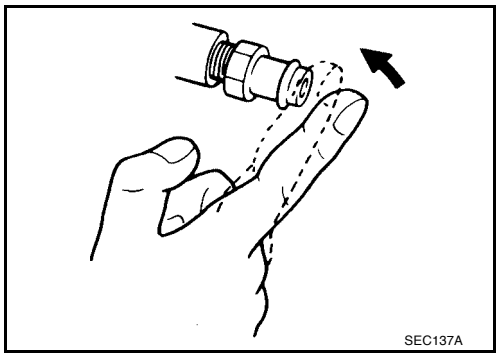
Refer to EC-733, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace mass air flow sensor.

8. CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover; make sure that 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.



OK or NG

OK (With CONSULT-II)>>GO TO 9.
OK (Without CONSULT-II)>>GO TO 10.
NG >> Replace PCV valve.

9. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. 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 (B2)	XXX V
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

PBIB2025E

5. Check the following.

- “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown below.
- “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.

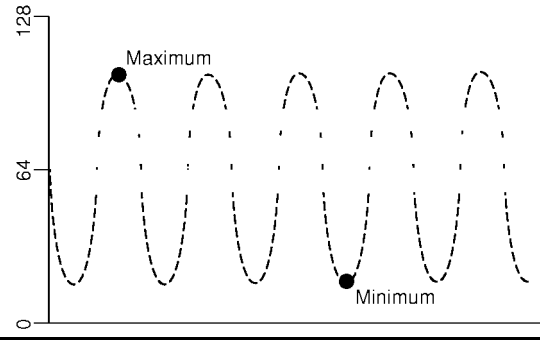
Bank 1						
	cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R					
Bank 2						
	cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R					

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

OK or NG

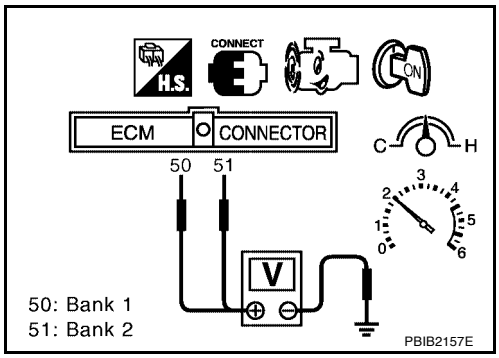
OK >> GO TO 11.
NG >> Replace malfunctioning heated oxygen sensor 1.

10. CHECK FRONT HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and 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 1 time.
- The minimum voltage is below 0.3V at least 1 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 → 0 - 0.3V

CAUTION:

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

OK or NG

OK >> GO TO 11.
NG >> Replace malfunctioning heated oxygen sensor 1.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DI2

HEATED OXYGEN SENSOR 1

Refer to EM-80, "OUTER COMPONENT PARTS" .

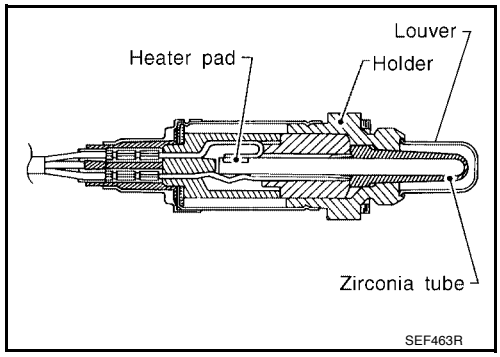
DTC P0134, P0154 HO2S1

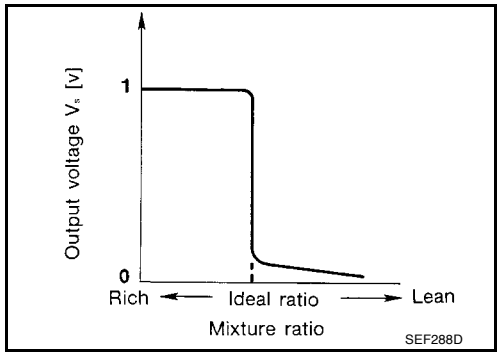
PFP:22690

Component Description

UBS00DI3

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





CONSULT-II Reference Value in Data Monitor Mode

UBS00DI4

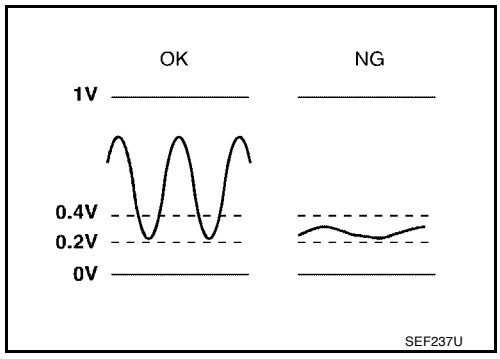
Specification data are reference values.

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

UBS00DI5

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



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0134 (Bank 1) P0154 (Bank 2)	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 1

DTC Confirmation Procedure

UBS00DI6

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 5 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)/(B2) P0134/P0154” 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 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 4.

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

LEC068A

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	1,800 - 3,150 rpm
Vehicle speed	More than 64 km/h (40 MPH)
B/FUEL SCHDL	2.8 - 13.0 msec
Selector lever	Suitable position

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

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

LEC069A

6. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-805, "Diagnostic Procedure" .

   During this test, P1148 and P1168 may be stored in ECM.

HO2S1 (B1) P0134
COMPLETED

LEC034A

Overall Function Check

UBS00DI7

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

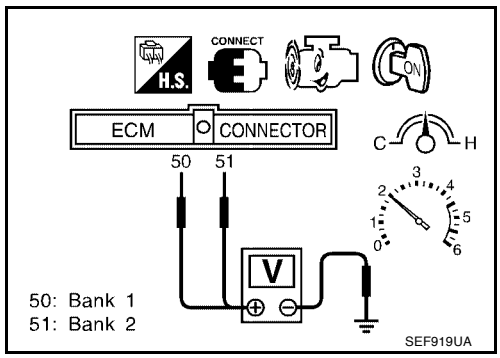
WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and ground.

3. Check the following with engine speed held at 2,000 rpm constant under no load.

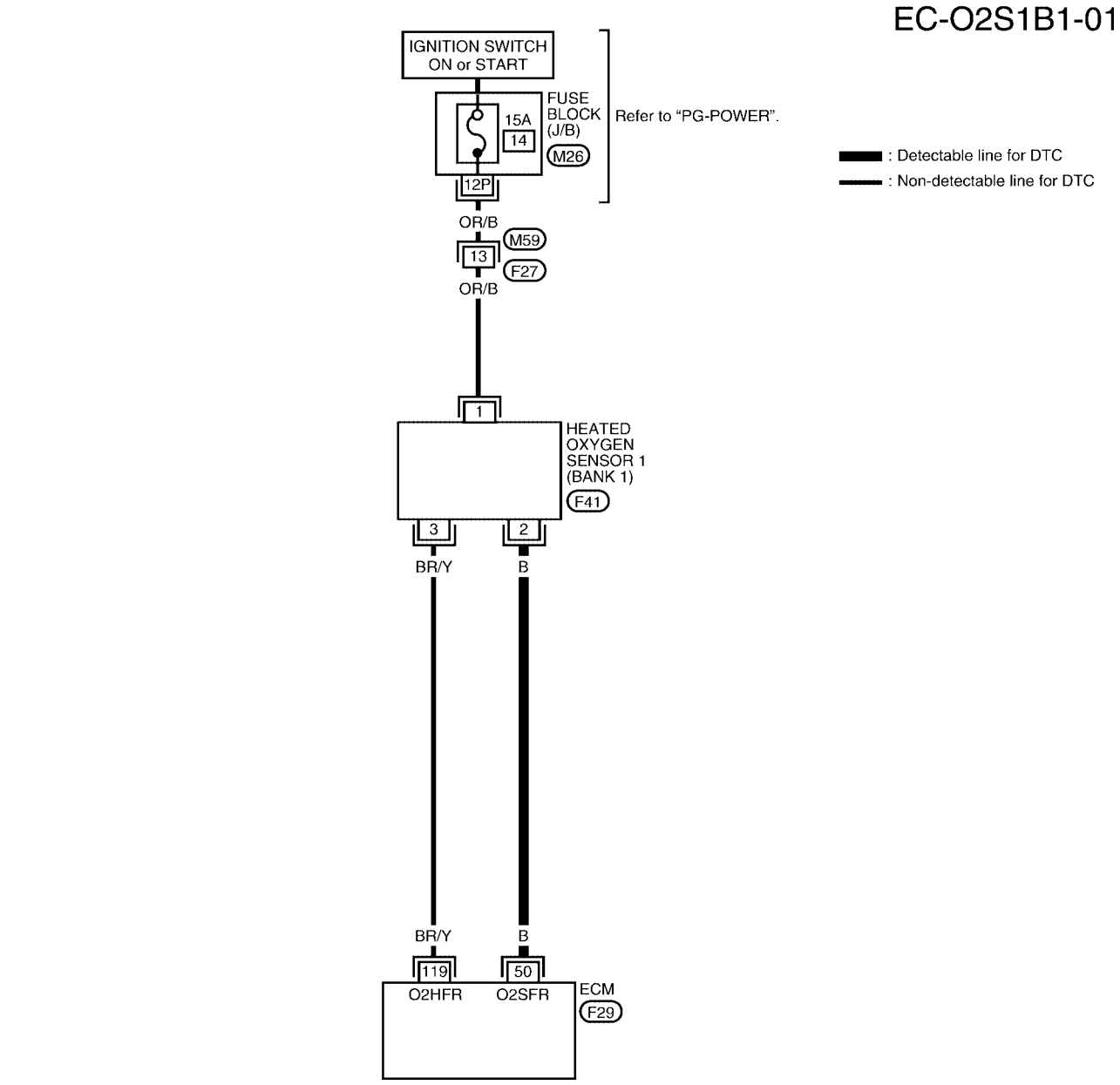
- The voltage does not remain in the range of 0.2 to 0.4V.

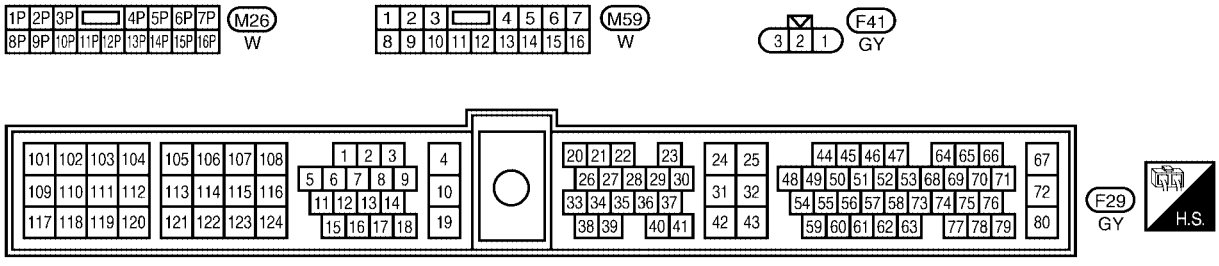
4. If NG, go to EC-805, "Diagnostic Procedure" .



Wiring Diagram
BANK 1

UBS00DI8



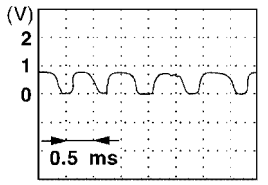


BBWA1075E

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

CAUTION:

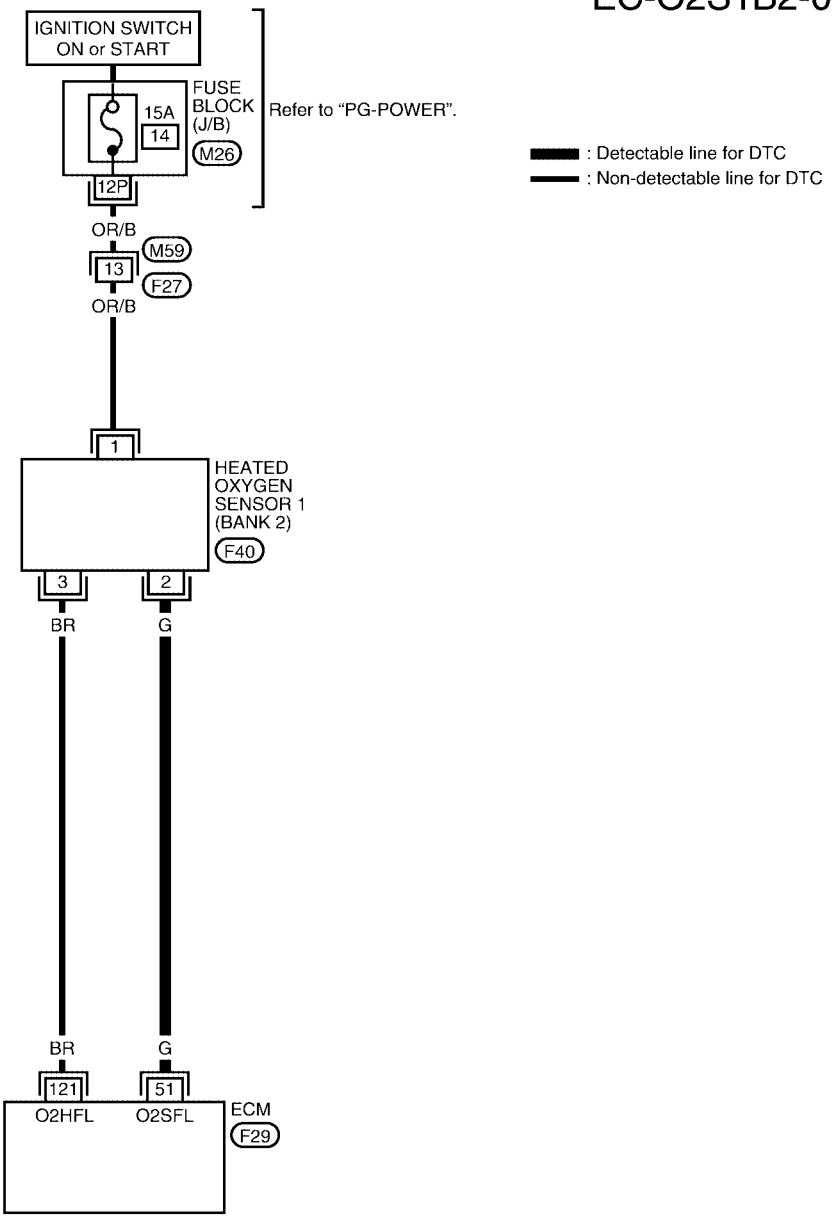
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V★  SEF002V

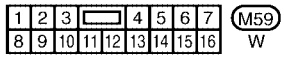
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.

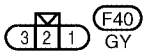
BANK 2

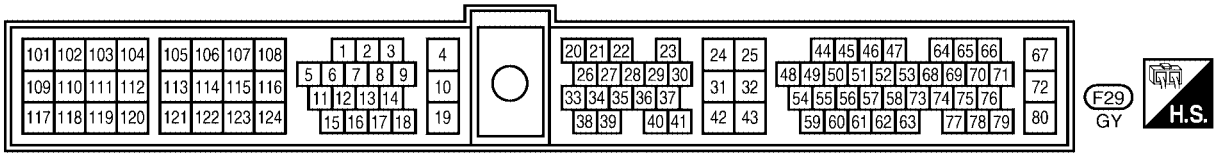
EC-O2S1B2-01









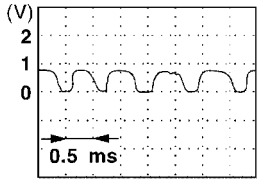


BBWA1076E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	G	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V★  SEF002V

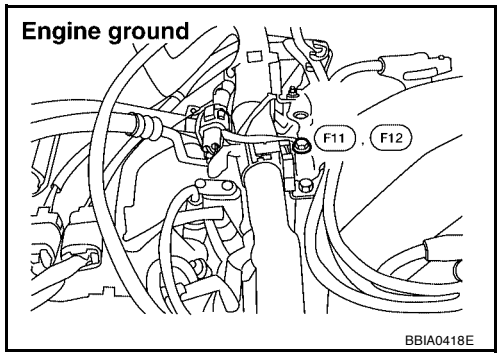
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.

Diagnostic Procedure

UBS00DI9

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .



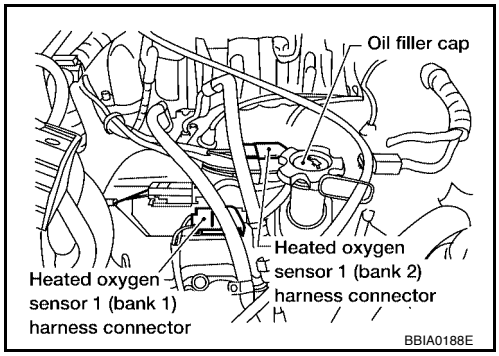
BBIA0418E

OK or NG

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

2. CHECK HO2S 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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



DTC	Terminals		Bank
	ECM	Sensor	
P0134	50	2	Bank 1
P0154	51	2	Bank 2

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0134	50	2	Bank 1
P0154	51	2	Bank 2

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 3.
OK (Without CONSULT-II)>> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. 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 (B2)	XXX V
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

PBIB2025E

5. Check the following.

– “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
5 times (cycles) are counted as shown below.

– “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.

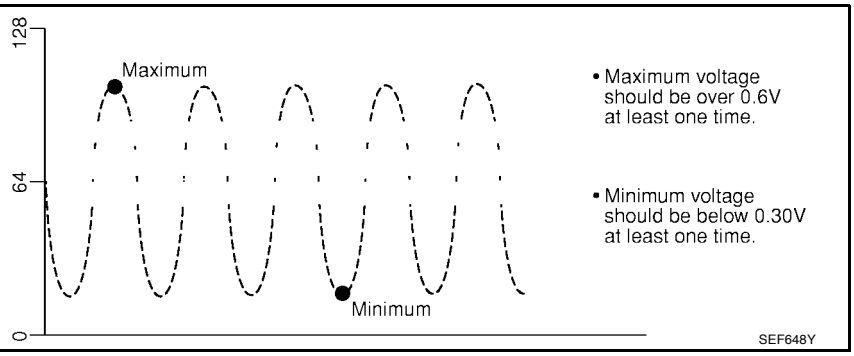
Bank 1						
	cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R					
Bank 2						
	cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R					

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

OK or NG

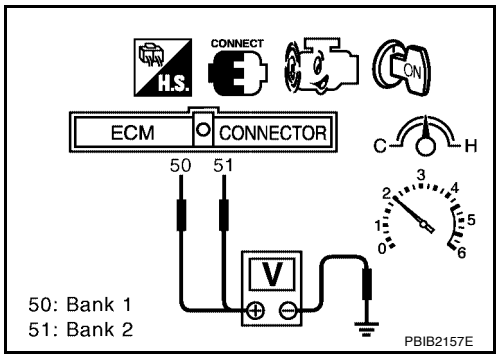
OK >> GO TO 5.
NG >> Replace malfunctioning heated oxygen sensor 1.

4. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B1) signal] and 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 1 time.
- The minimum voltage is below 0.3V at least 1 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 → 0 - 0.3V

CAUTION:

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

OK or NG

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

5. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DIA

HEATED OXYGEN SENSOR 1

Refer to EM-80, "OUTER COMPONENT PARTS" .

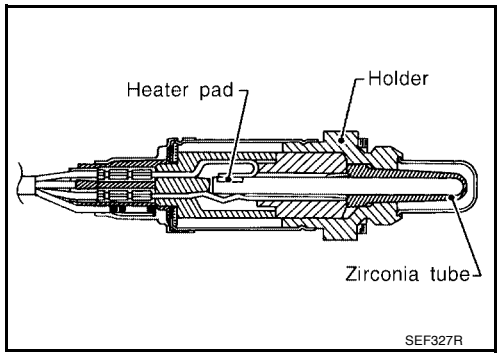
DTC P0138, P0158 HO2S2

PFP:226A0

Component Description

UBS00DIB

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DIC

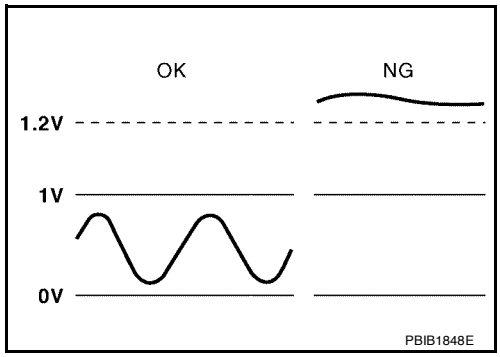
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Warm-up condition ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS00DID

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0138 (Bank 1) P0158 (Bank 2)	Heated oxygen sensor 2 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2

DTC Confirmation Procedure

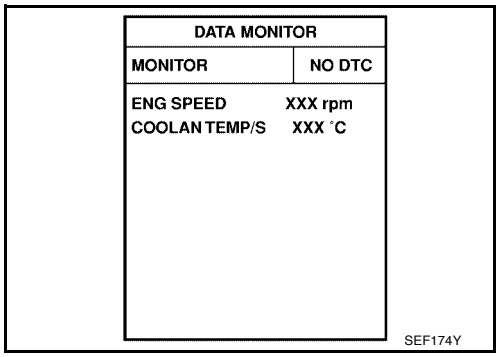
UBS00DIE

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 5 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-814, "Diagnostic Procedure" .



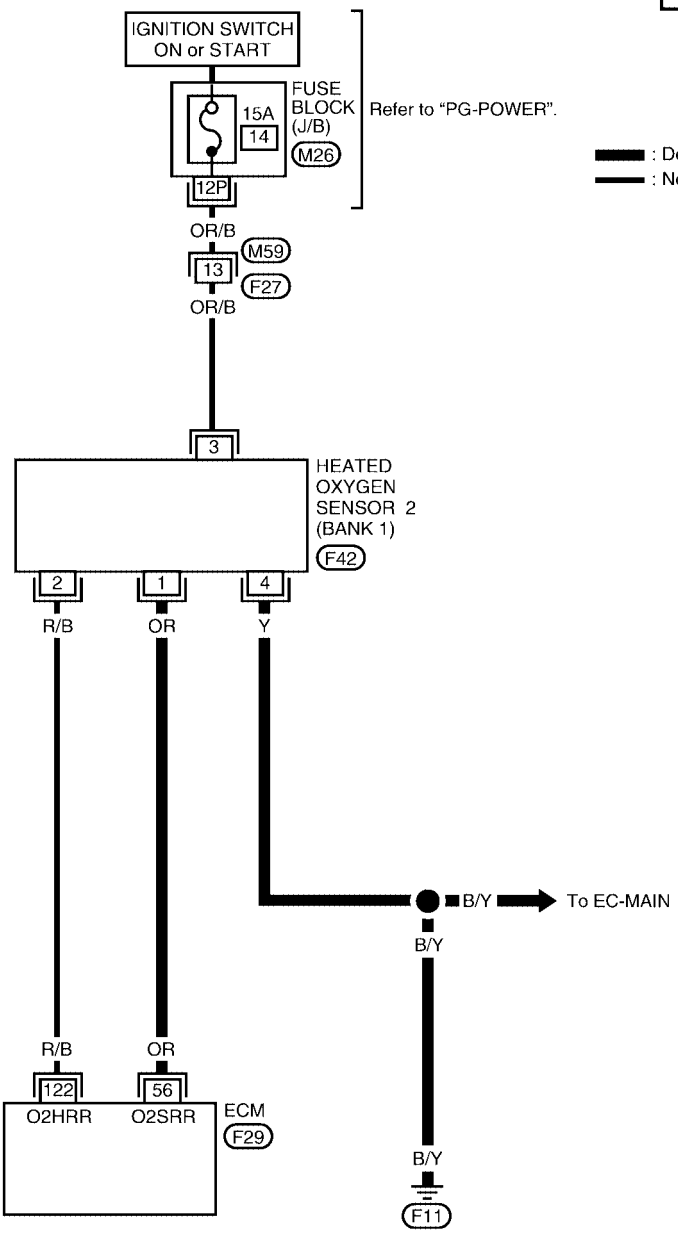
WITH GST

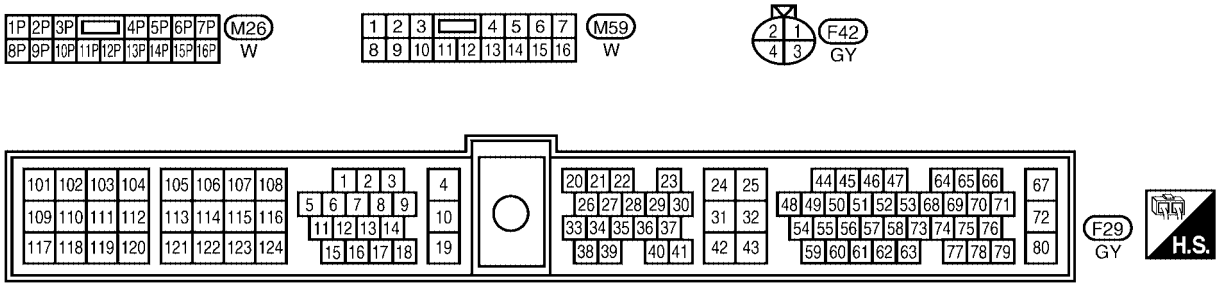
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 2 minutes.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
7. Let engine idle for 2 minutes.
8. Select MODE 3 with GST.
9. If DTC is detected, go to EC-814, "Diagnostic Procedure" .

Wiring Diagram
BANK 1

UBS00DIF

EC-O2S2B1-01





BBWA1079E

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

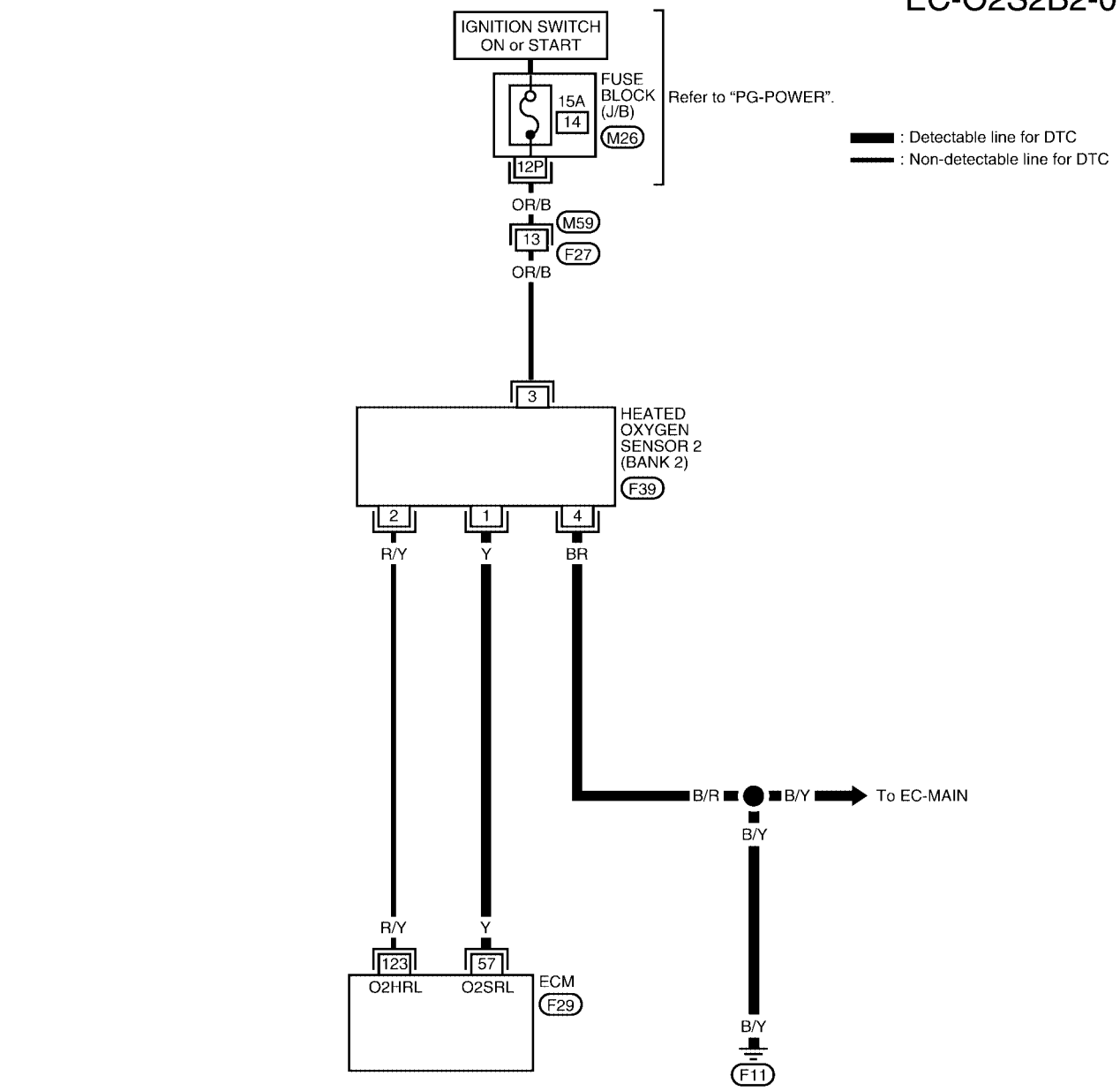
CAUTION:

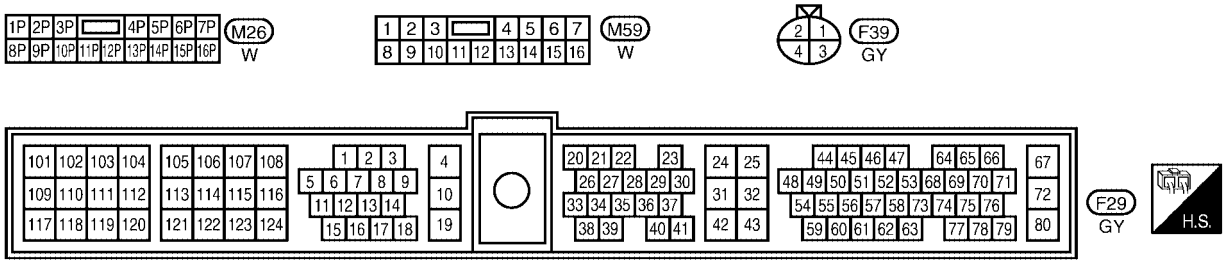
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

BANK 2

EC-O2S2B2-01





BBWA1080E

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

CAUTION:

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

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	Y	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

Diagnostic Procedure

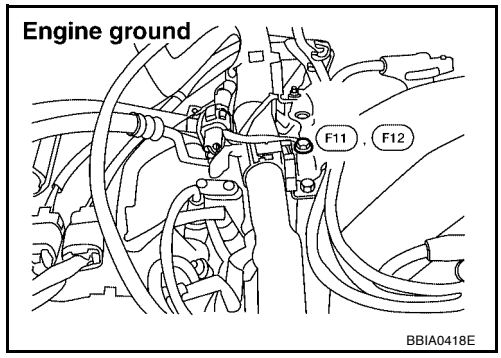
UBS00DIG

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

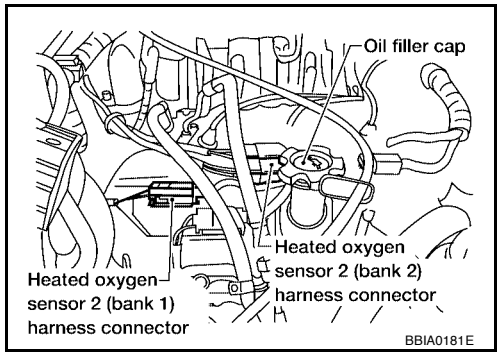
OK or NG

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



2. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Check harness continuity between ECM terminal and HO2S2 terminal as follows.
   Refer to Wiring Diagram.



DTC	Terminals		Bank
	ECM	Sensor	
P0138	56	1	Bank 1
P0158	57	1	Bank 2

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	56	1	Bank 1
P0158	57	1	Bank 2

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

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

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

2. 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 HO2S2 CONNECTORS FOR WATER

Check heated oxygen sensor 2 connector and harness connector for water.
Water should not exist.

OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

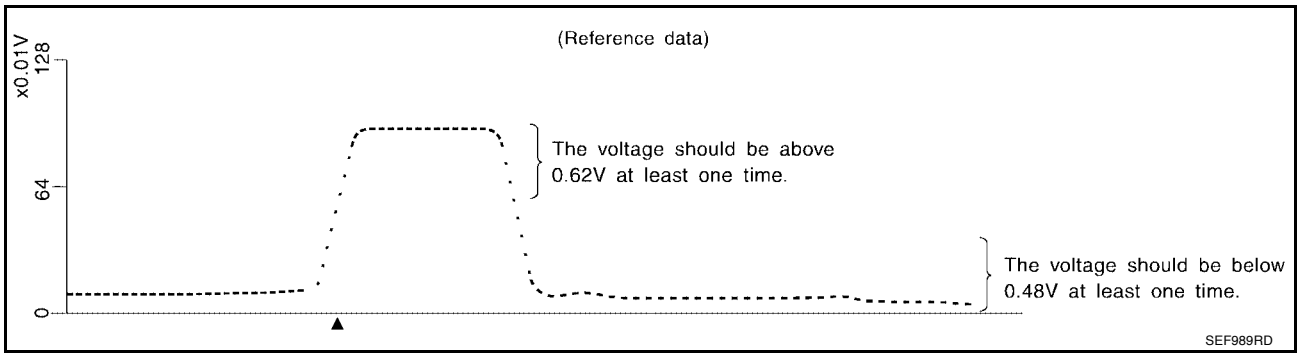
With CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperate.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

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

SEF662Y

7. Check “HO2S2 (B1)/(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 oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

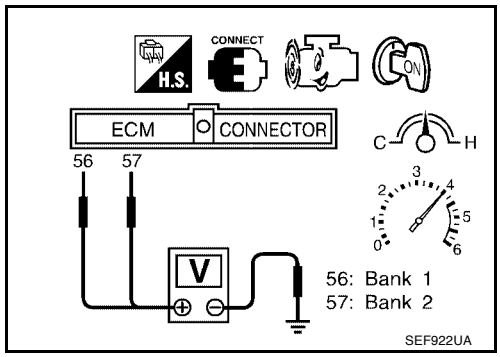
OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK HEATED OXYGEN SENSOR 2

Without CONSULT-II

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Stop vehicle with engine running.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.62V at least once during this procedure.
   If the voltage is above 0.62V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.48V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

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

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DIH

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

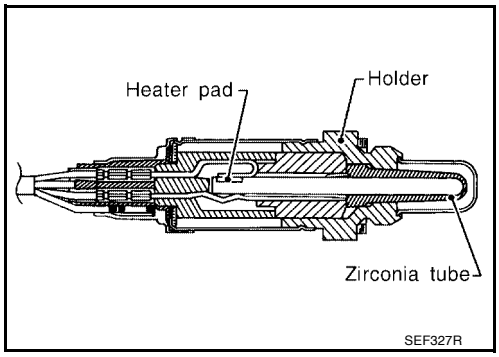
DTC P0139, P0159 HO2S2

PFP:226A0

Component Description

UBS00DII

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DIJ

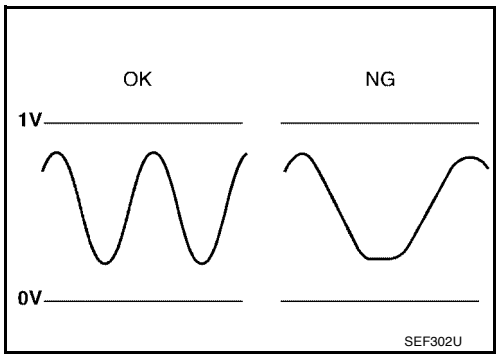
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Warm-up condition ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS00DIK

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139 (Bank 1)	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector ● Intake air leaks
P0159 (Bank 2)			

DTC Confirmation Procedure

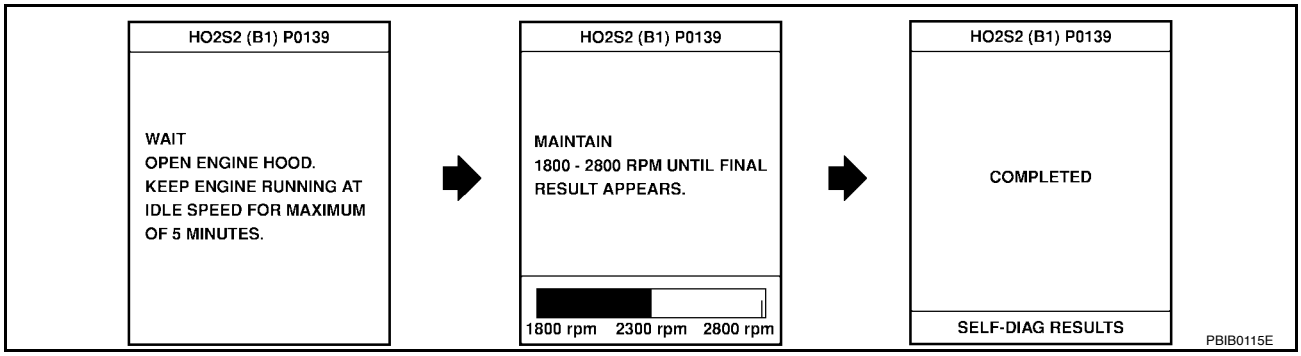
UBS00DIL

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
TESTING CONDITION:
Open engine hood before conducting following procedure

WITH CONSULT-II

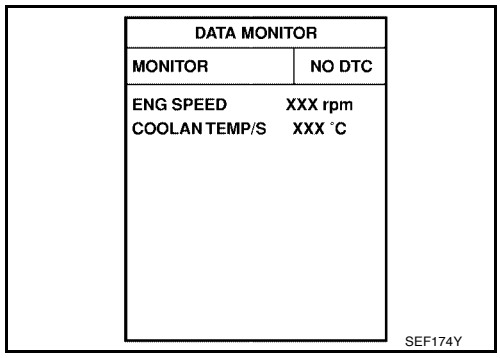
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “HO2S2 (B1) P0139” or “HO2S2 (B2) P0159” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II and follow the instruction of CONSULT-II.
6. Start engine and following the instruction of CONSULT-II.



7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-823, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
c. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-II.
d. When “COOLAN TEMP/S” indication reaches to 70°C (158°F), go to step 3.



Overall Function Check

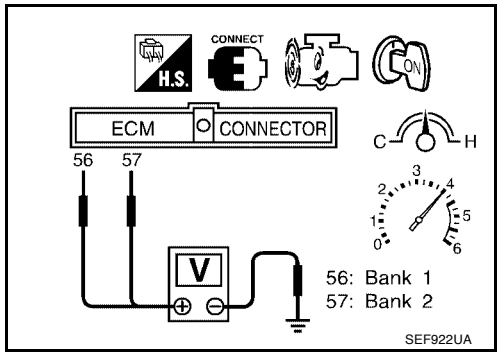
UBS00DIM

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

CAUTION:
Always drive vehicle at a safe speed.

WITH GST

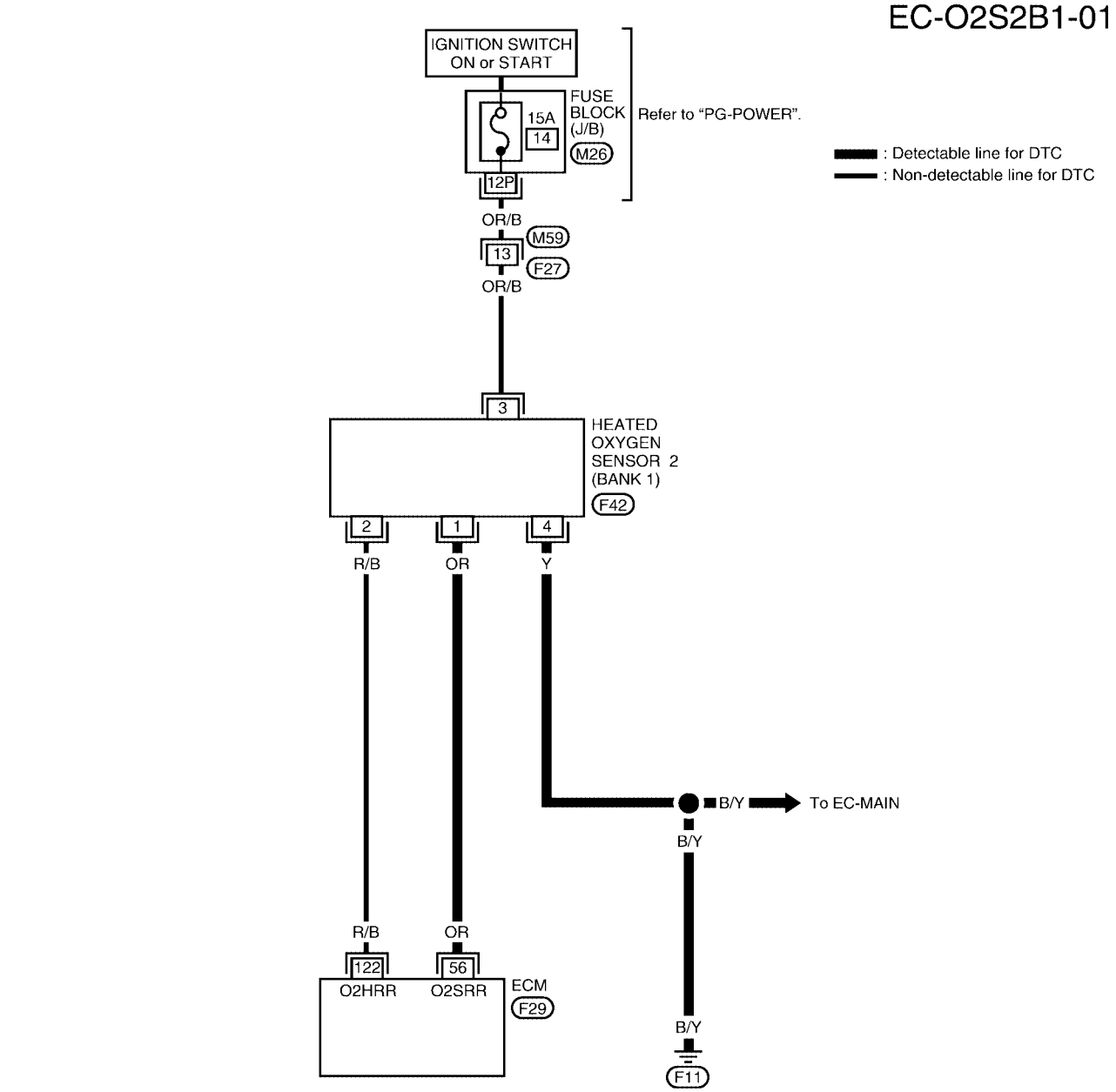
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 56 [HO2S2(B1) signal] or 57 [HO2S2(B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   A changed of voltage should be more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   A changed of voltage should be more than 0.06V for 1 second during this procedure.
8. If NG, go to EC-823, "Diagnostic Procedure" .

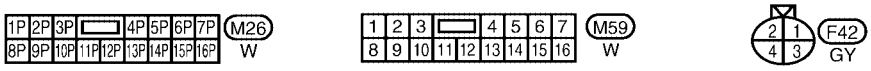


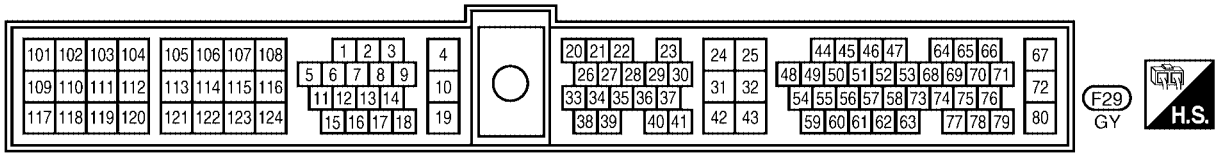
Wiring Diagram

UBS00DIN

BANK 1







BBWA1079E

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

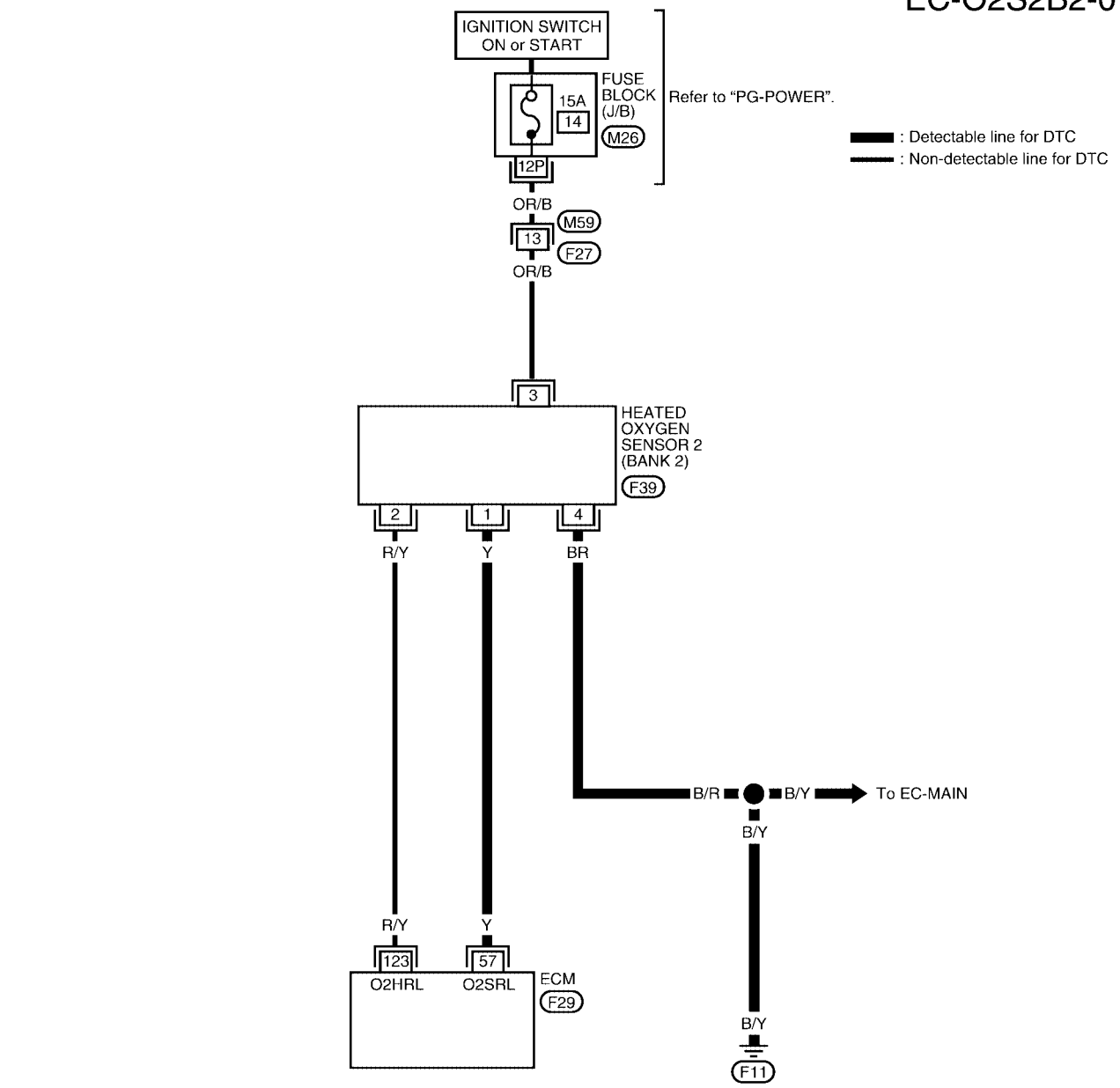
CAUTION:

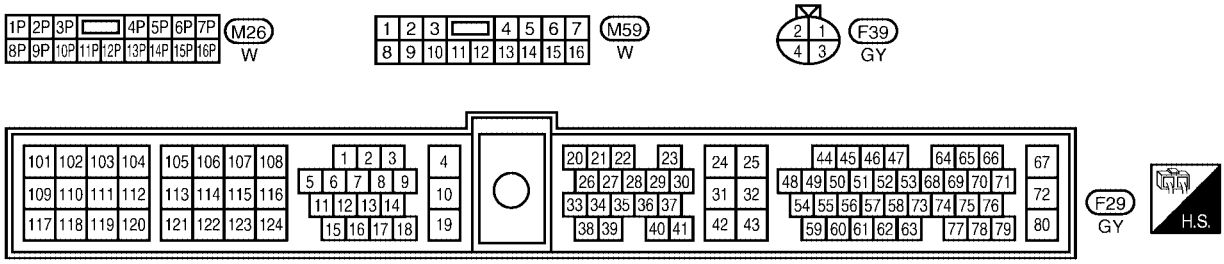
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

BANK 2

EC-O2S2B2-01





BBWA1080E

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

CAUTION:

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

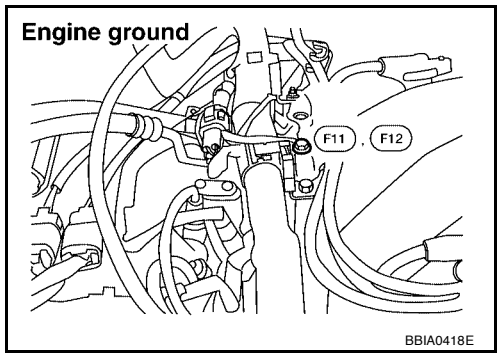
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	Y	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

Diagnostic Procedure

UBS00DIO

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .



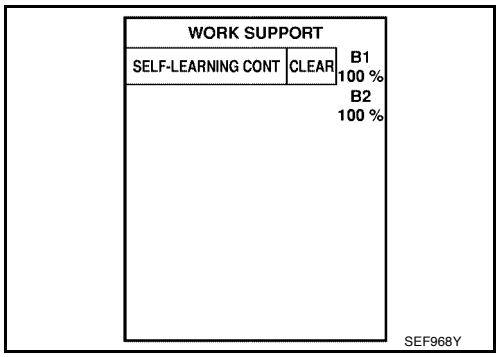
OK or NG

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

2. CLEAR THE SELF-LEARNING DATA

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0174 or P0172, 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 DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-638, "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, P0174 or P0172, P0175 detected?
   Is it difficult to start engine?

Yes or No

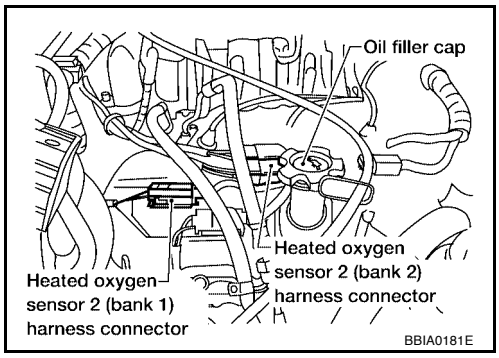
Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-828 or EC-836 .
No >> GO TO 3.

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 ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. 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 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	
P0139	56	1	Bank 1
P0159	57	1	Bank 2

Continuity should exist.

3. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	56	1	Bank 1
P0159	57	1	Bank 2

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

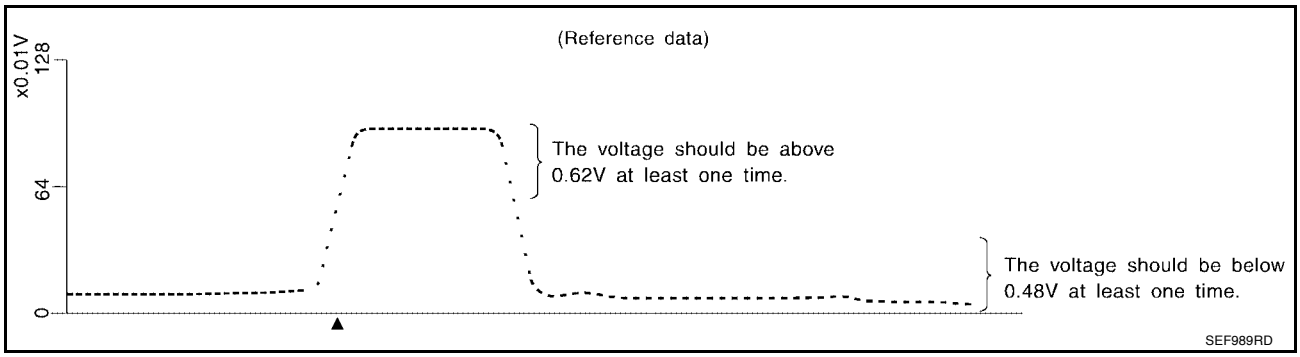
With CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperate.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

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

SEF662Y

7. Check “HO2S2 (B1)/(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 oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

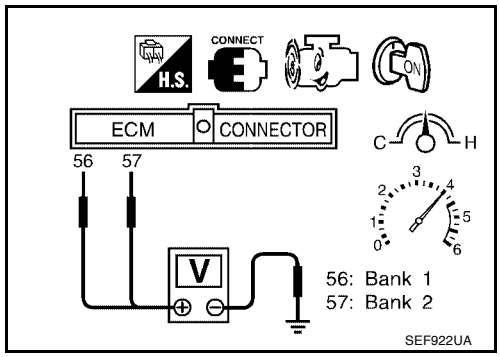
OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK HEATED OXYGEN SENSOR 2

Without CONSULT-II

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Stop vehicle with engine running.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.62V at least once during this procedure.
   If the voltage is above 0.62V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.48V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

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

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00DIP

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

UBS00DIQ

With the Air-Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171 (Bank 1) P0174 (Bank 2)	Fuel injection system too lean	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	● Intake air leaks ● Heated oxygen sensor 1 ● Fuel injector ● Exhaust gas leaks ● Incorrect fuel pressure ● Lack of fuel ● Mass air flow sensor ● Incorrect PCV hose connection

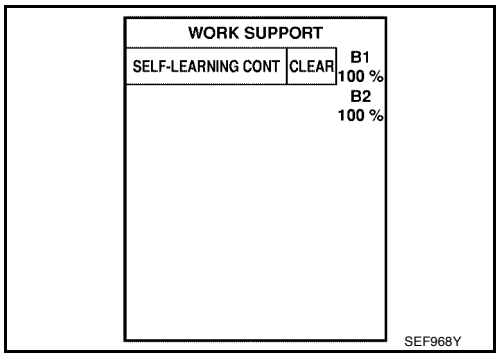
DTC Confirmation Procedure

UBS00DIR

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 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 EC-832, "Diagnostic Procedure" .
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 EC-832, "Diagnostic Procedure" . If engine does not start, check exhaust and intake air leak visually.



WITH GST

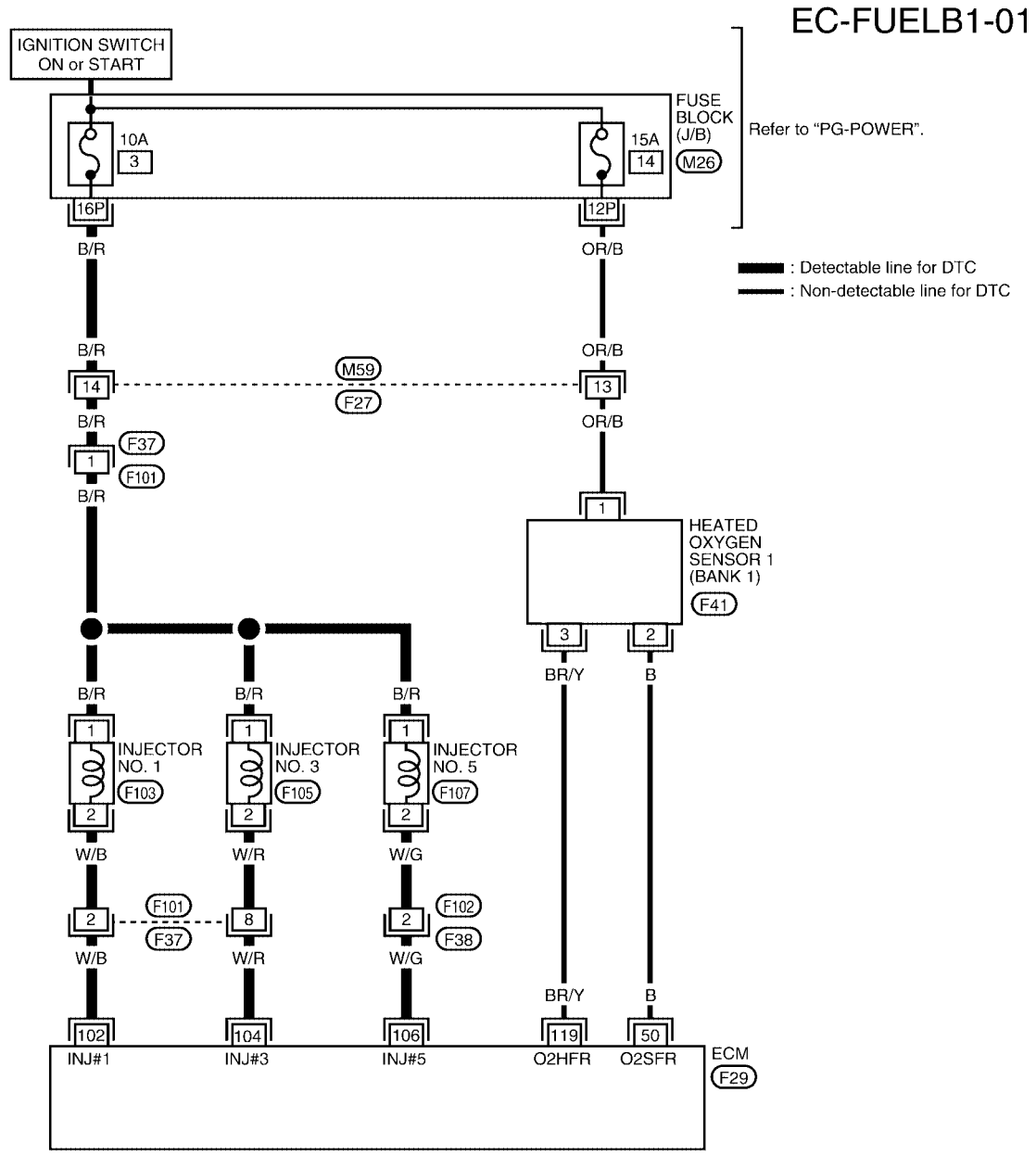
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select MODE 3 with GST. Make sure DTC P0102 is detected.
6. Select MODE 4 with GST and erase the DTC P0102.
7. Start engine again and let it idle for at least 10 minutes.

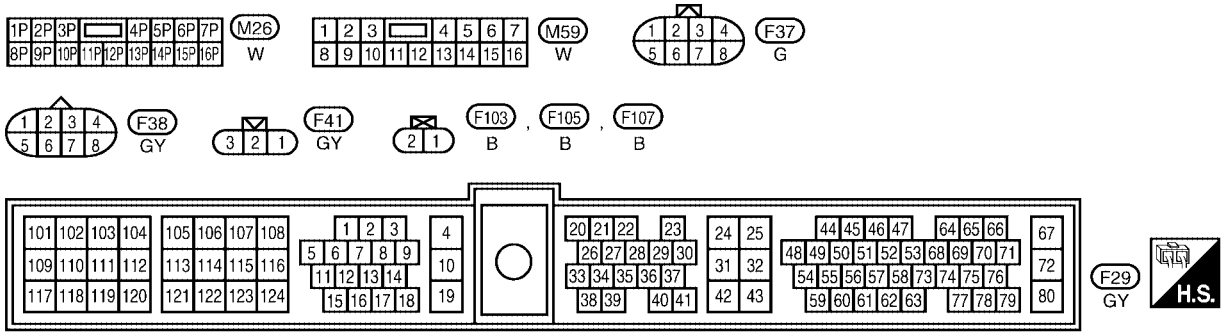
8. Select MODE 7 with GST. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to EC-832, "Diagnostic Procedure" .
9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal. If engine starts, go to EC-832, "Diagnostic Procedure" . If engine does not start, check exhaust and intake air leak visually.

Wiring Diagram

UBS00DIS

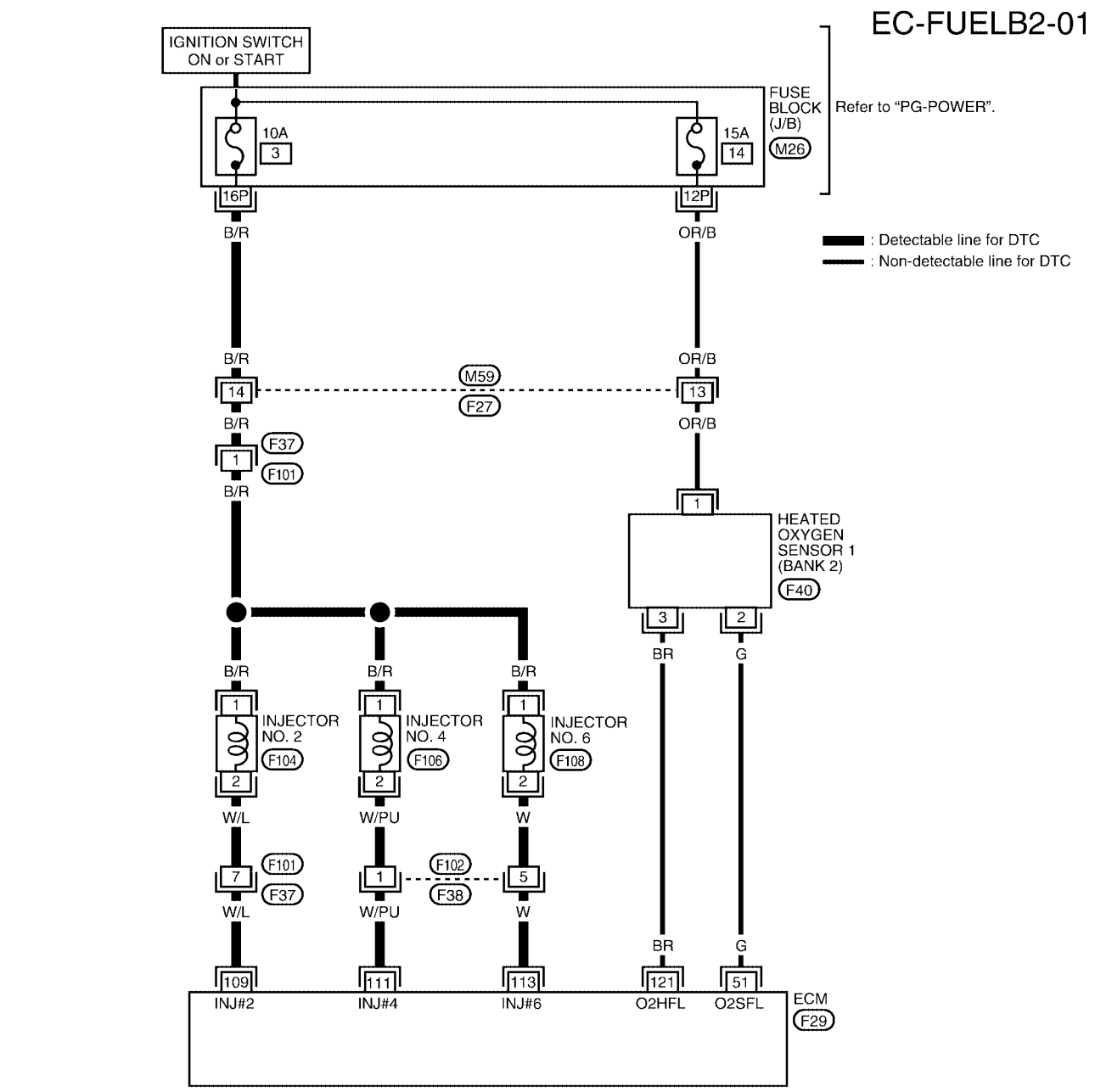
BANK 1

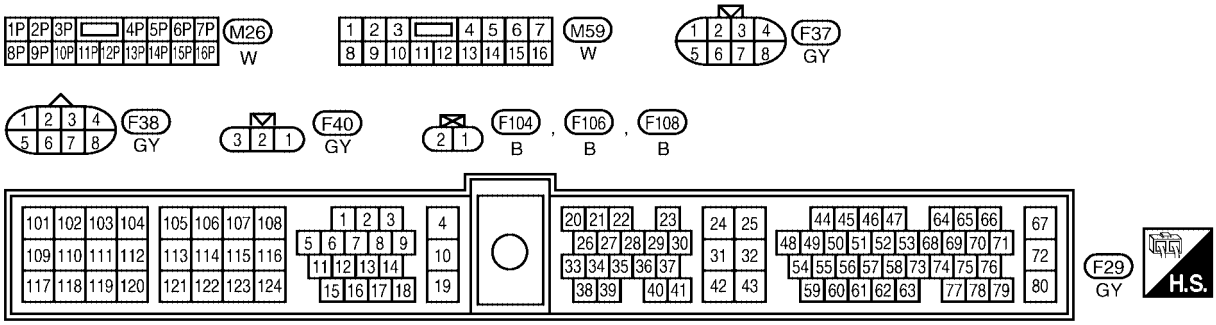




BBWA1082E

BANK 2





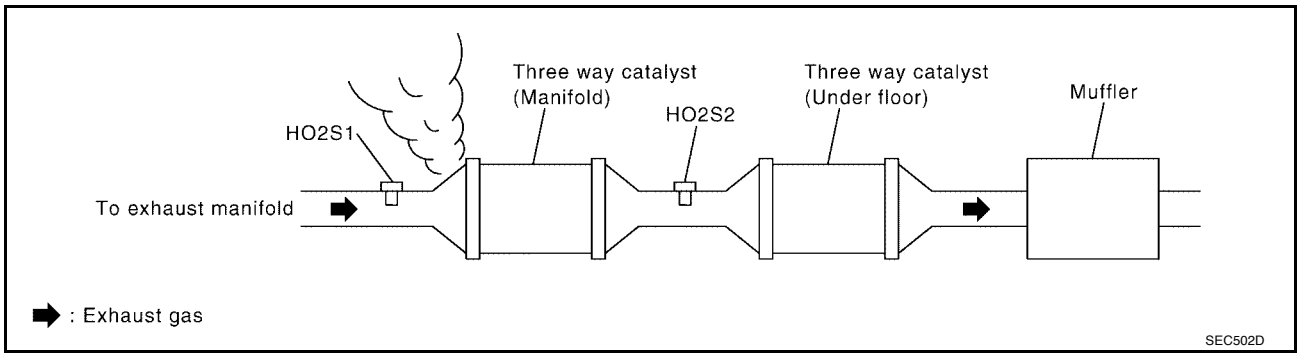
BBWA1083E

Diagnostic Procedure

UBS00DIT

1. CHECK EXHAUST GAS LEAK

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



OK or NG

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

2. CHECK FOR INTAKE AIR LEAK

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

OK or NG

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

3. CHECK FOR PCV HOSE

Check PCV hose for loose connection or disconnection.

OK or NG

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

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

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S1 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0171	50	2	Bank 1
P0174	51	2	Bank 2

Continuity should exist.

5. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0171	50	2	Bank 1
P0174	51	2	Bank 2

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-622, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-623, "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 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-1158 .)
- Fuel pressure regulator (Refer to EC-623 .)
- Fuel lines (Refer to MA-28, "Checking Fuel Lines" .)
- Fuel filter for clogging

>> Repair or replace.

7. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all parts removed.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

3.3 - 4.8 g·m/sec : at idling
12.0 - 14.9 g·m/sec : at 2,500 rpm

With GST

1. Install all parts removed.
2. Check mass air flow sensor signal in MODE 1 with GST.

3.3 - 4.8 g·m/sec : at idling
12.0 - 14.9 g·m/sec : at 2,500 rpm

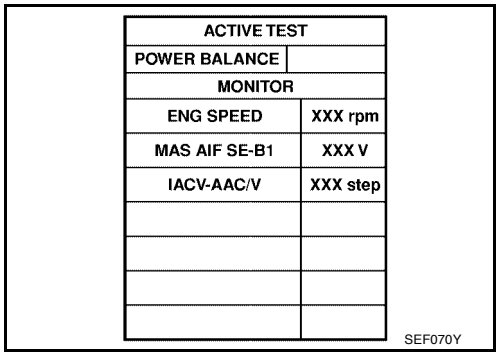
OK or NG

OK >> GO TO 8.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-727 .

8. CHECK FUNCTION OF INJECTORS

With CONSULT-II

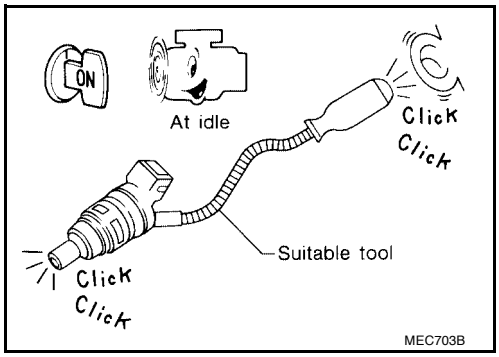
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.

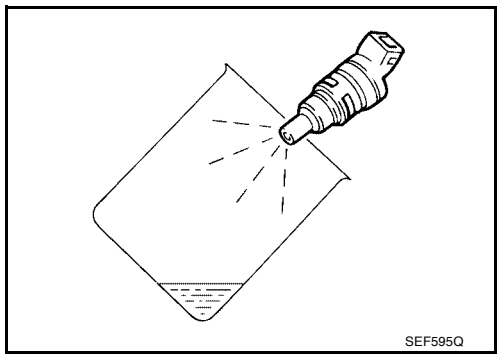


OK or NG

OK >> GO TO 9.
NG >> Perform trouble diagnosis for EC-1148, "INJECTOR CIRCUIT" .

9. 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 all injector harness connectors.
4. Remove injector gallery assembly. Refer to EM-80, "OUTER COMPONENT PARTS" .
   Keep fuel hose and all injectors connected to injector gallery.
5. For DTC P0171, reconnect injector harness connectors on bank 1.
   For DTC P0174, reconnect injector harness connectors on bank 2.
6. Disconnect all ignition coil harness connectors.
7. Prepare pans or saucers under each injector.
8. Crank engine for about 3 seconds.
   For DTC P0171, make sure that fuel sprays out for injectors on bank 1.
   For DTC P0174, make sure that fuel sprays out for injectors on bank 2.



Fuel should be sprayed evenly for each injector.

OK or NG

OK >> GO TO 10.
NG >> Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

UBS00DIU

With the Air-Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172 (Bank 1) P0175 (Bank 2)	Fuel injection system too rich	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	● Heated oxygen sensor 1 ● Fuel injector ● Exhaust gas leaks ● Incorrect fuel pressure ● Mass air flow sensor

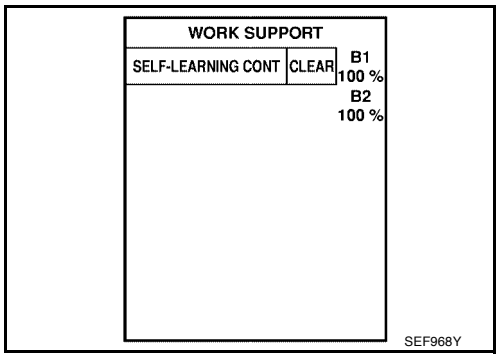
DTC Confirmation Procedure

UBS00DIV

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 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 EC-840, "Diagnostic Procedure" .
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 EC-840, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.



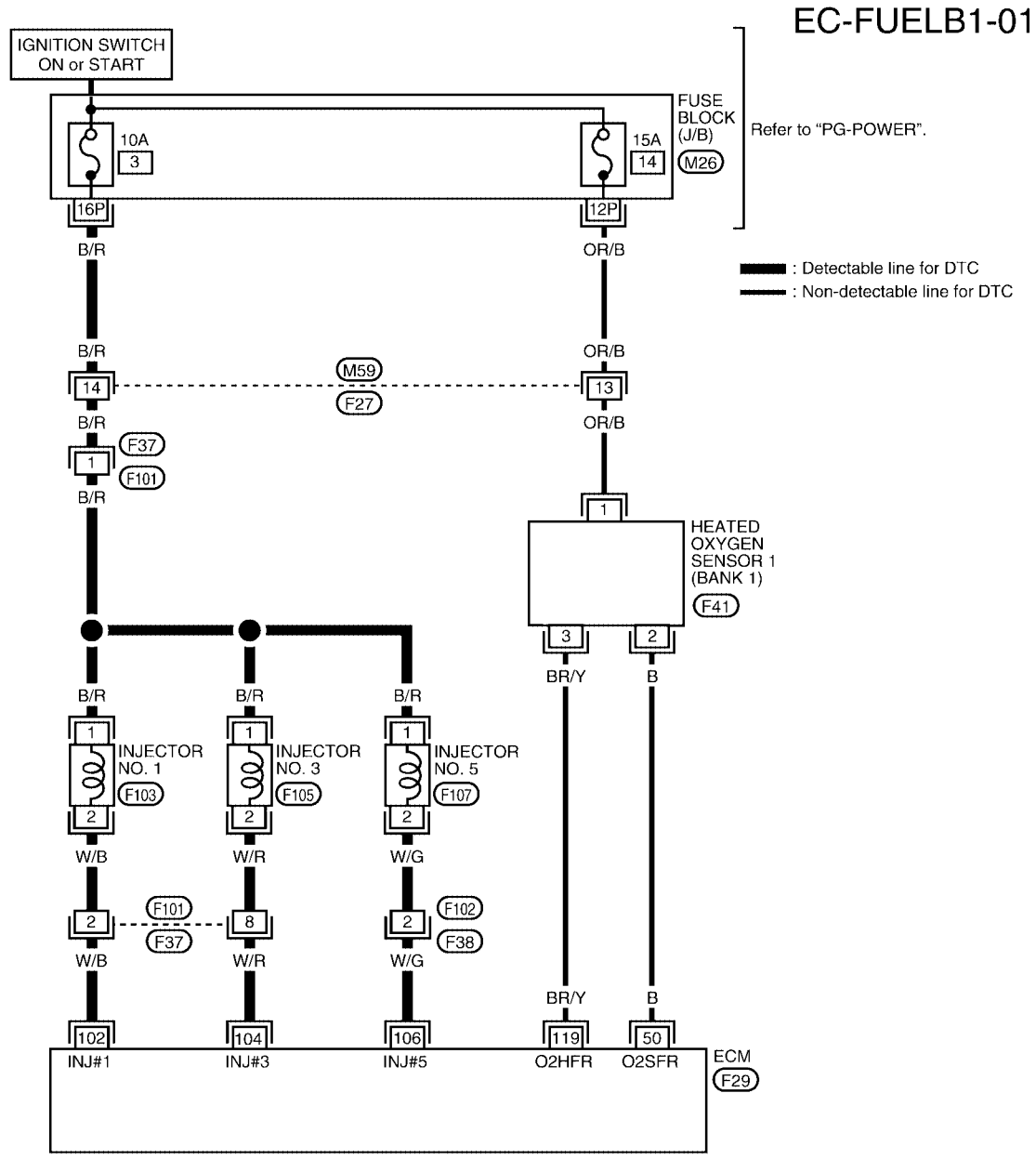
WITH GST

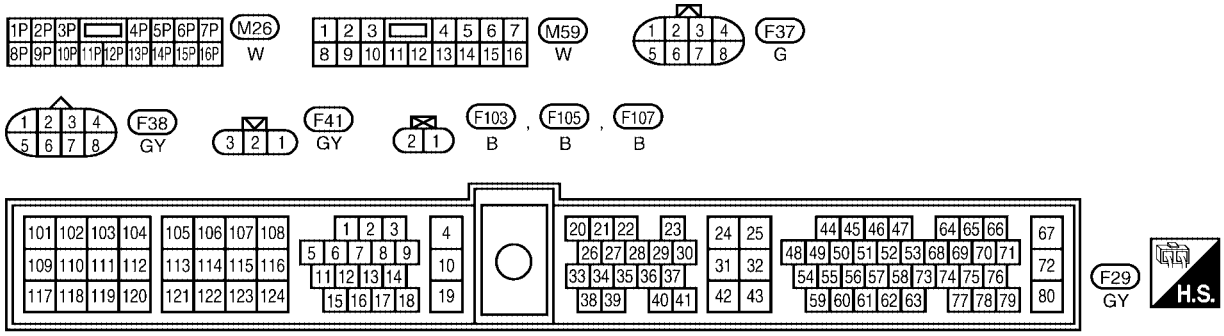
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select MODE 3 with GST. Make sure DTC P0102 is detected.
6. Select MODE 4 with GST and erase the DTC P0102.
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 EC-840, "Diagnostic Procedure" .
9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.

10. Crank engine while depressing accelerator pedal.
If engine starts, go to EC-840, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.

Wiring Diagram
BANK 1

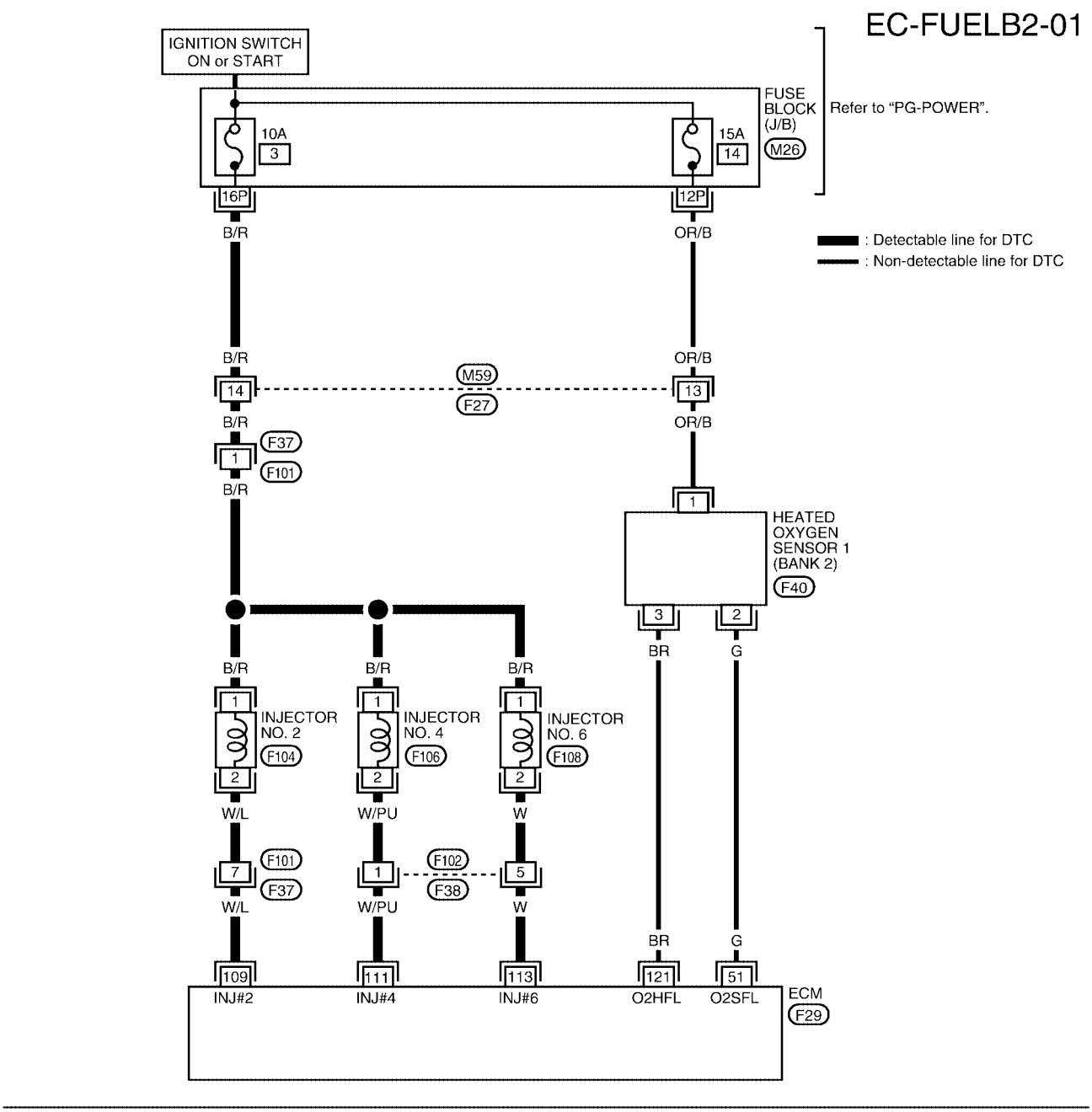
UBS00DIW

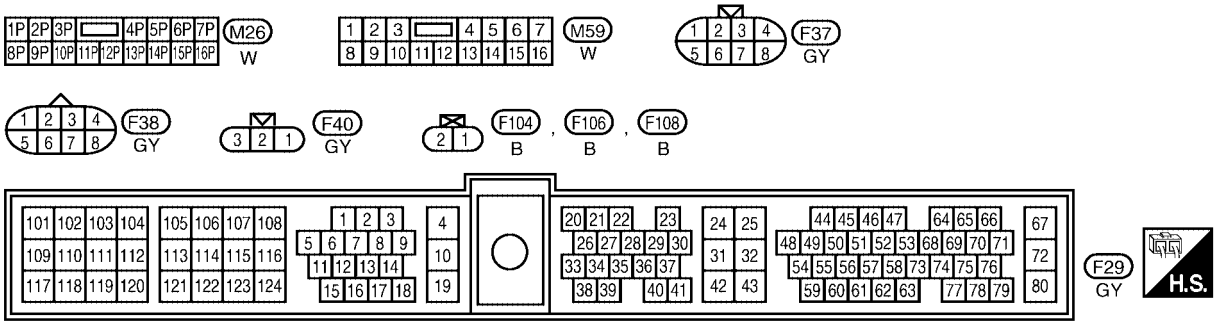




BBWA1082E

BANK 2





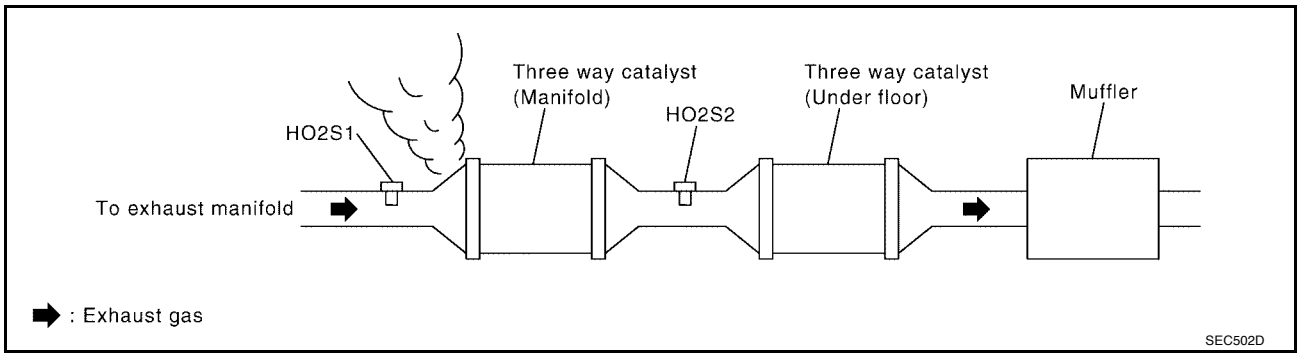
BBWA1083E

Diagnostic Procedure

UBS00DIX

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the 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 heated oxygen sensor 1 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	50	2	Bank 1
P0175	51	2	Bank 2

Continuity should exist.

5. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0172	50	2	Bank 1
P0175	51	2	Bank 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-622, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-623, "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-1158 .)
- Fuel pressure regulator (Refer to EC-623 .)

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all parts removed.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

3.3 - 4.8 g·m/sec	**: at idling**
12.0 - 14.9 g·m/sec	**: at 2,500 rpm**

With GST

1. Install all parts removed.
2. Check mass air flow sensor signal in MODE 1 with GST.

3.3 - 4.8 g·m/sec	**: at idling**
12.0 - 14.9 g·m/sec	**: at 2,500 rpm**

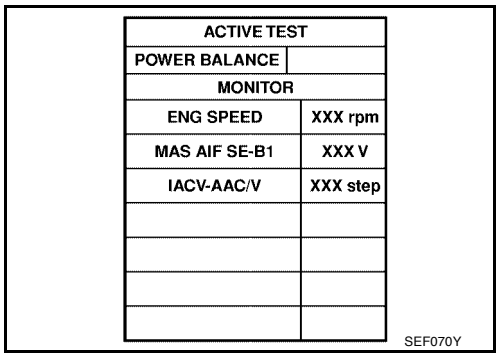
OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-727 .

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.



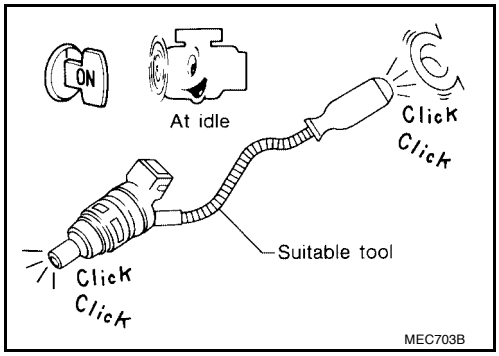
Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.

OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for EC-1148, "INJECTOR CIRCUIT" .



8. CHECK INJECTOR

1. Remove injector assembly. Refer to EM-80, "OUTER COMPONENT PARTS" .
   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 all injector harness connectors
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 EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

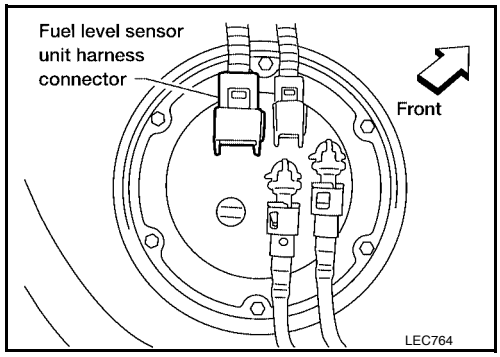
DTC P0181 FTT SENSOR

PFP:22630

Component Description

UBS00DIY

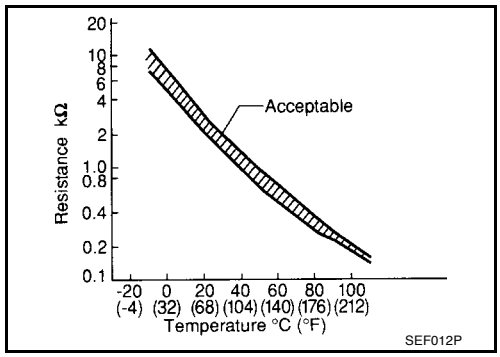
The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Fluid 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 60 (Fuel tank temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

On Board Diagnosis Logic

UBS00DIZ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0181	Fuel tank temperature sensor circuit range/ performance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	• Harness or connectors (The sensor circuit is open or shorted) • Fuel tank temperature sensor

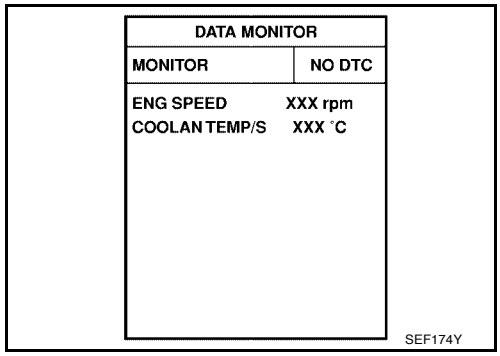
DTC Confirmation Procedure

UBS00DJ0

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 the result is NG, go to EC-846, "Diagnostic Procedure" .
   If the result is OK, 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 EC-846, "Diagnostic Procedure" .



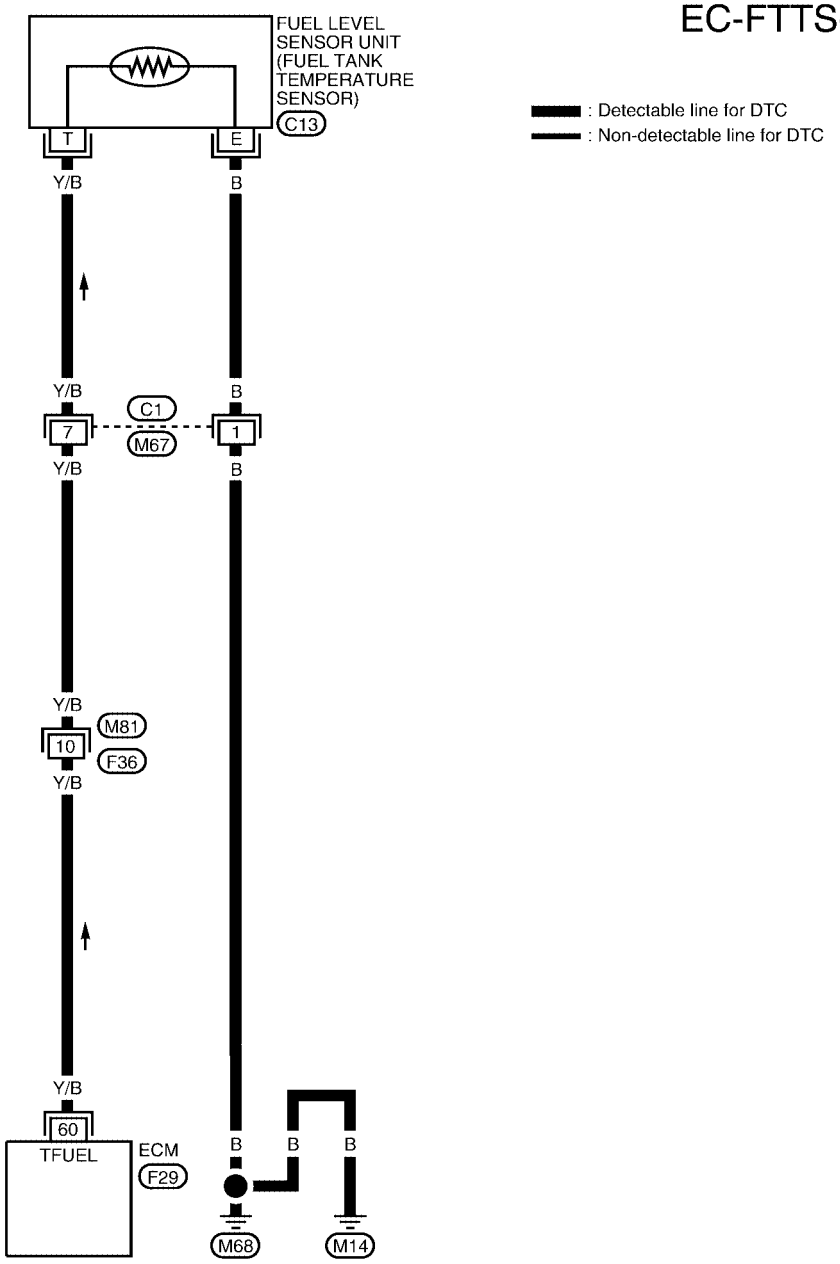
WITH GST

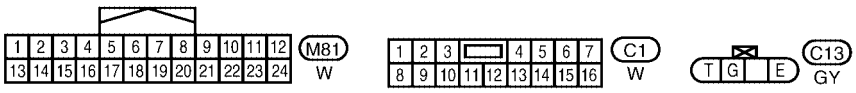
Follow the procedure “WITH CONSULT-II” above.

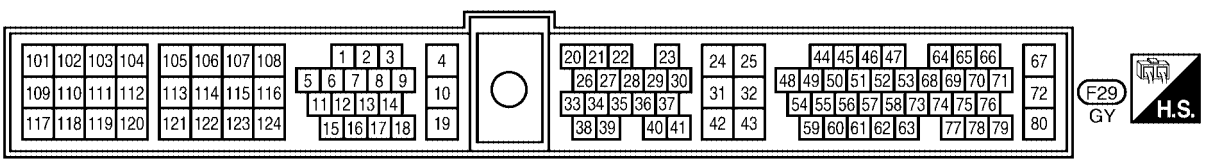
Wiring Diagram

UBS00DJ1

EC-FTTS-01







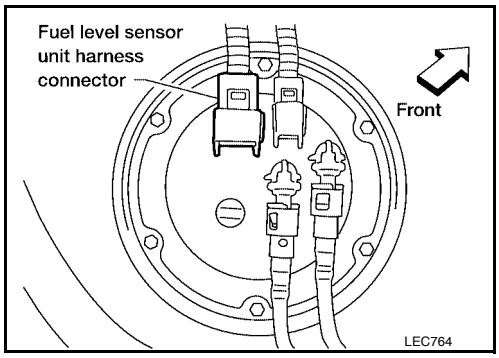
BBWA1084E

Diagnostic Procedure

UBS00DJ2

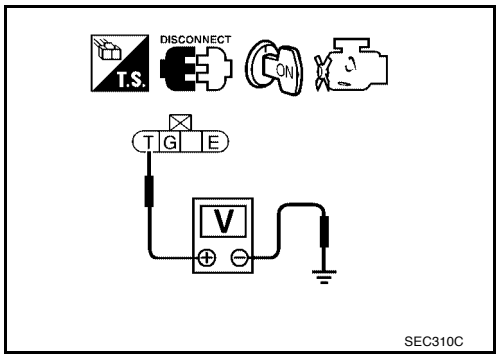
1. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit harness connector.
3. Turn ignition switch ON.



4. Check voltage between fuel level sensor unit terminal T 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 C1, M67
- Harness connectors M81, F36
- Harness for open or short between ECM and fuel tank temperature sensor

>> 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 terminal E and 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

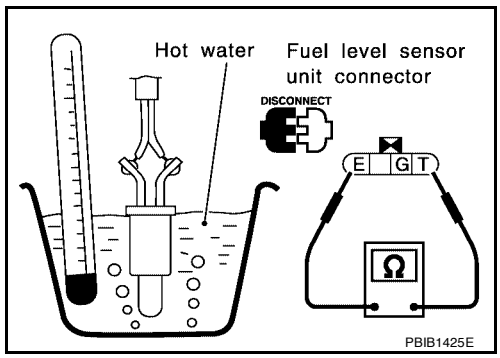
Check the following.

- Harness for open between fuel tank temperature sensor and ground
- Harness connectors C1, M67

>> Repair open circuit or short to power in harness or connectors.

5. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance fuel level sensor unit terminals T and E 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

OK or NG

OK >> GO TO 6.
NG >> Replace fuel tank temperature sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00DJ3

FUEL TANK TEMPERATURE SENSOR

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

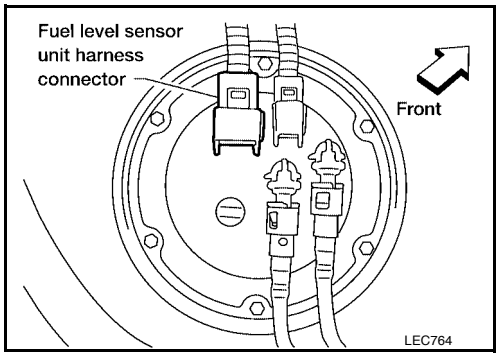
DTC P0182, P0183 FTT SENSOR

PFP:22630

Component Description

UBS00DJ4

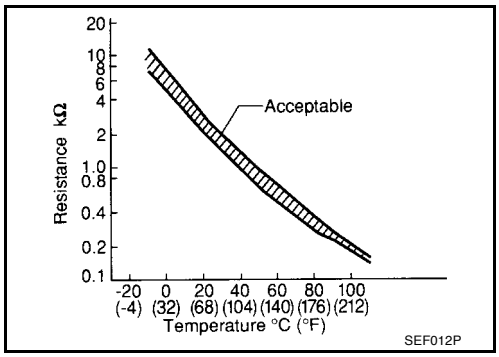
The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Fluid 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 60 (Fuel tank temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

On Board Diagnosis Logic

UBS00DJ5

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Fuel tank temperature sensor
P0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

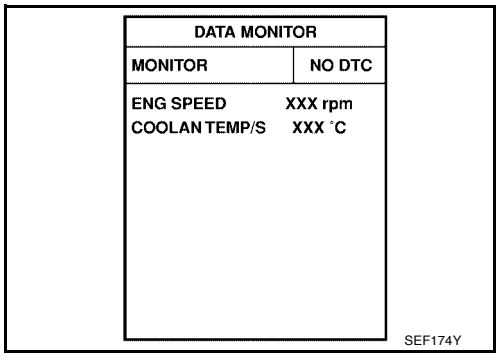
DTC Confirmation Procedure

UBS00DJ6

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-850, "Diagnostic Procedure"
   .



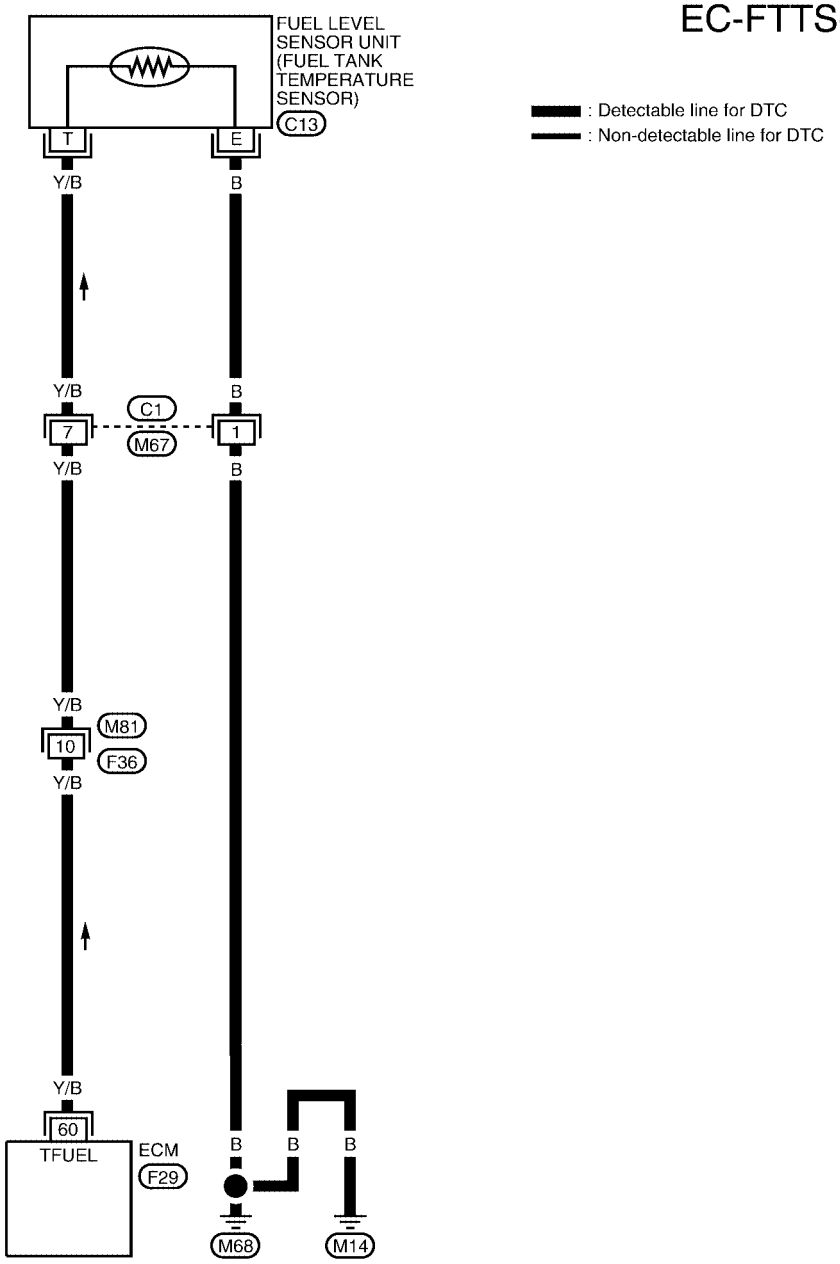
WITH GST

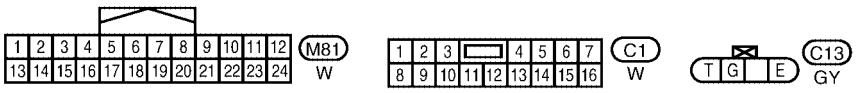
Follow the procedure “WITH CONSULT-II” above.

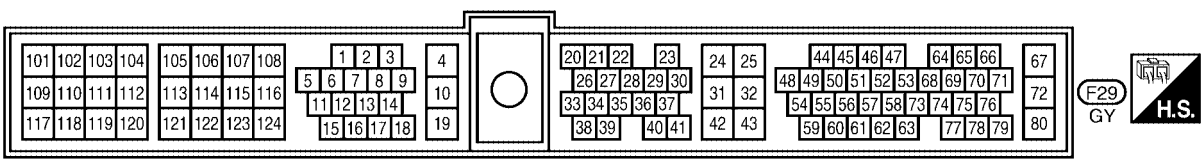
Wiring Diagram

UBS00DJ7

EC-FTTS-01







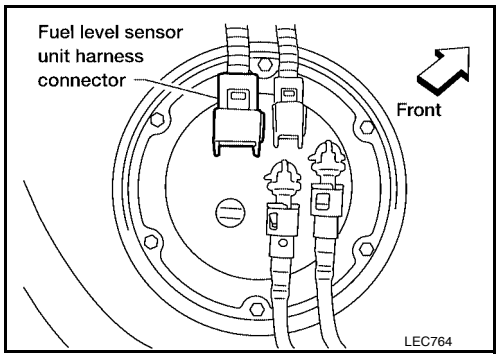
BBWA1084E

Diagnostic Procedure

UBS00DJ8

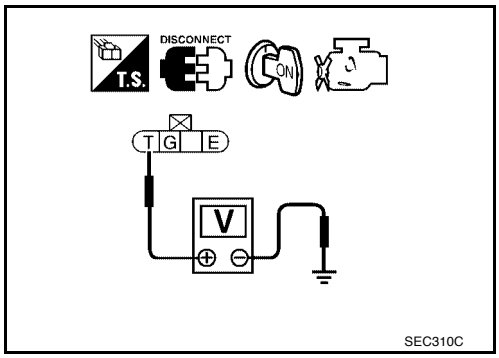
1. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit harness connector.
3. Turn ignition switch ON.



4. Check voltage between fuel level sensor unit terminal T 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 C1, M67
- Harness connectors M81, F36
- Harness for open or short between ECM and fuel tank temperature sensor

>> 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 terminal E and 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.

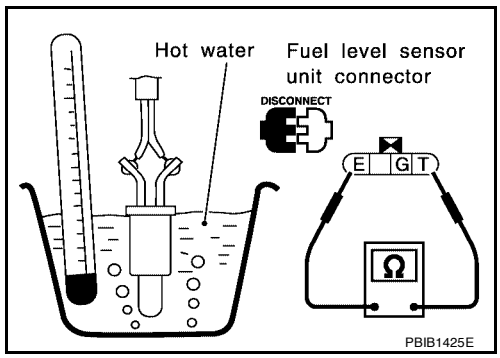
- Harness for open between fuel tank temperature sensor and ground
- Harness connectors C1, M67

>> Repair open circuit or short to power in harness or connectors.

5. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance fuel level sensor unit terminals T and E 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



OK or NG

OK >> GO TO 6.
NG >> Replace fuel tank temperature sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00DJ9

FUEL TANK TEMPERATURE SENSOR

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

PFP:00019

On Board Diagnosis Logic

UBS00DJA

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy.

This self-diagnosis has one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0217	Engine coolant over temperature condition	Engine coolant temperature is excessively high under normal engine speed.	● Cooling fan (crankshaft driven) ● Thermostat ● Improper ignition timing ● Engine coolant temperature sensor ● Blocked radiator ● Blocked front end (Improper fitting of nose mask) ● Crushed vehicle frontal area (Vehicle frontal is collided but not repaired) ● Blocked air passage by improper installation of front fog lamp or fog lamps ● Improper mixture ratio of coolant ● Damaged bumper For more information, refer to EC-856, "Main 12 Causes of Overheating" .

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to MA-26, "Changing Engine Coolant" . Also, replace the engine oil. Refer to MA-30, "Changing Engine Oil" .

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "ANTI-FREEZE COOLANT MIXTURE RATIO" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

UBS00DJB

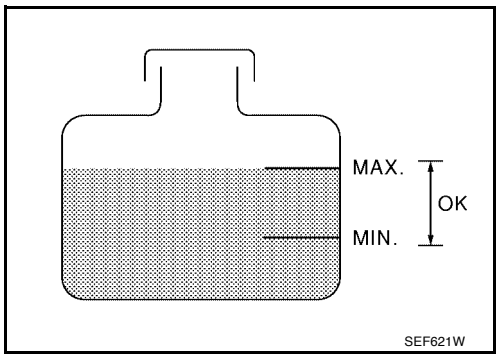
Use this procedure to check the overall function of the engine coolant over temperature enrichment protection check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high-pressure fluid escaping from the radiator.
Wrap a thick cloth around the 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.

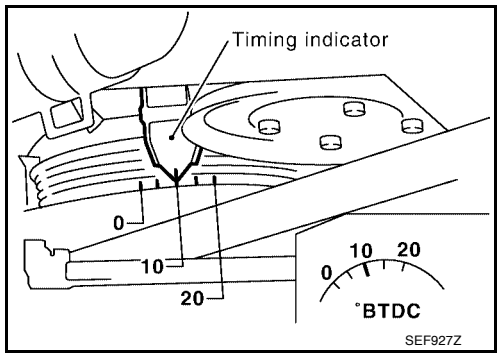
WITH CONSULT-II

1. Check the coolant level and mixture ratio (Using coolant tester) in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level and mixture ratio.
   - If the coolant level in the reservoir and/or the radiator is below the proper range, skip following steps and go to EC-854, "Diagnostic Procedure" .
   - If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to MA-26, "Changing Engine Coolant" .
   - Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "ANTI-FREEZE COOLANT MIXTURE RATIO" .
   - After refilling coolant, run engine to ensure that no water-flow noise is emitted.



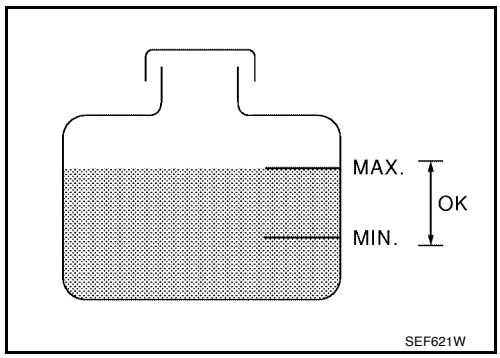
- After checking or replacing coolant, go to step 3) below.

2. Confirm whether customer filled the engine coolant or not. If customer filled the engine coolant, skip following steps and go to EC-854, "Diagnostic Procedure" .
3. Start engine and make sure that cooling fan (crankshaft driven) operates. If NG, go to EC-854, "Diagnostic Procedure" . After repair, go to next step.
4. Check for blocked coolant passage.
   Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.
   If NG, go to step 4 of EC-854, "Diagnostic Procedure" . After repair, go to next step.
   Be extremely careful not to touch any moving or adjacent parts.
5. Check radiator for blocked air passage
   Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps ...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.
   Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.
   If NG, take appropriate action and then go to next step.
6. Check ECT sensor for proper operation. Refer to step 5 of EC-854, "Diagnostic Procedure" . If NG, replace ECT sensor and go to next step.
7. Check ignition timing. Refer to EC-652, "Basic Inspection" .
   Make sure that ignition timing is 10 ± 5° at 700 ± 50 rpm.
   If NG, adjust ignition timing and then recheck.



WITH GST

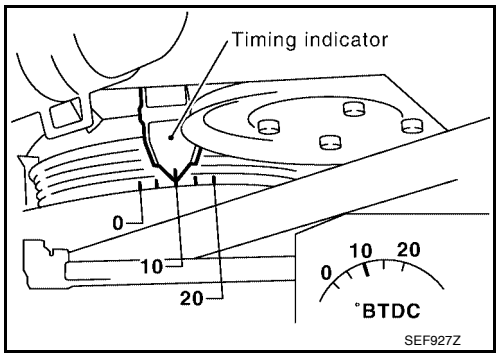
1. Check the coolant level and mixture ratio (Using coolant tester) in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level and mixture ratio.
   - If the coolant level in the reservoir and/or radiator is below the proper range, skip the following steps and go to EC-854, "Diagnostic Procedure" .
   - If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to MA-26, "Changing Engine Coolant" .



   - Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "ANTI-FREEZE COOLANT MIXTURE RATIO" .
   - After refilling coolant, run engine to ensure that no water-flow noise is emitted.
   - After checking or replacing coolant, go to step 3) below.
2. Confirm whether customer filled the engine coolant or not. If customer filled engine coolant, skip following steps and go to EC-854, "Diagnostic Procedure" .
3. Start engine and make sure that cooling fan (crankshaft driven) operates.
   Be careful not to overheat engine.
   If NG, go to step 1 of EC-854, "Diagnostic Procedure" . After repair, go to next step.
4. Check for blocked coolant passage.
   Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.
   If NG, go to step 4 of EC-854, "Diagnostic Procedure" . After repair, go to next step.

Be extremely careful not to touch any moving or adjacent parts.

5. Check radiator for blocked air passage
   Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps ...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.
   Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.
   If NG, take appropriate action and then go to next step.
6. Check ECT sensor for proper operation. Refer to step 5 of EC-854, "Diagnostic Procedure" . If NG, replace ECT sensor and go to next step.
7. Check ignition timing. Refer to EC-652, "Basic Inspection" .
   Make sure that ignition timing is 10 ± 5° at 700 ± 50 rpm.
   If NG, adjust ignition timing and then recheck.



Diagnostic Procedure

UBS00DJC

1. CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION

Start engine and make sure that cooling fan (crankshaft driven) operates.

OK or NG

OK >> GO TO 2.
NG >> Check cooling fan (crankshaft driven). Refer to CO-32, "COOLING FAN (CRANKSHAFT DRIVEN)" .

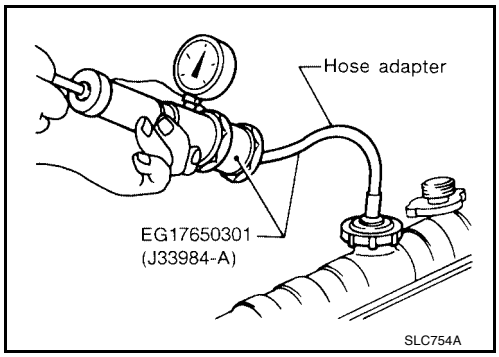
2. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

CAUTION:
Higher than the specified pressure may cause radiator damage.

Testing pressure: 157 kPa (1.6 kg/cm^2 , 23 psi)

Pressure should not drop.



OK or NG

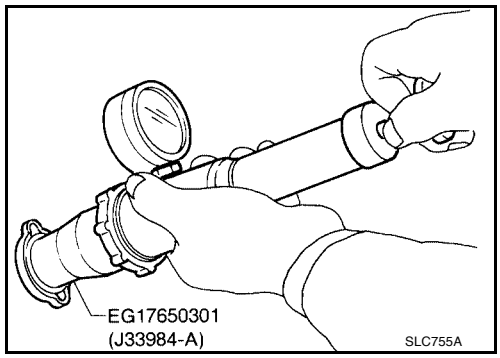
OK >> GO TO 3.
NG >> Check the following for leak:

- Hose
- Radiator
- Water pump
  Refer to CO-25, "WATER PUMP" .

3. 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)



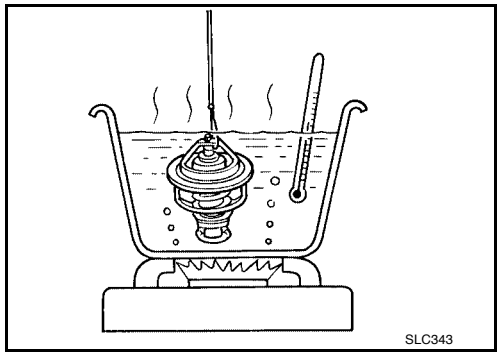
OK or NG

OK >> GO TO 4.
NG >> Replace radiator cap.

4. CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
It should seat tightly.
2. Check valve opening temperature and valve lift.

Valve opening temperature: 82°C (180°F) [standard]
Valve lift: More than 10 mm/95°C (0.39 in/203°F)



3. Check if valve is closed at 5°C (41°F) below valve opening temperature.

For details, refer to CO-28, "THERMOSTAT" .

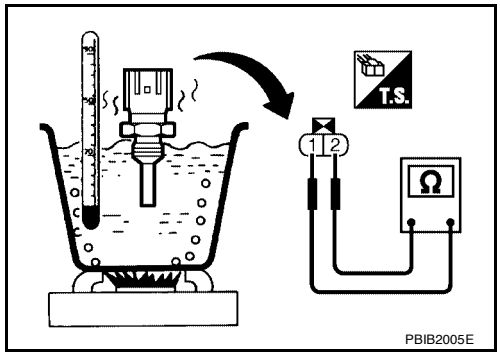
OK or NG

OK >> GO TO 5.
NG >> Replace thermostat.

5. CHECK ENGINE COOLANT TEMPERATURE SENSOR

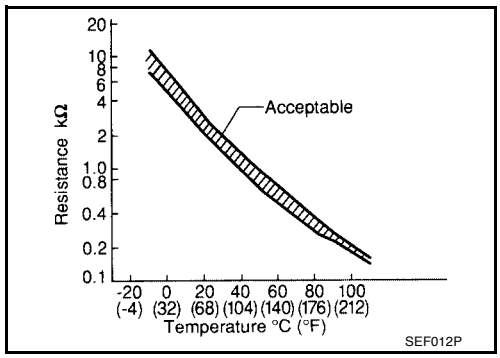
Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.
<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



OK or NG

OK >> GO TO 6.
NG >> Replace engine coolant temperature sensor.



6. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to EC-856, "Main 12 Causes of Overheating" .

>> INSPECTION END

Main 12 Causes of Overheating

UBS00DJD

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-14 .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-26 .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See CO-23 .
ON*1	5	● Coolant leaks	● Visual	No leaks	See CO-23 .
ON*1	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-28 .
ON*1	7	● Cooling fan (Crankshaft driven)	● Visual	Operating	SeeCO-32 .
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—
ON*2	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 MA-26 .
OFF*3	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See CO-22 .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-102 .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-131 .

*1: Engine running at 3,000 rpm for 10 minutes.
*2: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*3: After 60 minutes of cool down time.
For more information, refer to CO-21, "OVERHEATING CAUSE ANALYSIS" .

DTC P0300 - P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

PFP:00000

On Board Diagnosis Logic

UBS00DJE

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (OBD)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	● Improper spark plug ● Insufficient compression ● Incorrect fuel pressure ● The injector circuit is open or shorted ● Fuel injector ● Intake air leak ● The ignition secondary signal circuit is open or shorted ● Lack of fuel ● Signal plate or flywheel ● Heated oxygen sensor 1 ● Incorrect PCV hose connection
P0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	
P0305	No. 5 cylinder misfire detected	No. 5 cylinder misfires.	
P0306	No. 6 cylinder misfire detected	No. 6 cylinder misfires.	

DTC Confirmation Procedure

UBS00DJF

CAUTION:

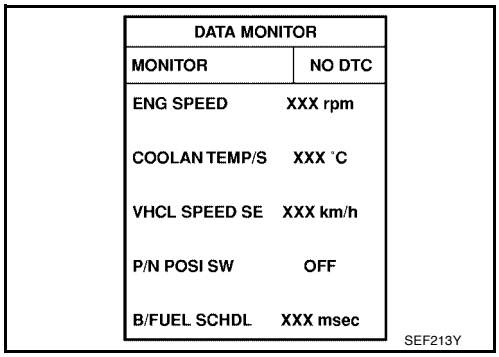
Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 seconds.
4. Restart engine and let it idle for about 15 minutes.
5. If 1st trip DTC is detected, go to EC-858, "Diagnostic Procedure" .



NOTE:
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
   Hold the accelerator pedal as steady as possible.

   The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00DJG

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 AIF SE-B1	XXX V
IACV-AAC/V	XXX step

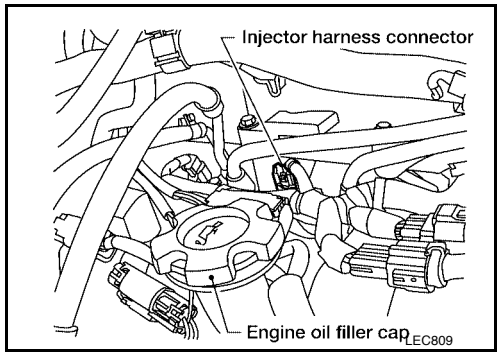
SEF070Y

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.

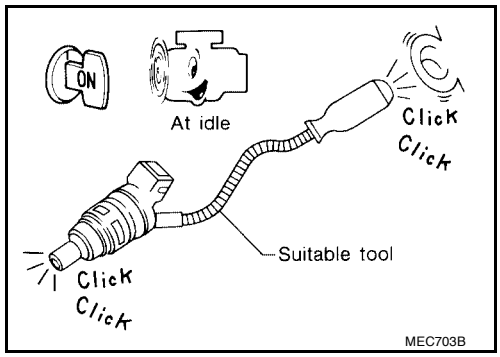


4. CHECK INJECTOR

Does each injector make an operating sound at idle?

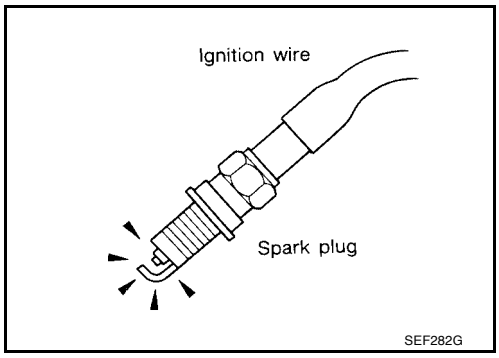
Yes or No

Yes >> GO TO 5.
No >> Check injector(s) and circuit(s). Refer to EC-1148, "INJECTOR CIRCUIT" .



5. CHECK IGNITION SPARK

1. Stop engine and turn ignition switch OFF.
2. Disconnect all injector harness connectors.
3. Disconnect ignition wire from spark plug.
4. Connect a known-good spark plug to the ignition wire.
5. Place end of spark plug against a suitable ground and crank engine.
6. Check for spark.

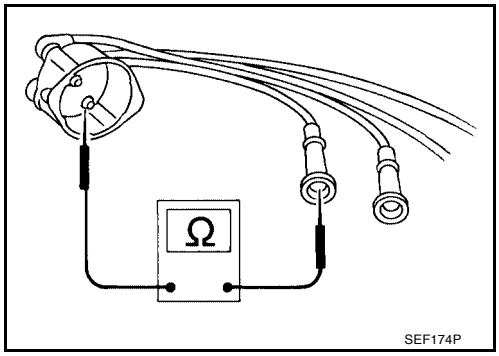


OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. CHECK IGNITION WIRES

1. Inspect wires for cracks, damage, burned terminals and for improper fit.
2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.
   Resistance:



Cylinder No.	Resistance kΩ [at 25°C (77°F)]
1	Approx. 6.5
2	Approx. 10.0
3	Approx. 8.5
4	Approx. 12.5
5	Approx. 8.5
6	Approx. 11.0

If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.

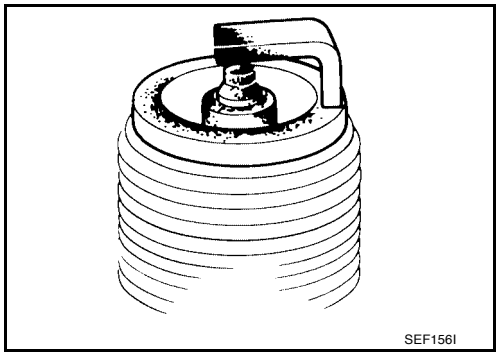
OK or NG

OK >> Check the following:
- Distributor rotor head for incorrect parts
- Ignition coil, power transistor and their circuits
  Refer to EC-1142, "IGNITION SIGNAL" .

NG >> Replace.

7. CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.



OK or NG

OK >> GO TO 8.
NG >> Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-32, "Changing Spark Plugs" .

8. CHECK COMPRESSION PRESSURE

Refer to EM-102, "Measurement of Compression" .

- Check compression pressure.

Standard	**: 1,196 kPa (12.2 kg/cm^2 , 173 psi)/300 rpm**
Minimum	**: 883 kPa (9.0 kg/cm^2 , 128 psi)/300 rpm**
Difference between each cylinder	**: 98 kPa (1.0 kg/cm^2 , 14 psi)/300 rpm**

OK or NG

OK >> GO TO 9.
NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

9. CHECK FUEL PRESSURE

1. Install any parts removed.
2. Release fuel pressure to zero.
   Refer to EC-622, "FUEL PRESSURE RELEASE" .
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-623, "FUEL PRESSURE CHECK" .

At idle: Approx. 235 kPa (2.4 kg/cm^2 , 34 psi)

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-1158 .)
- Fuel pressure regulator (Refer to EC-623 .)
- Fuel lines (Refer to MA-28 .)
- Fuel filter for clogging

>> Repair or replace.

11. CHECK IGNITION TIMING

Check the following items. Refer to EC-652, "Basic Inspection" .

Items	Specifications
Ignitions timing	M/T: 10 ± 5° BTDC (in Neutral position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

OK or NG

OK (With CONSULT-II)>>GO TO 12.
OK (Without CONSULT-II)>>GO TO 13.
NG >> Adjust ignition timing.

12. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and “HI SPEED” in “DATA MONITOR” mode with CONSULT-II, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. 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 (B2)	XXX V
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

PBIB2025E

5. Check the following.

- “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown left:
- “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					

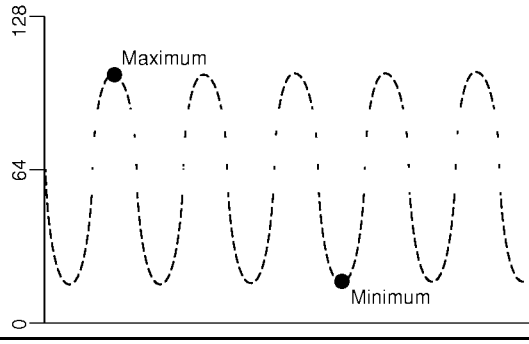
Bank 2						
cycle	1	2	3	4	5	
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R					

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



- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

SEF648Y

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

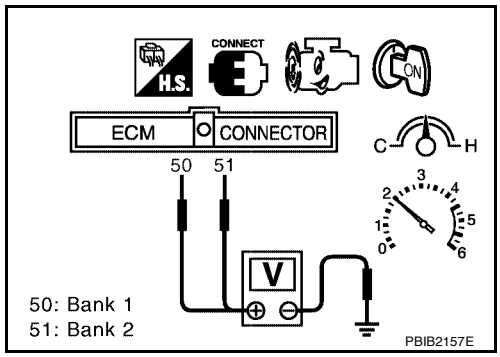
OK >> GO TO 14.
NG >> Replace malfunctioning heated oxygen sensor 1.

13. CHECK HEATED OXYGEN SENSOR 1 (BANK1)(BANK2)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and 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 1 time.
- The minimum voltage is below 0.3V at least 1 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 → 0 - 0.3V

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 14.
NG >> Replace malfunctioning heated oxygen sensor 1.

14. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

Check mass air flow sensor signal in “DATA MONITOR” mode with CONSULT-II.

3.3 - 4.8 g·m/sec : at idling
12.0 - 14.9 g·m/sec : at 2,500 rpm

With GST

Check mass air flow sensor signal in MODE 1 with GST.

3.3 - 4.8 g·m/sec : at idling
12.0 - 14.9 g·m/sec : at 2,500 rpm

OK or NG

OK >> GO TO 15.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-727 .

15. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-665, "Symptom Matrix Chart" .

OK or NG

OK >> GO TO 16.
NG >> Repair or replace.

16. 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-638, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 17.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

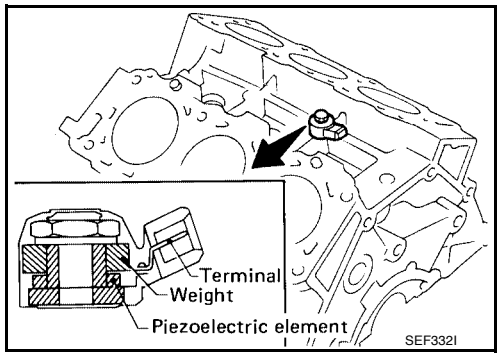
DTC P0327, P0328 KS

PFP:22060

Component Description

UBS00DJH

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.



On Board Diagnosis Logic

UBS00DJI

The MIL will not light up for these diagnoses.

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause
P0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Knock sensor
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

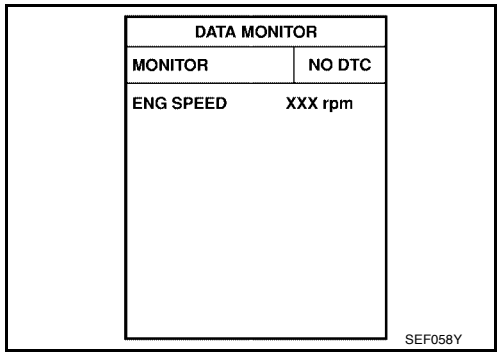
UBS00DJJ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-867, "Diagnostic Procedure" .



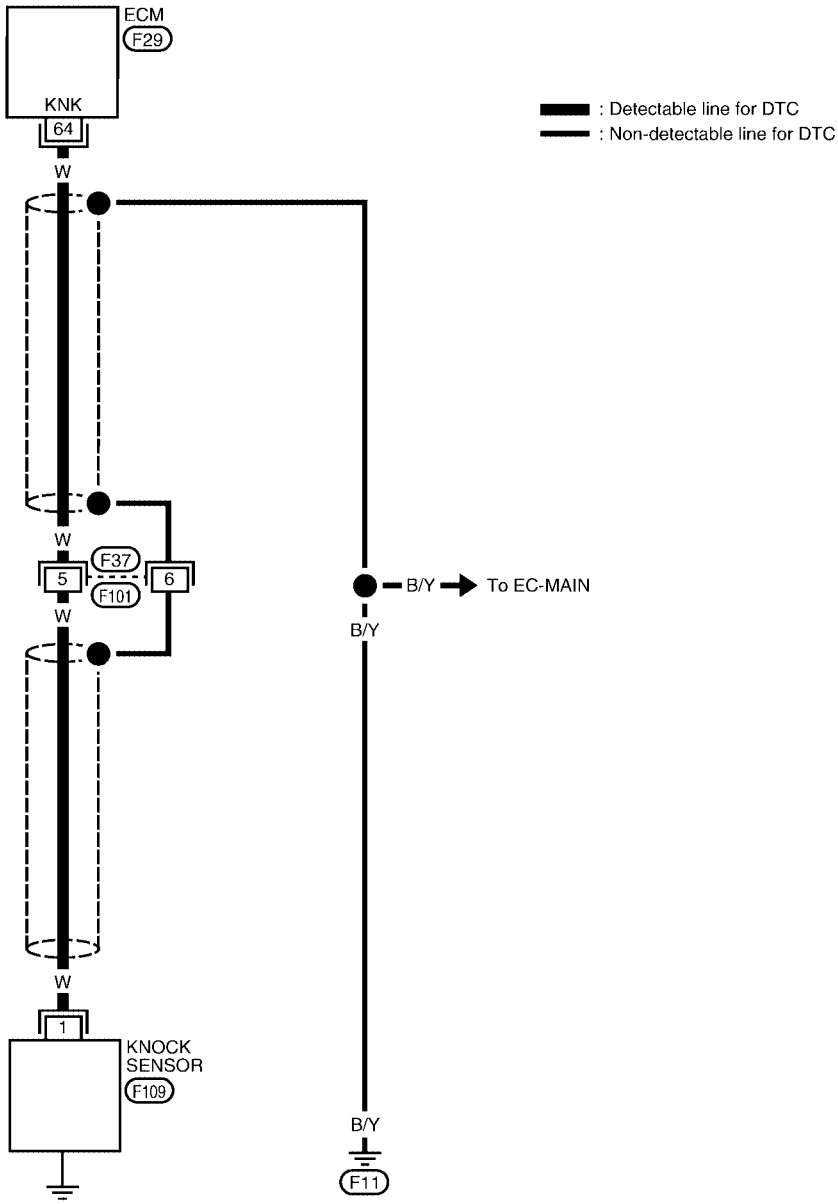
WITH GST

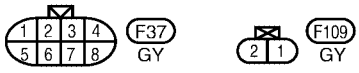
Follow the procedure “WITH CONSULT-II” above.

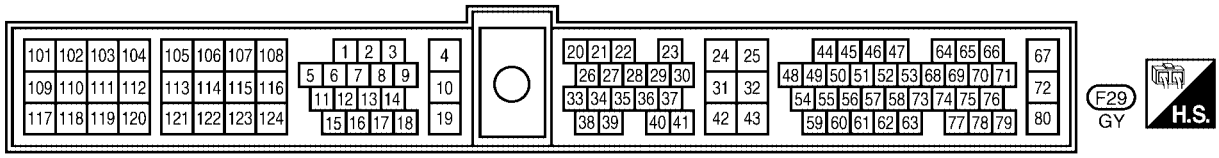
Wiring Diagram

UBS00DJK

EC-KS-01







BBWA0480E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
64	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V

Diagnostic Procedure

UBS00DJL

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 terminal 64 and ground.

   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

   Resistance: Approximately 500 - 620 kΩ [at 25°C (77°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 64 and knock sensor terminal 1. Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F37, F101
- Harness for open or short between ECM and knock sensor

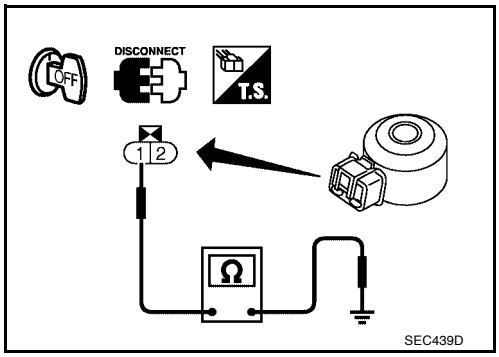
>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK KNOCK SENSOR

NOTE:
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

1. Disconnect knock sensor harness connector.
2. Check resistance between terminal 1 and ground.

Resistance: 500 - 620 kΩ [at 25°C (77°F)]



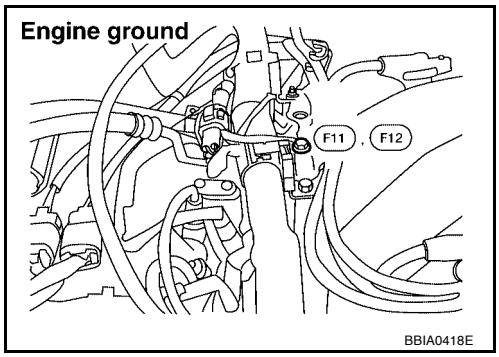
CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

OK or NG

OK >> GO TO 5.
NG >> Replace knock sensor.

5. CHECK GROUND CONNECTIONS

Loosen and retighten ground screw.
Refer to EC-709, "Ground Inspection" .



OK or NG

OK >> GO TO 6.
NG >> Repair or replace ground connections.

6. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors F37, F101.
2. Check harness continuity between harness connector F37 terminal 6 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F37
- Harness for open or short between harness connector F37 and ground

>> Repair open circuit or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

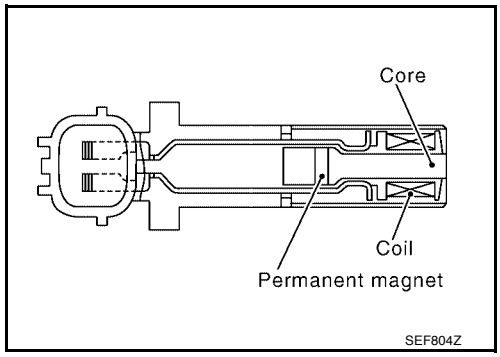
DTC P0335 CKP SENSOR (OBD)

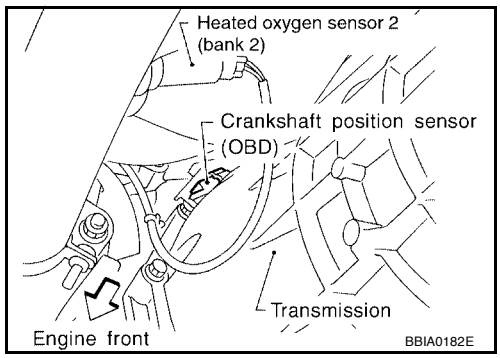
PFP:23731

Component Description

UBS00DJM

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
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.
This sensor is not used to control the engine system. It is used only for the on board diagnosis.





CONSULT-II Reference Value in Data Monitor Mode

UBS00DJN

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II with the value tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

UBS00DJO

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (OBD) circuit	● The proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed.	● Harness or connectors (The sensor circuit is open or shorted) ● Crankshaft position sensor (OBD)

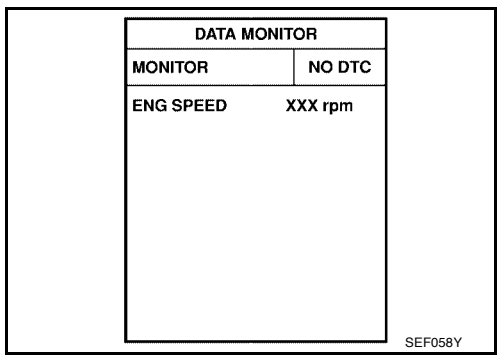
DTC Confirmation Procedure

UBS00DJP

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 run it for at least 15 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-872, "Diagnostic Procedure"
.



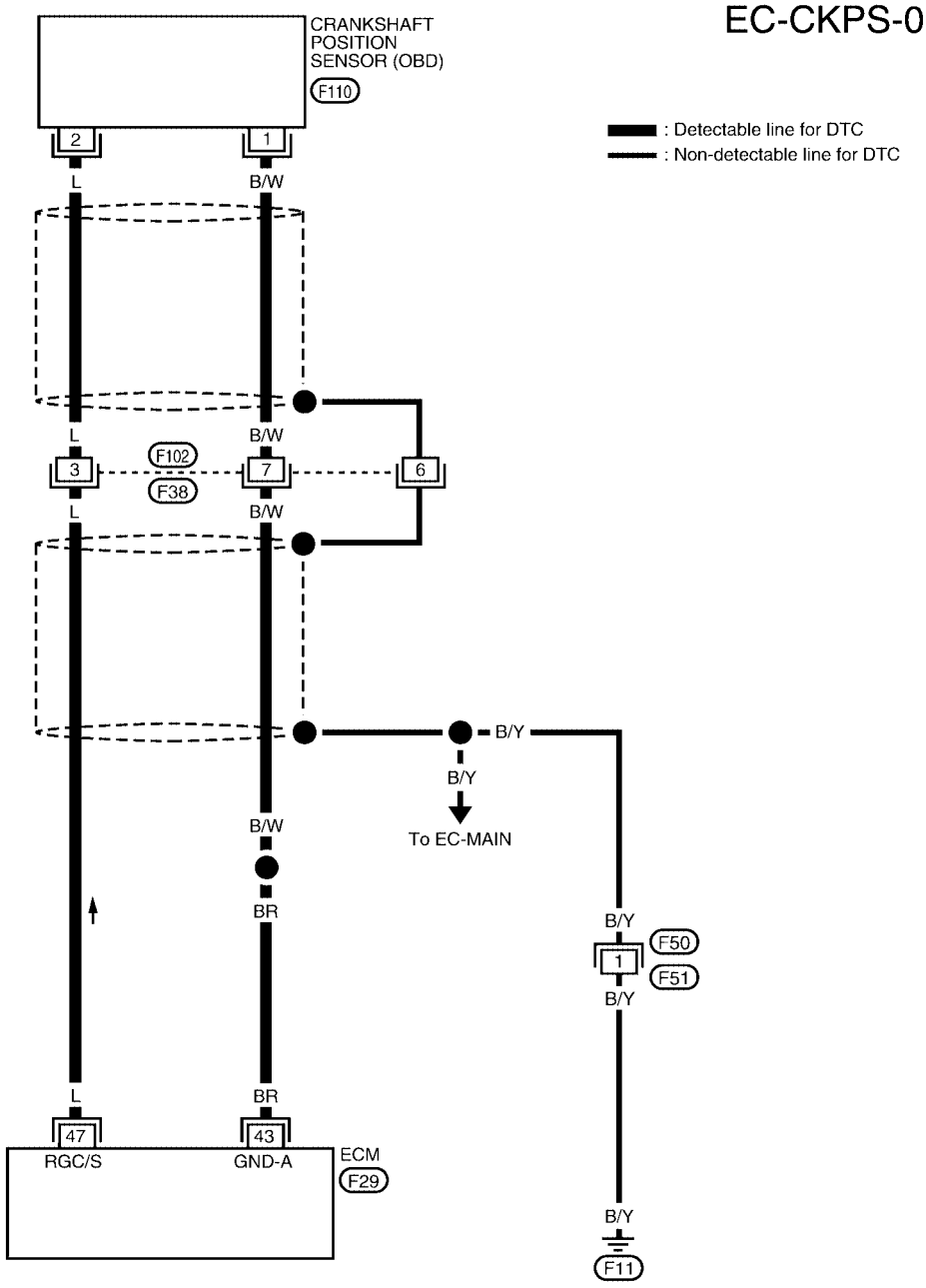
WITH GST

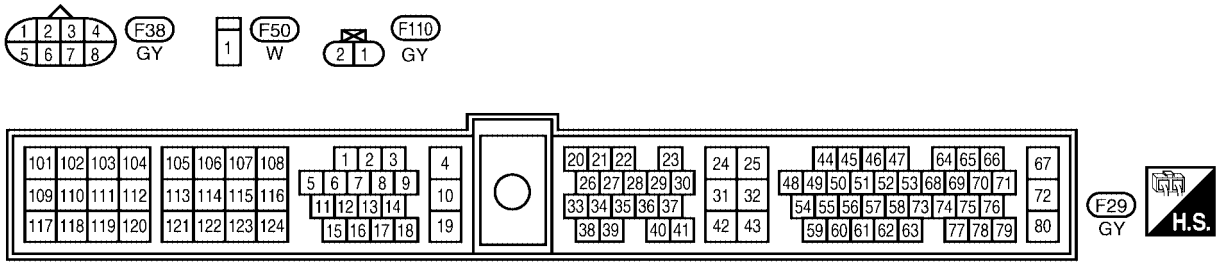
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DJQ

EC-CKPS-01



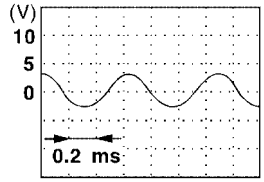
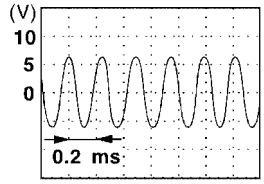


BBWA0481E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
43	BR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1 - 2V★ (AC range)  SEF690W
			[Engine is running] ● Engine speed is 2,000 rpm	3 - 4V★ (AC range)  SEF691W

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

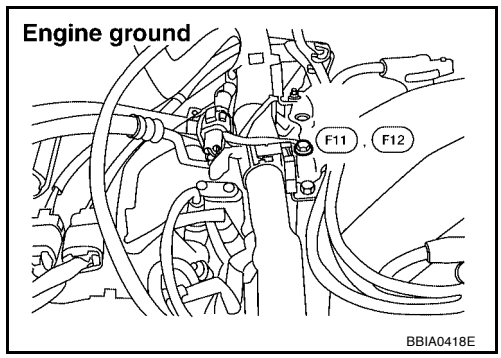
UBS00DJR

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



BBIA0418E

2. CHECK CKP SENSOR (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

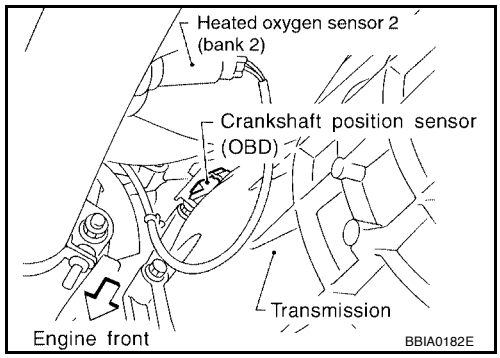
1. Disconnect crankshaft position (CKP) sensor (OBD) and ECM harness connectors.
2. Check continuity between ECM terminal 47 and CKP sensor (OBD) terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F38, F102
- Harness for open or short between ECM and crankshaft position sensor (OBD)

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR (OBD) GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between sensor terminal 1 and ECM terminal 43. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F38, F102
- Harness for open between crankshaft position sensor (OBD) and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CKP SENSOR (OBD) SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors F102, F38.
2. Check harness continuity between harness connector F38 terminal 6 and ground. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

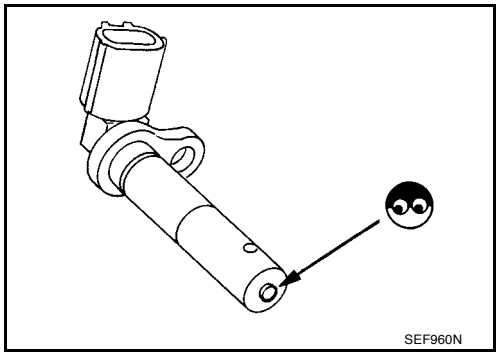
Check the following.

- Harness connector F38
- Harness connectors F50, F51
- Harness for open or short between harness connector F38 and ground

>> Repair open circuit or short to power in harness or connectors.

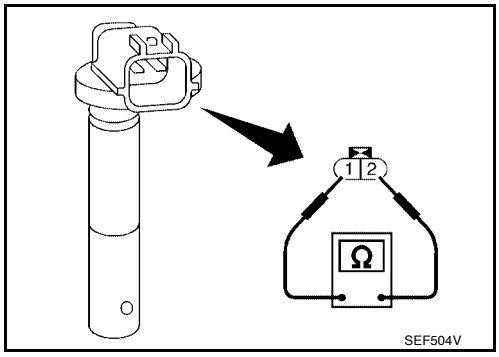
8. CHECK CRANKSHAFT POSITION SENSOR (OBD)

1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.


SEF960N

5. Check resistance as shown in the figure.

Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]



SEF504V

OK or NG

OK >> GO TO 9.
NG >> Replace crankshaft position sensor (OBD).

9. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

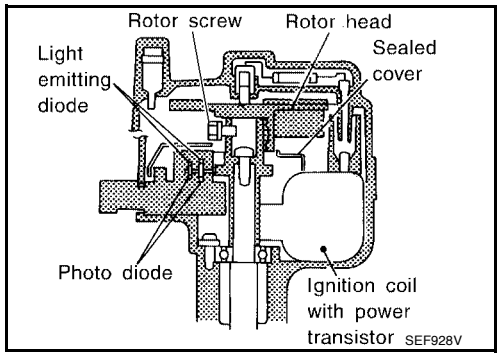
DTC P0340 CMP SENSOR

PFP:22100

Component Description

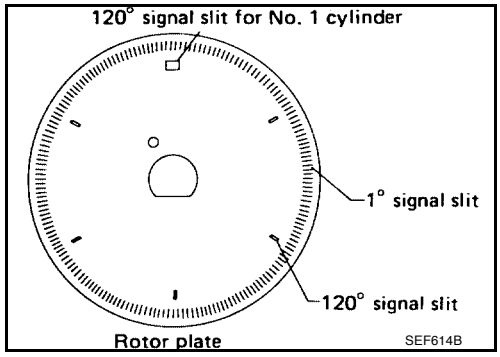
UBS00DJS

The camshaft position sensor is a basic component of the engine control system. It monitors engine speed and piston position. These input signals to the ECM are used to control fuel injection, ignition timing and other functions.
The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° (POS) signal and 6 slits for a 120° (REF) signal. The wave-forming circuit consists of Light Emitting Diodes (LED) and photo diodes.
The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into ON-OFF signals by the wave-forming circuit and sent to the ECM.
The distributor is not repairable and must be replaced as an assembly except distributor cap and rotor head.



NOTE:
The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

: 3.6±0.3 N·m (37±3 kg-cm, 32±3 in-lb)



On Board Diagnosis Logic

UBS00DJT

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0340	Camshaft position sensor circuit	A)	● Either 1° or 120° signal is not sent to ECM for the first few seconds during engine cranking.	● Harness or connectors (The CMP sensor circuit is open or shorted) ● Camshaft position sensor ● Starter motor (Refer to SC-9 .) ● Starting system circuit (Refer to SC-9 .) ● Dead (Weak) battery
		B)	● Either 1° or 120° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed.	
		C)	● The relation between 1° and 120° signal is not in the normal range during the specified engine speed.	

DTC Confirmation Procedure

UBS00DJU

NOTE:
- **Perform PROCEDURE FOR MALFUNCTION A first. If DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B AND C.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

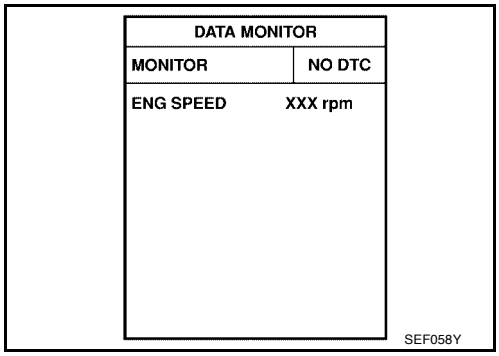
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Crank engine for at least 2 seconds.
4. If 1st trip DTC is detected, go to EC-879, "Diagnostic Procedure"
.



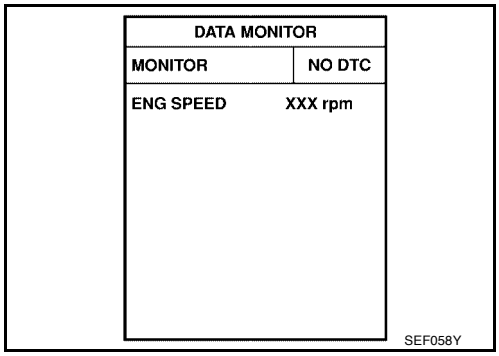
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B AND C

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and run it for at least 2 seconds at idle speed.
4. If 1st trip DTC is detected, go to EC-879, "Diagnostic Procedure"
.



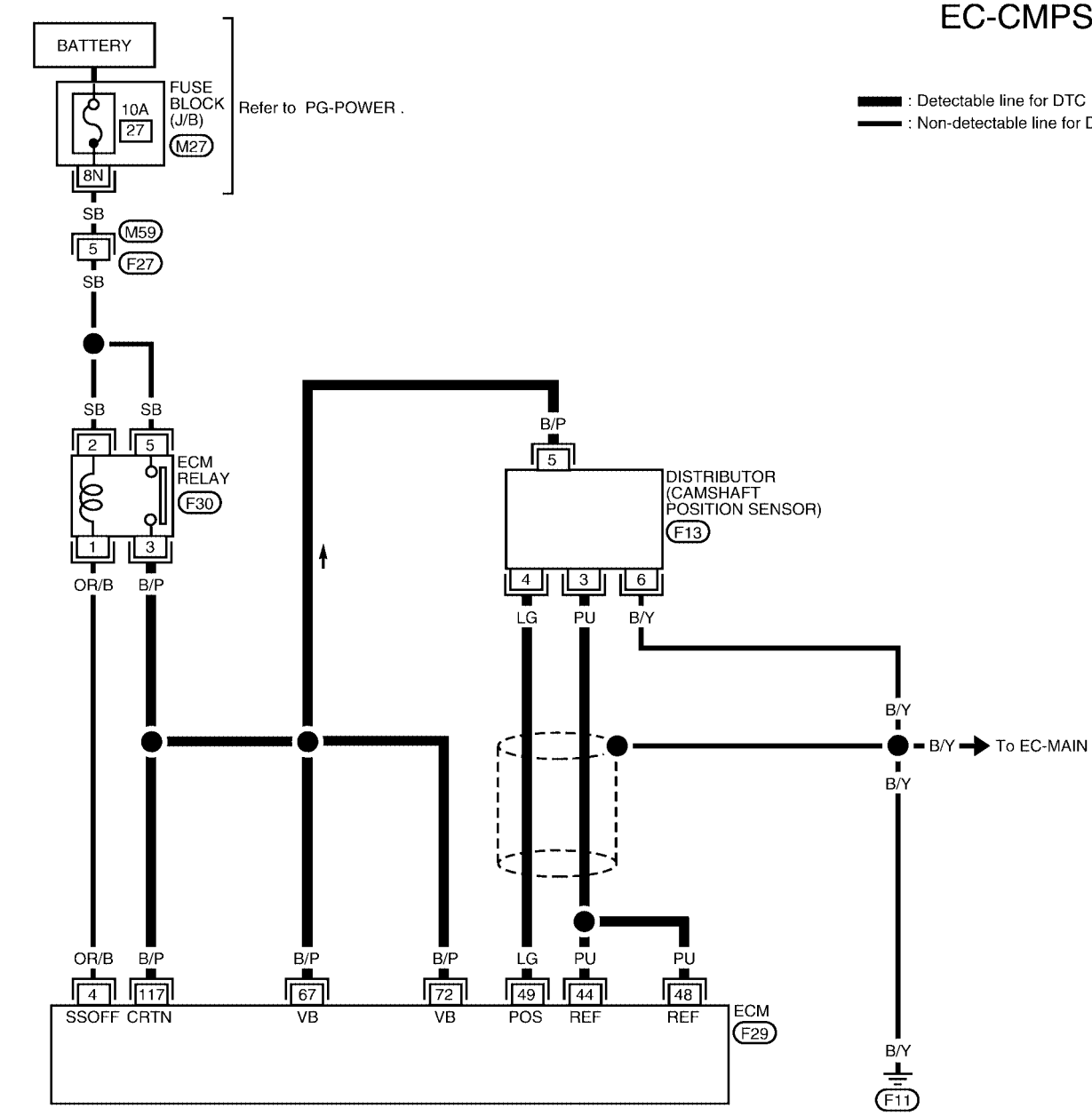
With GST

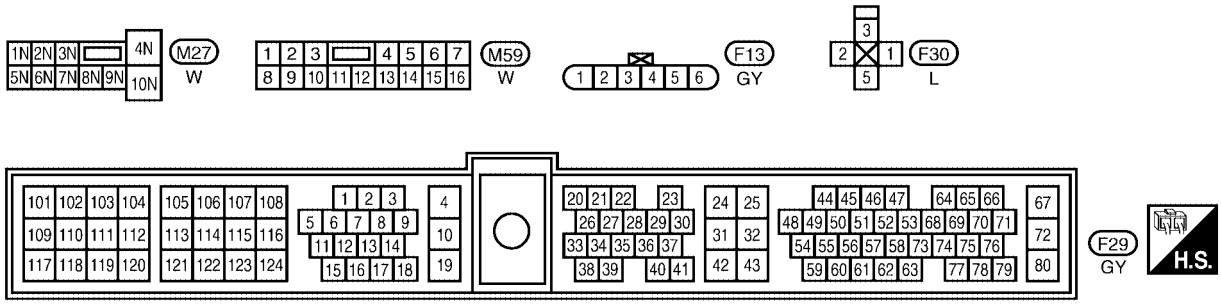
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00DJV

EC-CMPS-01



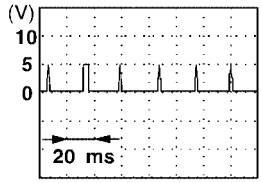
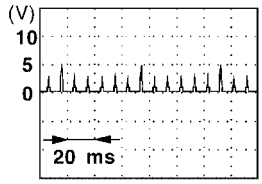
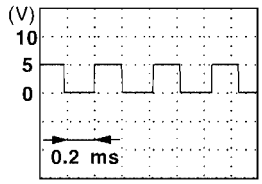
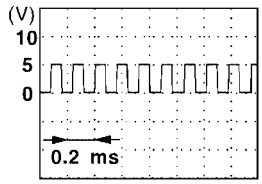


BBWA0482E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
44 48	PU PU	Camshaft position sensor (Reference signal)	**[Engine is running]** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0.3 - 0.5V★  SEF997U
			[Engine is running] ● Engine speed is 2,000 rpm	0.3 - 0.5V★  SEF998U
49	LG	Camshaft position sensor (Position signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 2.5V★  SEF999U
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5V★  SEF001V
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P		**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

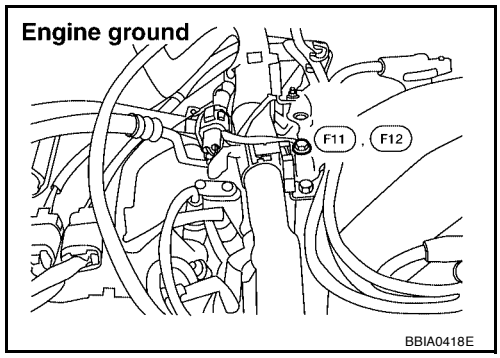
UBS00DJW

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

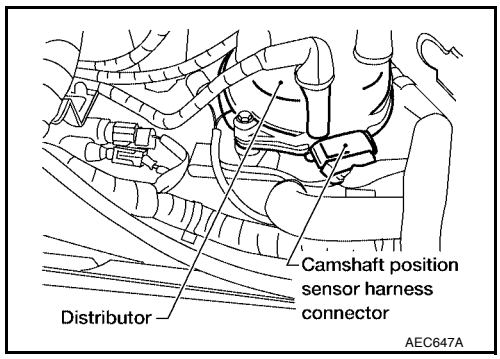
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



2. CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor harness connector.
2. Turn ignition switch ON.

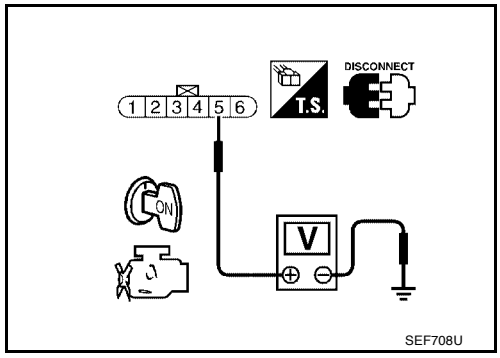


3. Check voltage between CMP sensor terminal 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between camshaft position sensor and ECM relay
- Harness for open or short between camshaft position sensor and ECM

>> Repair harness or connectors.

4. CHECK CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between CMP sensor terminal 4 and ECM terminal 49, CMPS terminal 3 and ECM terminals 44, 48. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMPS GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between CMPS terminal 6 and ground.

Continuity should exist.

2. Also check harness for short to power.

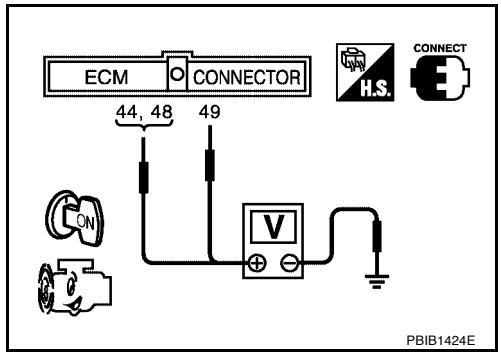
OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to power in harness or connector.

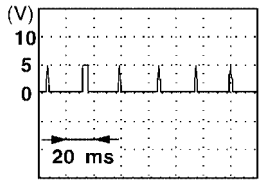
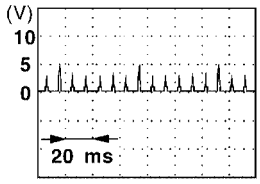
6. CHECK CAMSHAFT POSITION SENSOR

1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.

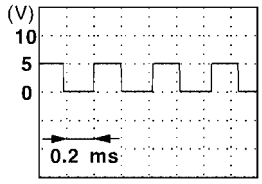
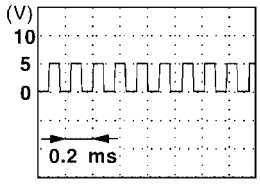
NOTE:
The pulse cycle changes depending on rpm at idle.



<Terminal 44 or 48 and ground>

Condition	Idle	2,000 rpm
Voltage	0.3 - 0.5V	0.3 - 0.5V
Pulse signal	 SEF997U	 SEF998U

<Terminal 49 and ground>

Condition	Idle	2,000 rpm
Voltage	Approximately 2.5V	Approximately 2.5V
Pulse signal	 SEF999U	 SEF001V

OK or NG

OK >> GO TO 7.
NG >> Replace distributor assembly with camshaft position sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00DJX

DISTRIBUTOR

Refer to EM-80, "OUTER COMPONENT PARTS" .

DTC P0400 EGR FUNCTION

PFP:14710

Description

UBS00DJY

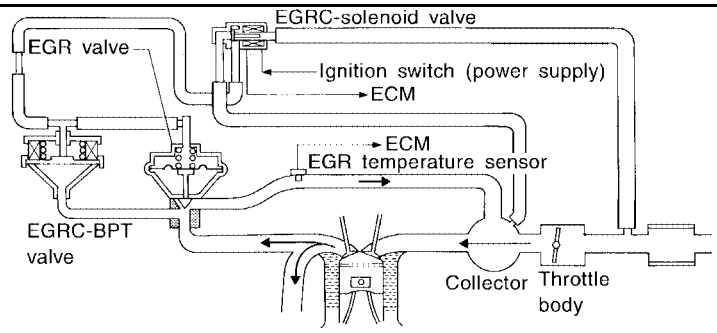
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC-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		

This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC-solenoid valve. When the ECM detects any of the following conditions, current does not flow through the solenoid valve. This causes the intake manifold vacuum to be discharged into the atmosphere. The EGR valve remains closed.

- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction

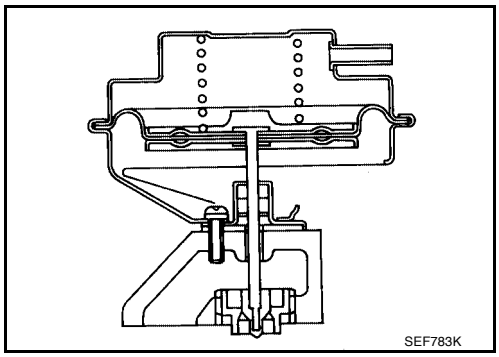
EGR and vacuum



COMPONENT DESCRIPTION

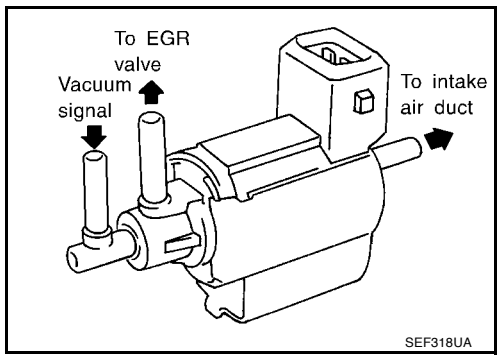
Exhaust Gas Recirculation (EGR) Valve

The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening and EGRC-BPT valve operation. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.



EGRC-Solenoid Valve

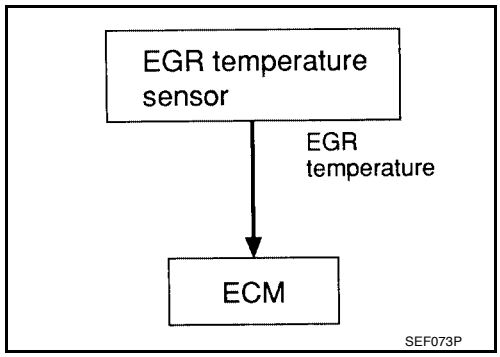
The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. The vacuum signal (from the intake manifold collector to the EGR valve) passes through the solenoid valve. The signal then reaches the EGR valve.
When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal from the intake manifold to the ECR valve.



On Board Diagnosis Logic

UBS00DJZ

If the absence of EGR flow is detected by EGR temperature sensor under the condition that calls for EGR, a low-flow malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0400	EGRC-solenoid valve circuit close	● No EGR flow is detected under conditions that call for EGR.	● EGR valve stuck closed ● EGRC-BPT valve ● Vacuum hose ● EGRC-solenoid valve ● EGR passage ● EGR temperature sensor ● Exhaust gas leaks

DTC Confirmation Procedure

UBS00DK0

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 5 seconds before conducting the next test.
- P0400 will not be displayed at “SELF-DIAG RESULTS” mode with CONSULT-II even though DTC work support test result is “NG”.

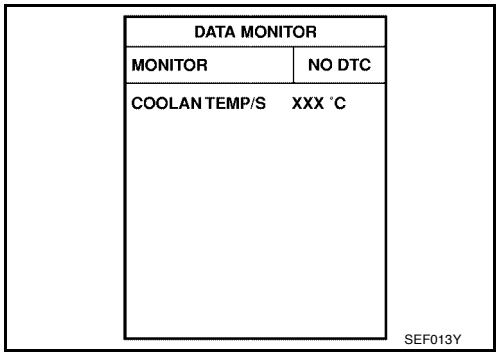
WITH CONSULT-II

1. Turn ignition switch ON.

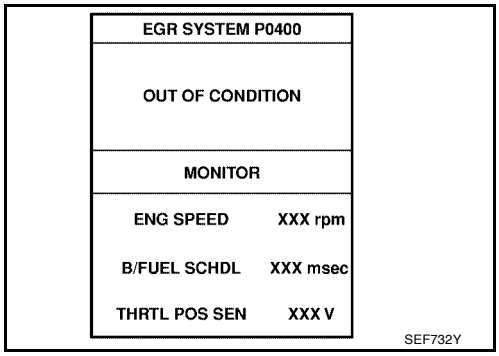
2. Check “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
   Confirm COOLAN TEMP/S valve is within the range listed below.

   COOLAN TEMP/S: Less than 40°C (104°F)

   If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the engine coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

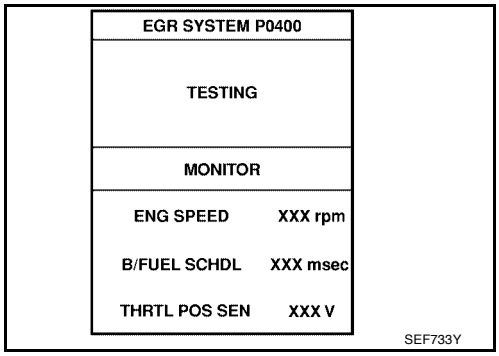


3. Start engine and let it idle monitoring “COOLAN TEMP/S” value.
   When the “COOLAN TEMP/S” value reaches 70°C (158°F), immediately go to the next step.
4. Select “EGR SYSTEM P0400” of “EGR SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
5. Touch “START”.
6. Accelerate vehicle to a speed of 40 km/h (25 MPH) once and then stop vehicle with engine running.
   If “COMPLETED” appears on CONSULT-II screen, go to step 9.
   If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.
7. Check the output voltage of “THRTL POS SEN” (at closed throttle position) and note it.

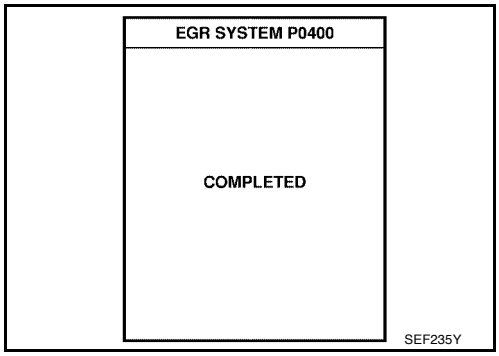


8. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions until “TESTING” changes to “COMPLETED”. (It will take approximately 60 seconds or more.)

ENG SPEED	1,600 - 2,400 rpm (A/T) 1,800 - 2,600 rpm (M/T)
B/FUEL SCHDL	6 - 9 msec
THRTL POS SEN	X – (X + 0.82) V X = Voltage value measured at step 7
Selector lever	Suitable position



   If “TESTING” is not displayed after 5 minutes, retry from step 2.
9. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-887, "Diagnostic Procedure" .



Overall Function Check

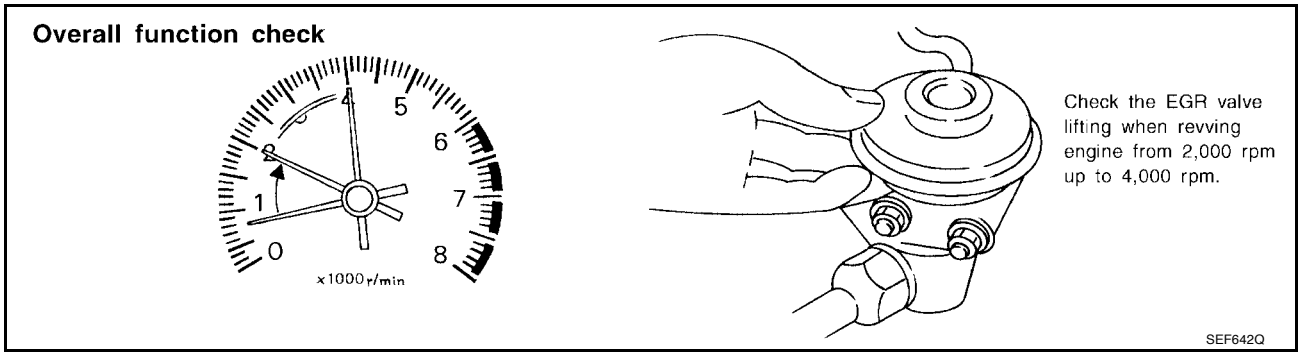
UBS00DK1

Use this procedure to check the overall EGR function. During this check, a 1st trip DTC might not be confirmed.

WITH GST

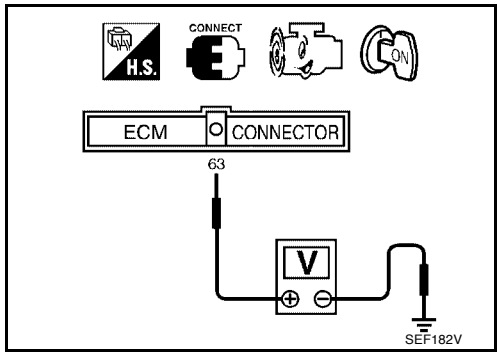
1. Start engine and warm it up to normal operating temperature.

2. Check the EGR valve lifting when revving engine from 2,000 to 3,000 rpm quickly under no load using the following methods.

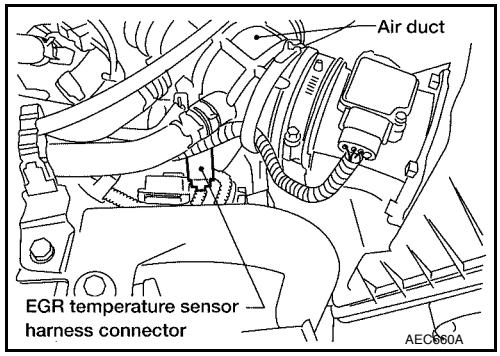


EGR valve should lift up and down without sticking.
If NG, go to EC-887, "Diagnostic Procedure" .

3. Check voltage between ECM terminal 63 (EGR temperature sensor signal) and ground at idle speed.
Less than 4.5V should exist.
If NG, go to next step.
4. Turn ignition switch OFF.



5. Disconnect EGR temperature sensor harness connector.
6. Disconnect ECM harness connector.



7. Check harness continuity between EGR temperature sensor harness connector terminal 2 and ECM terminal 43. Refer to EC-900, "Wiring Diagram" .

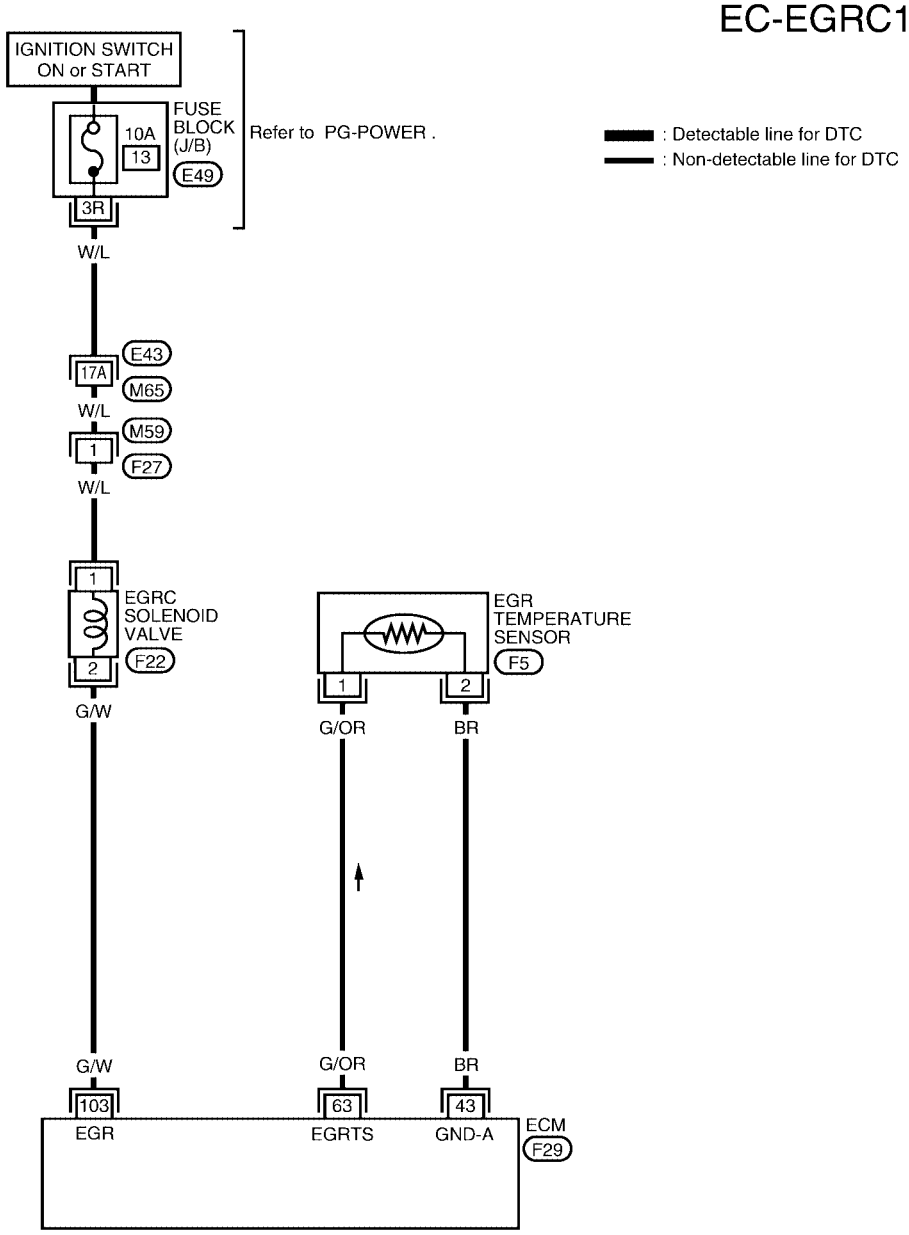
Continuity should exist.

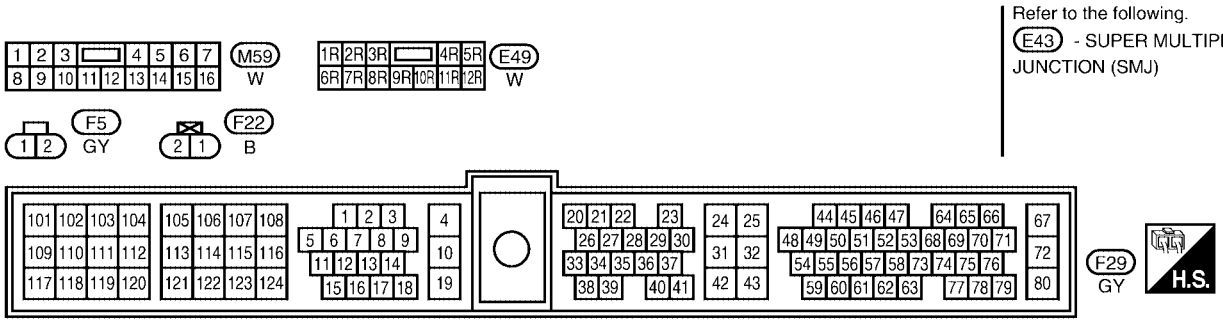
8. Perform EC-902, "Component Inspection" .

Wiring Diagram

UBS00DK2

EC-EGRC1-01





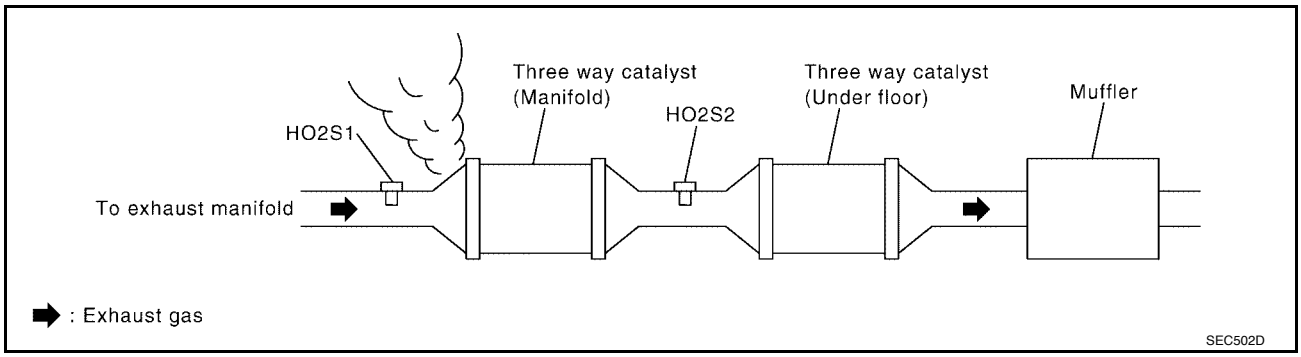
BBWA0504E

Diagnostic Procedure

UBS00DK3

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

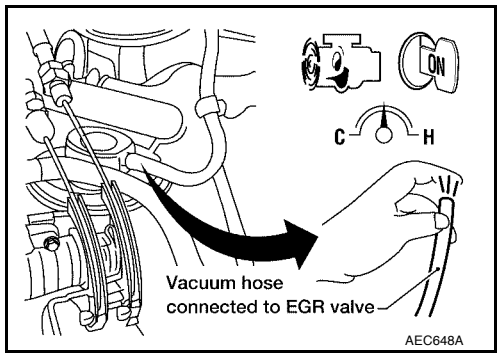
OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> Repair or replace.

2. CHECK VACUUM SOURCE TO EGR VALVE

With CONSULT-II

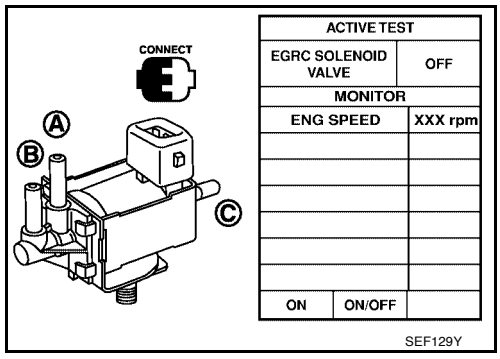
1. Warm engine up to normal operating temperature.
2. Disconnect vacuum hose to EGR valve.
3. Check for vacuum existence at idle.

Vacuum should not exist at idle.



4. Select “EGRC SOLENOID VALVE” in “ACTIVE TEST” mode with CONSULT-II and turn the solenoid valve ON.
5. Check for vacuum existence when revving engine from idle up to 3,000rpm.

Vacuum should exist when revving engine.



OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

3. CHECK VACUUM SOURCE TO EGR VALVE

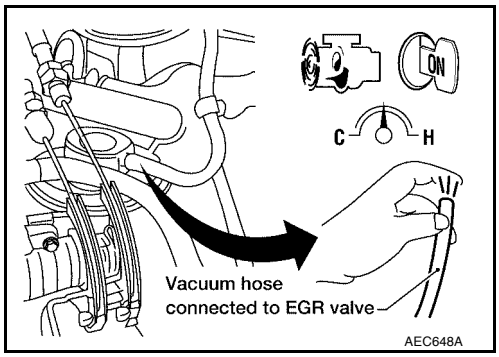
Without CONSULT-II

1. Warm engine up to normal operating temperature.
2. Disconnect vacuum hose to EGR valve.
3. Check for vacuum existence at idle.

Vacuum should not exist at idle.

4. Check for vacuum existence when revving engine from idle up to 3,000 rpm quickly.

Vacuum should exist when revving engine.



OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK EGR VALVE

Refer to EC-890, "Component Inspection" .

OK or NG

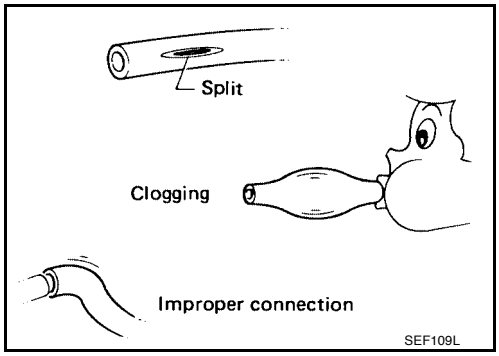
OK >> GO TO 11.
NG >> Replace EGR valve.

5. CHECK VACUUM HOSE

1. Turn ignition switch OFF.
2. Check vacuum hose for clogging, cracks or improper connection.

OK or NG

OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> Repair or replace vacuum hose.



6. CHECK EGRC-SOLENOID VALVE OPERATION

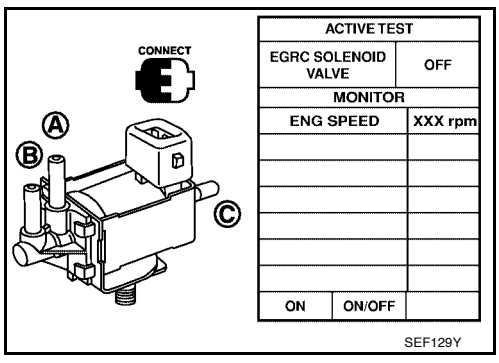
With CONSULT-II

1. Turn ignition switch ON.
2. Turn EGRC-solenoid valve “ON” and “OFF” in “ACTIVE TEST” mode with CONSULT-II and check operating sound.

Clicking noise should be heard.

OK or NG

OK >> GO TO 8.
NG >> Repair or replace EGRC-solenoid valve or repair circuit.



7. CHECK EGRC-SOLENOID VALVE OPERATION

Without CONSULT-II

1. Disconnect ECM harness connector.
2. Turn ignition switch ON.
3. Connect a suitable jumper wire between ECM terminal 103 and ground.
4. Check operating sound of EGRC-solenoid valve when disconnecting and connecting the jumper wire.

Clicking noise should be heard.

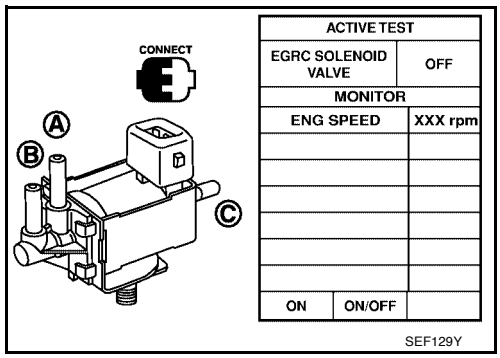
OK or NG

OK >> GO TO 9.
NG >> Repair or replace EGRC-solenoid valve or repair circuit.

8. CHECK EGRC-SOLENOID VALVE

1. Perform “EGRC SOLENOID VALVE” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time under the following conditions.

Conditions	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes



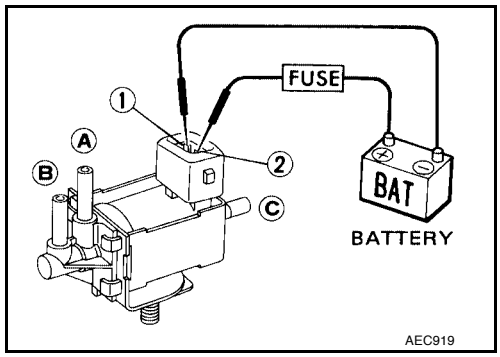
OK or NG

OK >> GO TO 10.
NG >> Repair EGRC-solenoid valve.

9. CHECK EGRC-SOLENOID VALVE

1. Check air passage continuity and operation delay time under the following conditions.

Conditions	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



OK or NG

OK >> GO TO 10.
NG >> Repair EGRC-solenoid valve.

10. CHECK EGRC-BPT VALVE

Refer to EC-890, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace EGRC-BPT valve.

11. CHECK EGR TEMPERATURE SENSOR

Refer to EC-902, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace EGR temperature sensor.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> INSPECTION END

Component Inspection

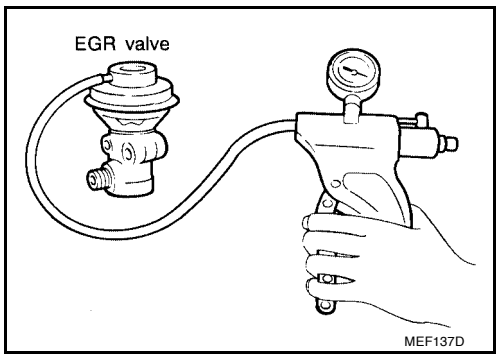
UBS00DK4

EGR VALVE

1. Apply vacuum to EGR vacuum port with a hand vacuum pump.

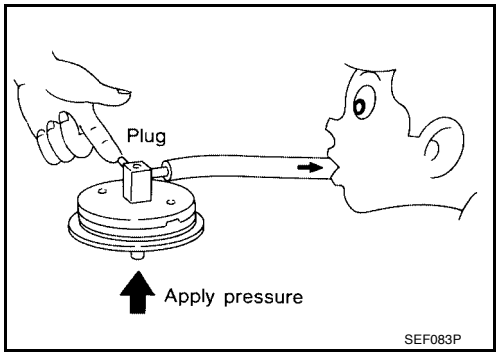
   EGR valve spring should lift.

2. Check for sticking.
3. If NG, repair or replace EGR valve.



EGRC-BPT VALVE

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH_2 O, 3.94 inH_2 O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.



Removal and Installation

UBS00DK5

EGR VALVE

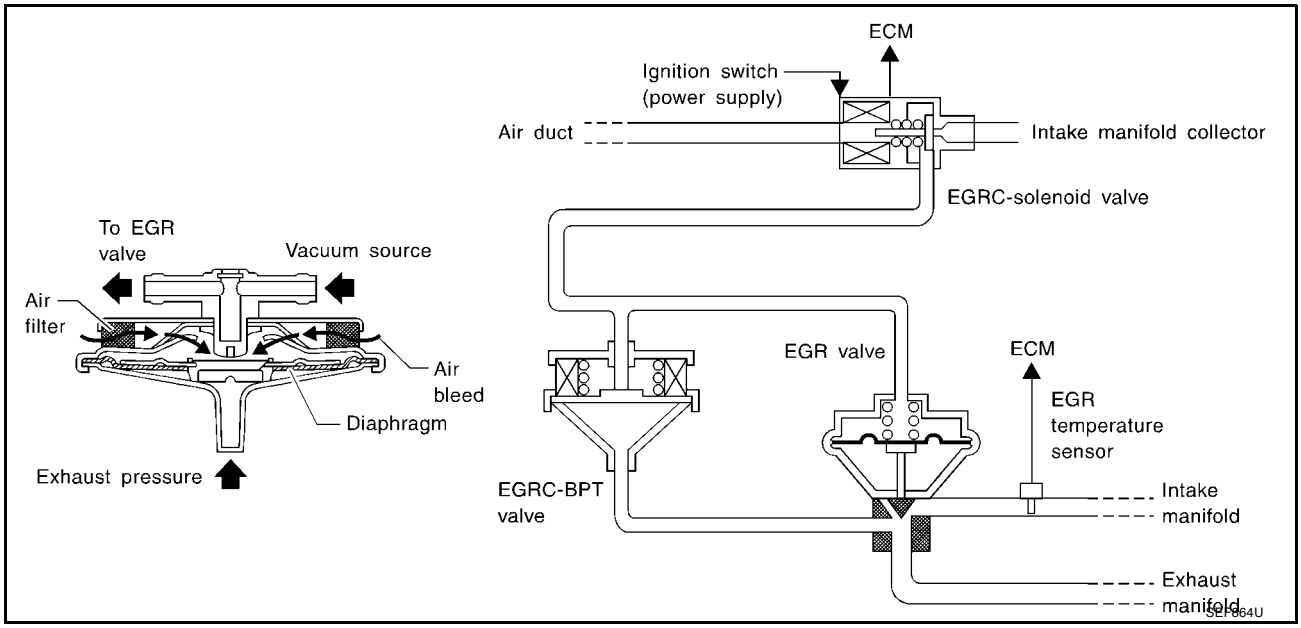
Refer to EM-80, "OUTER COMPONENT PARTS" .

DTC P0402 EGRC-BPT VALVE FUNCTION

PFP:14741

Description

UBS00DK6



SYSTEM DESCRIPTION

The EGRC-BPT valve monitors exhaust pressure to activate the diaphragm, controlling intake manifold vacuum applied to the EGR valve. In other words, recirculated exhaust gas is controlled in response to positioning of the EGR valve or to engine operation.

On Board Diagnosis Logic

UBS00DK7

If too much EGR flow exists due to an EGRC-BPT valve malfunction, off idle engine roughness will increase. If the roughness is large, then the vacuum to the EGR valve is interrupted through the EGRC-solenoid valve. If the engine roughness is reduced at that time, the EGRC-BPT valve malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0402	ECRC-BPT VALVE FUNCTION	● The EGRC-BPT valve does not operate properly.	● EGRC-BPT valve ● EGR valve ● Loose or disconnected rubber tube ● Blocked rubber tube ● Camshaft position sensor ● Blocked exhaust system ● Orifice ● Mass air flow sensor ● EGRC-solenoid valve

DTC Confirmation Procedure

UBS00DK8

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

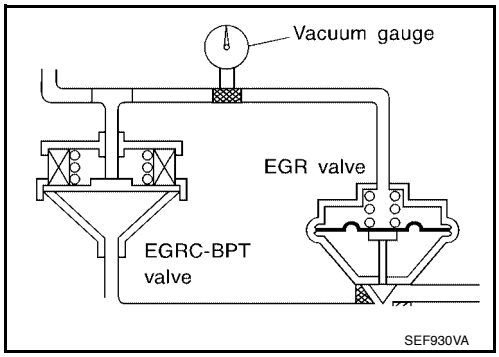
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

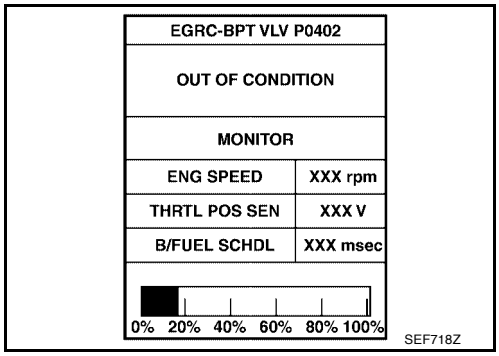
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

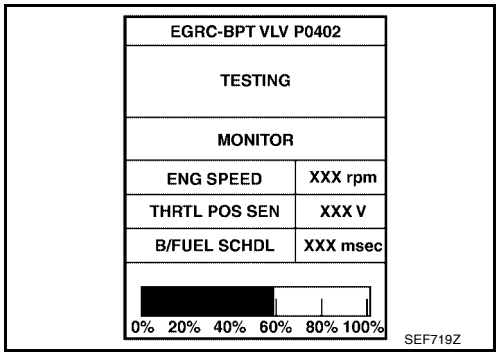
1. Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
2. Start engine and warm it up to normal operating temperature.
3. Stop engine and wait at least 5 seconds.
4. Turn ignition switch ON and select “EGRC-BPT VLV P0402” of “EGR SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
5. Start engine and let it idle.



6. Touch “START”.
7. Check the output voltage of “THRTL POS SEN” (at closed throttle position) and note it.



8. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen and the bar chart may increase. Maintain the conditions many times until “COMPLETED” appears.

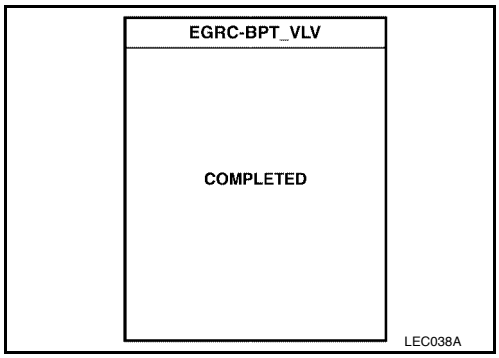


Selector lever	Suitable position
ENG SPEED	1,000 - 1,600 rpm
Vehicle speed	30 - 60 km/h (19 - 37 MPH) (A/T) 30 - 100 km/h (19 - 62 MPH) (M/T)
B/FUEL SCHDL	3.5 - 5.2 msec
THRTL POS SEN	X – (X + 0.9) V X = Voltage value measured at step 7

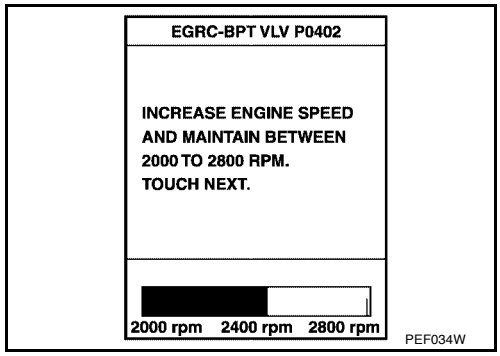
NOTE:

- **The bar chart on CONSULT-II screen indicates the status of this test. However, the test may be finished before the bar chart becomes full scale.**
- **If the bar chart indication does not continue to progress, completely release accelerator pedal once and try to meet the conditions again.**
- **If “TESTING” does not appear on CONSULT-II screen, retry from step 2.**

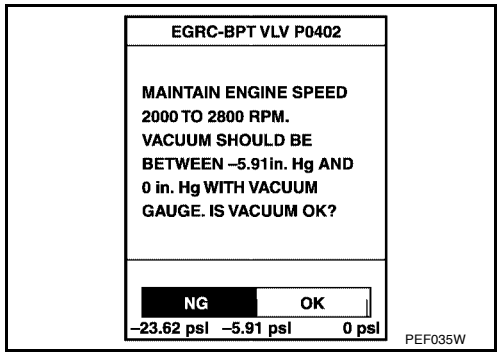
9. If CONSULT-II instructs to carry out Overall Function Check, go to next step. If “NG” is displayed, refer to EC-894, "Diagnostic Procedure" .
10. Open engine hood.



11. Raise engine speed to 2,000 to 2,800 rpm under no-load and hold it. Then touch “NEXT” on CONSULT-II screen.



12. Check vacuum gauge while keeping engine speed at 2,000 to 2,800 rpm.
Vacuum should be 0 to −20 kPa (0 to −150 mmHg, 0 to −5.91 inHg).
If NG, go to EC-894, "Diagnostic Procedure" .
If OK, touch “YES” on the CONSULT-II screen.
13. Check the rubber tube between intake manifold collector, EGRC-solenoid valve, EGR valve and EGRC-BPT valve for cracks, blockages or twisting.
If NG, repair or replace.
If OK, touch “YES” on the CONSULT-II screen.



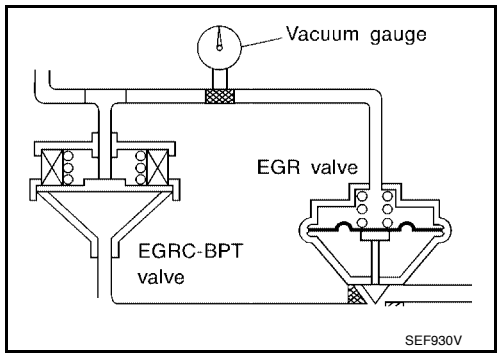
Overall Function Check

UBS00DK9

Use this procedure to check the overall function of the EGRC-BPT valve. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
2. Lift up vehicle.
3. Start engine and shift to D (A/T), 1st (M/T) position.
4. Check vacuum gauge while keeping engine speed at 2,000 to 2,800 rpm.
Vacuum should be 0 to −20 kPa (0 to −150 mmHg, 0 to −5.91 inHg).
If NG, go to EC-894, "Diagnostic Procedure" .
If OK, go to next step.
5. Check rubber tube between intake manifold collector, EGRC-solenoid valve, EGR valve and EGRC-BPT valve for misconnection, cracks or blockages.
6. If NG, go to EC-894, "Diagnostic Procedure" .



Diagnostic Procedure

UBS00DKA

1. CHECK HOSE

Check vacuum hose for clogging and improper connection.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace vacuum hose.

2. CHECK EXHAUST SYSTEM

Check exhaust system for collapse.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace exhaust system.

3. CHECK ORIFICE

Check if orifice is installed in vacuum hose between EGRC-BPT valve and EGRC-solenoid valve.

OK or NG

OK >> GO TO 4.
NG >> Replace vacuum hose.

4. CHECK EGRC-BPT VALVE

Refer to EC-896, "Component Inspection" .

OK or NG

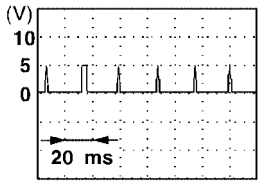
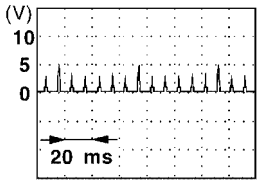
OK >> GO TO 5.
NG >> Replace EGRC-BPT valve.

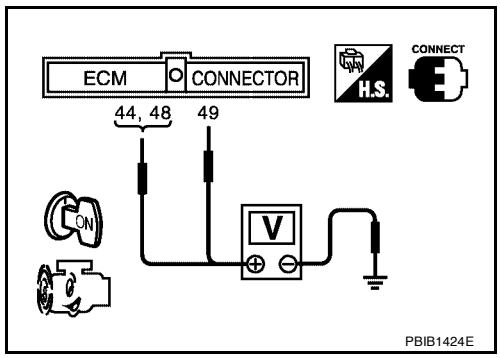
5. CHECK CAMSHAFT POSITION SENSOR

1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.

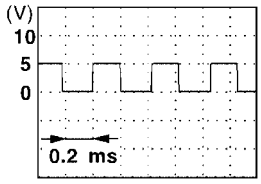
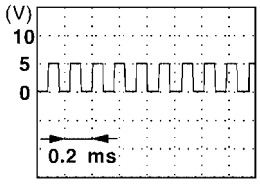
NOTE:
The pulse cycle changes depending on rpm at idle.

<Terminal 44 or 48 and ground>

Condition	Idle	2,000 rpm
Voltage	0.3 - 0.5V	0.3 - 0.5V
Pulse signal	 SEF997U	 SEF998U



<Terminal 49 and ground>

Condition	Idle	2,000 rpm
Voltage	Approximately 2.5V	Approximately 2.5V
Pulse signal	 SEF999U	 SEF001V

OK or NG

OK >> GO TO 6.
NG >> Replace camshaft position sensor.

6. CHECK MASS AIR FLOW SENSOR

Refer to EC-733, "Component Inspection" .

OK or NG

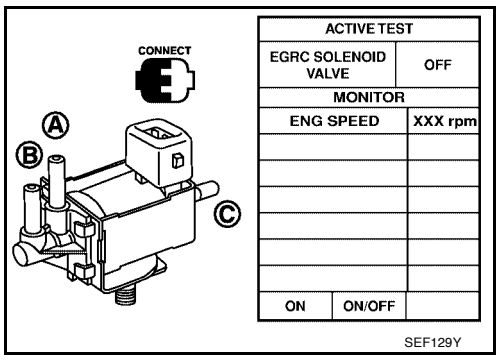
OK >> GO TO 7.
NG >> Replace mass air flow sensor.

7. CHECK EGRC-SOLENOID VALVE

With CONSULT-II

1. Perform “EGRC SOLENOID VALVE” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time under the following conditions.

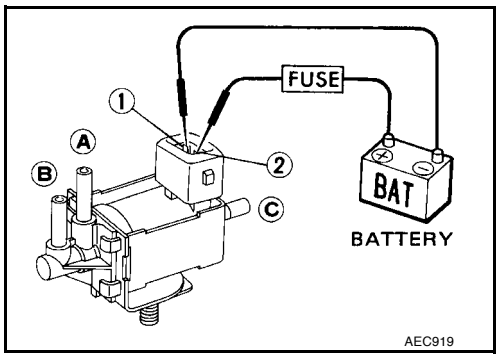
Conditions	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes



Without CONSULT-II

1. Check air passage continuity and operation delay time under the following conditions.

Conditions	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



OK or NG

OK >> GO TO 8.
NG >> Replace EGRC-solenoid valve.

8. CHECK EGR VALVE

Refer to EC-890, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace EGR valve.

9. CHECK INTERMITTENT INCIDENT

Perform EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

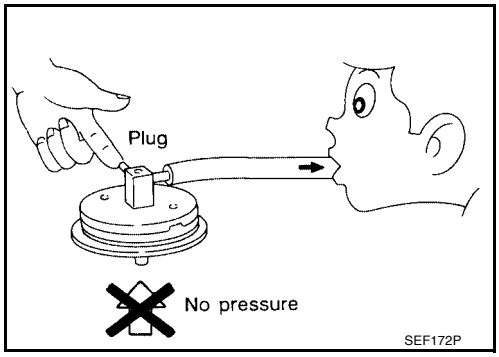
Component Inspection

UBS00DKB

EGRC-BPT VALVE

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check leakage without applying any pressure from under EGR-BPT valve.

Leakage should exist.



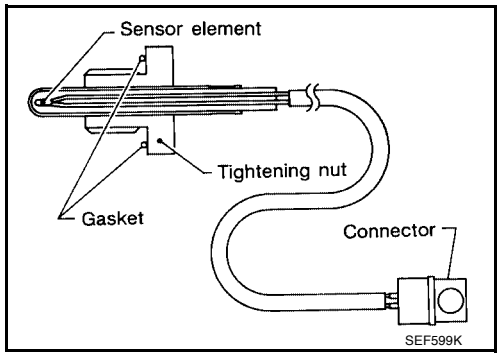
DTC P0405, P0406 EGRT SENSOR

PFP:14710

Component Description

UBS00DKC

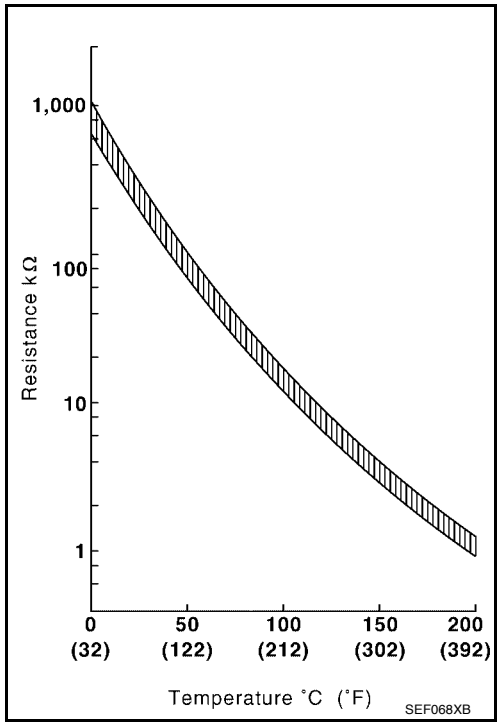
The EGR temperature sensor detects temperature changes in the EGR passageway. When the EGR valve opens, hot exhaust gases flow, and the temperature in the passageway changes. The EGR temperature sensor is a thermistor that modifies a voltage signal sent from the ECM. This modified signal then returns to the ECM as an input signal. As the temperature increases, EGR temperature sensor resistance decreases. This sensor is not used to control the engine system.
It is used only for the on board diagnosis.



<Reference data>

EGR temperature °C (°F)	Voltage* V	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015

*: These data are reference values and are measured between ECM terminal 63 (EGR temperature sensor) and ground.
When EGR system is operating.
Voltage: 0 - 1.5V



On Board Diagnosis Logic

UBS00DKD

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0405	EGR temperature circuit low input	An excessively low voltage from the EGR temperature sensor is sent to ECM.	● Harness or connectors (The EGR temperature sensor circuit is shorted.) ● EGR temperature sensor ● Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve
P0406	EGR temperature circuit high input	An excessively high voltage from the EGR temperature sensor is sent to ECM.	● Harness or connectors (The EGR temperature sensor circuit is open.) ● EGR temperature sensor ● Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve

DTC Confirmation Procedure

UBS00DKE

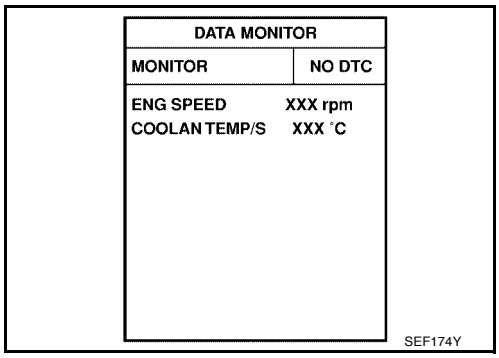
Perform PROCEDURE FOR DTC P0405 first. If 1st trip DTC cannot be confirmed, perform PROCEDURE FOR DTC P0406.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR DTC P0405

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Verify that engine coolant temperature is less than 50°C (122°F).
   If the engine coolant temperature is above the range, cool the engine down.
4. Start engine and let it idle for at least 8 seconds.
5. If 1st trip DTC is detected, go to EC-901, "Diagnostic Procedure" .



With GST

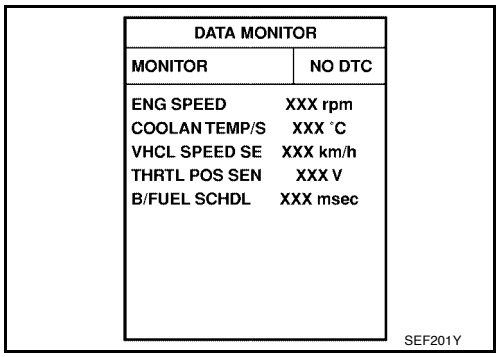
- Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR DTC P0406

CAUTION:
Always drive vehicle at a safe speed.

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Confirm that EGR valve is not lifting.
   If the result is NG, perform trouble diagnosis for DTC P1402. Refer to EC-1065 .
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Read “EGR TEMP SEN” at about 1,500 rpm while holding the EGR valve in full open position by hand.
   Voltage should decrease to less than 1.5V.
   If the result is NG, go to EC-901, "Diagnostic Procedure" .
   If the result is OK, go to following step.
5. Turn ignition switch OFF and wait at least 5 seconds.
6. Turn ignition switch ON.
7. Check the output voltage of “THRTL POS SEN” (at closed throttle position) and note it.
8. Start engine.
9. Maintain the following conditions for at least 5 consecutive seconds.



ENG SPEED	1,600 - 2,400 rpm (A/T) 1,800 - 2,600 rpm (M/T)
COOLAN TEMP/S	Above 70°C (158°F)
B/FUEL SCHDL	6 - 9 msec
THRTL POS SEN	X – (X + 0.82) V X = Voltage value measured at step 7
Selector lever	Suitable position

10. If 1st trip DTC is detected, go to EC-901, "Diagnostic Procedure" .

Overall Function Check

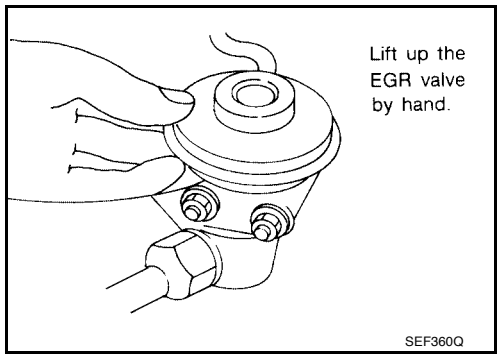
UBS00DKF

Use this procedure to check the overall function of the EGR temperature sensor. During this check, a 1st trip DTC might not be confirmed.

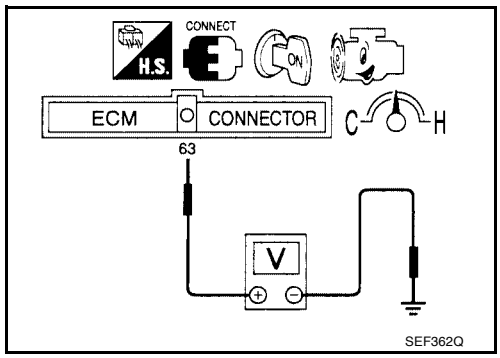
PROCEDURE FOR DTC P0406

With GST

1. Start engine and warm it up to normal operating temperature.
2. Confirm that EGR valve is not lifting. If NG, perform trouble diagnosis for DTC P1402. Refer to EC-1065 .



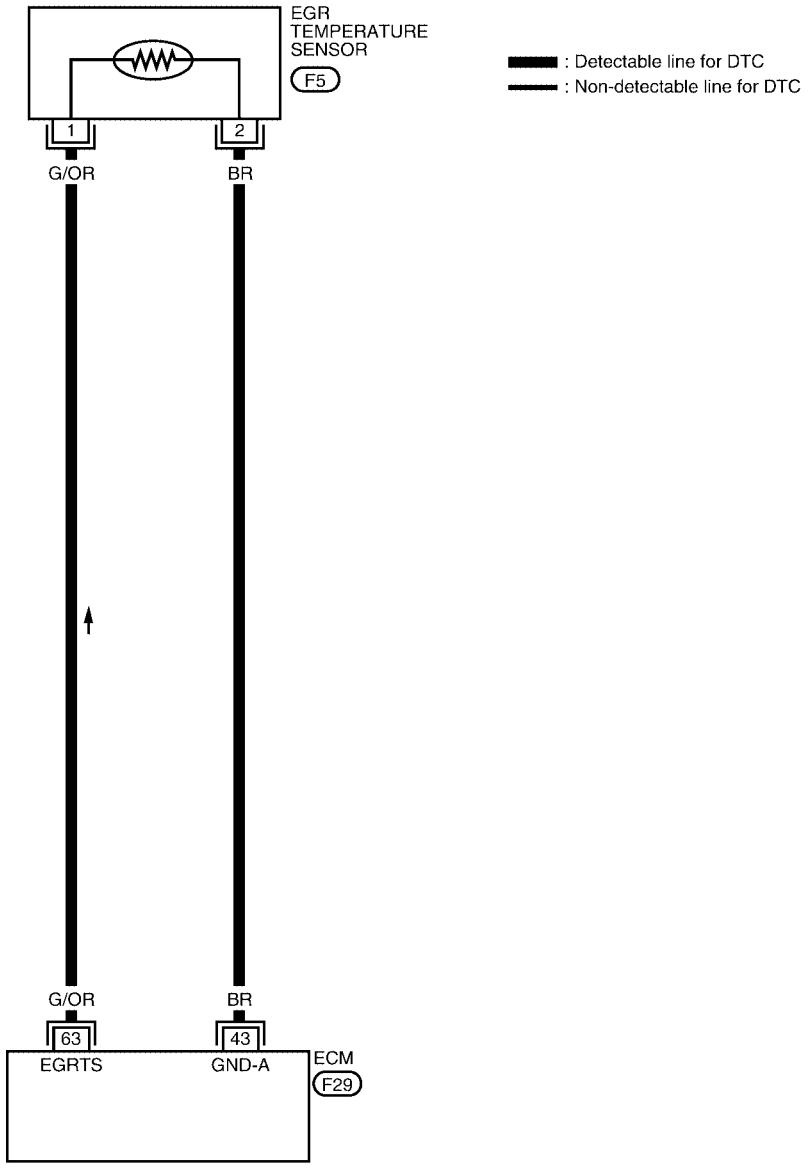
3. Check voltage between ECM terminal 63 (EGR temperature sensor signal) and ground at about 1,500 rpm with EGR valve lifted up to the full position by hand.
   Voltage should decrease to less than 1.5V.
4. If NG, go to EC-901, "Diagnostic Procedure" .
   If OK, perform trouble diagnoses for DTC P0400 and P1400. Refer to P0400 EC-882 and P1400 EC-1060 .

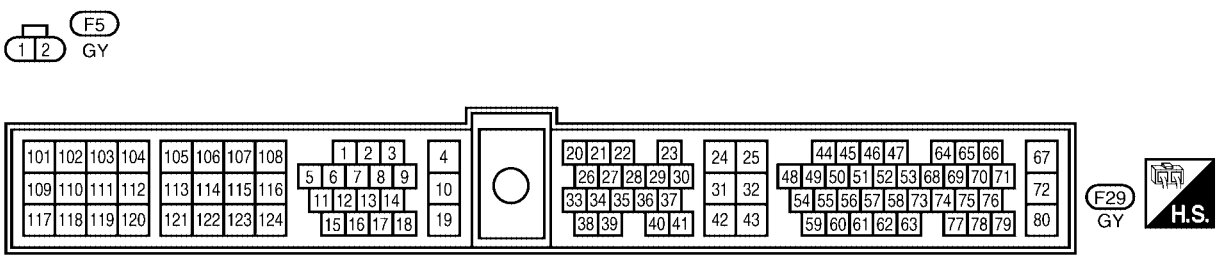


Wiring Diagram

UBS00DKG

EC-EGR/TS-01





BBWA0506E

Diagnostic Procedure

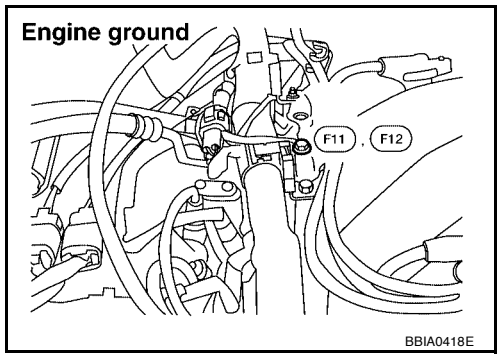
UBS00DKH

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

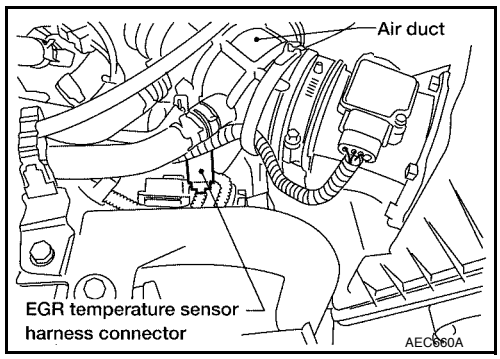
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



2. CHECK EGR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect EGR temperature sensor harness connector.
2. Turn ignition switch ON.

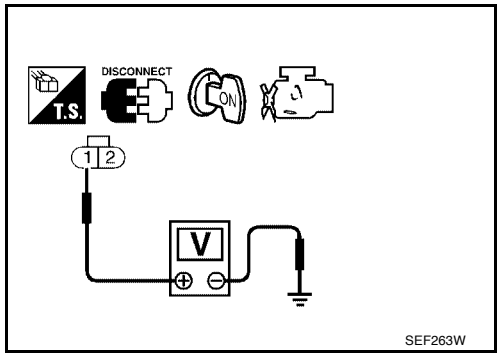


3. Check voltage between EGR temperature sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.
NG >> Repair harness or connectors.



3. CHECK EGR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EGR temperature sensor terminal 2 and ECM terminal 43.
   Refer to the 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 connector.

4. CHECK EGR TEMPERATURE SENSOR

Refer to EC-902, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace EGR temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Perform EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

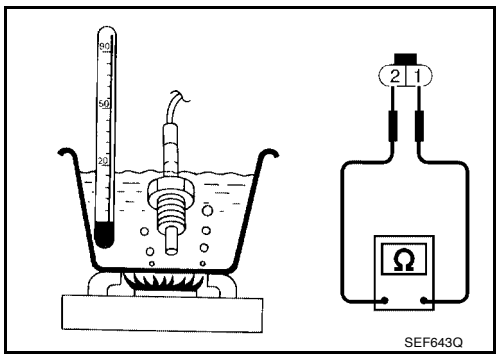
>> **INSPECTION END**

Component Inspection

UBS00DKI

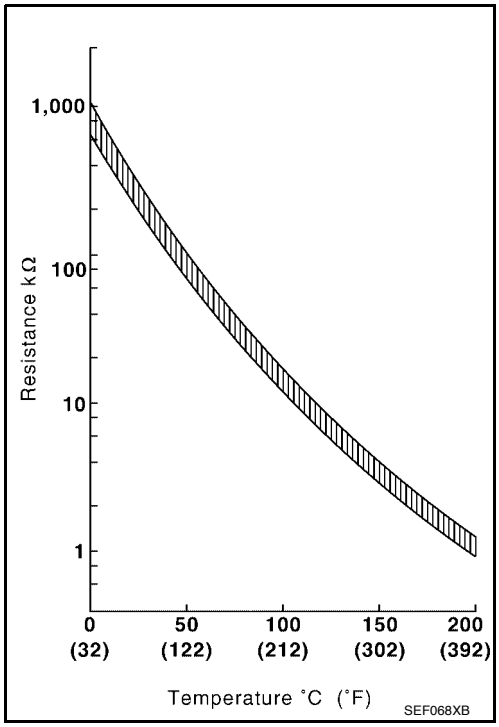
EGR TEMPERATURE SENSOR

1. Check resistance change and resistance value.



<Reference data>

EGR temperature °C (°F)	Voltage [V]	Resistance MΩ
0 (32)	4.56	0.62 - 1.05
50 (122)	2.25	0.065 - 0.094
100 (212)	0.59	0.011 - 0.015



2. If NG, replace EGR temperature sensor.

Removal and Installation

UBS00DKJ

EGR TEMPERATURE SENSOR

Refer to EM-80, "OUTER COMPONENT PARTS" .

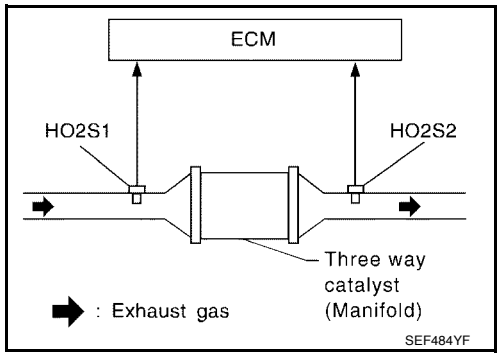
DTC P0420, P0430 THREE WAY CATALYST FUNCTION

PFP:20905

On Board Diagnosis Logic

UBS00DKK

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 and 2.
A three way catalyst (Manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of heated oxygen sensors 1 and 2 approaches a specified limit value, the three way catalyst (Manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420 (Bank 1) P0430 (Bank 2)	Catalyst system efficiency below threshold	● Three way catalyst (Manifold) does not operate properly. ● Three way catalyst (Manifold) does not have enough oxygen storage capacity.	● Three way catalyst (Manifold) ● Exhaust tube ● Intake air leaks ● Fuel injector ● Fuel injector leaks ● Spark plug ● Improper ignition timing

DTC Confirmation Procedure

UBS00DKL

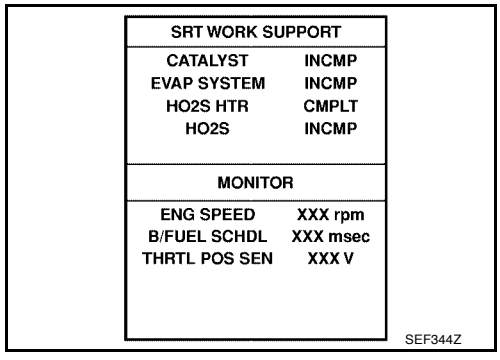
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

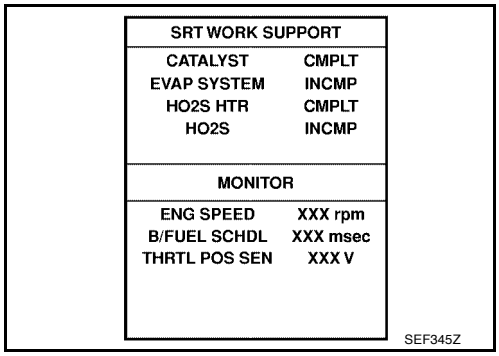
TESTING CONDITION

- **Do not hold engine speed for more than the specified minutes below.**

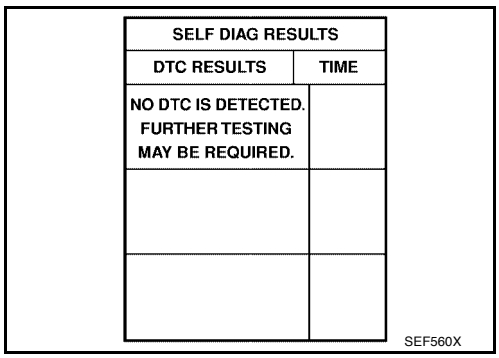
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
7. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
   If “INCMP” of “CATALYST” changed to “COMPLT”, go to step 10.
8. Wait 5 seconds at idle.



9. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).
If not “CMPLT”, perform the following.



10. Select “SELF-DIAG RESULTS” mode with CONSULT-II.
11. Confirm that the 1st trip DTC is not detected.
If the 1st trip DTC is detected, go to EC-905, "Diagnostic Procedure" .



Overall Function Check

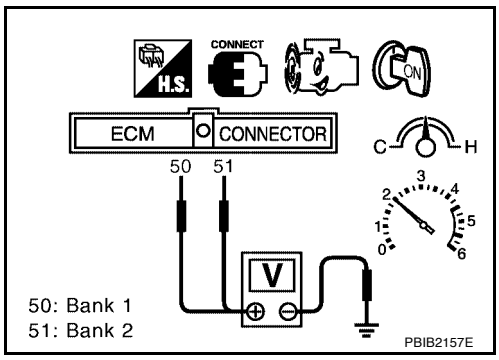
UBS00DKM

Use this procedure to check the overall function of the three way catalyst (manifold). During this check, a DTC might not be confirmed.

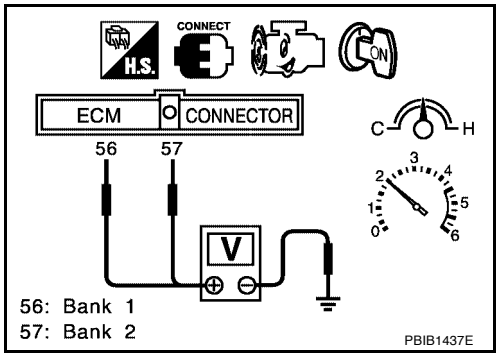
CAUTION:
Always drive vehicle at a safe speed.

WITH GST

1. Start engine and warm it up to the normal operation temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeters probes between ECM terminals 50 [HO2S1 (B1) signal], 51 [HO2S1 (B2) signal] and ground, and ECM terminals 56 [HO2S2 (B1) signal], 57 [HO2S2 (B2) signal] and ground.
6. Keep engine speed at 2,000 rpm constant under no load.



7. Make sure that the voltage switching frequency (high & low) between ECM terminals 56 and ground, or 57 and ground is very less than that of ECM terminals 50 and ground, or 51 and ground.
Switching frequency ratio = A/B
A: Heated oxygen sensor 2 voltage switching frequency
B: Heated oxygen sensor 1 voltage switching frequency
This ratio should be less than 0.75.
If the ratio is greater than above, it means three way catalyst (manifold) does not operate properly. Go to EC-905, "Diagnostic Procedure" .



NOTE:
If the voltage at terminal 50 or 51 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for DTC P0133, P0153 first. (See EC-787, "DTC P0133, P0153 HO2S1" .)

Diagnostic Procedure

UBS00DKN

1. CHECK EXHAUST SYSTEM

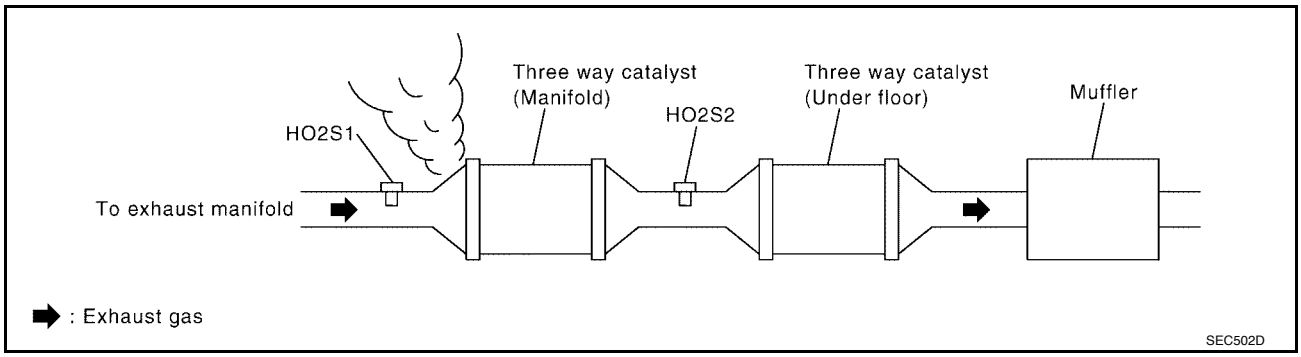
Visually check exhaust tubes and muffler for dent.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace it.

2. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK IGNITION TIMING

Check the following items. Refer to EC-652, "Basic Inspection" .

Items	Specifications
Ignitions timing	M/T: 10 ± 5° BTDC (in Neutral position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

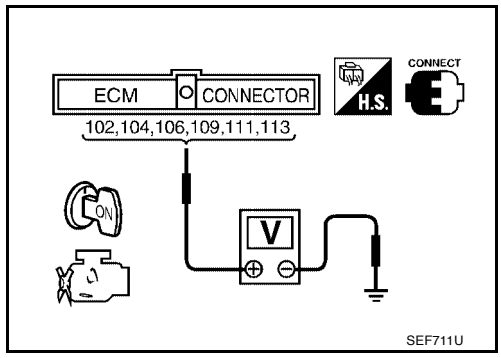
OK or NG

OK >> GO TO 5.
NG >> Adjust ignition timing.

5. CHECK INJECTORS

1. Refer to Wiring Diagram for Injectors, EC-1149 .
2. Stop engine and then turn ignition switch ON.
3. Check voltage between ECM terminals 102, 104, 106, 109, 111 and 113 and ground with CONSULT-II or tester.

Battery voltage should exist.

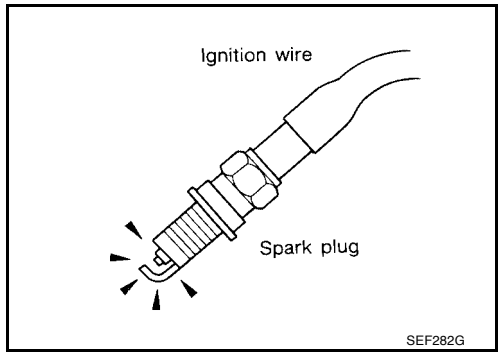


OK or NG

OK >> GO TO 6.
NG >> Perform EC-1148, "INJECTOR CIRCUIT" .

6. CHECK IGNITION SPARK

1. Turn ignition switch OFF.
2. Disconnect ignition wire from spark plug.
3. Connect a known-good spark plug to the ignition wire.
4. Disconnect all injector harness connectors.
5. Place end of spark plug against a suitable ground and crank engine.
6. Check for spark.

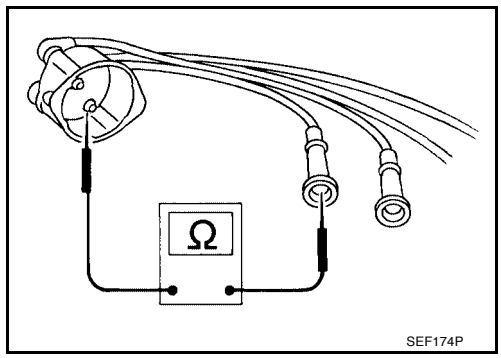


OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. CHECK IGNITION WIRES

1. Inspect wires for cracks, damage, burned terminals and for improper fit.
2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.
Resistance:



Cylinder No.	Resistance kΩ [at 25°C (77°F)]
1	Approx. 6.5
2	Approx. 10.0
3	Approx. 8.5
4	Approx. 12.5
5	Approx. 8.5
6	Approx. 11.0

If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.

OK or NG

OK >> Check ignition coil, power transistor and their circuits. Refer to EC-1142, "IGNITION SIGNAL" .
NG >> Replace.

8. CHECK INJECTOR

1. Turn ignition switch OFF.
2. Remove injector assembly.
   Refer to EM-80, "OUTER COMPONENT PARTS" .
   Keep fuel hose and all injectors connected to injector gallery.
3. Reconnect all injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Turn ignition switch ON.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip)>>GO TO 9.
NG (Drips)>>Replace the injector(s) from which fuel is dripping.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Trouble is fixed>>**INSPECTION END**
Trouble is not fixed>>Replace three way catalyst (manifold).

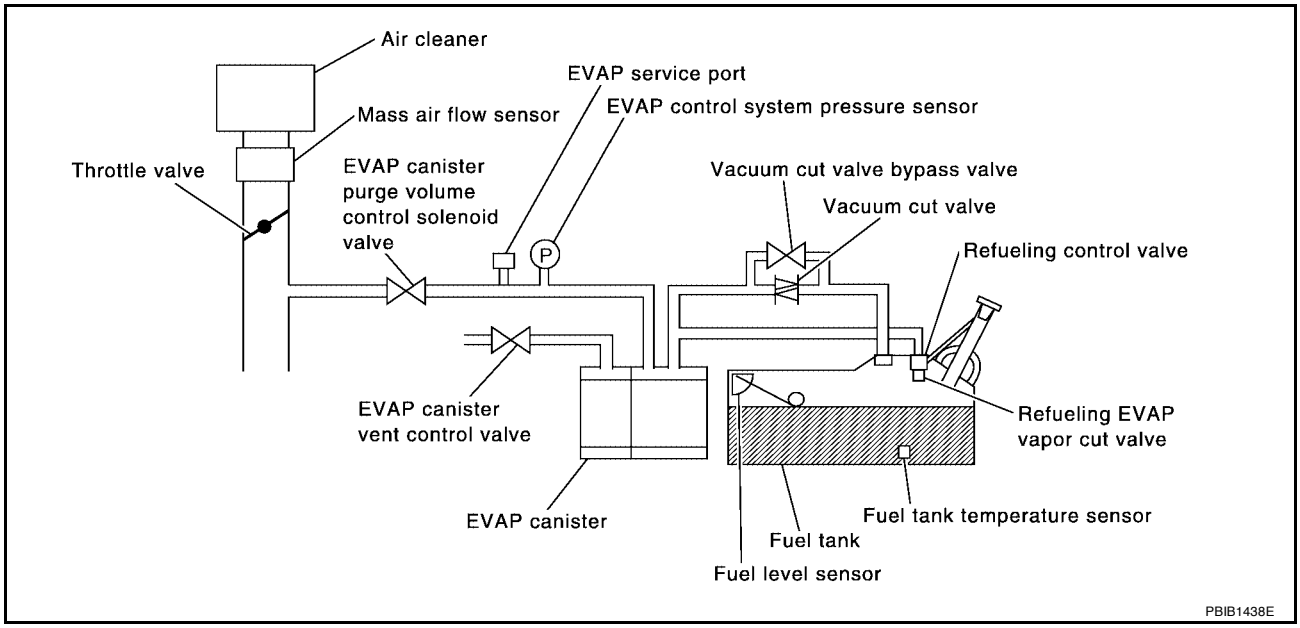
DTC P0441 EVAP CONTROL SYSTEM

PFP:14950

System Description

UBS00DKO

NOTE:
If DTC P0441 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-999 .)



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. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

UBS00DKP

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0441	EVAP control system incorrect purge flow	EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	● 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 ● Closed throttle position switch ● Blocked purge port ● EVAP canister vent control valve

DTC Confirmation Procedure

UBS00DKQ

CAUTION:
Always drive vehicle at a safe speed.

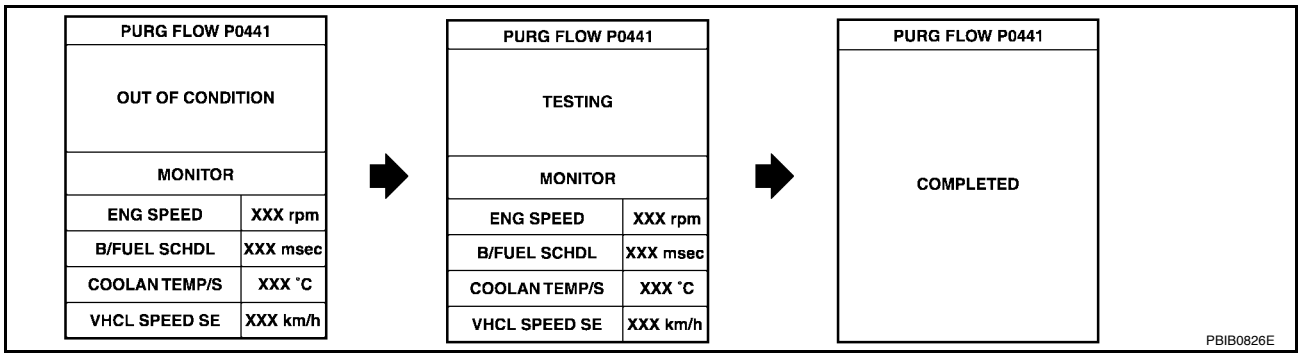
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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 5 seconds.
3. Start engine and let it idle for at least 70 seconds.
4. Select “PURG FLOW P0441” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” 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
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,400 rpm
B/FUEL SCHDL	1.0 - 10.0 msec
COOLAN TEMP/S	0 - 119°C (32 - 246°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 EC-910, "Diagnostic Procedure" .

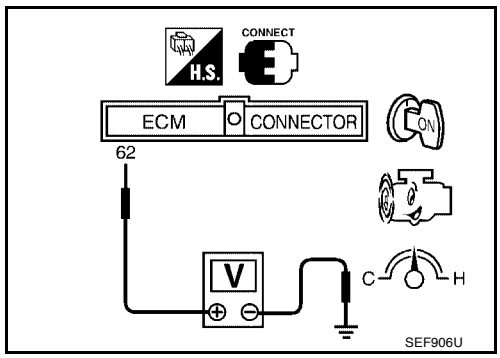
Overall Function Check

UBS00DKR

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 5 seconds.
4. Start engine and wait at least 70 seconds.
5. Set voltmeter probes to ECM terminals 62 (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
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 EC-910, "Diagnostic Procedure" .

Diagnostic Procedure

UBS00DKS

1. CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

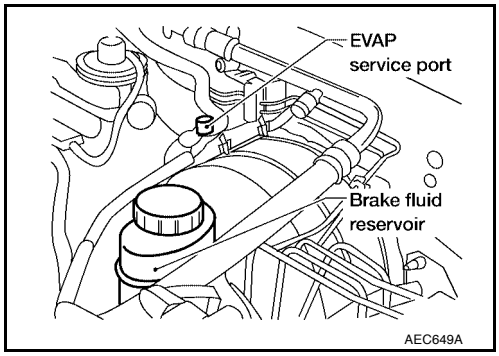
OK or NG

OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> Replace EVAP canister.

2. CHECK PURGE FLOW

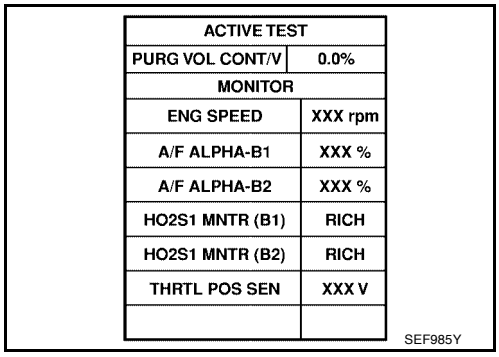
With CONSULT-II

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.

PURG VOL CONT/V	VACUUM
100%	Should exist
0%	Should not exist



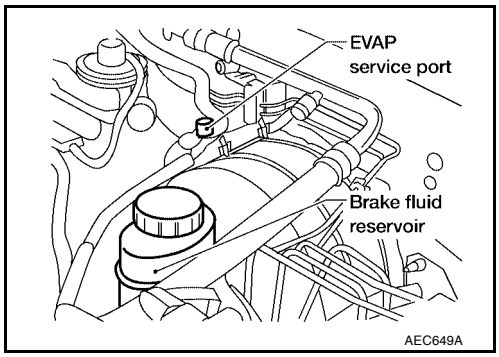
OK or NG

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

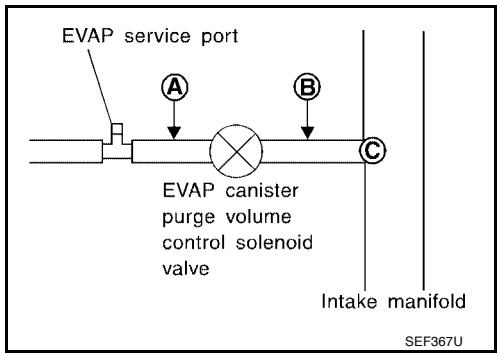
1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection.
   Refer to EC-1174, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 5.
NG >> Repair it.

5. CHECK EVAP PURGE HOSE AND PURGE PORT

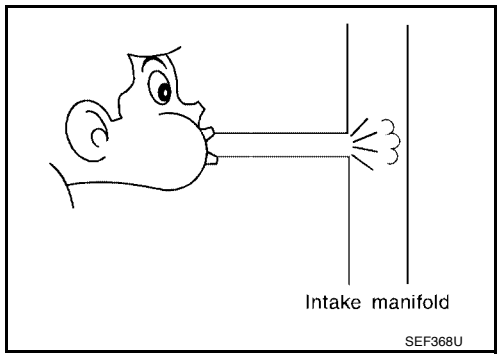
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B** .
2. Blow air into each hose and EVAP purge port **C** .



3. Check that air flows freely.

OK or NG

OK (with CONSULT-II)>>GO TO 6.
OK (without CONSULT-II)>>GO TO 7.
NG >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

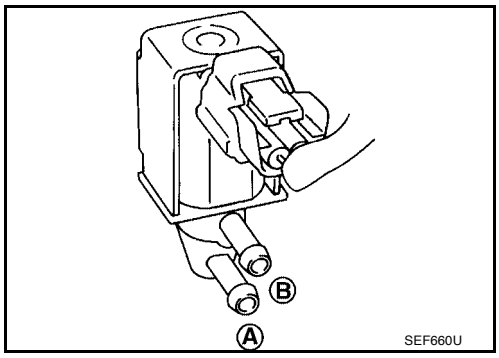
1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.
   If OK, inspection end. If NG, go to following step.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No



SEF660U

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

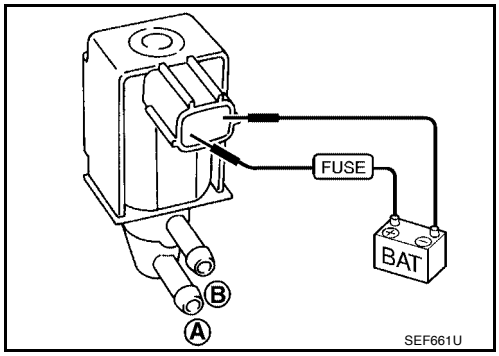
OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Without CONSULT-II

Check air passage continuity.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



SEF661U

If NG, replace the EVAP canister purge volume control solenoid valve.

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

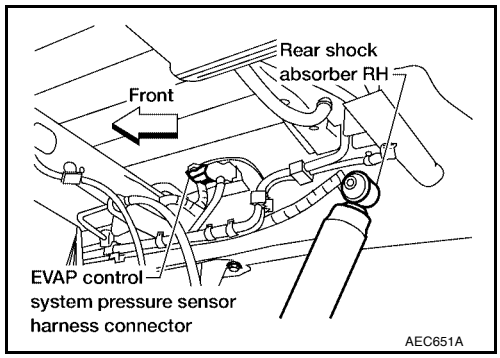
OK >> GO TO 9.
NG >> Repair it.

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 P0452, EC-941 or P0453, EC-950 .

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP control system pressure sensor.

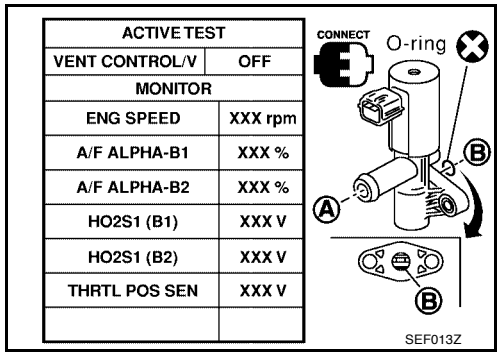
11. CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1second.



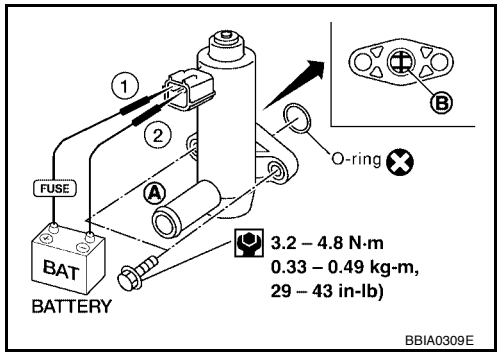
Without CONSULT-II

1. Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1second.

If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.
Make sure new O-ring is installed properly.



OK (With CONSULT-II)>>GO TO 12.
OK (Without CONSULT-II)>>GO TO 13.
NG >> Replace EVAP canister vent control valve.

12. CHECK CLOSED THROTTLE POSITION SWITCH

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Check indication of “CLSD THL/P SW”.
   Measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

If NG, adjust closed throttle position switch.
Check the following items. Refer to EC-652, "Basic Inspection" .

Items	Specifications
Ignitions timing	M/T: 10 ± 5° BTDC (in Neutral position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

6. If it is impossible to adjust closed throttle position switch in “Basic Inspection”, replace closed throttle position switch.

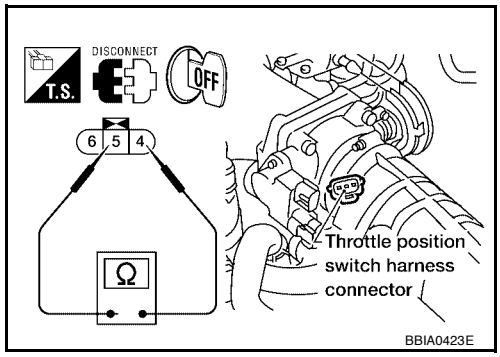
OK or NG

OK >> GO TO 14.
NG >> Replace throttle position switch with throttle position sensor.

13. CHECK CLOSED THROTTLE POSITION SWITCH

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect closed throttle position switch harness connector.
4. Check continuity between closed throttle position switch terminals 4 and 5.
   Resistance measurement must be made with closed throttle position switch installed in vehicle.



Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely closed	No

If NG, adjust closed throttle position switch.
Check the following items. Refer to EC-652, "Basic Inspection" .

Items	Specifications
Ignitions timing	M/T: 10 ± 5° BTDC (in Neutral position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

5. If it is impossible to adjust closed throttle position switch in “Basic Inspection”, replace closed throttle position switch.

OK or NG

OK >> GO TO 14.
NG >> Replace throttle position switch with throttle position sensor.

14. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to EC-1174, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 15.
NG >> Replace it.

15. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 16.

16. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0442 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS00DKT

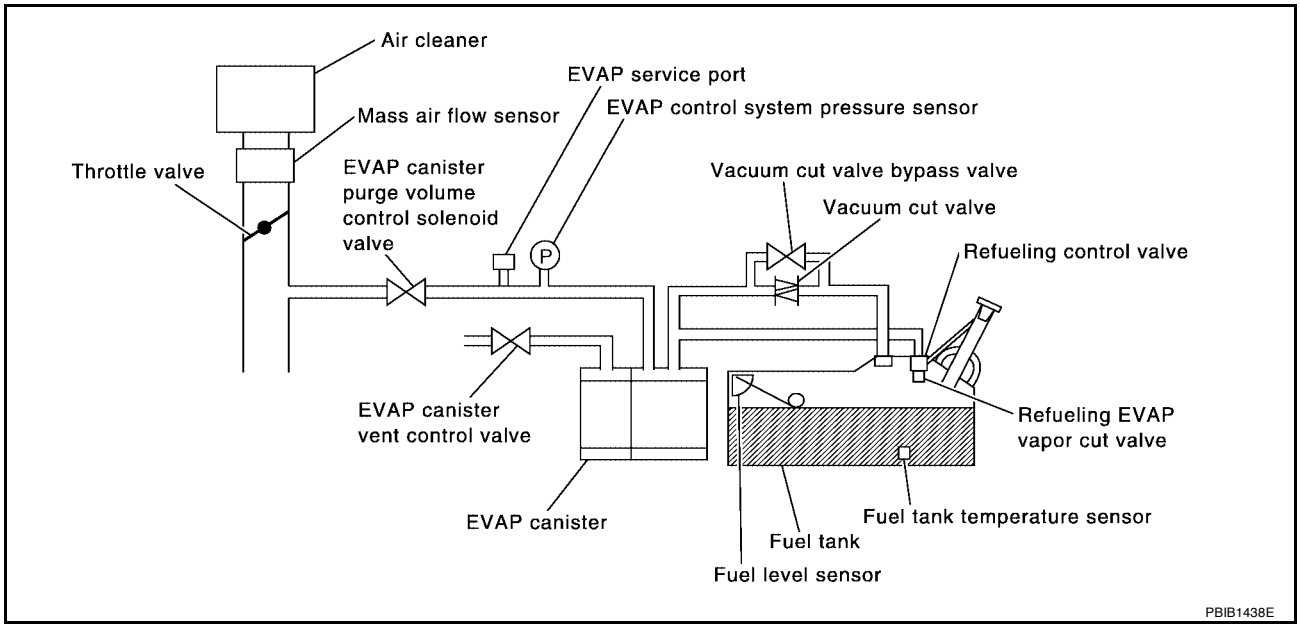
NOTE:

If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1090 .)

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.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	● 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 ● 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 ● Refueling EVAP vapor cut valve ● ORVR system leaks

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.**

DTC Confirmation Procedure

UBS00DKU

NOTE:

- **If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1090 .)**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

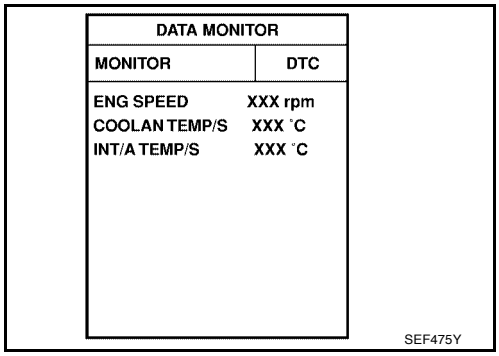
TESTING CONDITION:

- **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 procedure.**

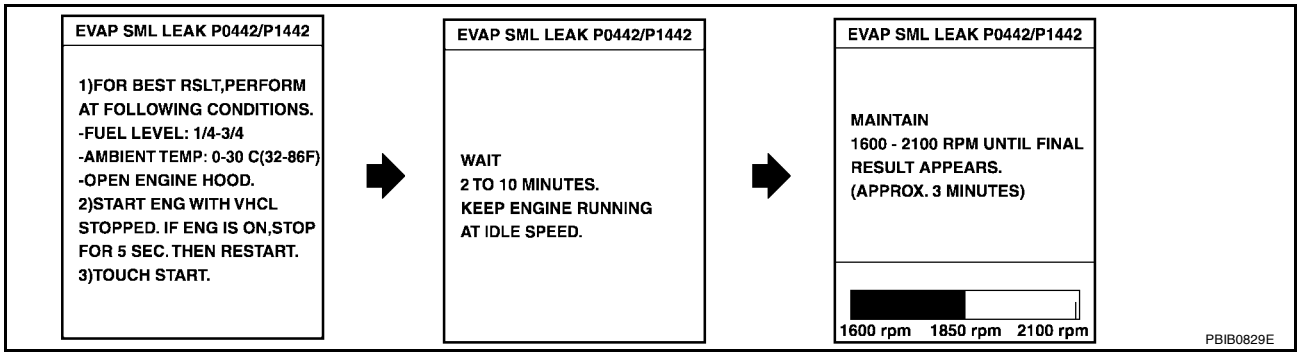
WITH CONSULT-II

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 5 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 - 32°C (32 - 90°F)
   INT/A TEMP SE: More than 0°C (32°F)



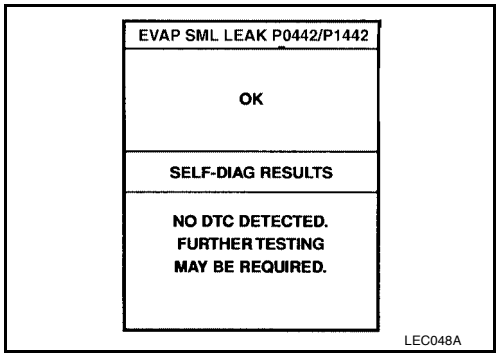
5. Select “EVAP SML LEAK P0442/P1442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.



NOTE:
If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-652, "Basic Inspection" .

6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-919, "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 EC-635, "Driving Pattern" before driving vehicle.

1. Start engine.
2. Drive vehicle according to EC-635, "Driving Pattern" .
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 5 seconds.
6. Start engine.
   It is not necessary to cool engine down before driving.
7. Drive vehicle again according to the EC-635, "Driving Pattern" .
8. Stop vehicle.
9. Select MODE 3 with GST.

- If P0442 is displayed on the screen, go to EC-919, "Diagnostic Procedure" .
- If P0441 is displayed on the screen, go to Diagnostic Procedure for DTC P0441, EC-910, "Diagnostic Procedure" .
- If P0442 and P0441 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

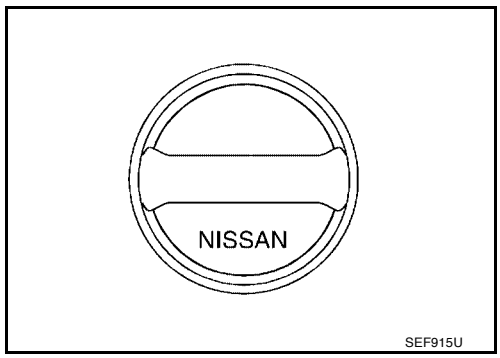
UBS00DKV

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

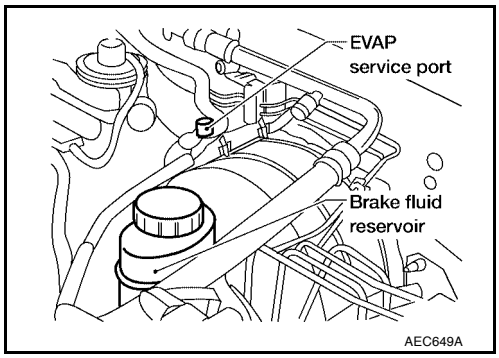
Refer to EC-1176, "Component Inspection" .

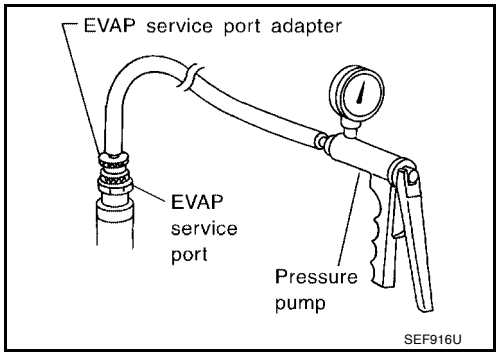
OK or NG

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.

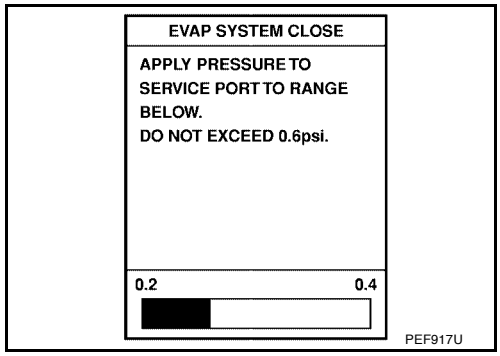
With CONSULT-II>>GO TO 6.
Without CONSULT-II>>GO TO 7.

6. CHECK FOR EVAP LEAK

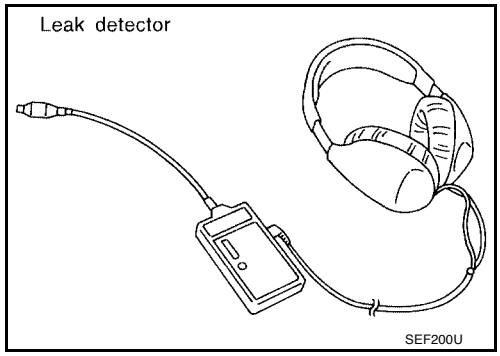
With CONSULT-II

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-1174, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

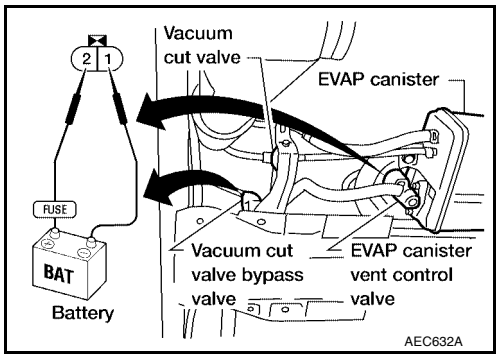
OK >> GO TO 8.
NG >> Repair or replace.

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.

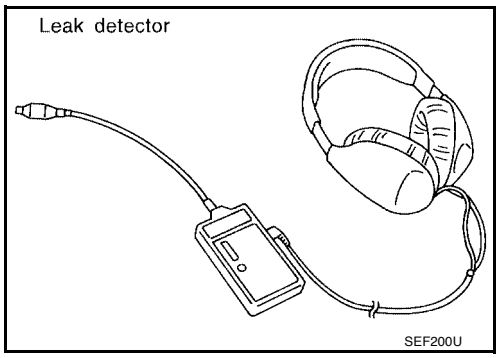
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-1174, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 8.
NG >> Repair or replace.



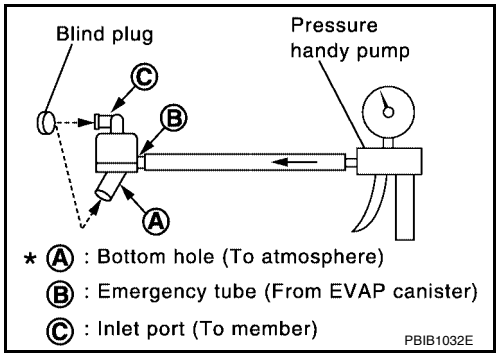
8. CHECK WATER SEPARATOR

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.

OK or NG

OK >> GO TO 9.
NG >> Replace water separator.



9. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

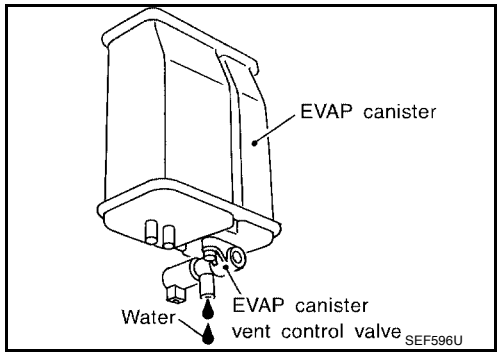
Refer to EC-1090, "DTC Confirmation Procedure" .

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. Check if water will 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%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

OK or NG

OK >> GO TO 17.
NG >> GO TO 15.

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-604, "Vacuum Hose Drawing" .

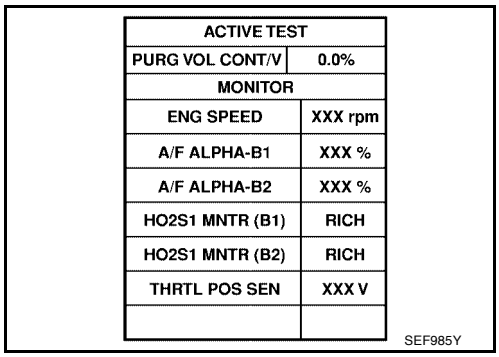
OK or NG

OK >> GO TO 16.
NG >> Repair or reconnect the hose.

16. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

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.



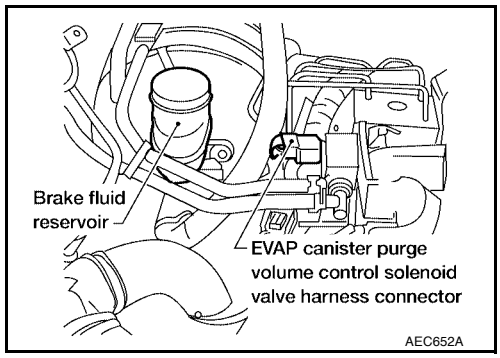
OK or NG

OK >> GO TO 18.
NG >> GO TO 17.

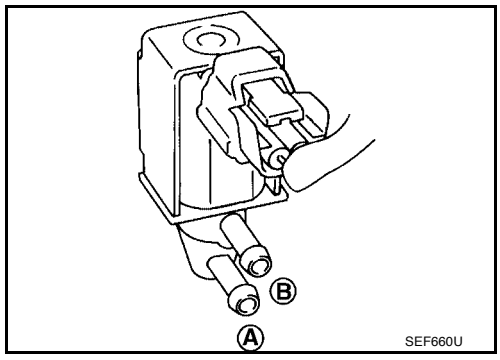
17. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

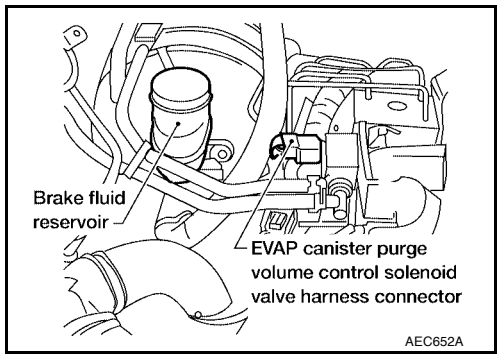


Condition PURG VOL CONT/V value	Air passage continuity between A or B
100%	Yes
0%	No

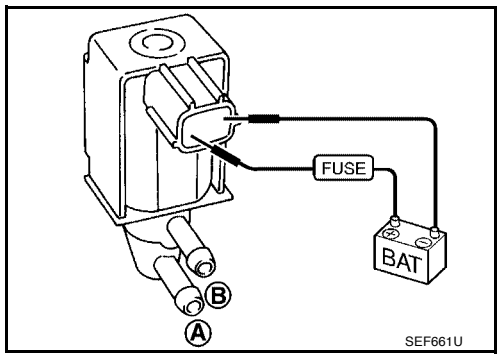


Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition	Air passage continuity between A or B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



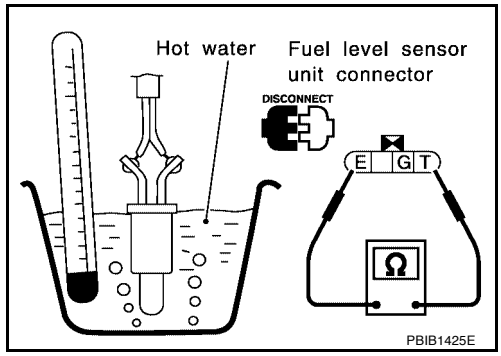
OK or NG

OK >> GO TO 18.

NG >> Replace EVAP canister purge volume control solenoid valve.

18. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals 1 and 2 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

OK or NG

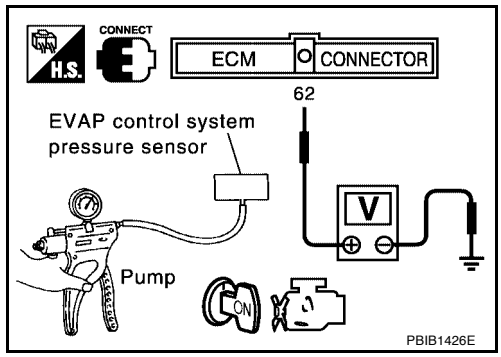
OK >> GO TO 19.
NG >> Replace fuel tank temperature sensor.

19. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
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 −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

5. Check input voltage between ECM terminal 62 and ground.



Applied vacuum	Voltage V
Not applied	1.8 - 4.8
-26.7 kpa (-200 mmHg, -7.87 inHg)	2.1 to 2.5V lower than above value

CAUTION:
- **Discard and EVAP control system pressure 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.**

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-1174, "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-1181, "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-1181, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 25.
NG >> Replace refueling control valve with fuel tank.

25. CHECK FUEL LEVEL SENSOR

Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 26.
NG >> Replace fuel level sensor unit.

26. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

UBS00DKW

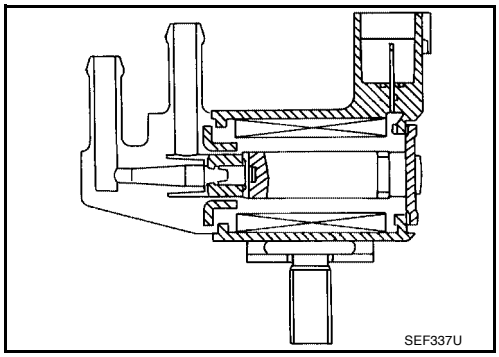
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	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		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	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

UBS00DKX

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

On Board Diagnosis Logic

UBS00DKY

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	● Harness or connectors (The solenoid valve circuit is open or shorted.) ● EVAP canister purge volume control solenoid valve
P0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	● Harness or connectors (The solenoid valve circuit is shorted.) ● EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

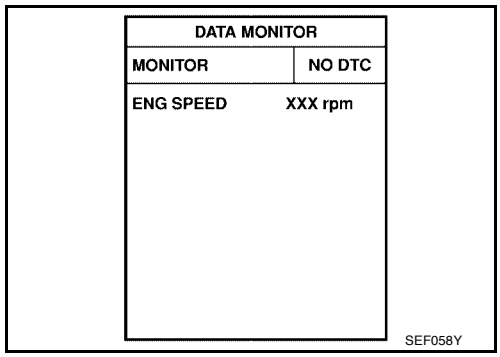
UBS00DKZ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-932, "Diagnostic Procedure"
.



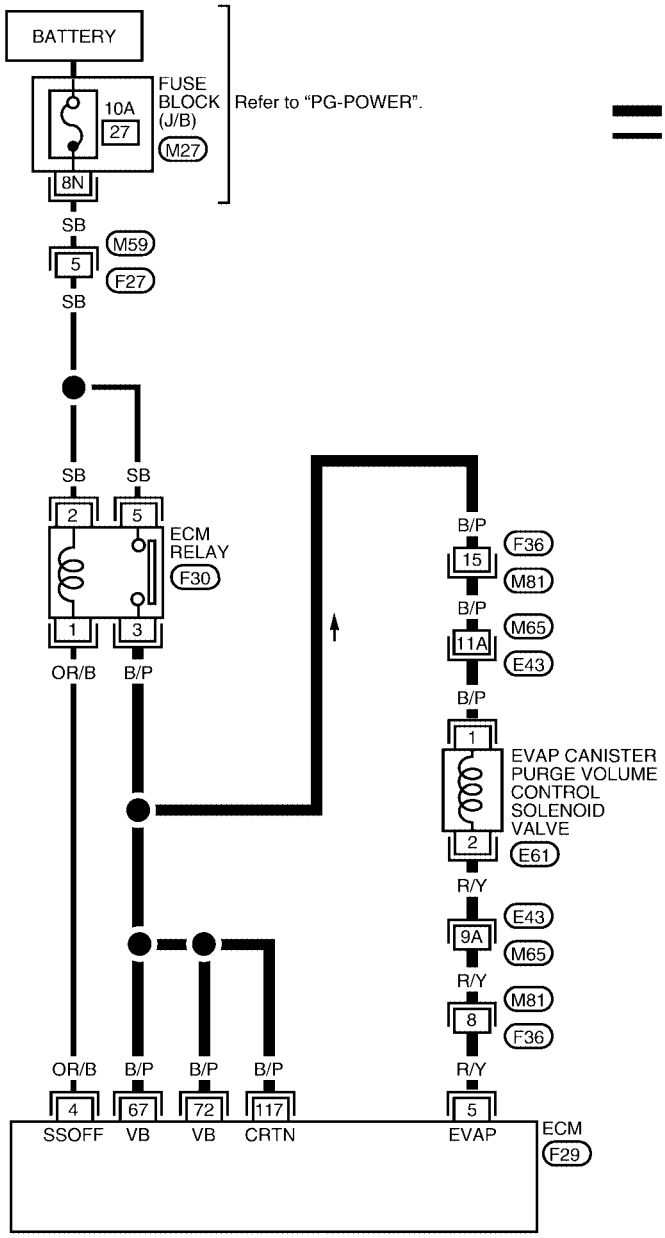
WITH GST

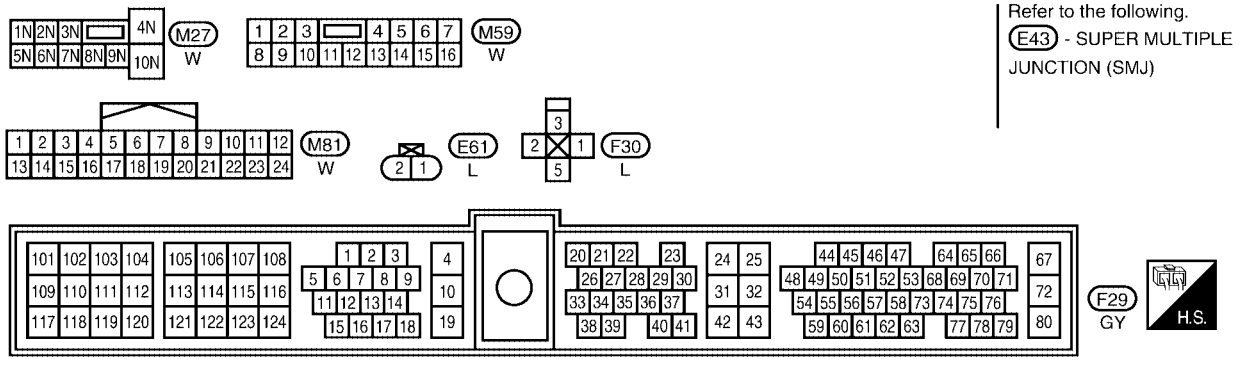
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DL0

EC-PGC/V-01



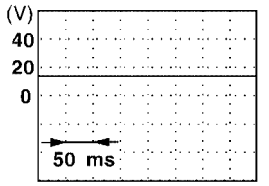
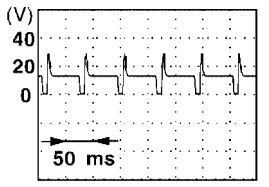


BBWA1085E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★  SEF995U
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

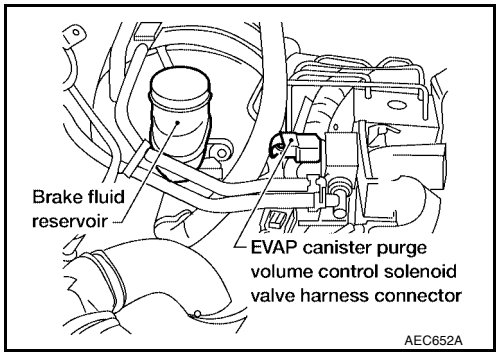
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00DL1

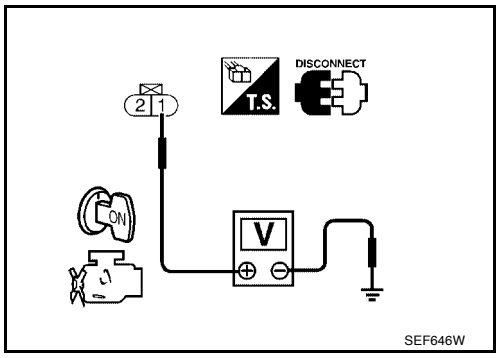
1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.



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.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F36, M81
- Harness connectors M65, E43
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 5 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 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M81, F36
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

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 7.
NG >> GO TO 6.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

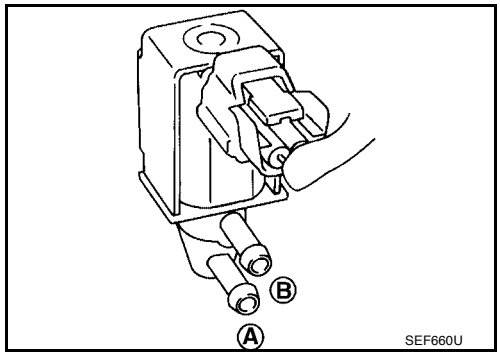
SEF985Y

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Check air passage continuity under the following conditions.

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No



SEF660U

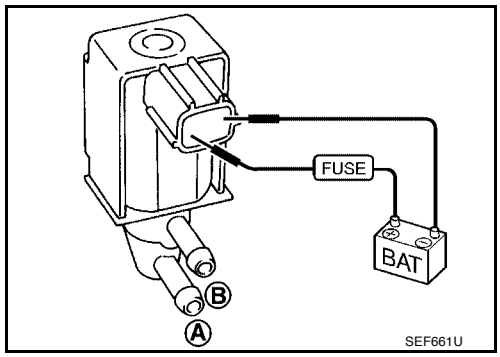
Without CONSULT-II

1. Check air passage continuity 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

OK or NG

OK >> GO TO 7.
NG >> Replace EVAP canister purge volume control solenoid valve.



SEF661U

7. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

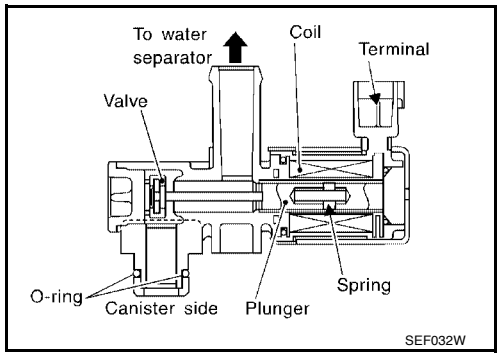
DTC P0447 EVAP CANISTER VENT CONTROL VALVE

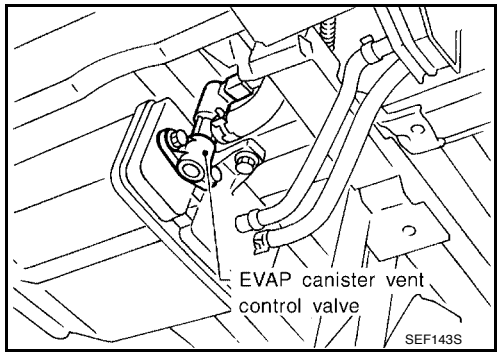
PFP:14935

Component Description

UBS00DL2

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

UBS00DL3

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00DL4

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447	EVAP canister vent control valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	● Harness or connectors (The valve circuit is open or shorted.) ● EVAP canister vent control valve

DTC Confirmation Procedure

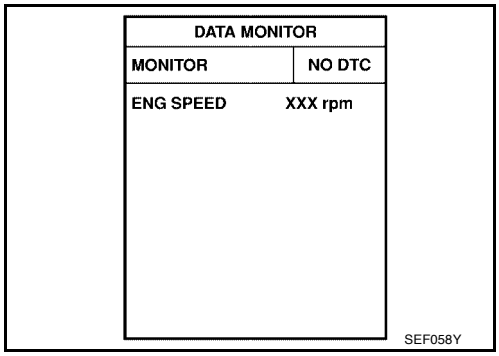
UBS00DL5

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-938, "Diagnostic Procedure"
.

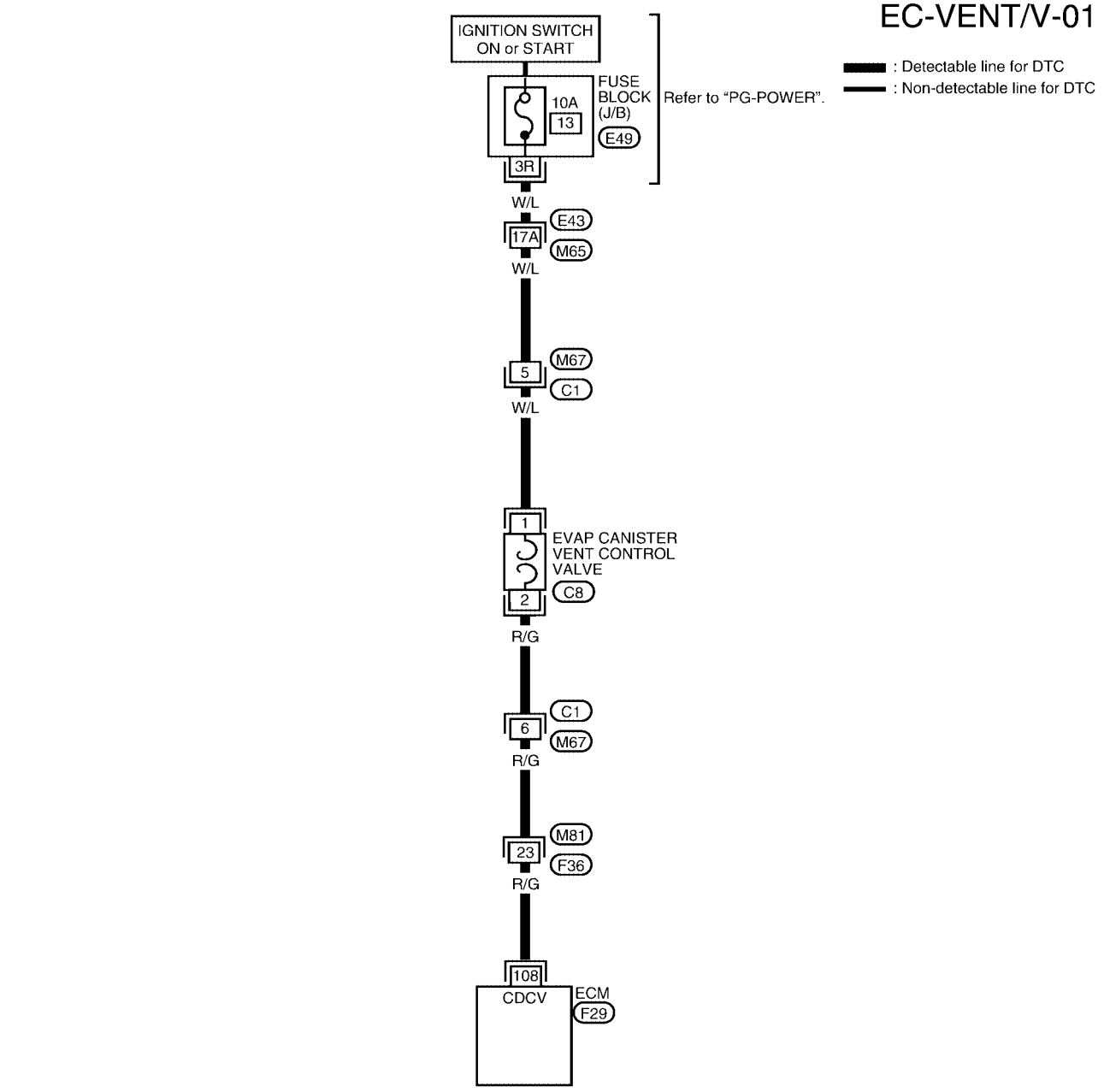


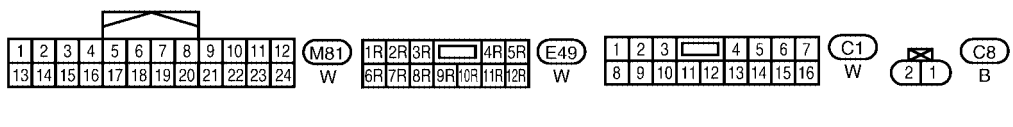
WITH GST

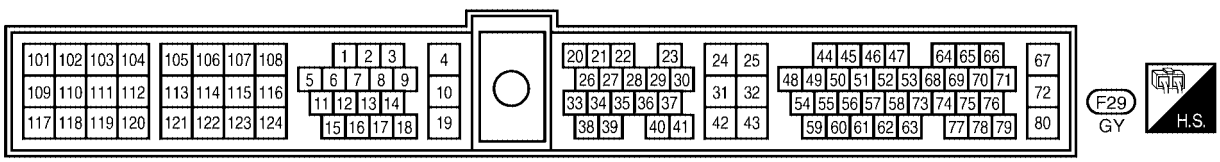
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DL6







BBWA1086E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00DL7

1. INSPECTION START

Do you have CONSULT-II?

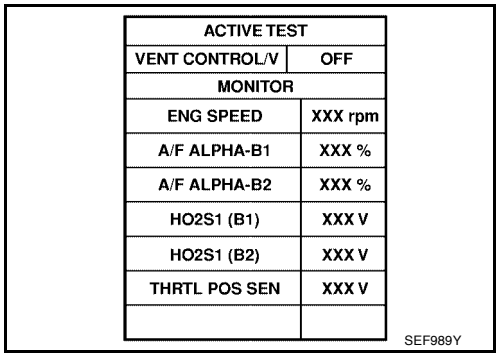
Yes or No

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.

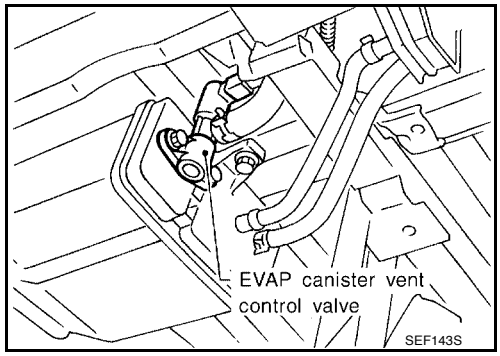


OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

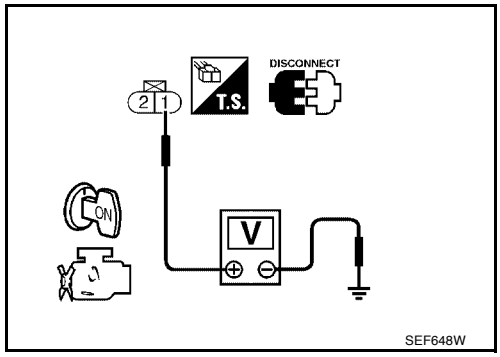
3. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

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 E43, M65
- Harness connectors M67, C1
- Fuse block (J/B) connector E49
- 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 108 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 C1, M67
- Harness connectors M81, F36
- 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.

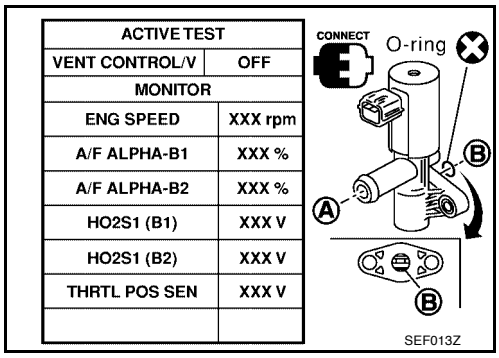
7. CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

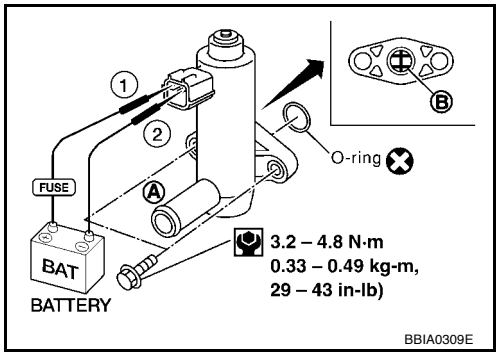


Without CONSULT-II

1. 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	No
OFF	Yes

Operation takes less than 1 second.
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.
Make sure new O-ring is installed properly.



OK or NG

OK >> GO TO 8.
NG >> Replace EVAP canister vent control valve.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

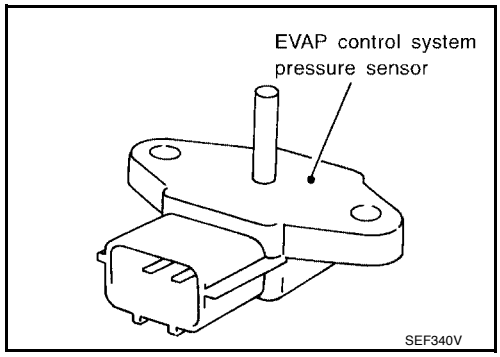
DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

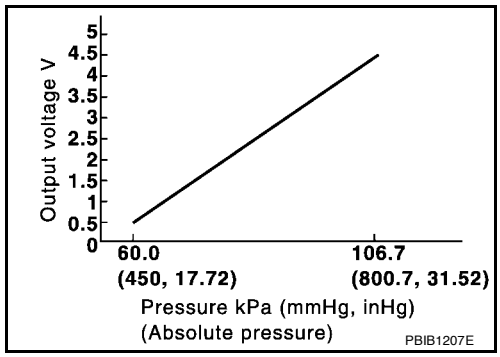
PFP:25085

Component Description

UBS00DL8

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

UBS00DL9

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

UBS00DLA

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● EVAP control system pressure sensor

DTC Confirmation Procedure

UBS00DLB

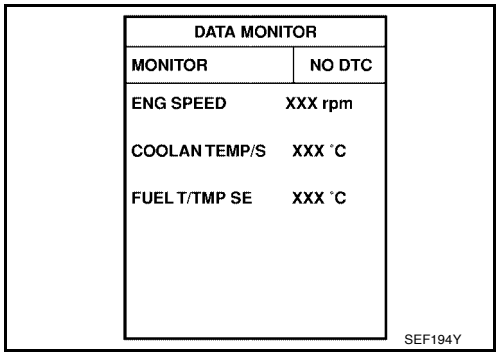
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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 5 seconds.
3. Turn ignition switch ON.

4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “FUEL T/TMP 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-944, "Diagnostic Procedure" .



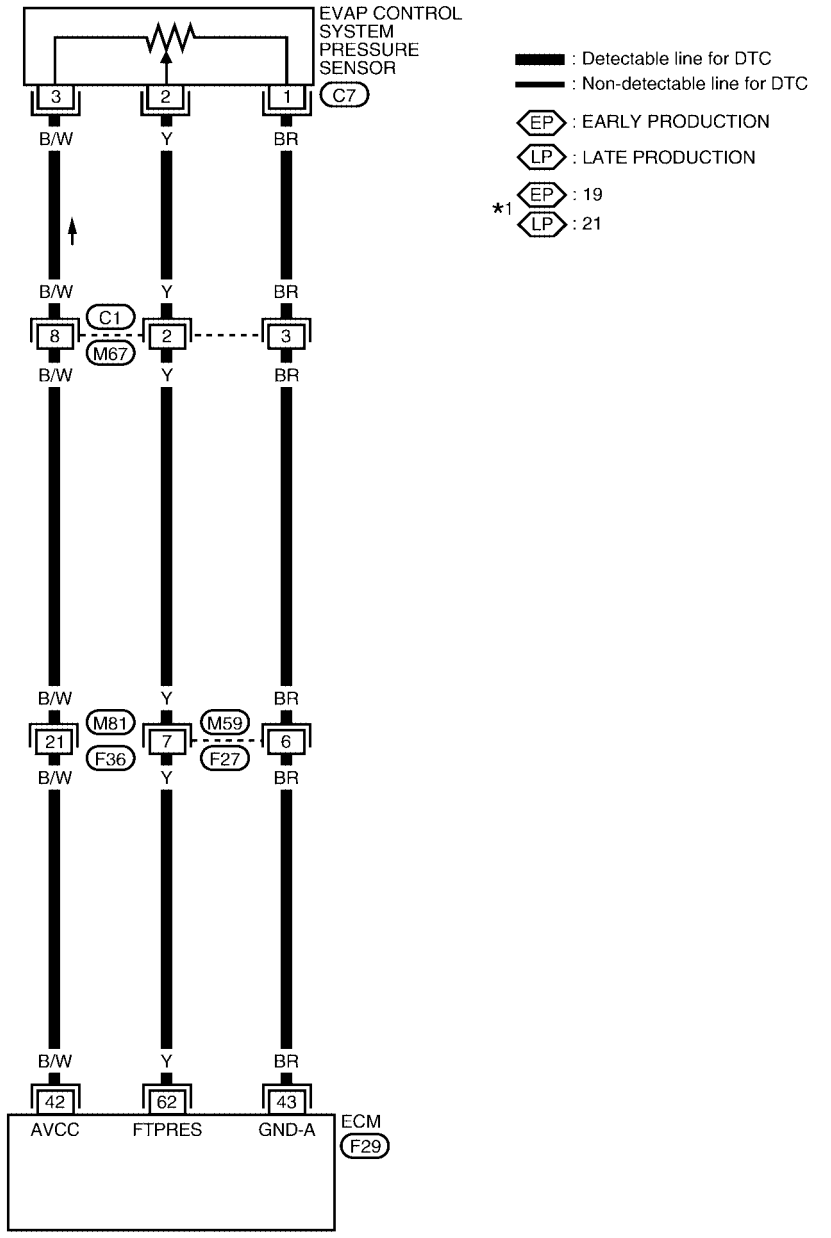
WITH GST

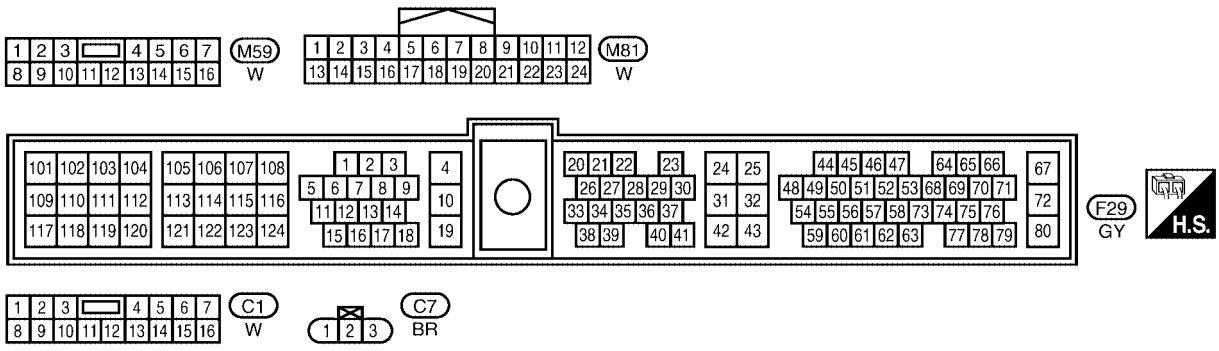
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 60 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select MODE 7 with GST.
   If 1st trip DTC is detected, go to EC-944, "Diagnostic Procedure" .

Wiring Diagram

UBS00DLC

EC-PRE/SE-01





BBWA1087E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	B/W	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
43	BR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
62	Y	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V

Diagnostic Procedure

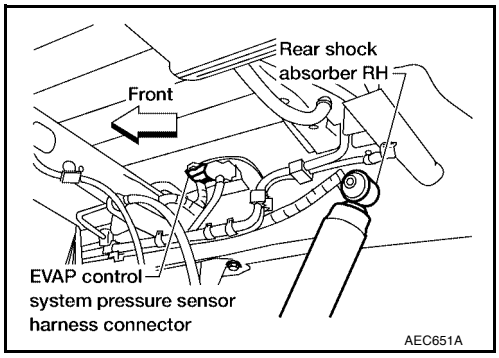
UBS00DLD

1. CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.

OK or NG

OK >> GO TO 2.
NG >> Reconnect, repair or replace.

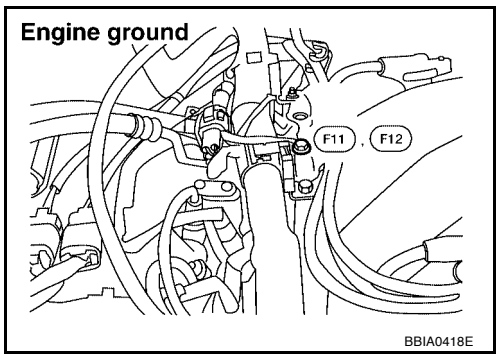


2. CHECK GROUND CONNECTIONS

Loosen and retighten ground screw.
Refer to EC-709, "Ground Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.



3. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.
   Water should not exist.

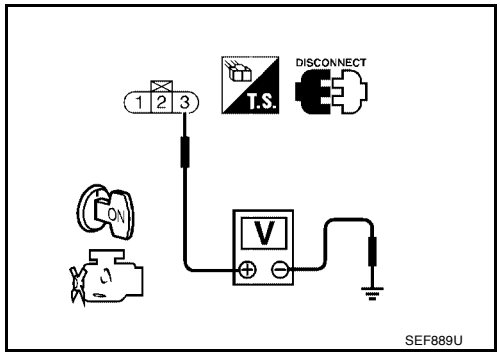
OK or NG

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 cnotrl system pressure sensor terminal 3 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 C1, M67
- Harness connectors M81, F36
- 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. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 43.
   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 C1, M67
- Harness connectors M59, F27
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 62 and EVAP control system pressure sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

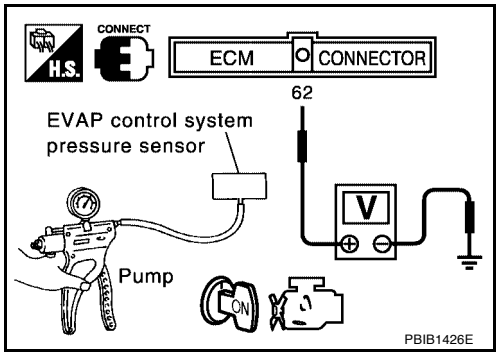
- Harness connectors C1, M67
- Harness connectors M59, F27
- Harness for open or short between ECM and EVAP control system pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
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.
5. Check input voltage between ECM terminal 62 and ground.

Applied vacuum	Voltage V
Not applied	1.8 - 4.8
−26.7 kpa (−200 mmHg, −7.87 inHg)	2.1 to 2.5 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.**

OK or NG

OK >> GO TO 14.
NG >> Replace EVAP control system pressure sensor.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

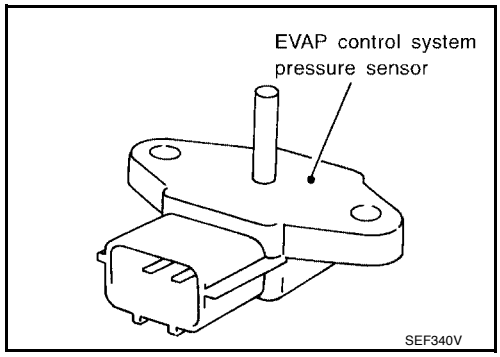
DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

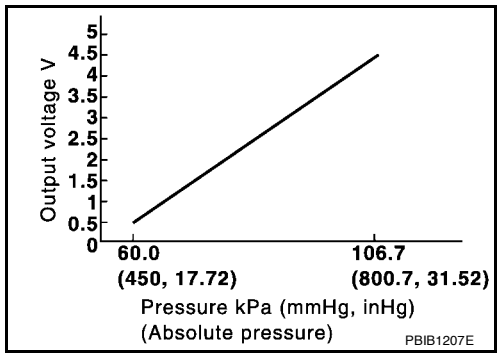
PFP:25085

Component Description

UBS00DLE

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

UBS00DLF

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

UBS00DLG

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453	EVAP control system pressure sensor high input	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● EVAP control system pressure sensor ● EVAP canister vent control valve ● EVAP canister ● Water separator ● Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

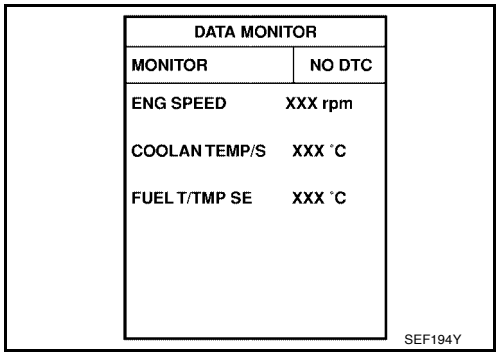
UBS00DLH

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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/TMP SE” is more than 0°C (32°F).
6. Wait at least 10 seconds.
7. If 1st trip DTC is detected, go to EC-950, "Diagnostic Procedure" .



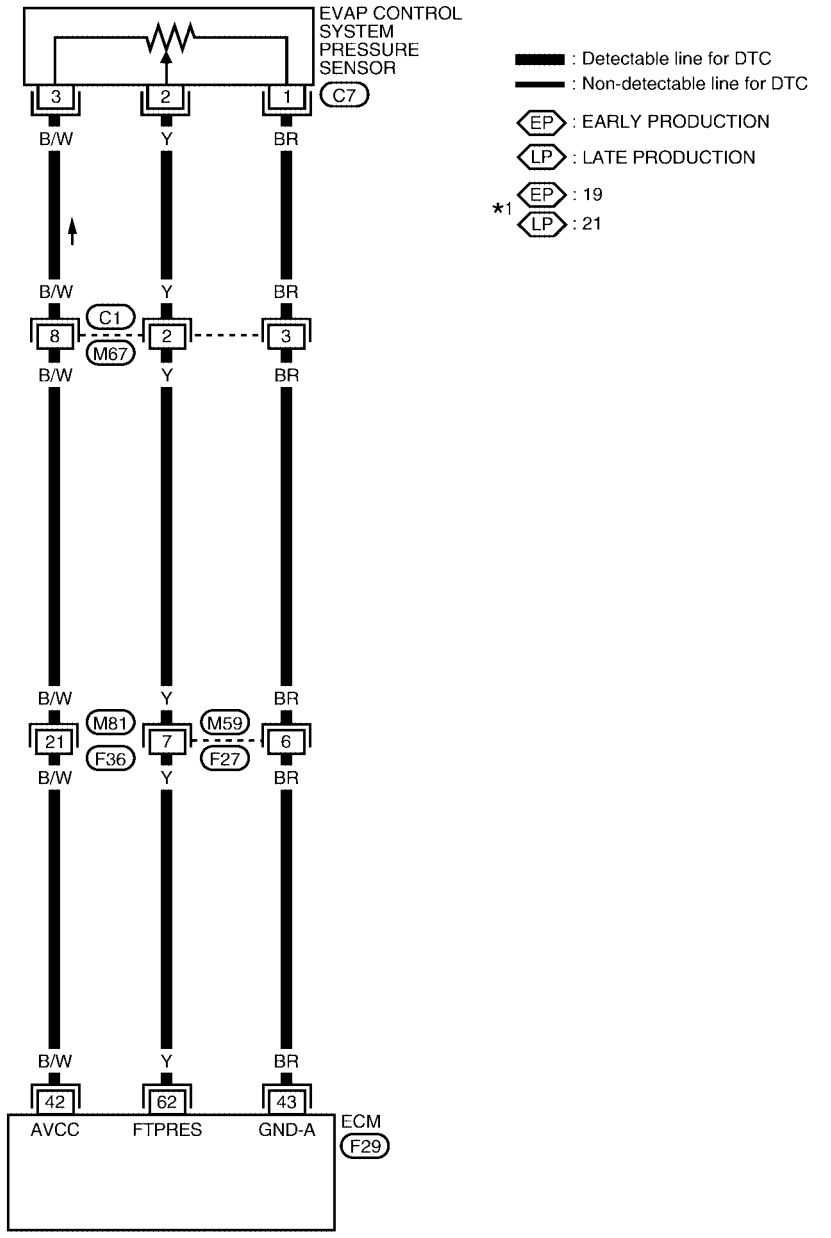
WITH GST

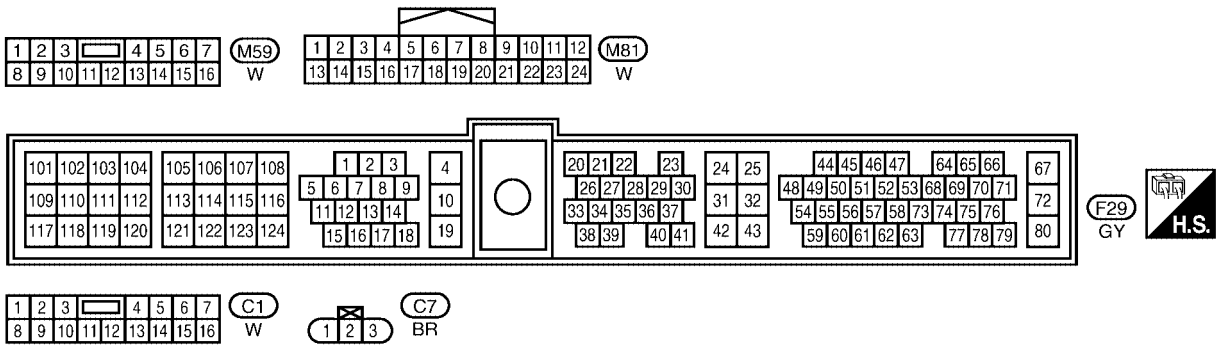
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 60 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Wait at least 10 seconds.
5. Select MODE 7 with GST.
   If 1st trip DTC is detected, go to EC-950, "Diagnostic Procedure" .

Wiring Diagram

UBS00DLI

EC-PRE/SE-01





BBWA1087E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	B/W	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
43	BR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
62	Y	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V

Diagnostic Procedure

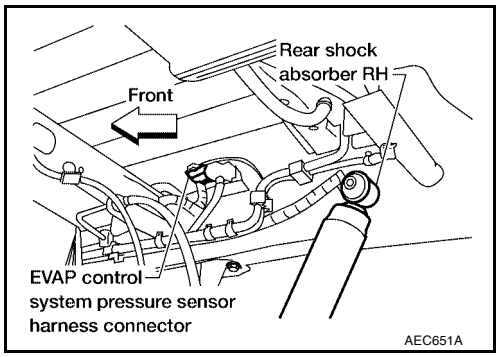
UBS00DLJ

1. CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.

OK or NG

OK >> GO TO 2.
NG >> Reconnect, repair or replace.

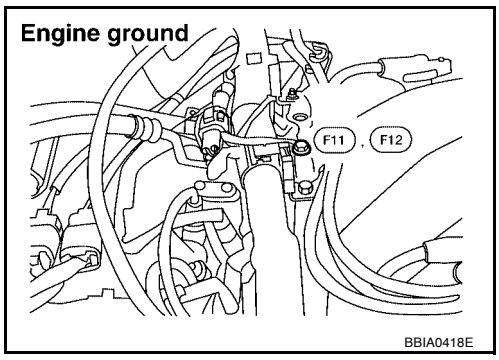


2. CHECK GROUND CONNECTIONS

Loosen and retighten ground screw.
Refer to EC-709, "Ground Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.



3. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.
   Water should not exist.

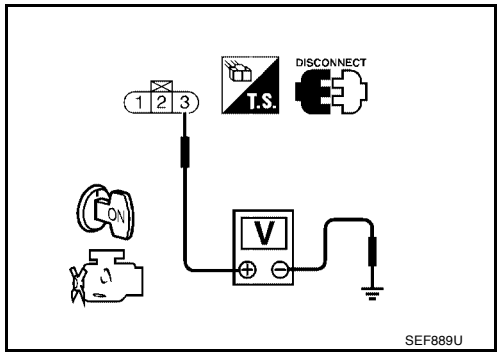
OK or NG

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 3 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 C1, M67
- Harness connectors M81, F36
- 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. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 43.
   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 C1, M67
- Harness connectors M59, F27
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 62 and EVAP control system pressure sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, M67
- Harness connectors M59, F27
- 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.

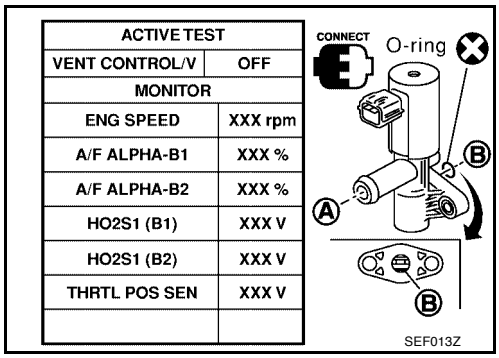
10. CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time under the following conditions.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

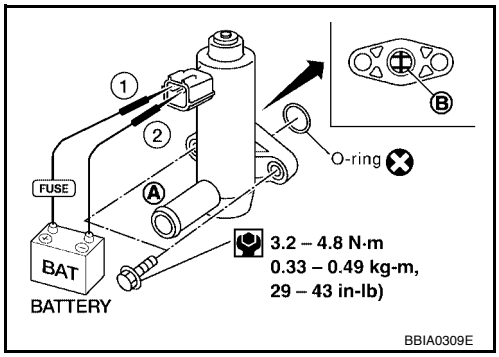


Without CONSULT-II

1. 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	No
OFF	Yes

Operation takes less than 1 second.
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.
Make sure new O-ring is installed properly.



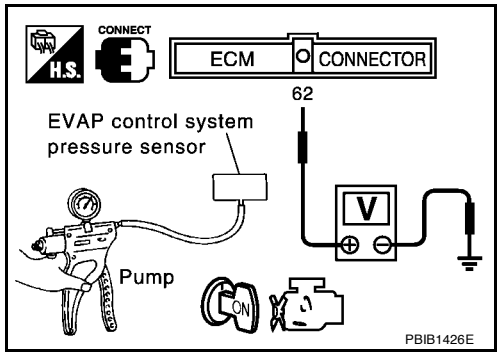
OK or NG

OK >> GO TO 11.
NG >> Replace EVAP canister vent control valve.

11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
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.
5. Check input voltage between ECM terminal 62 and ground.

Applied vacuum	Voltage V
Not applied	1.8 - 4.8
−26.7 kpa (−200 mmHg, −7.87 inHg)	2.1 to 2.5 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.**

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP control system pressure sensor.

12. CHECK RUBBER TUBE

Check obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

OK >> GO TO 13.
NG >> Clean, repair or replace rubber tube.

13. CHECK WATER SEPARATOR

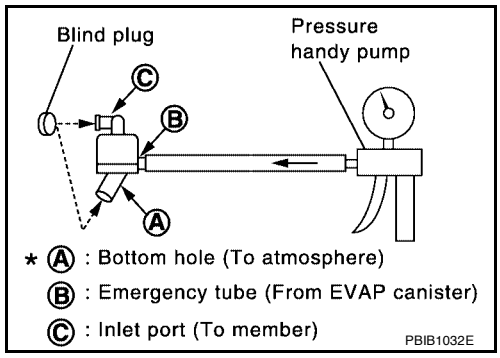
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

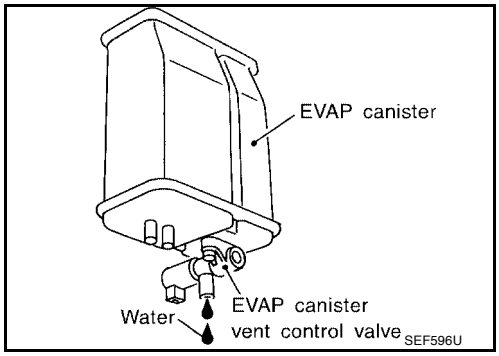
OK or NG

OK >> GO TO 14.
NG >> Replace water separator.



14. 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 15.
No >> GO TO 17.

15. 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 17.
NG >> GO TO 16.

16. 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.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

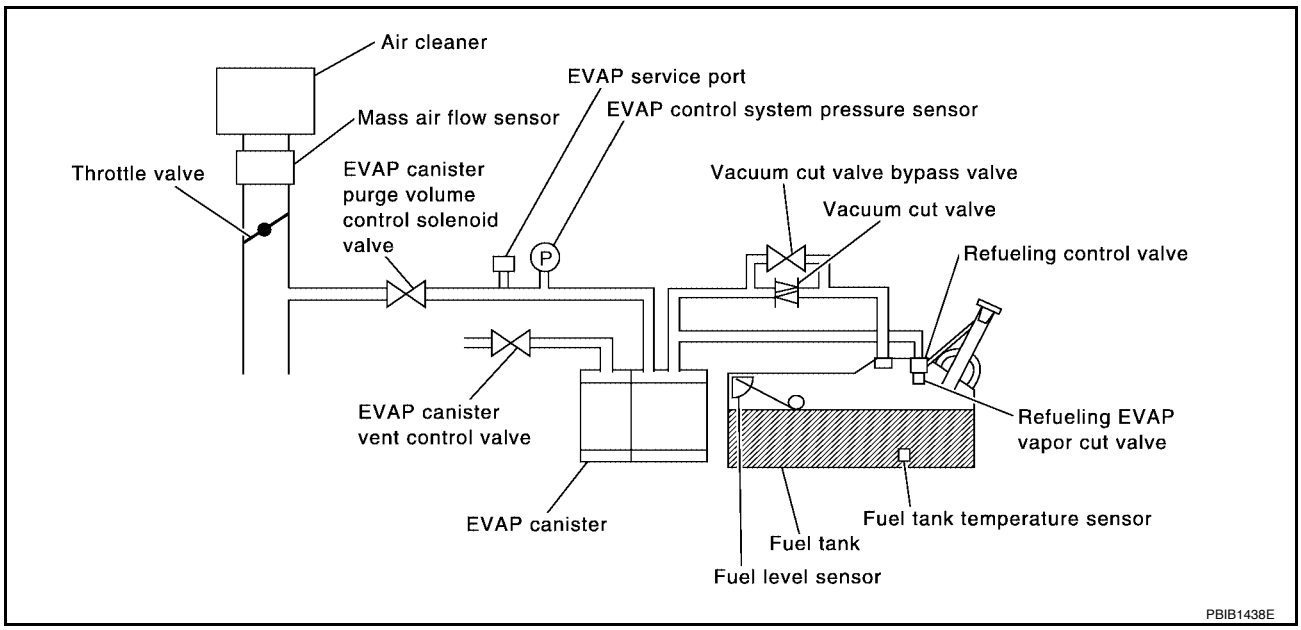
DTC P0455 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS00DLK

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (EC-1090 .)
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.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0455	EVAP control system gross leak detected	EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.	● 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 ● 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

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.**

DTC Confirmation Procedure

UBS00DLL

CAUTION:

Never remove fuel filter cap during the DTC confirmation procedure.

NOTE:

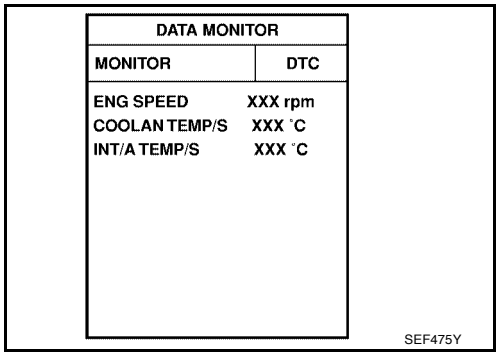
- **If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1090 .)**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

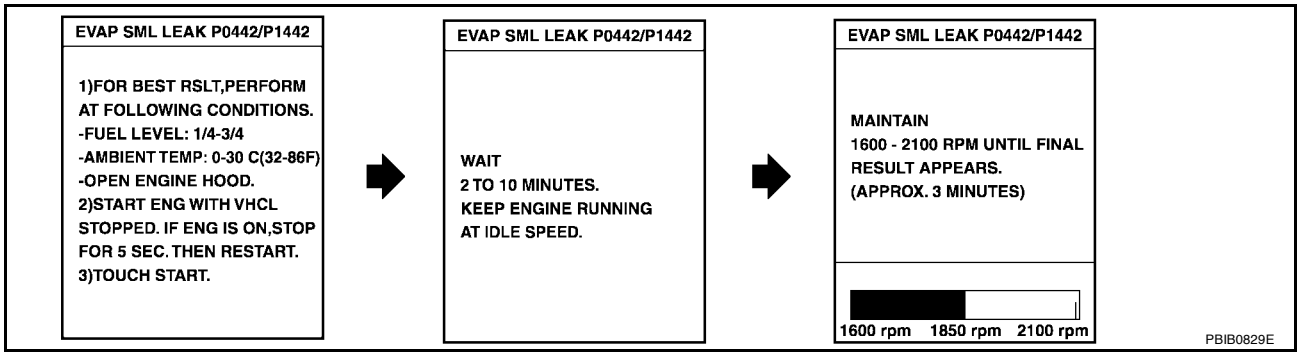
- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedure.**

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 5 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 - 32°C (32 - 90°F)
   INT/A TEMP SE: More than 0°C (32°F)



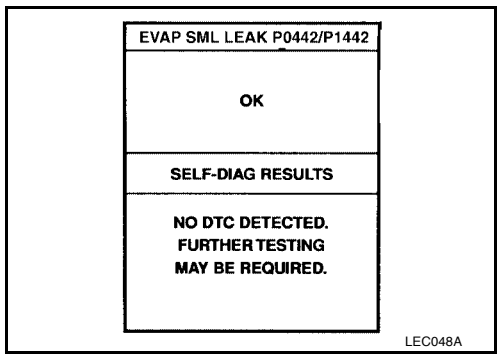
6. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.



NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-652, "Basic Inspection" .

7. Make sure that “OK” is displayed.
If “NG” is displayed, select “SELF-DIAG RESULTS” mode with CONSULT-II and make sure that “EVAP GROSS LEAK [P0455]” is displayed, refer to EC-957, "Diagnostic Procedure" .
If P0442 is displayed, perform EC-919, "Diagnostic Procedure" .



LEC048A

WITH GST

NOTE:
Be sure to read the explanation of EC-635, "Driving Pattern" before driving vehicle.

1. Start engine.
2. Drive vehicle according to EC-635, "Driving Pattern" .
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 5 seconds.
6. Start engine.
It is not necessary to cool engine down before driving.
7. Drive vehicle again according to the EC-635, "Driving Pattern" .
8. Stop vehicle.
9. Select MODE 3 with GST.

- If P0455 is displayed on the screen, go to EC-957, "Diagnostic Procedure" .
- If P0442 or P1442 is displayed on the screen, go to for DTC EC-919, "Diagnostic Procedure" or EC-1074, "Diagnostic Procedure" .
- If P0441 is displayed on the screen, go to EC-910, "Diagnostic Procedure" .
- If P0442, P0455 and P0441 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

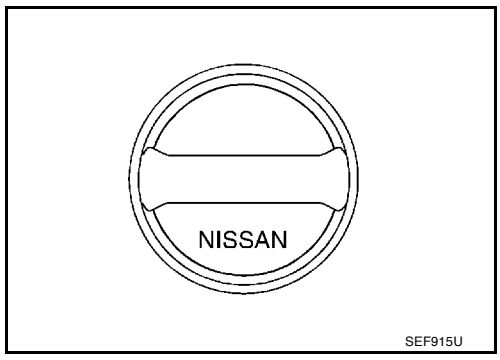
UBS00DLM

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.



SEF915U

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 >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. 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 (BUILT INTO FUEL FILLER CAP)

Refer to EC-1176, "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-1174, "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

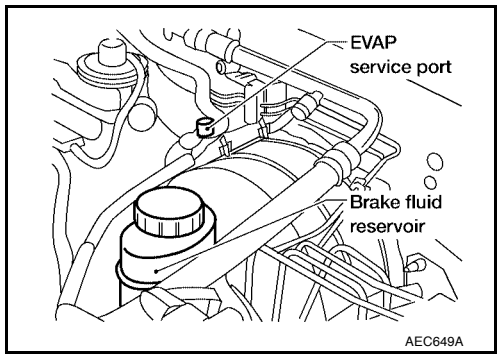
Refer to EC-1090, "DTC Confirmation Procedure" .

OK or NG

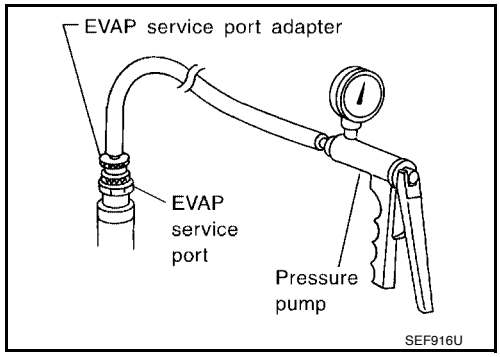
OK >> GO TO 8.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

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.

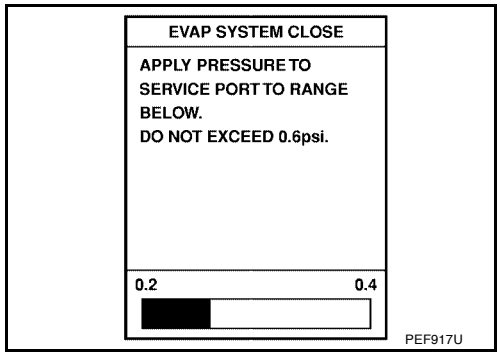


With CONSULT-II>>GO TO 9.
Without CONSULT-II>>GO TO 10.

9. CHECK FOR EVAP LEAK

With CONSULT-II

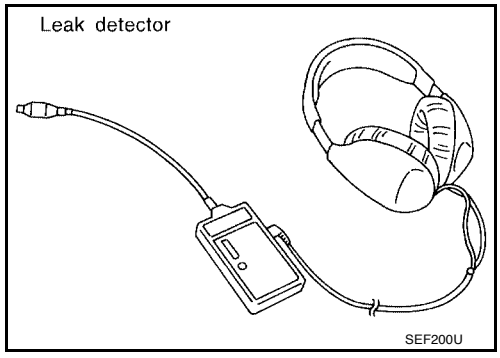
1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not 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-1174, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

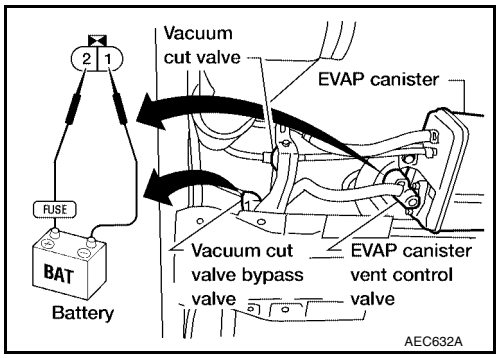


10. CHECK FOR EVAP LEAK

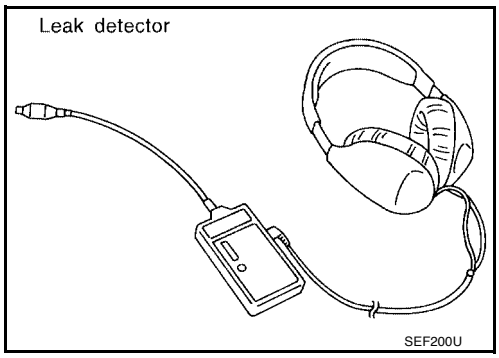
Without CONSULT-II

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-1174, "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%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

   Vacuum should exist.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

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-604, "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.
   If OK, inspection end. If NG, go to following step.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

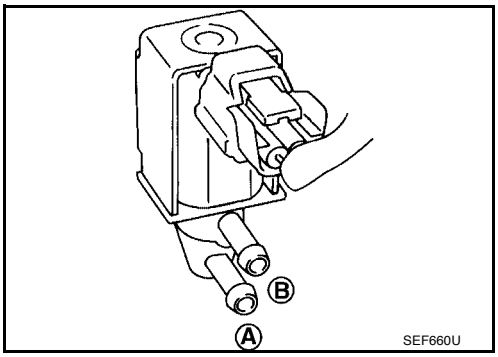
SEF985Y

3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister purge volume control solenoid valve.



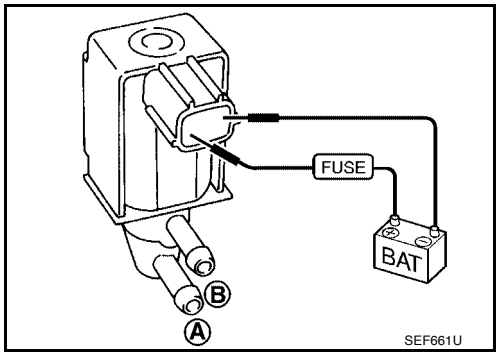
SEF660U

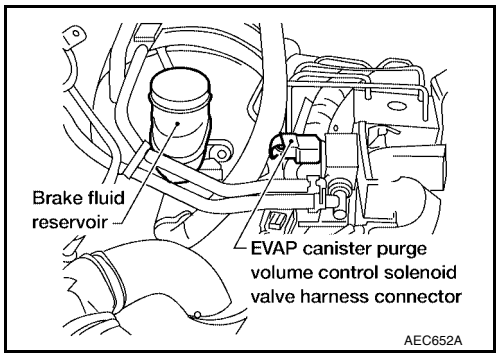
15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Without CONSULT-II

Check air passage continuity.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No





OK or NG

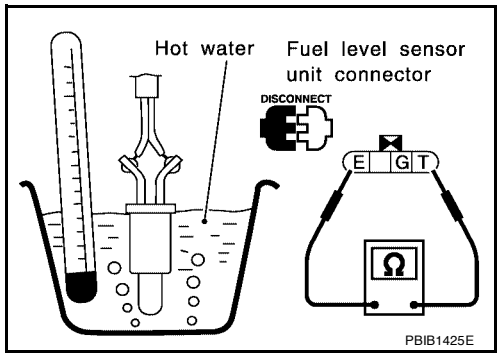
OK >> GO TO 16.

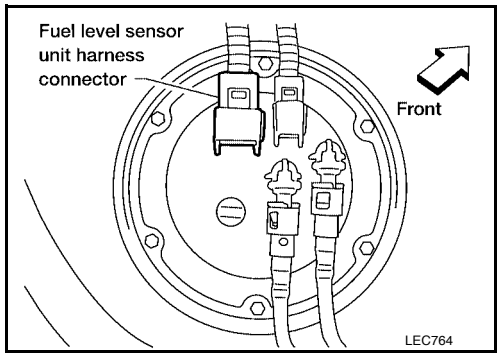
NG >> Replace EVAP canister purge volume control solenoid valve.

16. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit terminals T and E 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



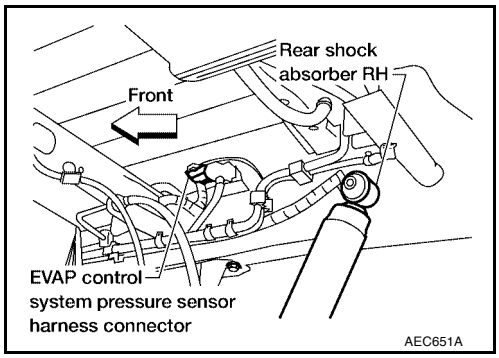


OK or NG

OK >> GO TO 17.
NG >> Replace fuel tank temperature sensor.

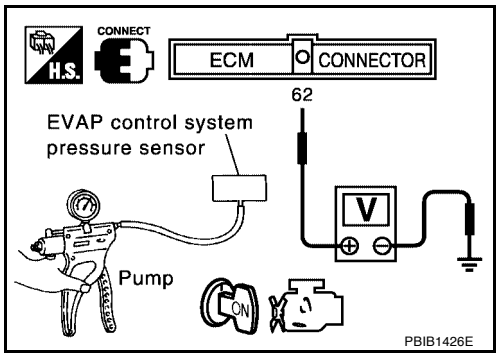
17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
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.



5. Check input voltage between ECM terminal 62 and ground.

Applied vacuum	Voltage V
Not applied	1.8 - 4.8
−26.7 kpa (−200 mmHg, −7.87 inHg)	2.1 to 2.5V lower than above value



CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

18. 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-1181, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)".

OK or NG

OK >> GO TO 19.
NG >> Repair or replace hoses and tubes.

19. 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 20.
NG >> Repair or replace hoses, tubes or filler neck tube.

20. CHECK REFUELING CONTROL VALVE

Refer to EC-1181, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 21.
NG >> Replace refueling control valve with fuel tank.

21. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

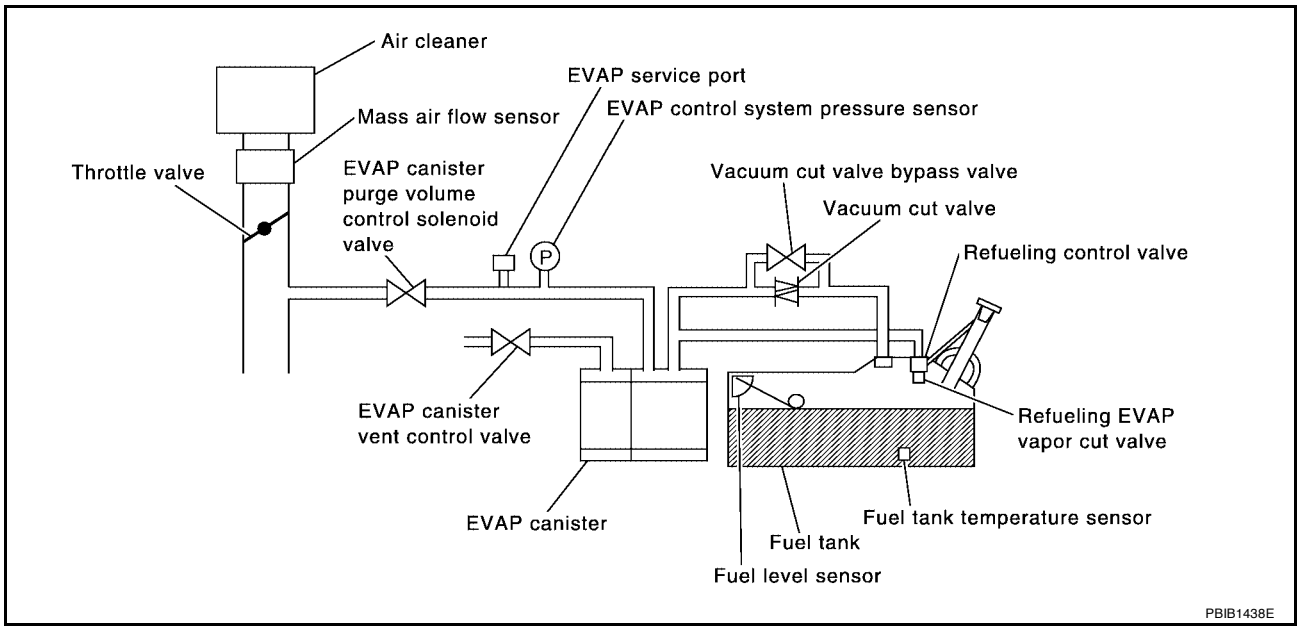
DTC P0456 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS00DLN

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.
If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be detected.
If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 will be detected.
If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456	Evaporative emission control system very small leak (negative pressure check)	• EVAP system has a very small leak. • EVAP system does not operate properly.	• 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 • 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 • Refueling control valve • ORVR system leaks • Fuel level sensor and the circuit • Foreign matter caught in EVAP canister purge volume control solenoid valve

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.**

DTC Confirmation Procedure

UBS00DLO

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

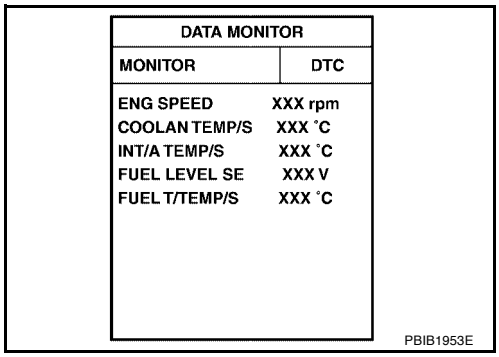
- **If DTC P0456 or P1456 is displayed with P0442, first perform trouble diagnosis for DTC P0456 or P1456.**
- **After repair, make sure that the hoses and clips are installed properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

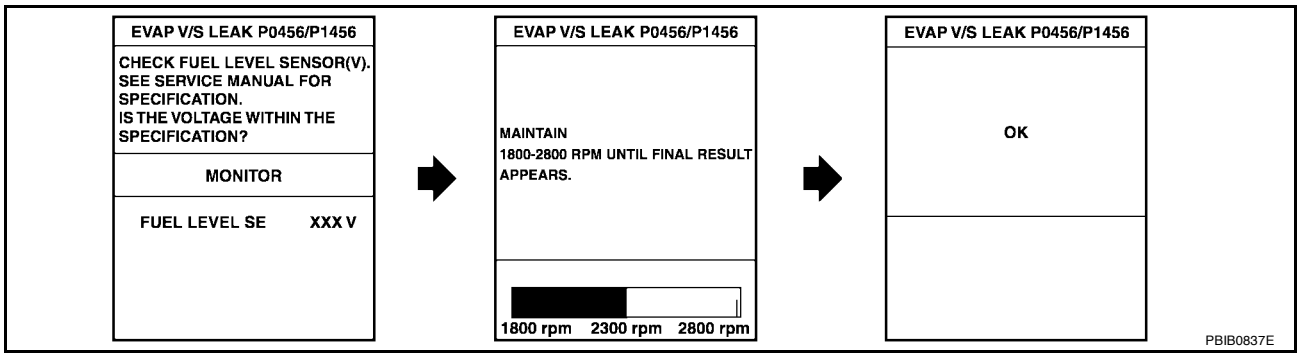
- **Open engine hood before conducting following procedure.**
- **If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**
  - **Fuel filler cap is removed.**
  - **Refilled or drained the fuel.**
  - **EVAP component parts is/are removed.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Make sure the following conditions are met.
   FUEL LEVEL SE: 1.08 - 0.2V
   COOLAN TEMP/S: 0 - 35°C (32 - 95°F)
   FUEL T/TMP SE: 0 - 32°C (32 - 90°F)
   INT A/TEMP SE: More than 0°C (32°F)
   If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the “FUEL LEVEL SE” meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).



3. Turn ignition switch OFF and wait at least 5 seconds.
4. Turn ignition switch ON.
5. Select “EVAP V/S LEAK P0456/P1456” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.



6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-969, "Diagnostic Procedure" .

NOTE:

- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to EC-652, "Basic Inspection" .**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

Overall Function Check

UBS00DLP

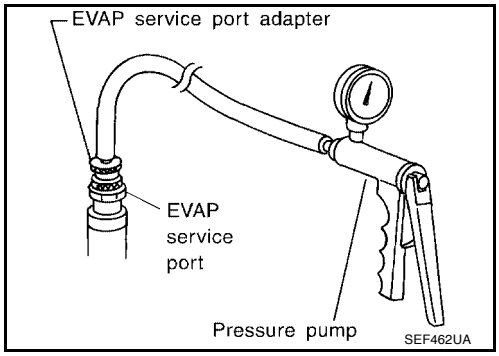
WITH GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a DTC might not be confirmed.

CAUTION:

- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2 , 0.6 psi).**

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Set the pressure pump and a hose.
3. Also set a vacuum gauge via 3-way connector and a hose.
4. Turn ignition switch ON.
5. Connect GST and select MODE 8.
6. Using MODE 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
7. Apply pressure and make sure the following conditions are satisfied.



Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)
Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg)
If NG, go to EC-969, "Diagnostic Procedure" .

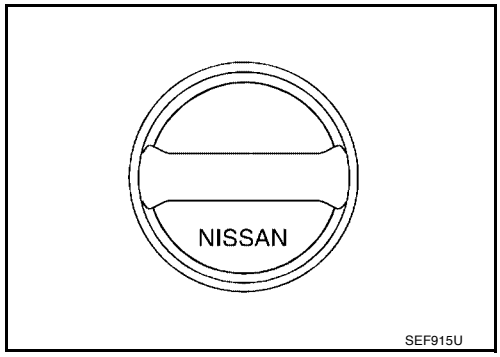
NOTE:
For more information, refer to GST instruction manual.

Diagnostic Procedure

UBS00DLQ

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

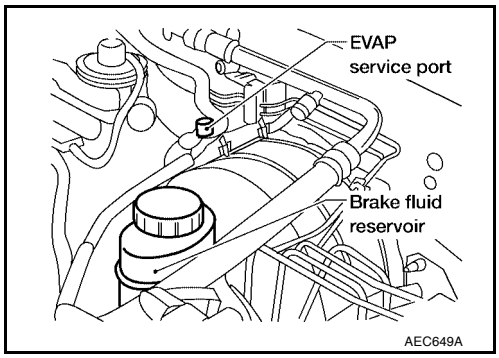
Refer to EC-1176, "Component Inspection" .

OK or NG

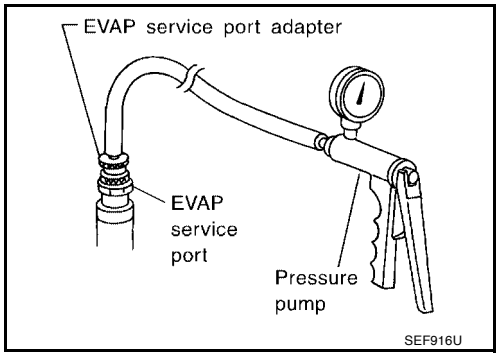
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

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.



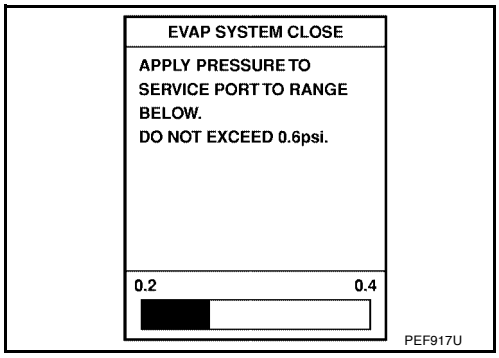
With CONSULT-II>>GO TO 6.
Without CONSULT-II>>GO TO 7.

6. CHECK FOR EVAP LEAK

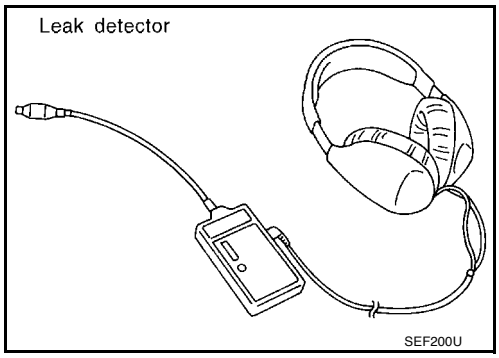
With CONSULT-II

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-1174, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

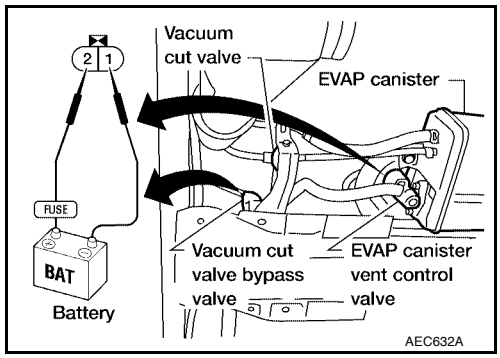
OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

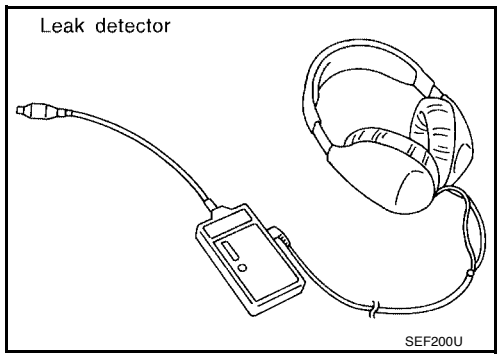
Without CONSULT-II

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-1174, "EVAPORATIVE EMISSION LINE DRAWING" .



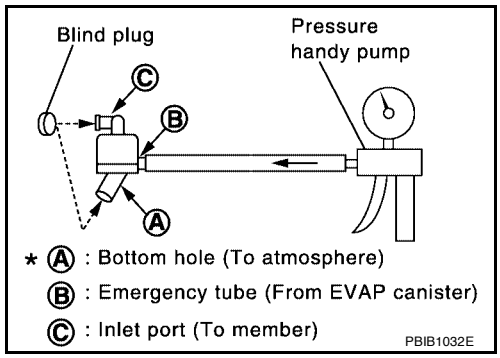
OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK 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.



OK or NG

OK >> GO TO 9.
NG >> Replace water separator.

9. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

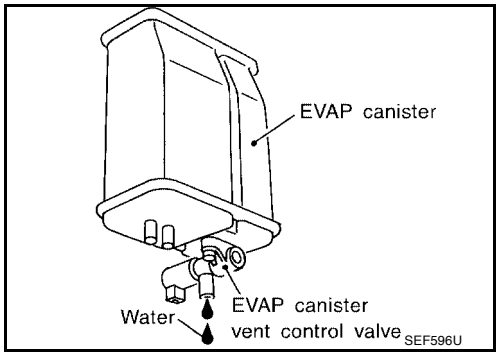
Refer to EC-1090, "DTC Confirmation Procedure" .

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%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

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-604, "Vacuum Hose Drawing" .

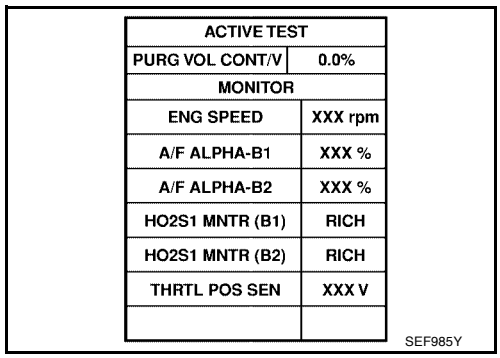
OK or NG

OK (With CONSULT-II)>>GO TO 16.
OK (Without CONSULT-II)>>GO TO 17.
NG >> Repair or reconnect the hose.

16. 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.



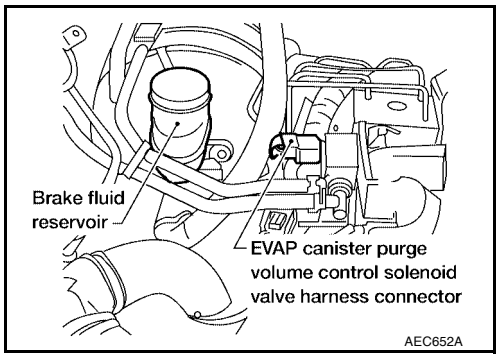
OK or NG

OK >> GO TO 18.
NG >> GO TO 17.

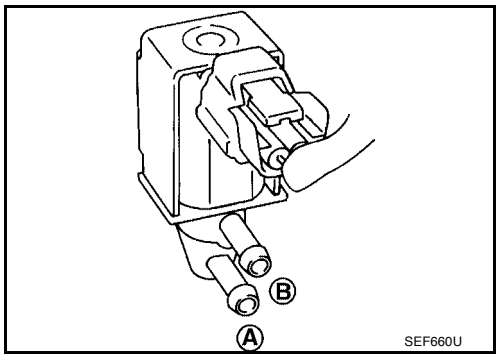
17. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

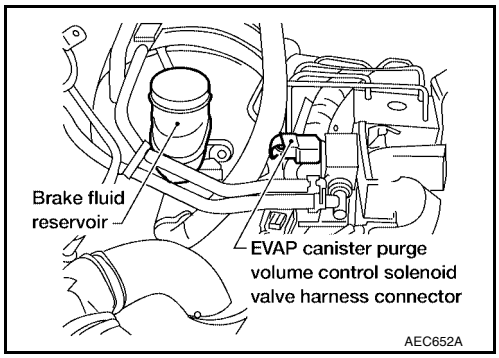


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100 %	Yes
0%	No

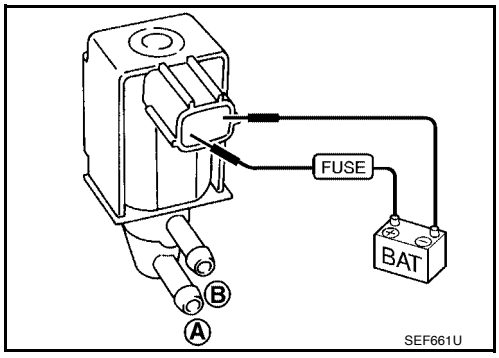


Without CONSULT-II

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



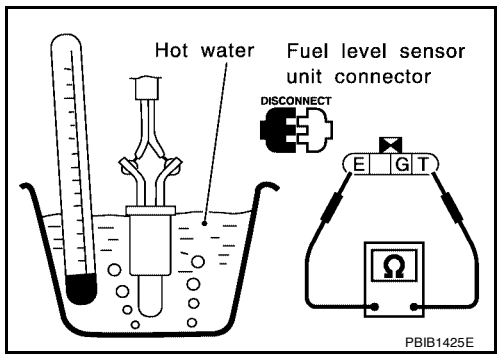
OK or NG

OK >> GO TO 18.

NG >> Replace EVAP canister purge volume control solenoid valve.

18. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit terminals T and E by heating with hot water or heat gun as shown in the figure.



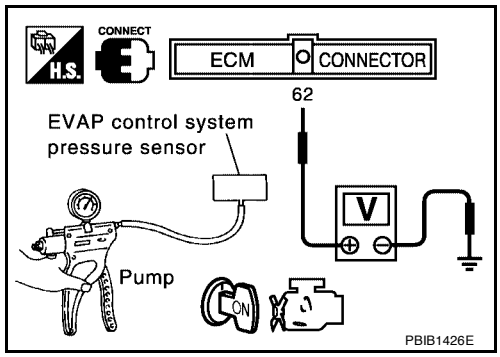
Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

OK or NG

OK >> GO TO 19.
NG >> Replace fuel level sensor unit.

19. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
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.
5. Check input voltage between ECM terminal 62 and ground.



Applied vacuum	Voltage V
Not applied	1.8 - 4.8
−26.7 kpa (−200 mmHg, −7.87 inHg)	2.1 to 2.5V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

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-1174, "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-1181, "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-1181, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 25.
NG >> Replace refueling control valve with fuel tank.

25. CHECK FUEL LEVEL SENSOR

Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 26.
NG >> Replace fuel level sensor unit.

26. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

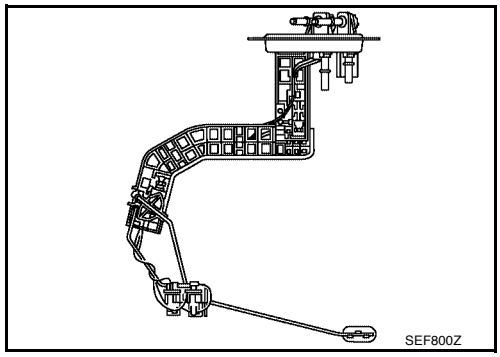
DTC P0460 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00DLR

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 is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnosis Logic

UBS00DLS

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.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Fuel level sensor

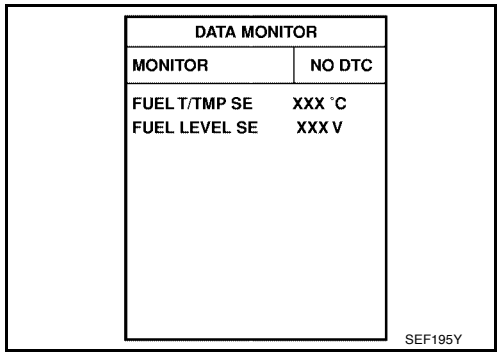
DTC Confirmation Procedure

UBS00DLT

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-979, "Diagnostic Procedure"
.



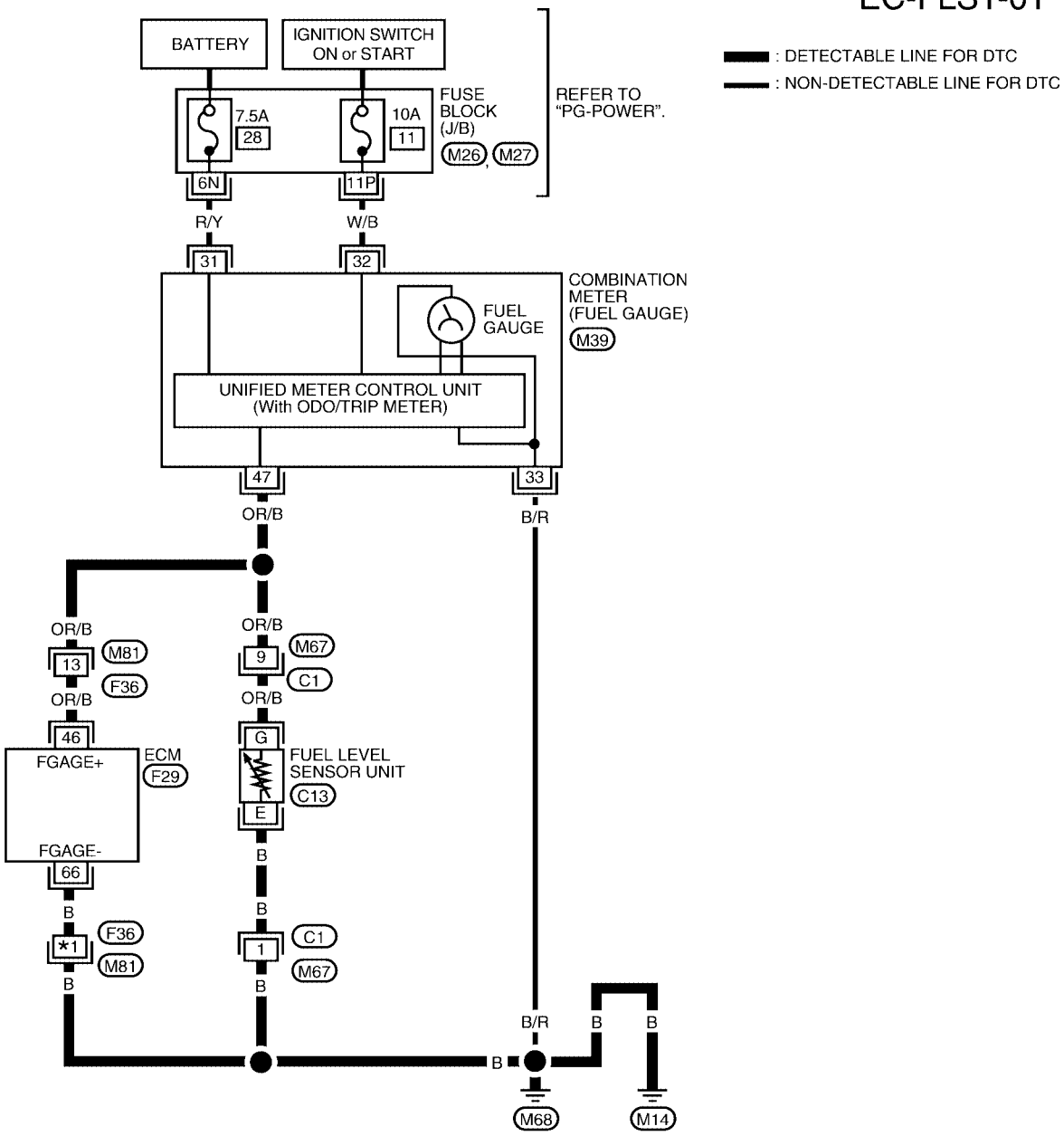
WITH GST

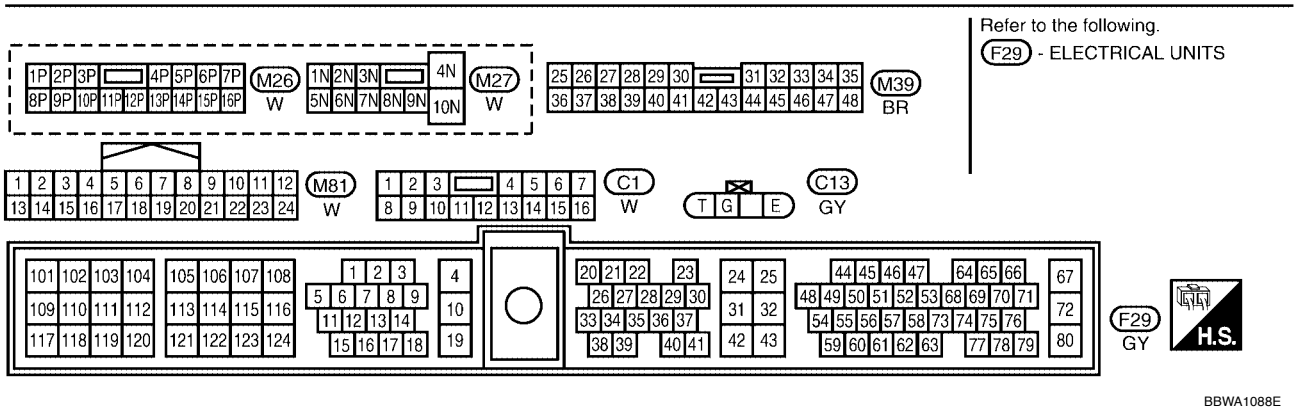
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DLU

EC-FLS1-01





BBWA1088E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	OR/B	Fuel level sensor	**[Ignition switch: ON]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V

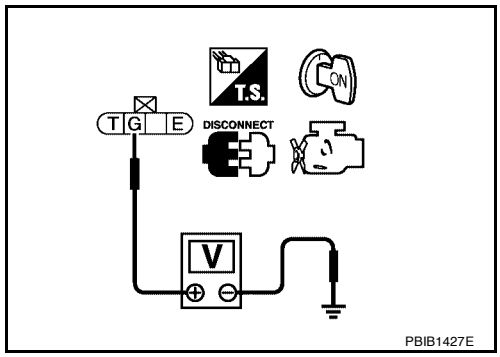
Diagnostic Procedure

UBS00DLV

1. CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit harness connector.
3. Turn ignition switch ON.
4. Check voltage between fuel level sensor unit terminal G 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 M67, C1
- Harness for open or short between combination meter and fuel level sensor unit

>> 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. Check harness continuity between fuel level sensor unit terminal E and 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.

- Harness connectors M67, C1
- Harness for open or short between fuel level sensor unit and ground

>> Repair open circuit 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 46 and fuel level sensor unit terminal G, ECM terminal 66 and 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 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M67, C1
- Harness connectors M81, F36
- Harness for open or short between ECM and fuel level sensor
- Harness for open or short between ECM and ground

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK FUEL LEVEL SENSOR

Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 8.
NG >> Replace fuel level sensor unit.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DLW

FUEL LEVEL SENSOR

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

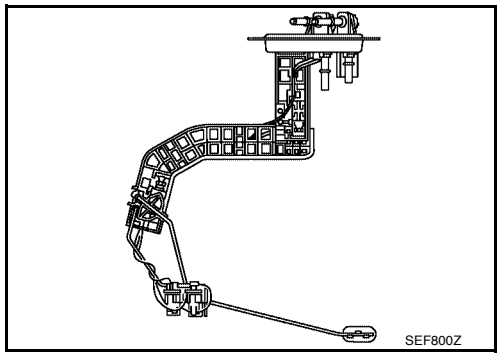
DTC P0461 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00DLX

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 is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnosis Logic

UBS00DLY

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.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0461	Fuel level sensor circuit range/performance	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.	● Harness or connectors (The sensor circuit is open or shorted) ● Fuel level sensor

Overall Function Check

UBS00DLZ

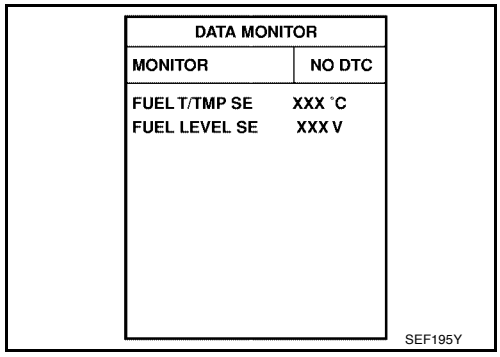
Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

WARNING:
When performing following procedure, be sure to observe the handling of the fuel. Refer to FL-3, "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 10, 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 toEC-622, "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 5 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. Check “FUEL LEVEL SE” output voltage and note it.
11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
12. Check “FUEL LEVEL SE” output voltage and note it.

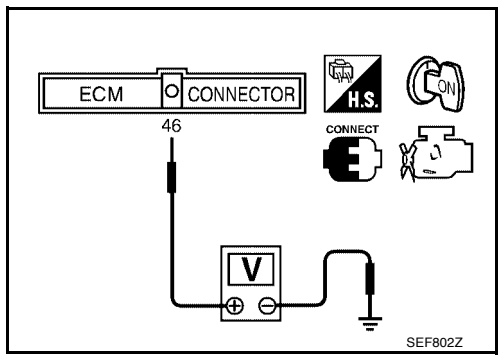


13. Confirm whether the voltage changes more than 0.03V during step 7 to 10 and 10 to 12.
If NG, check the fuel level sensor, refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

WITH GST

NOTE:
Start from step 8, 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-622, "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 46 (fuel level sensor signal) and ground.
7. Turn ignition switch ON.
8. Check voltage between ECM terminal 46 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 46 and ground changes more than 0.03V during step 8 - 10.
    If NG, check component of fuel level sensor, refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .



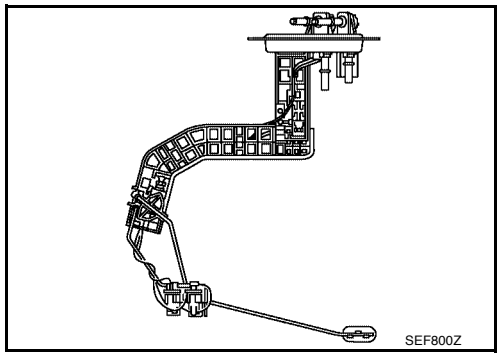
DTC P0462, P0463 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00DM0

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 is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnosis Logic

UBS00DM1

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.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462	Fuel level sensor circuit low input	An excessively low voltage is sent from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Fuel level sensor
P0463	Fuel level sensor circuit high input	An excessively high voltage is sent from the sensor is sent to ECM.	

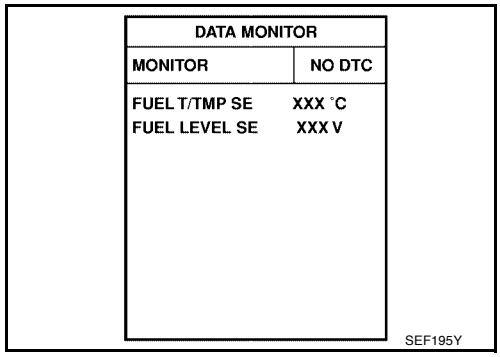
DTC Confirmation Procedure

UBS00DM2

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-985, "Diagnostic Procedure"
.



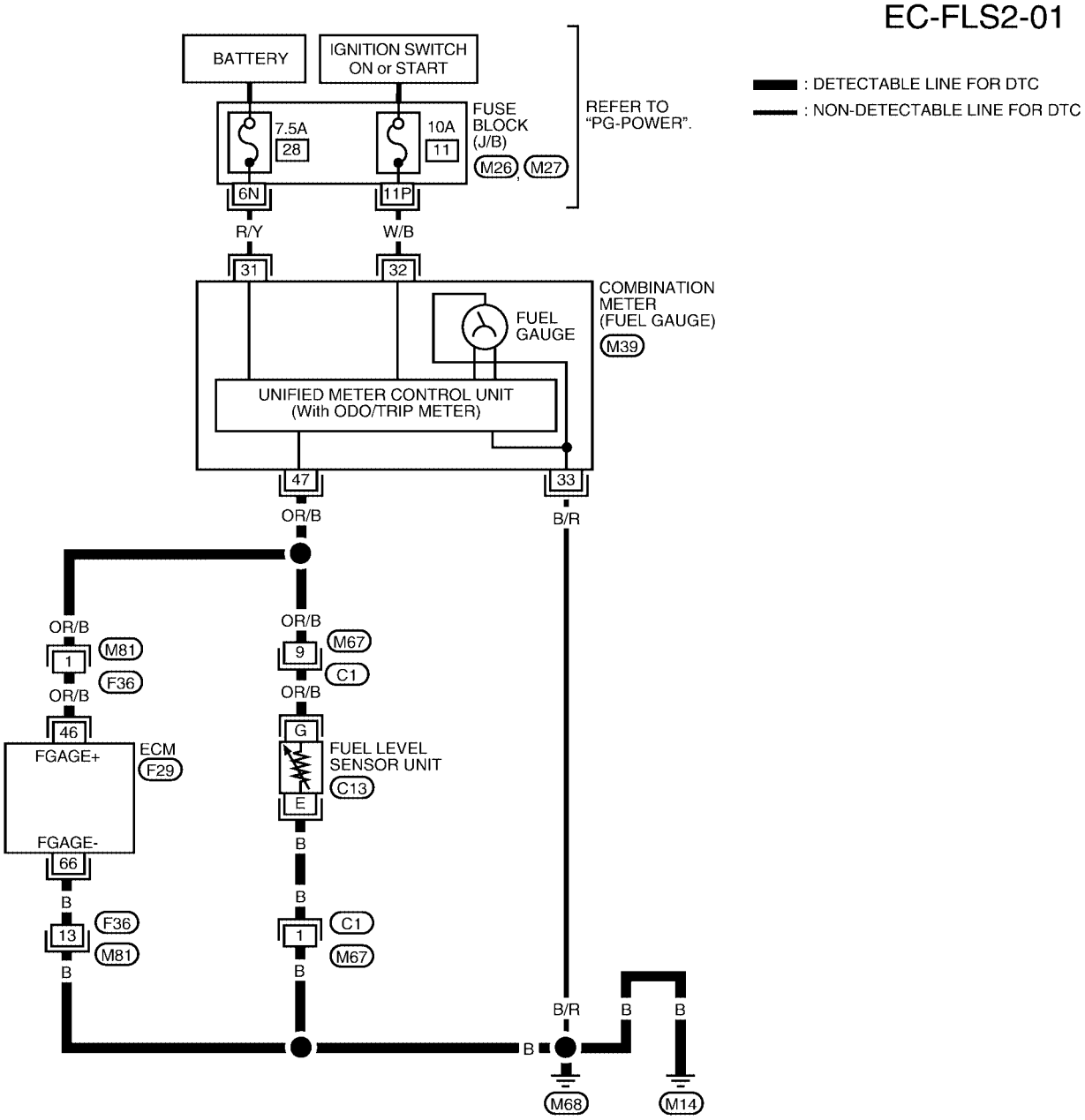
WITH GST

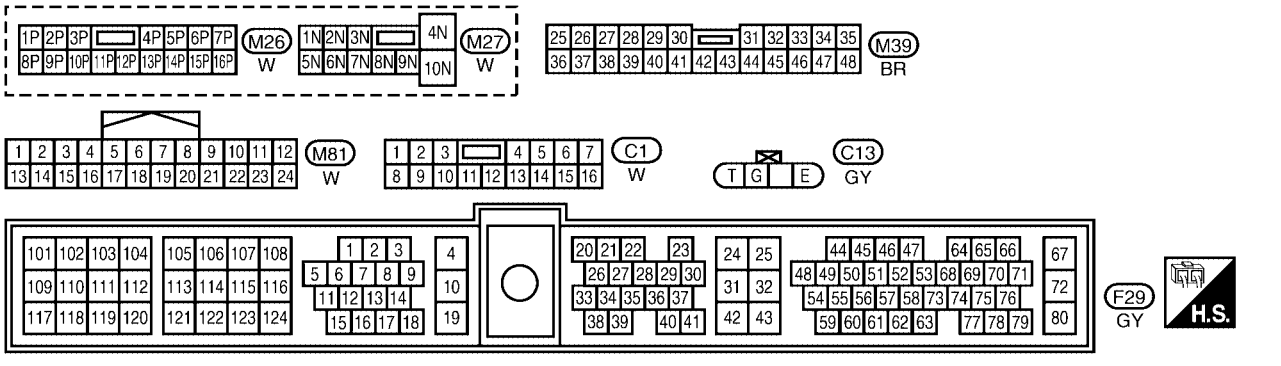
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DM3

EC-FLS2-01





BBWA1089E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	OR/B	Fuel level sensor	**[Ignition switch: ON]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V

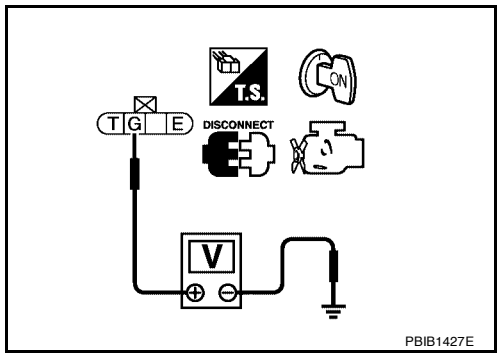
Diagnostic Procedure

UBS00DM4

1. CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit harness connector.
3. Turn ignition switch ON.
4. Check voltage between fuel level sensor unit terminal G 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 M67, C1
- Harness for open or short between combination meter and fuel level sensor unit

>> 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. Check harness continuity between fuel level sensor unit terminal E and 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.

- Harness connectors M67, C1
- Harness for open or short between fuel level sensor unit and ground

>> Repair open circuit or short to power in harness or connectors.

5. CHECK FUEL LEVEL SENSOR INPUT CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 46 and fuel level sensor unit terminal G. 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 M67, C1
- Harness connectors M81, F36
- Harness for open or short between ECM and fuel level sensor unit

>> Repair open circuit or short to ground or short to power in harness on connectors.

7. CHECK FUEL LEVEL SENSOR

Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 8.
NG >> Replace fuel level sensor unit.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DM5

FUEL LEVEL SENSOR

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

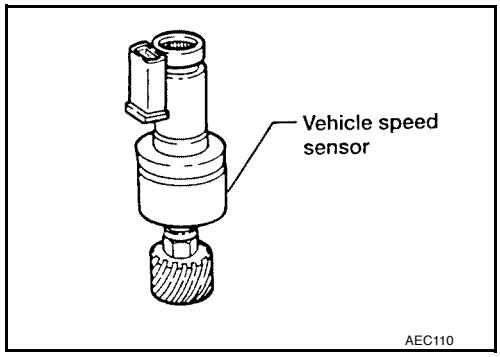
DTC P0500 VSS

PFP:32702

Component Description

UBS00DM6

The vehicle speed sensor is installed in the transmission. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.



On Board Diagnosis Logic

UBS00DM7

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	● Harness or connectors (The vehicle speed sensor circuit is open or shorted.) ● Vehicle speed sensor

DTC Confirmation Procedure

UBS00DM8

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

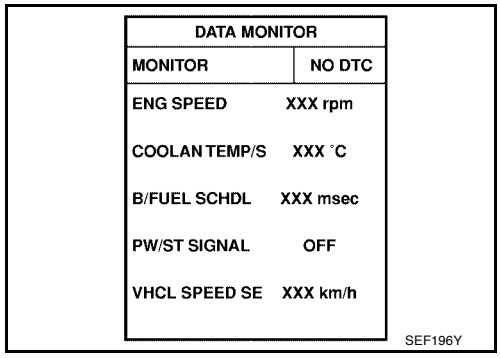
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
   If NG, go to EC-990, "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.



END SPEED	1,700 - 6,000 rpm (A/T) 2,000 - 6,000 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	4.5 - 31.8 msec (A/T) 6.3 - 31.8 msec (M/T)
Selector lever	Suitable position
PW/ST SIGNAL	OFF

6. If 1st trip DTC is detected, go to EC-990, "Diagnostic Procedure" .

Overall Function Check

UBS00DM9

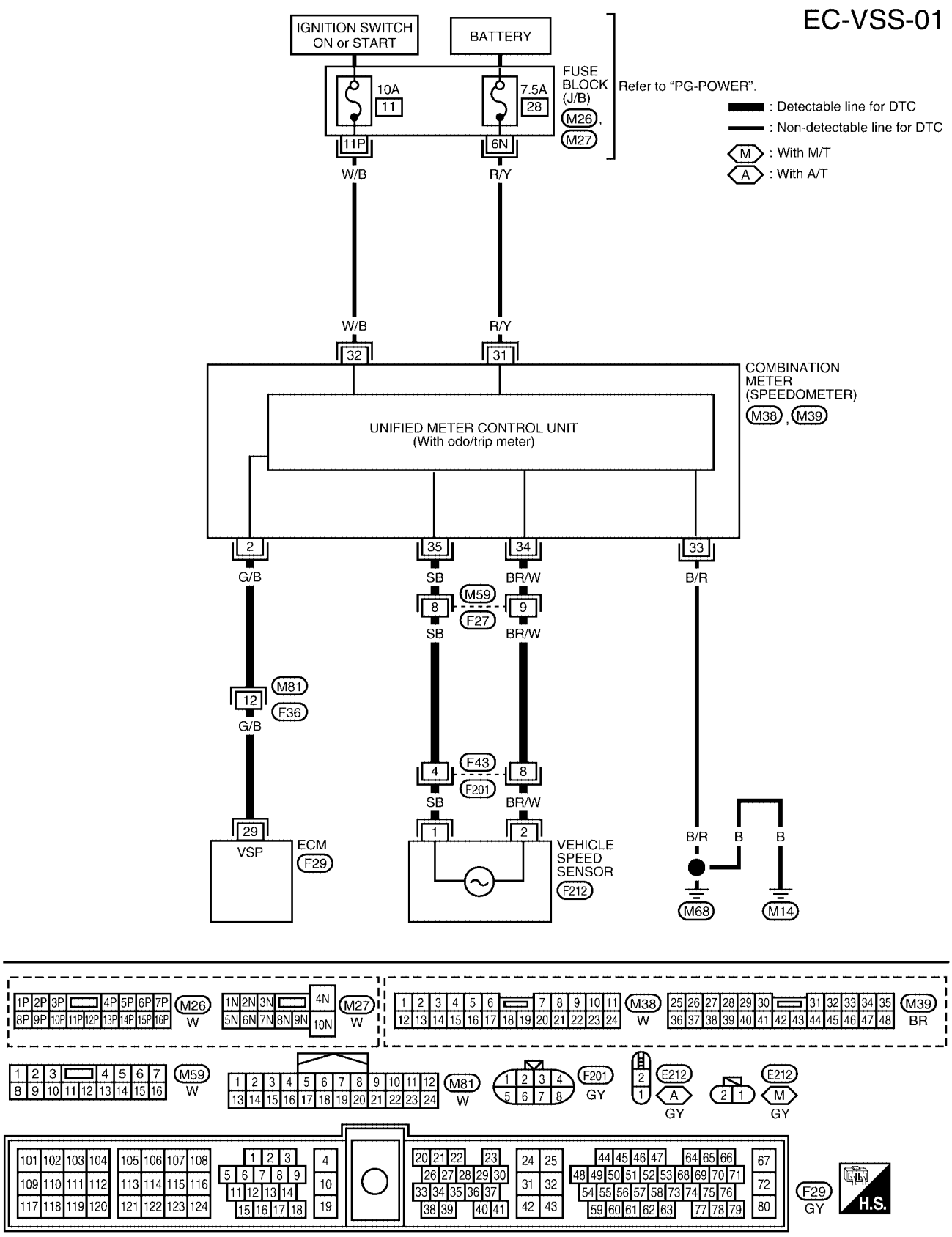
Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

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-990, "Diagnostic Procedure" .

Wiring Diagram

UBS00DMA

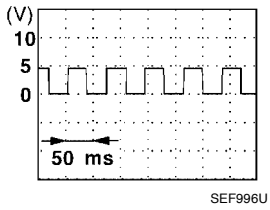


BBWA1090E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	G/B	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle. ● Shift lever: 2nd (M/T), D (A/T) ● Vehicle speed is 40 km/h (25 MPH)	2 - 3V★  SEF996U

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00DMB

1. CHECK VEHICLE SPEED SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and combination meter harness connector.
3. Check harness continuity between ECM terminal 29 and combination meter 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 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M81, F36
- 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.

3. CHECK SPEEDOMETER FUNCTION

Make sure that speedometer functions properly.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK SPEEDOMETER CIRCUIT FOR OPEN AND SHORT

Check the following.

- Harness connectors M59, F27
- Harness connectors F43, F201
- Harness for open or short between combination meter and vehicle speed sensor

OK or NG

OK >> Check combination meter and vehicle speed sensor. Refer to DI-3, "METERS AND GAUGES" .
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

DTC P0505 ISC SYSTEM

PFP:23781

Description

UBS00DMC

SYSTEM DESCRIPTION

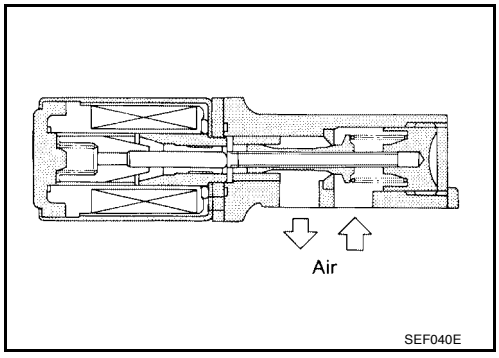
Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Idle air control	IACV-AAC valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Park/neutral position (PNP) switch	Park/neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Ambient air temperature switch	Ambient air temperature		
Intake air temperature sensor	Intake air temperature		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in 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 warm up, deceleration, and engine load (air conditioner and power steering).

COMPONENT DESCRIPTION

IACV-AAC Valve

The IACV-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DMD

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	10 - 20%
		2,000 rpm	—

On Board Diagnosis Logic

UBS00DME

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
P0505	A)	Idle speed control system circuit	The IACV-AAC valve does not operate properly	● Harness or connectors (The IACV-AAC valve circuit is open) ● IACV-AAC valve
	B)	Idle speed control system RPM lower than expected	The IACV-AAC valve does not operate properly	● Harness or connectors (The IACV-AAC valve circuit is open) ● IACV-AAC valve
	C)	Idle speed control system RPM higher than expected	The IACV-AAC valve does not operate properly	● Harness or connectors (The IACV-AAC valve circuit is open) ● IACV-AAC valve

DTC Confirmation Procedure

UBS00DMF

NOTE:

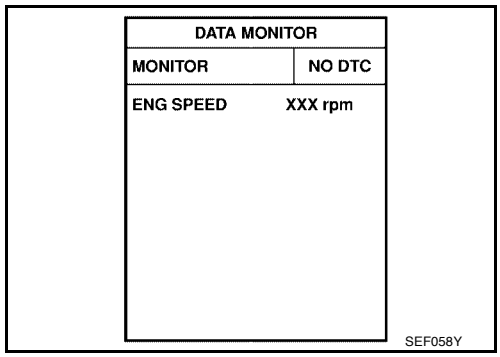
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- **Perform PROCEDURE FOR MALFUNCTION A first. If 1st trip DTC cannot confirmed, perform PROCEDURE FOR MALFUNCTION B AND C.**

PROCEDURE FOR MALFUNCTION A

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. Wait at least 2 seconds.
4. If 1st trip DTC is detected, go to EC-996, "Diagnostic Procedure"
.



With GST

Follow the procedure “With CONSULT-II” above.

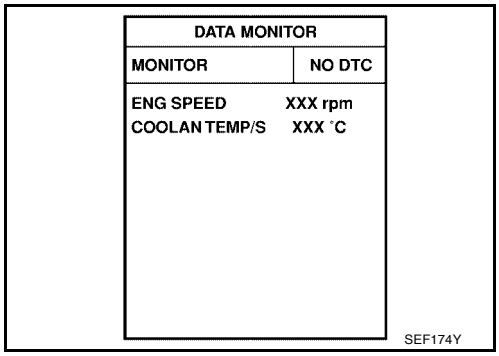
PROCEDURE FOR MALFUNCTION B AND C

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. Turn ignition switch OFF and wait at least 5 seconds.

3. Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and run it for at least 1 minute at idle speed.
5. If 1st trip DTC is detected, go to EC-996, "Diagnostic Procedure" .



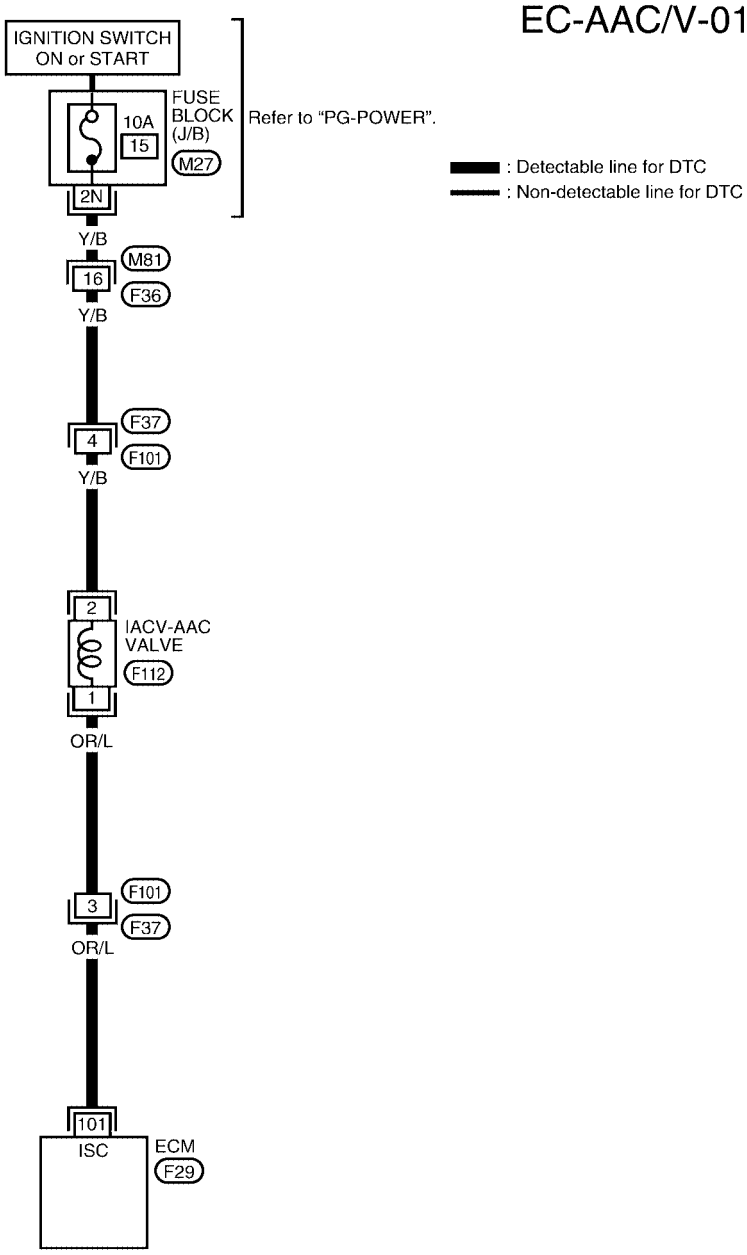
With GST

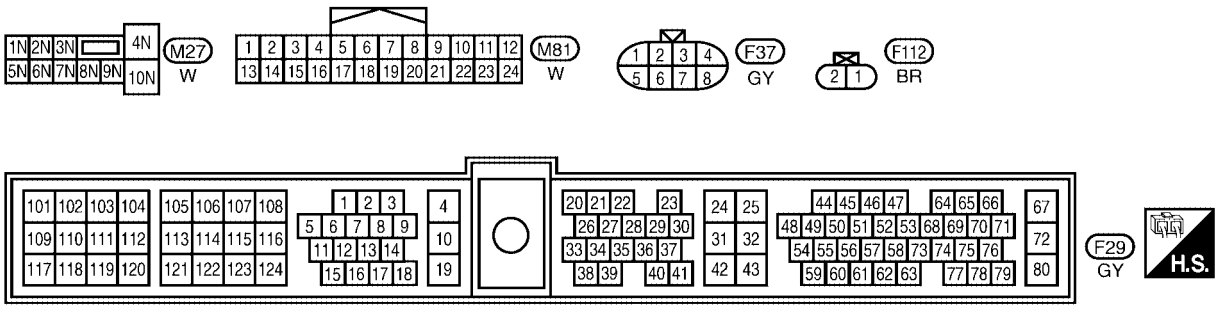
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00DMG

EC-AAC/V-01



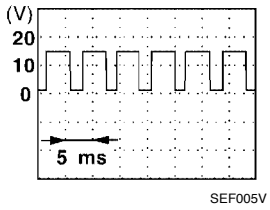
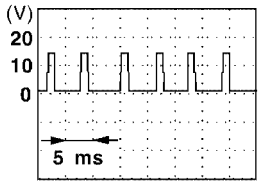


BBWA1091E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	8 - 11V★  SEF005V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 3,000 rpm	7 - 10V★  SEF692W

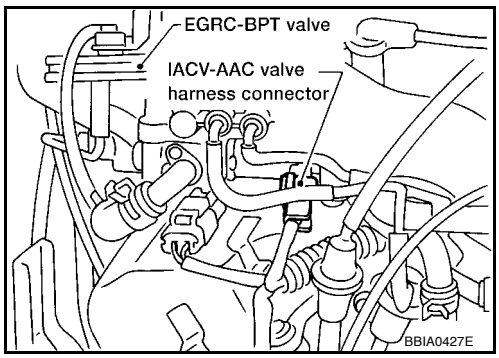
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00DMH

1. CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.
3. Turn ignition switch ON.

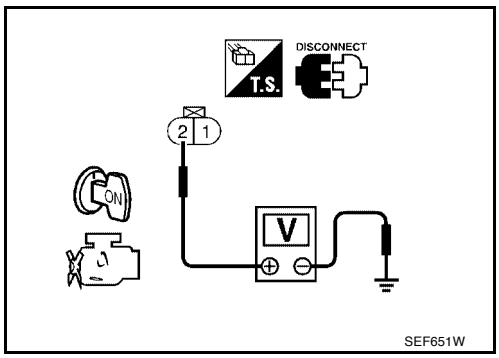


4. Check voltage between IACV-ACC valve terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M81, F36
- Harness connectors F37, F101
- Fuse block (J/B) connector M27
- 10A fuse
- Harness for open or short between IACV-AAC valve and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK IACV-AAC 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 101 and IACV-AAC valve terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F101, F37
- Harness for open or short between IACV-AAC valve and ECM

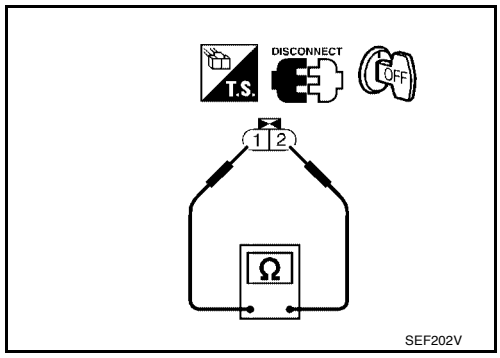
>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK IACV-AAC VALVE

1. Remove IACV-AAC valve.

– Check IACV-AAC valve resistance.

Resistance: Approximately 10Ω [at 20°C (68°F)]



– Check plunger for seizing or sticking.
– Check for broken spring.

2. Supply battery voltage between IACV-AAC valve connector terminals.
Plunger should move.

OK or NG

OK >> GO TO 6.
NG >> Replace IACV-AAC valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END.**

Removal and Installation

UBS00DMI

IACV-AAC VALVE

Refer to EM-80, "OUTER COMPONENT PARTS" .

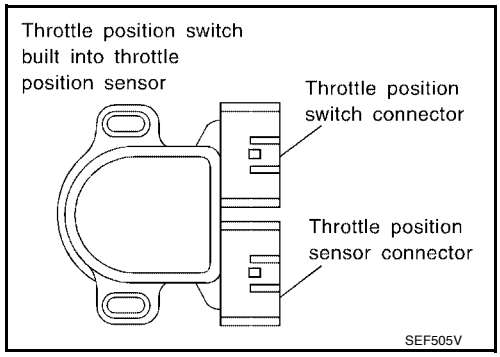
DTC P0510 CLOSED TP SWITCH

PFP:22620

Component Description

UBS00DMJ

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.
When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge volume control solenoid valve when the throttle position sensor is malfunctioning.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DMK

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
CLSD THL/P SW	● Engine: After warming up, idle the engine	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF

On Board Diagnosis Logic

UBS00DML

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0510	Closed throttle position switch	Battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened	● Harness or connectors (The closed throttle position switch circuit is open or shorted) ● Closed throttle position switch ● Throttle position sensor

DTC Confirmation Procedure

UBS00DMM

CAUTION:
Always drive vehicle at a safe speed.

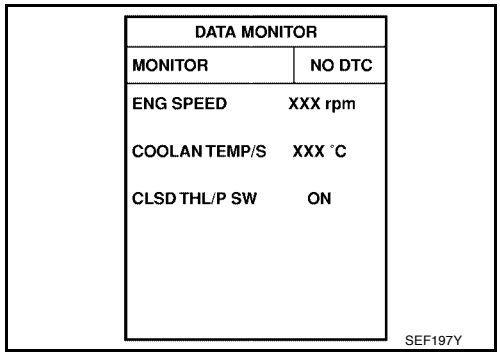
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF, wait at least 10 seconds and then start engine.
3. Select “CLSD THL/P SW” in “DATA MONITOR” mode.
4. Check the signal under the following conditions.

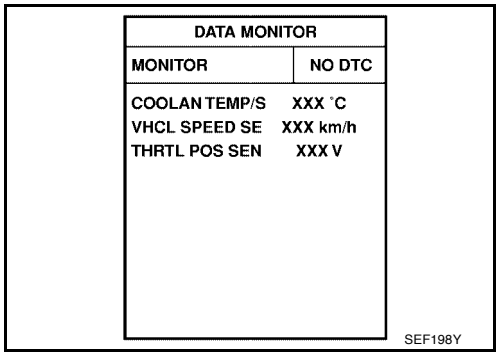
Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

If the result is NG, go to EC-1002, "Diagnostic Procedure" .
If OK, go to following step.



5. Select “DATA MONITOR” mode with CONSULT-II.
6. Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.5V
VHCL SPEED SE	More than 5 km/h (3 MPH)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.



7. If 1st trip DTC is detected, go to EC-1002, "Diagnostic Procedure" .

Overall Function Check

UBS00DMN

Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

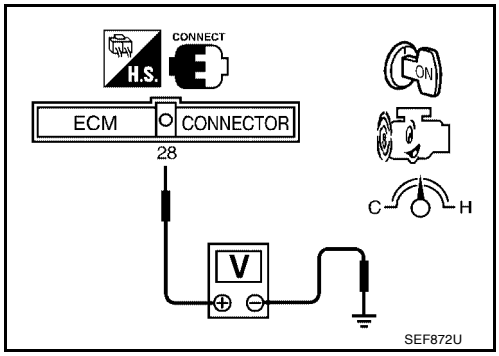
WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM terminal 28 (Closed throttle position switch signal) and ground under the following conditions.

   At idle : Battery voltage

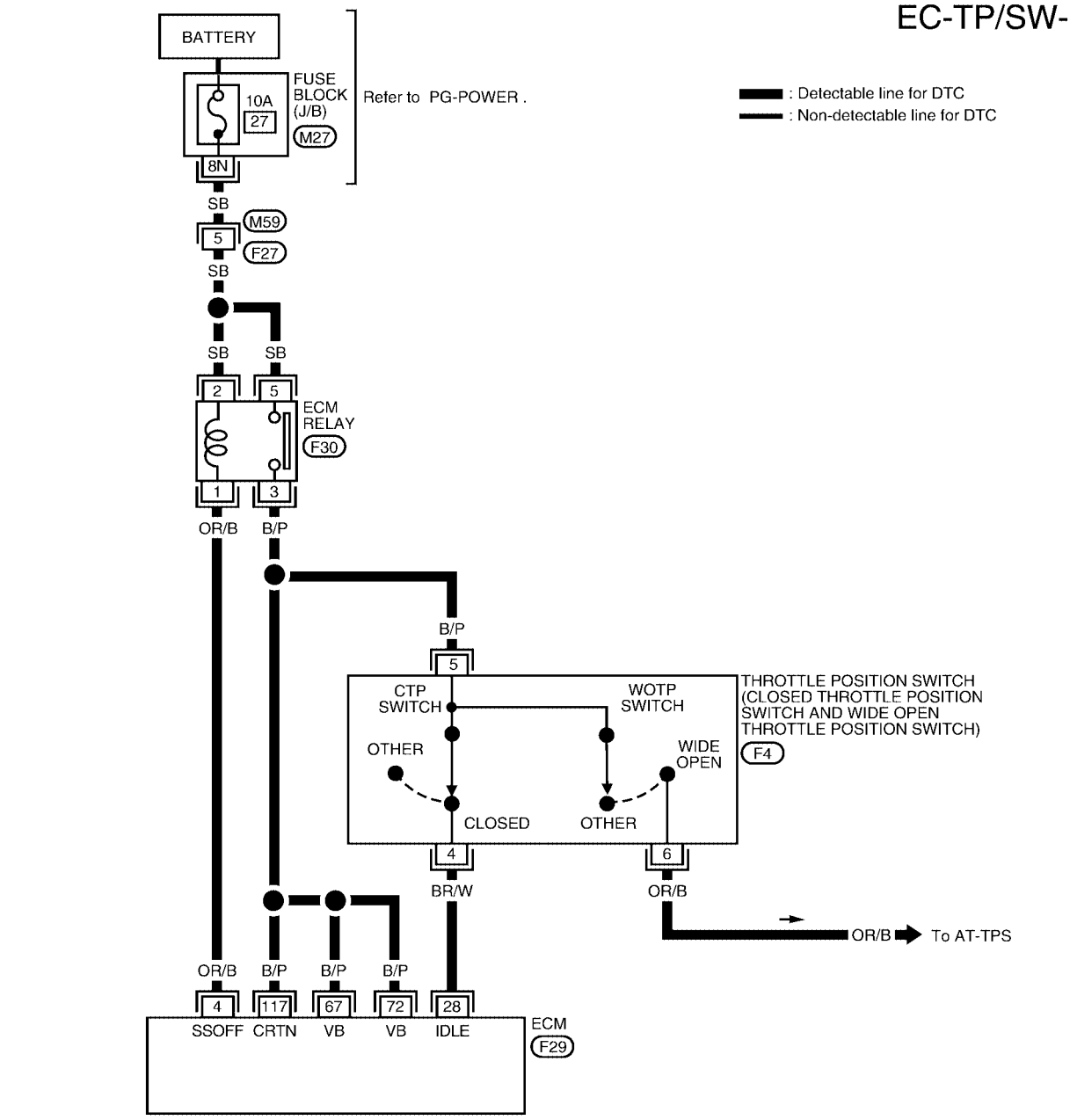
   At 2,000 rpm : Approximately 0V

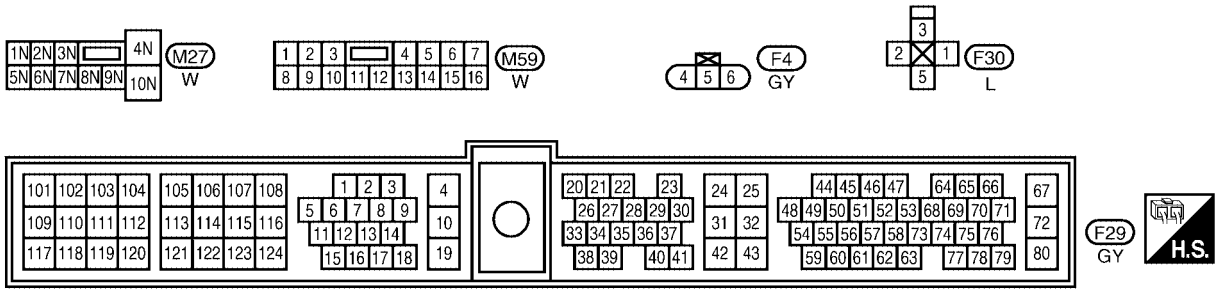
3. If NG, go to EC-1002, "Diagnostic Procedure" .



Wiring Diagram

UBS00DMO





BBWA0490E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

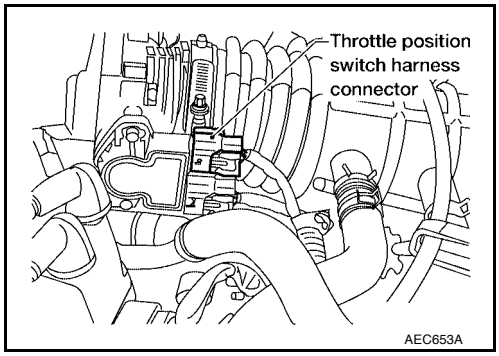
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	BR/W	Throttle position switch (Closed position)	**[Engine is running]** ● **Warm-up condition** ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump ● Accelerator pedal is fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal is depressed	Approximately 0V

Diagnostic Procedure

UBS00DMP

1. CHECK CLOSED THROTTLE POSITION SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect throttle position switch harness connector.
3. Turn ignition switch ON.

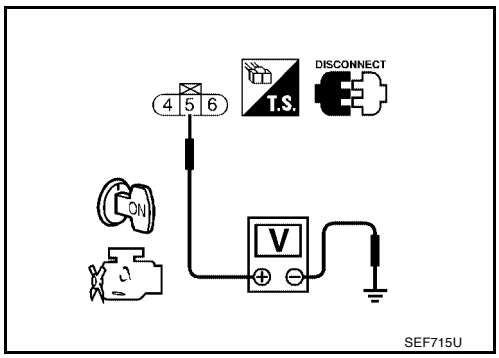


4. Check voltage between throttle position switch terminal 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between throttle position switch and ECM relay
- Harness for open or short between throttle position switch and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK CLOSED THROTTLE POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 28 and throttle position switch terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK IGNITION TIMING AND ENGINE IDLE SPEED

Check the following items. Refer to EC-652, "Basic Inspection" .

Items	Specifications
Ignitions timing	M/T: 10 ± 5° BTDC (in Neutral position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

With CONSULT-II>>GO TO 5.
Without CONSULT-II>>GO TO 6.

5. CHECK CLOSED THROTTLE POSITION SWITCH

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Check indication of “CLSD THL/P SW”.
   Measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely closed	OFF

OK or NG

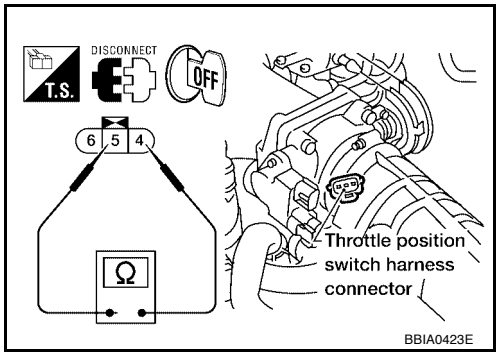
OK >> GO TO 8.
NG >> GO TO 7.

6. CHECK CLOSED THROTTLE POSITION SWITCH

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect closed throttle position switch harness connector.
4. Check continuity between closed throttle position switch terminals 4 and 5.
   Resistance measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely closed	No



OK or NG

OK >> GO TO 9.
NG >> GO TO 7.

7. ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to EC-652, "Basic Inspection" .

Items	Specifications
Ignitions timing	M/T: 10 ± 5° BTDC (in Neutral position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

If it is impossible to adjust closed throttle position switch in Basic Inspection, replace closed throttle position switch.

OK or NG

OK (with CONSULT-II)>>GO TO 8.
OK (without CONSULT-II)>>GO TO 9.
NG >> Replace throttle position switch.

8. CHECK THROTTLE POSITION SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Check voltage of “THRTL POS SEN”.

Throttle valve conditions	Voltage [V]
Completely closed	0.15 - 0.85
Completely open	3.5 - 4.7

Voltage measurement must be made with throttle position sensor installed in vehicle.
If NG, adjust closed throttle position switch. Refer to EC-652, "Basic Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace throttle position sensor.

9. CHECK THROTTLE POSITION SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Turn ignition switch ON.
4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground.
Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	Voltage [V]
Completely closed	0.15 - 0.85
Completely open	3.5 - 4.7

If NG, adjust closed throttle position switch. Refer to EC-652, "Basic Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace throttle position sensor.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

DTC P0600 A/T COMMUNICATION LINE

PFP:23710

System Description

UBS00DMQ

These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/ deceleration.
Voltage signals are exchanged between ECM and TCM (Transmission Control Module).

On Board Diagnosis Logic

UBS00DMR

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0600*	A/T control serial communication link	ECM receives incorrect voltage from TCM (Transmission Control Module) continuously.	● Harness or connectors [The circuit between ECM and TCM (Transmission Control Module) is open or shorted.]

*: This DTC can be detected only by “DATA MONITOR (AUTO TRIG)” with CONSULT-II.

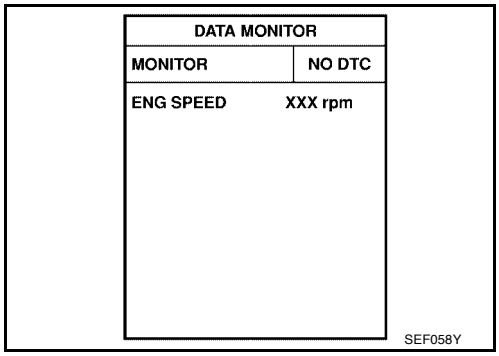
DTC Confirmation Procedure

UBS00DMS

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 rev engine more than 1,000 rpm once, then let it idle for more than 40 seconds.
4. If DTC 1st trip is detected, go to EC-1010, "Diagnostic Procedure" .



WITH GST

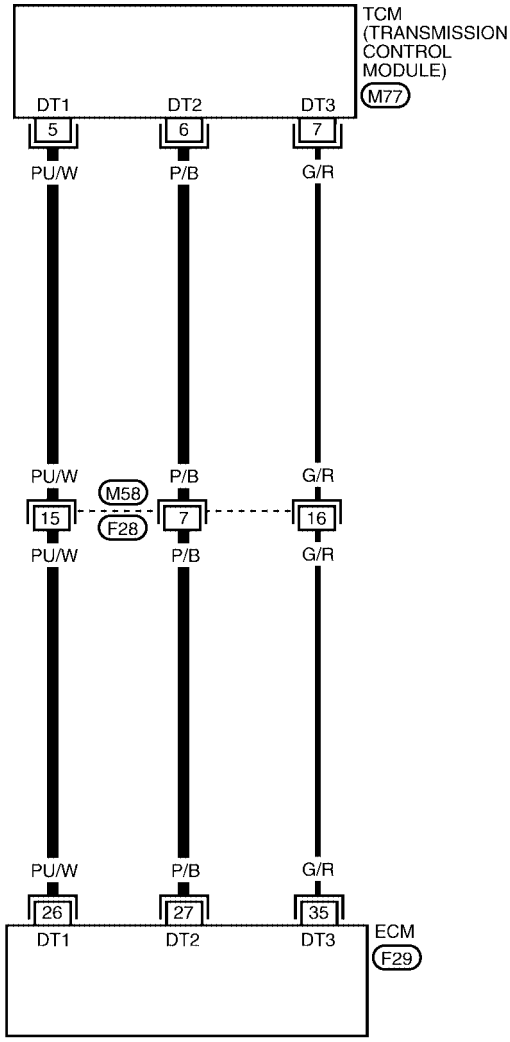
Follow the procedure “WITH CONSULT-II” above.

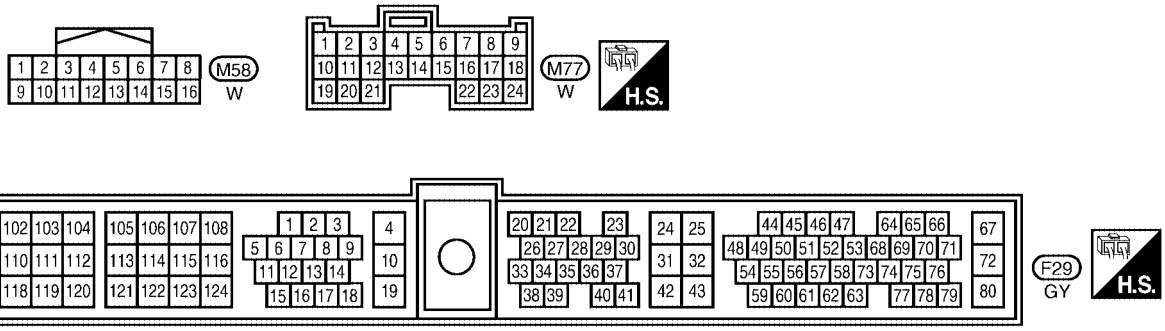
Wiring Diagram
WITHOUT VDC

UBS00DMT

EC-AT/C-01

: Detectable line for DTC
: Non-detectable line for DTC





BBWA1092E

Specification data are reference values and are measured between each terminal and ground.

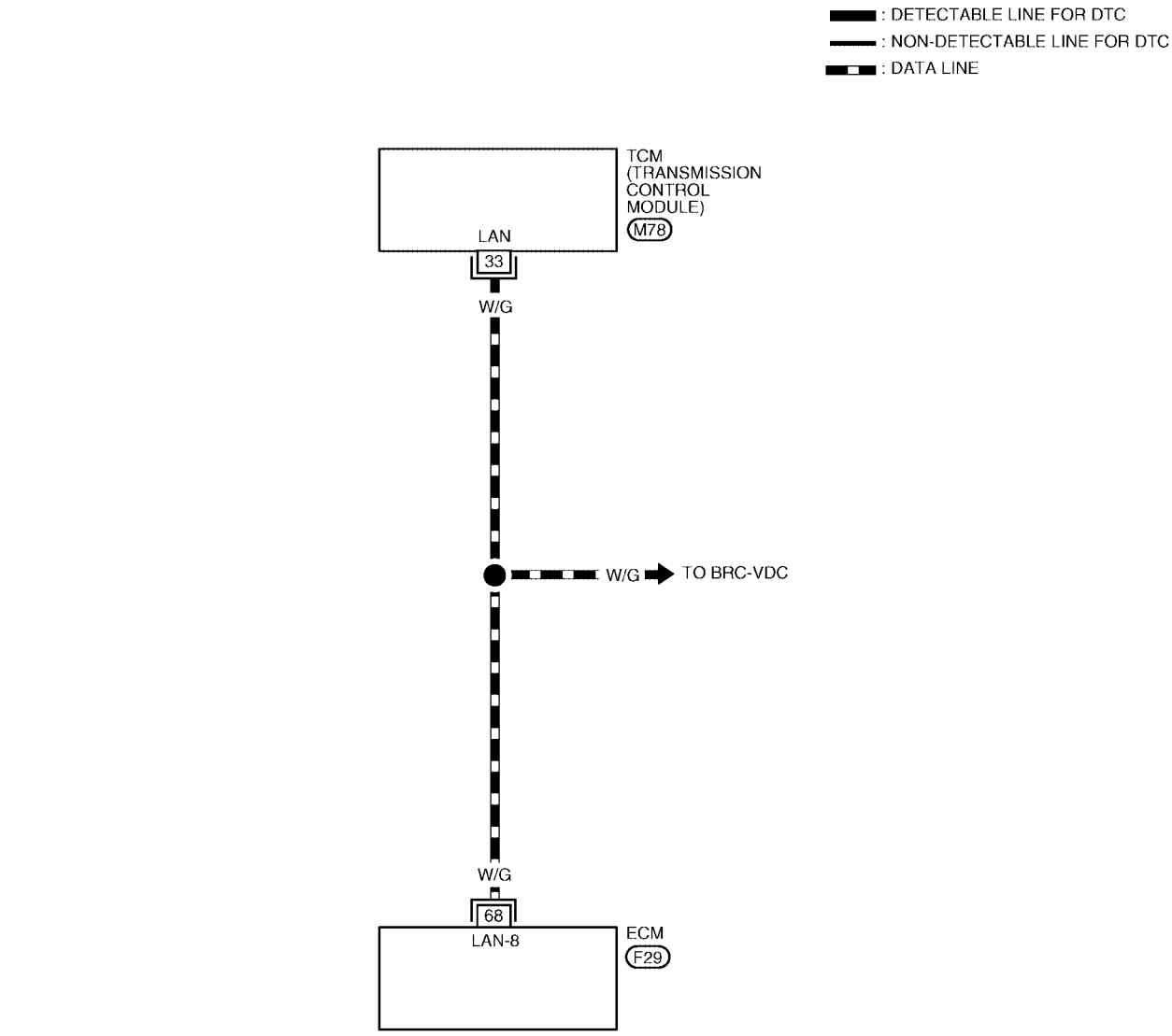
CAUTION:

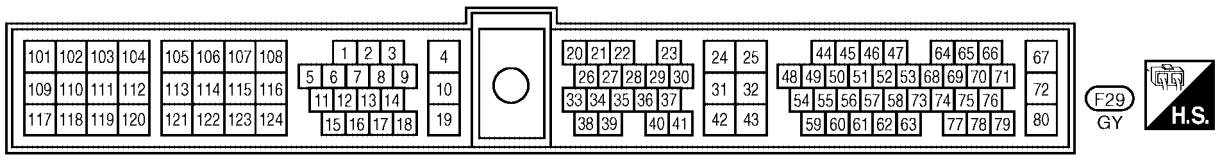
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

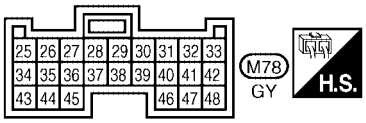
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	PU/W	A/T signal No. 1	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
27	P/B	A/T signal No. 2	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
35	G/R	A/T signal No. 3	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V

WITH VDC

EC-AT/C-02







BBWA1329E

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
68	W/G	A/T signal	**[Engine is running]** ● Idle speed	Approximately 0 - 5.0V

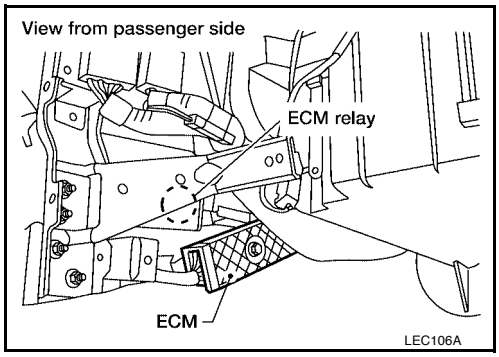
Diagnostic Procedure

UBS00DMU

WITHOUT VDC

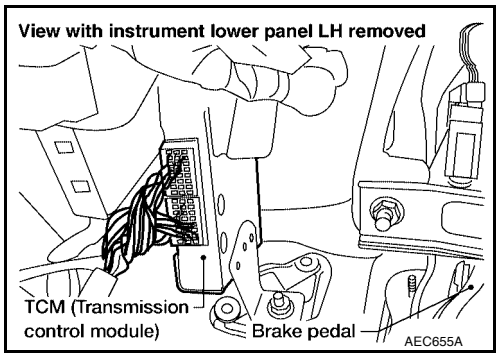
1. CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR OPEN

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.



3. Check harness continuity between ECM terminal 26 and TCM terminal 5, ECM terminal 27 and TCM terminal 6, ECM terminal 35 and TCM terminal 7.
   Refer to Wiring Diagram.

   Continuity should exist.



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F28
- Harness for open or short between ECM and TCM (Transmission Control Module)

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR SHORT

1. Check harness continuity between ECM terminal 26 and ground, ECM terminal 27 and ground, ECM terminal 35 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM and TCM (Transmission Control Module).

>> Repair open circuit or short to ground or short to power in harness.

5. CHECK INTERMITTENT INCIDENT

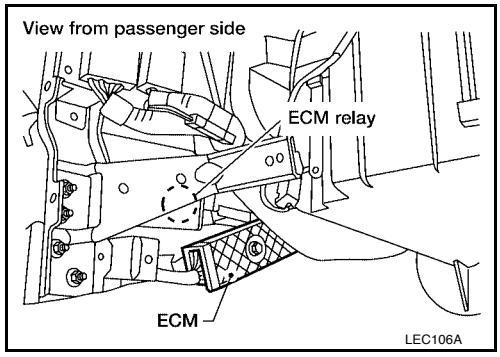
Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

WITH VDC

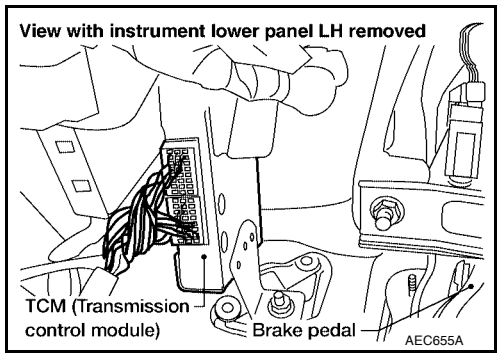
1. CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR OPEN

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.



3. Disconnect TCM harness connector.
4. Check harness continuity between ECM terminal 68 and TCM terminal 33.
   Refer to Wiring Diagram.

Continuity should exist.



OK or NG

OK >> GO TO 2
NG >> Repair harness or connectors.

2. CHECK A/T CONTROL INPUT SIGNAL FOR SHORT

1. Check harness continuity between ECM terminal 68 and ground.
   Refer to Wiring Diagram.

Continuity should not exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair short to ground or short to power in harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END.**

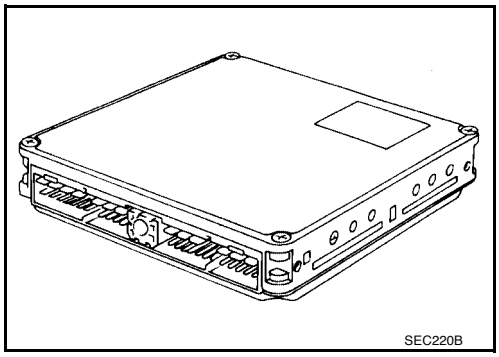
DTC P0605 ECM

PFP:23710

Component Description

UBS00DMV

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine.


SEC220B

On Board Diagnosis Logic

UBS00DMW

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0605	Engine control module	ECM calculation function is malfunctioning.	● ECM

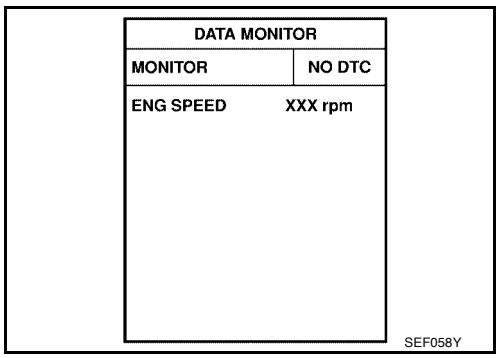
DTC Confirmation Procedure

UBS00DMX

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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. Run engine for at least 2 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-1013, "Diagnostic Procedure" .



SEF058Y

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00DMY

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-1012, "DTC Confirmation Procedure" .
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-1012, "DTC Confirmation Procedure" .
5. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes >> Replace ECM.
No >> **INSPECTION END**.

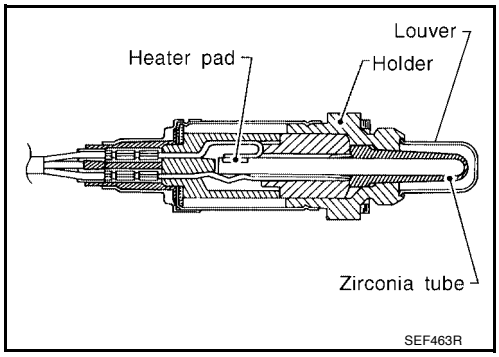
DTC P1143, P1163 HO2S1

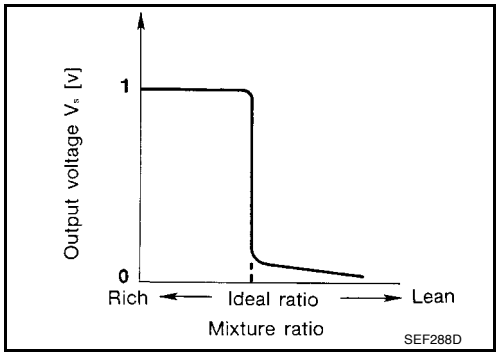
PFP:22690

Component Description

UBS00DMZ

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

UBS00DN0

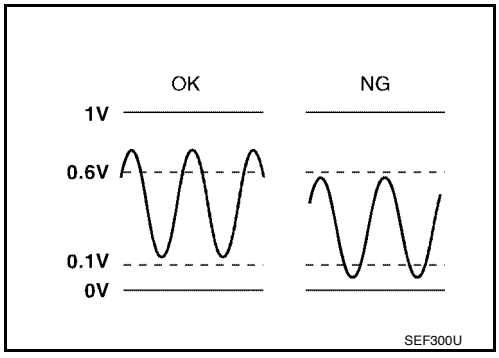
Specification data are reference values.

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

UBS00DN1

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1143 (Bank 1) P1163 (Bank 2)	Heated oxygen sensor 1 lean shift monitoring	The maximum and minimum voltage from the sensor are not reached to the specified voltages.	● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Fuel injector ● Intake air leaks

DTC Confirmation Procedure

UBS00DN2

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 5 seconds before conducting the next test.

TESTING CONDITION:

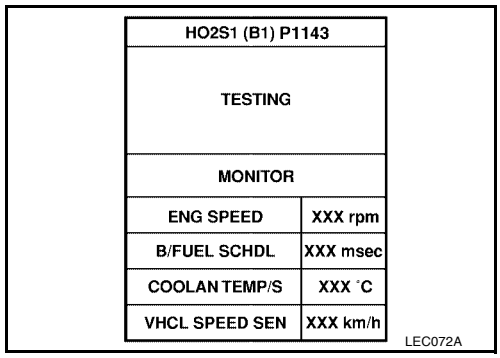
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 5 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1)/(B2) P1143/ P1163” 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.

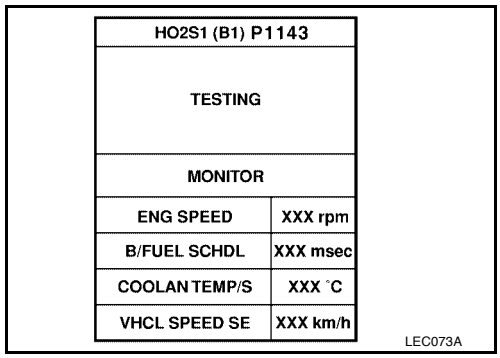
   NOTE:

   Never raise engine speed above 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 5.



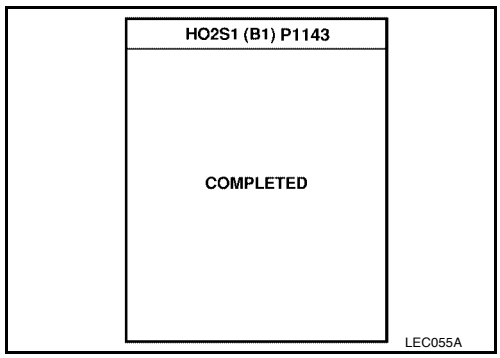
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

EGN SPEED	1,200 - 3,150 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.8 - 11.0 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-1016, "Diagnostic Procedure" .



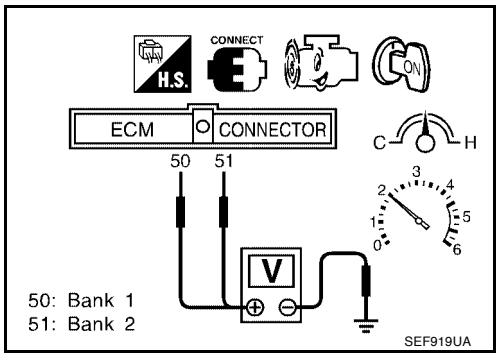
Overall Function Check

UBS00DN3

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and 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 1 time.
   - The minimum voltage is over 0.1V at least 1 time.
4. If NG, go to EC-1016, "Diagnostic Procedure" .



Diagnostic Procedure

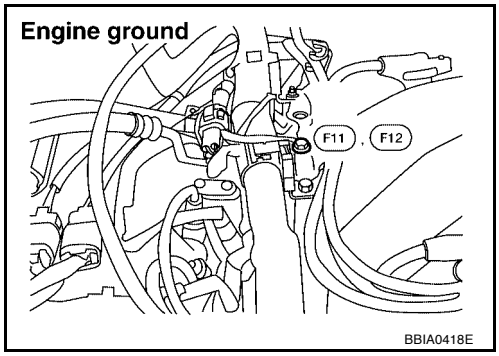
UBS00DN4

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

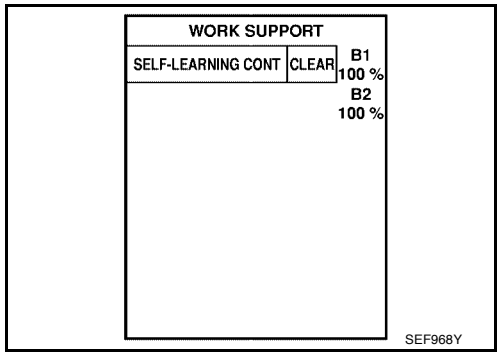
Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> 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 DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-638, "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-828 .
No >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 1 HEATER

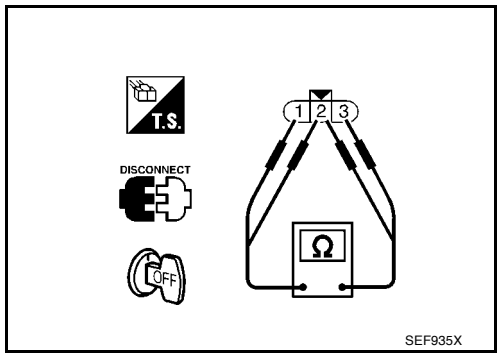
1. Stop engine.
2. Check resistance between HO2S1 terminals 3 and 1.

   Resistance: 3.3 - 4.0Ω [at 25°C (77°F)]

3. Check continuity between HO2S1 terminals 2 and 1, 3 and 2.

   Continuity should not exist.

   CAUTION:
   - **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
   - **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> Replace malfunctioning heated oxygen sensor 1.

5. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. 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 (B2)	XXX V
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

PBIB2025E

5. Check the following.

- “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown below.
- “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.

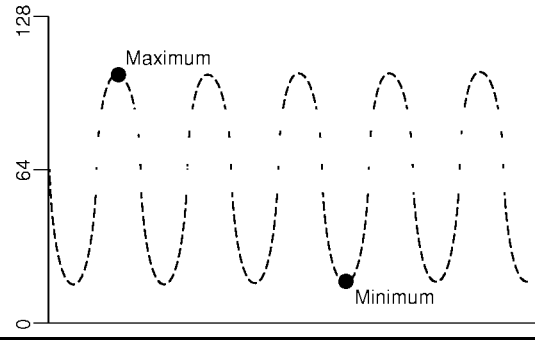
Bank 1						
	cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R					
Bank 2						
	cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R					

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 oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 1.

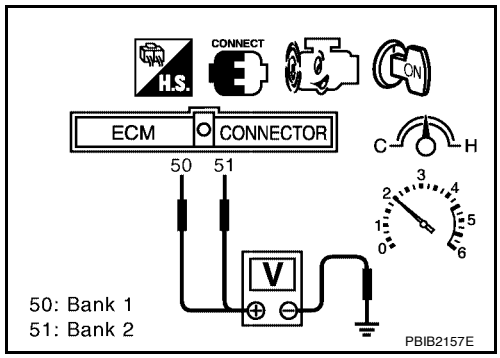
6. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and 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 1 time.
- The minimum voltage is below 0.3V at least 1 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 → 0 - 0.3V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 1.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For circuit, refer to EC-780, "Wiring Diagram" .

>> **INSPECTION END**

Removal and Installation

UBS00DN5

HEATED OXYGEN SENSOR 1

Refer to EM-80, "OUTER COMPONENT PARTS" .

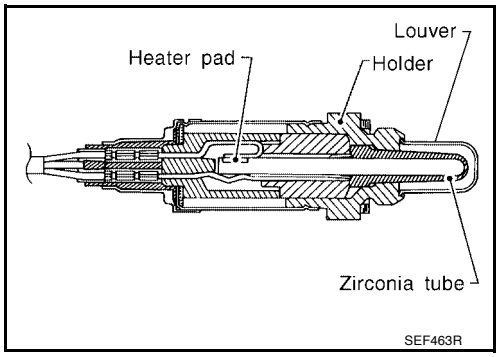
DTC P1144, P1164 HO2S1

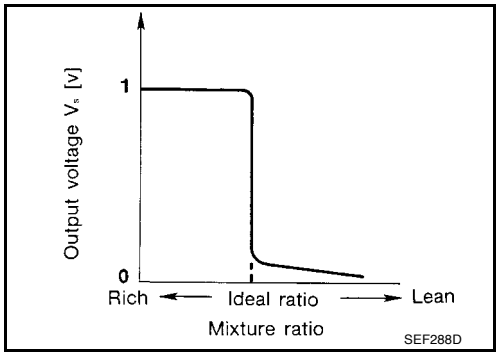
PFP:22690

Component Description

UBS00DN6

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

UBS00DN7

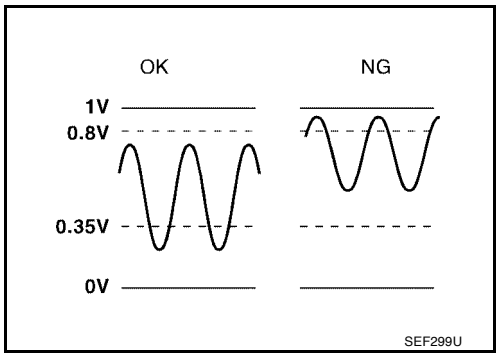
Specification data are reference values.

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

UBS00DN8

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high. The “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1144 (Bank 1) P1164 (Bank 2)	Heated oxygen sensor 1 rich shift monitoring	The maximum and minimum voltages from the sensor are beyond the specified voltages.	● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Fuel injector

DTC Confirmation Procedure

UBS00DN9

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 5 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)/(B2) P1144/P1164” 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 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 5.

HO2S1 (B1) P1144	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

LEC074A

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	1,200 - 3,150 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.8 - 11.0 msec
Selector lever	Suitable position

HO2S1 (B1) P1144	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

LEC075A

   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-1022, "Diagnostic Procedure" .

HO2S1 (B1) P1144
COMPLETED

LEC058A

Overall Function Check

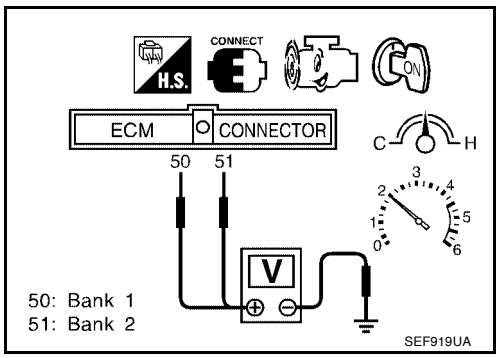
UBS00DNA

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.

2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and 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 1 time.
- The minimum voltage is below 0.35V at least 1 time.
4. If NG, go to EC-1022, "Diagnostic Procedure" .



Diagnostic Procedure

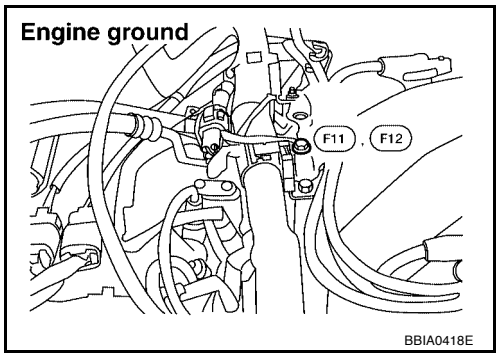
UBS00DNB

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
Refer to EC-709, "Ground Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

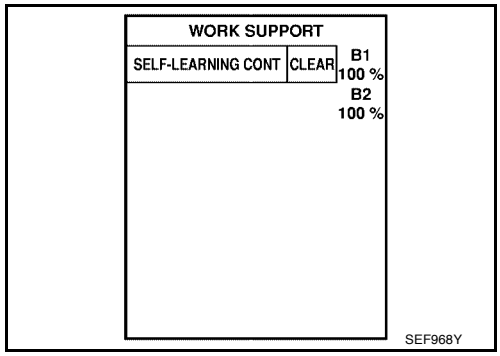
Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> 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 DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-638, "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 toEC-836 .
No >> GO TO 4.

4. CHECK HO2S 1 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.

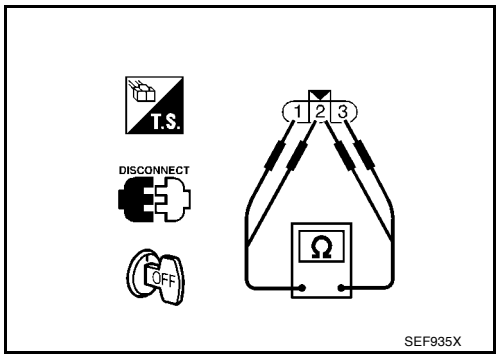
5. CHECK HEATED OXYGEN SENSOR 1 HEATER

Check resistance between HO2S1 terminals 3 and 1.

Resistance: 3.3 - 4.0Ω [at 25°C (77°F)]

Check continuity between HO2S1 terminals 2 and 1, 3 and 2.

Continuity should not exist.



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 1.

6. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. 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 (B2)	XXX V
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

PBIB2025E

5. Check the following.

- “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown below.
- “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.

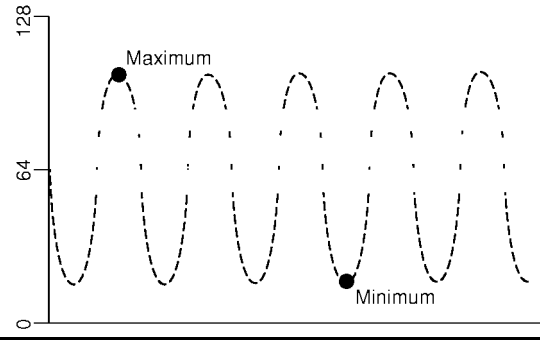
Bank 1						
	cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R					
Bank 2						
	cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R					

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 oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

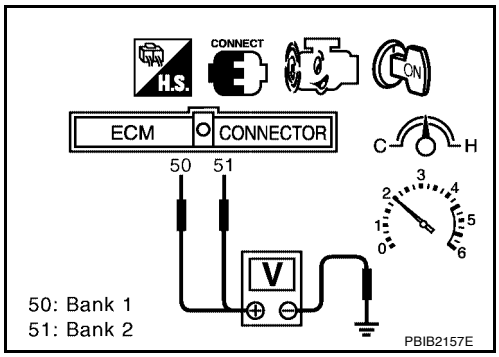
OK >> GO TO 8.
NG >> Replace malfunctioning heated oxygen sensor 1.

7. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and 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 1 time.
- The minimum voltage is below 0.3V at least 1 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 → 0 - 0.3V

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 8.
NG >> Replace malfunctioning heated oxygen sensor 1.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For circuit, refer to EC-780, "Wiring Diagram" .

>> **INSPECTION END**

Removal and Installation

UBS00DNC

HEATED OXYGEN SENSOR 1

Refer to EM-80, "OUTER COMPONENT PARTS" .

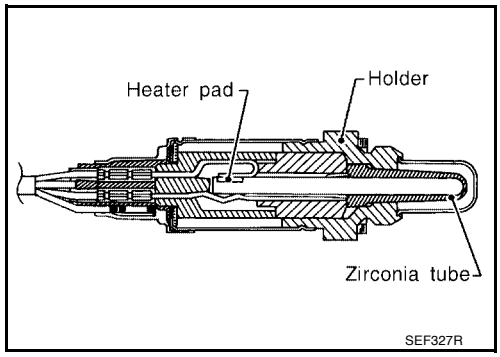
DTC P1146, P1166 HO2S2

PFP:226A0

Component Description

UBS00DND

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DNE

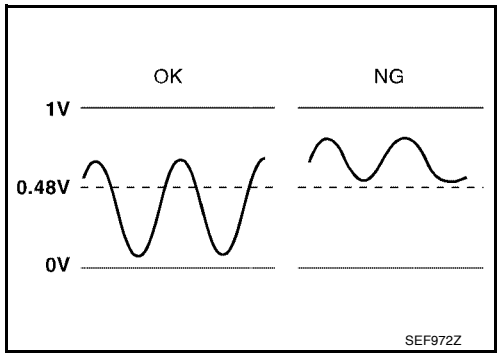
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Warm-up condition ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS00DNF

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146 (Bank 1) P1166 (Bank 2)	Heated oxygen sensor 2 minimum voltage monitoring	The minimum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector

DTC Confirmation Procedure

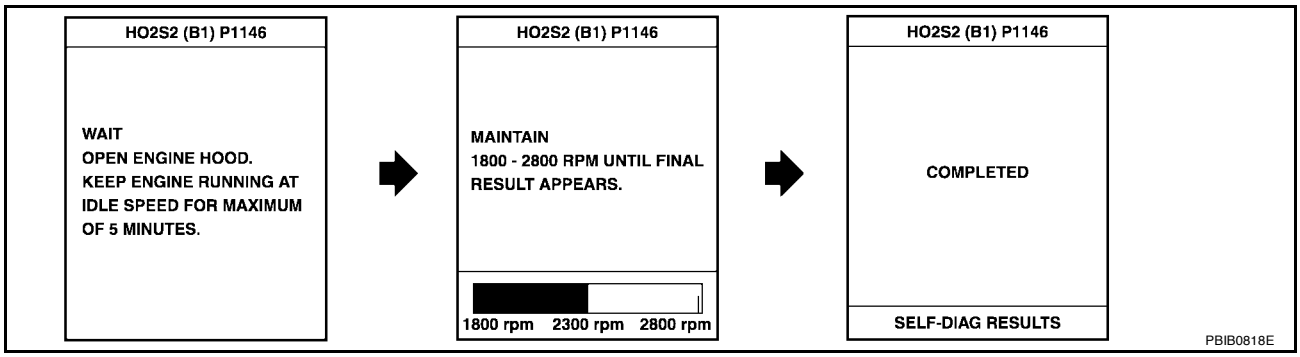
UBS00DNG

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

4. Let engine idle for 1 minute.
5. Select “HO2S2 (B1) P1146” or “HO2S2 (B2) P1166” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.



6. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-1033, "Diagnostic Procedure" .
   If “CAN NOT 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

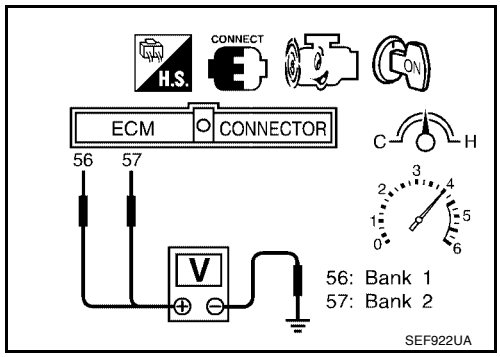
UBS00DNH

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

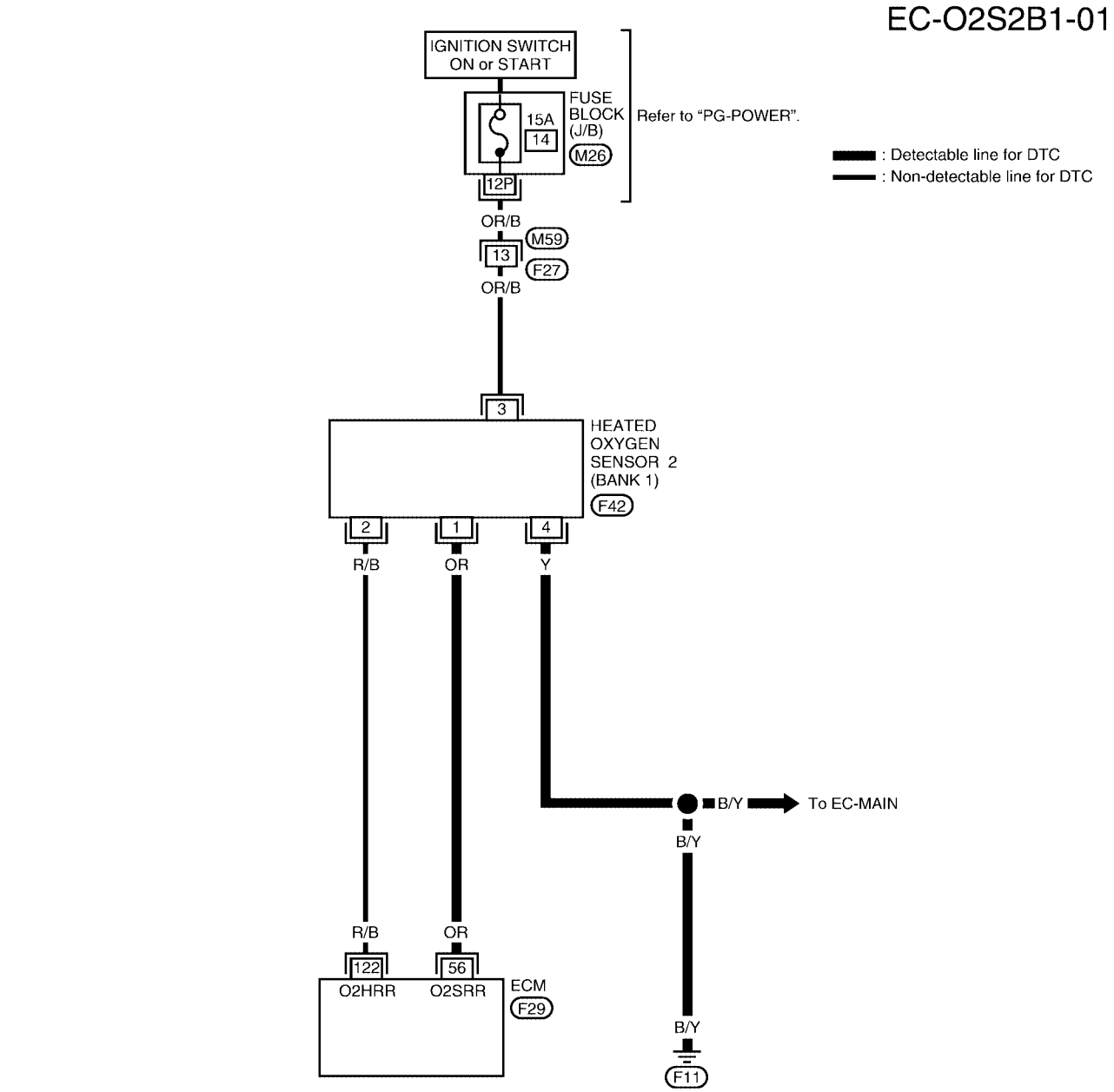
WITH GST

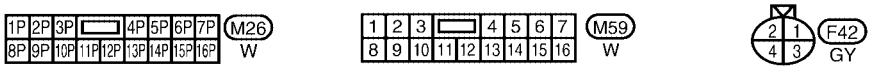
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.48V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.48V at least once during this procedure.
8. If NG, go to EC-1033, "Diagnostic Procedure" .

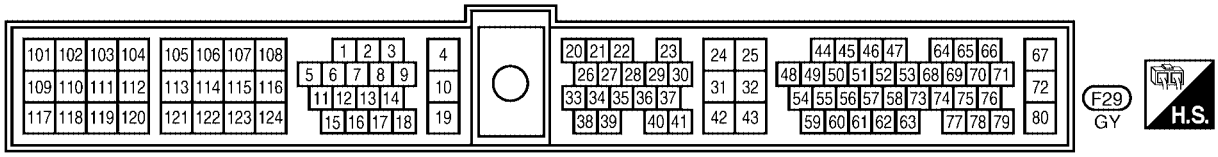


Wiring Diagram
BANK 1

UBS00DNI







BBWA1079E

Specification data are reference values and are measured between each terminal and ground.

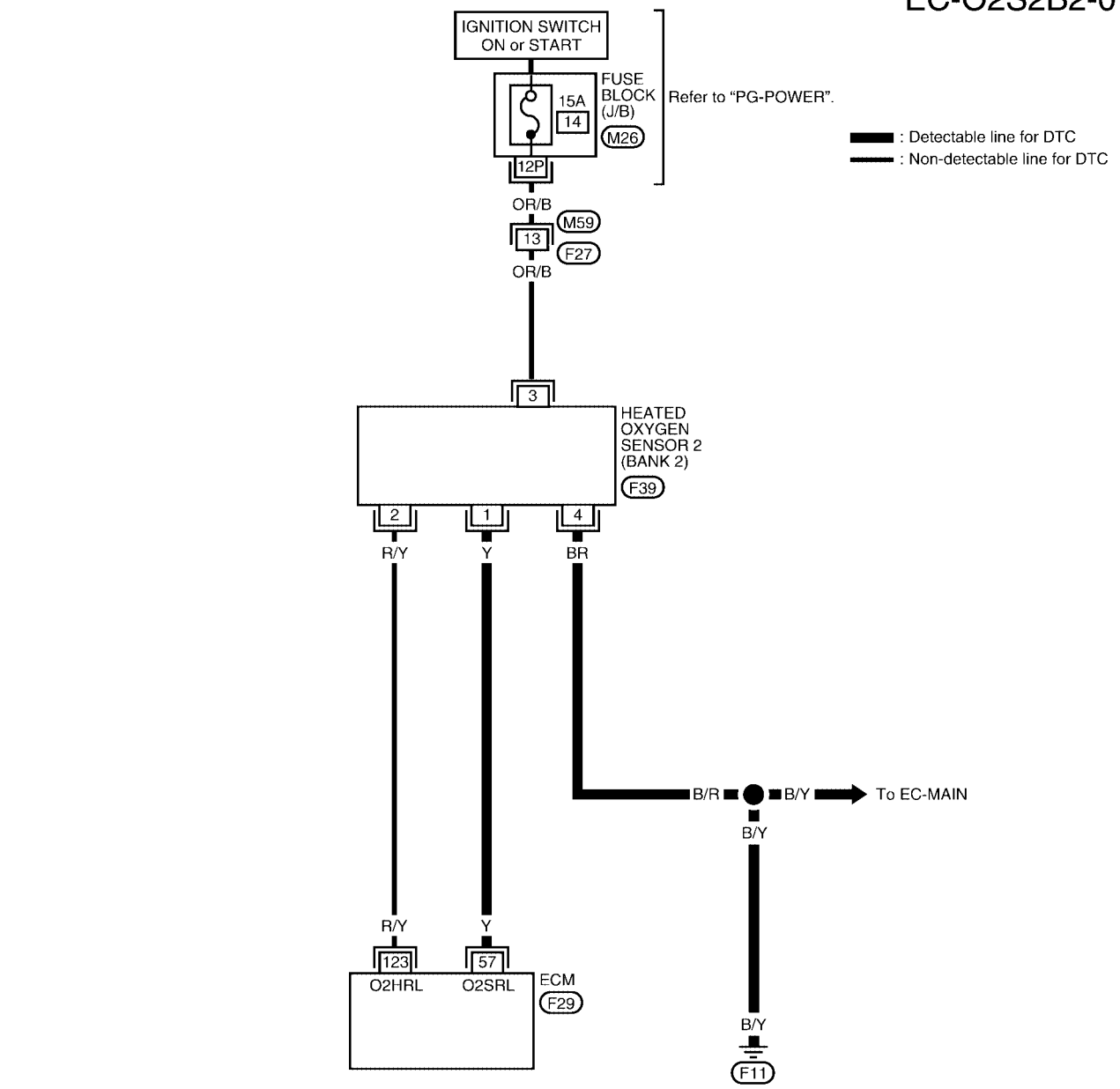
CAUTION:

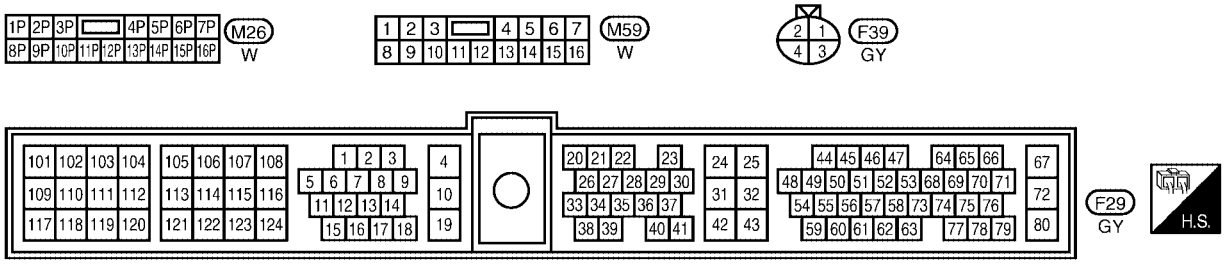
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition**. ● Revving engine from idle to 3,000 rpm quickly after the following condition are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

BANK 2

EC-O2S2B2-01





BBWA1080E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

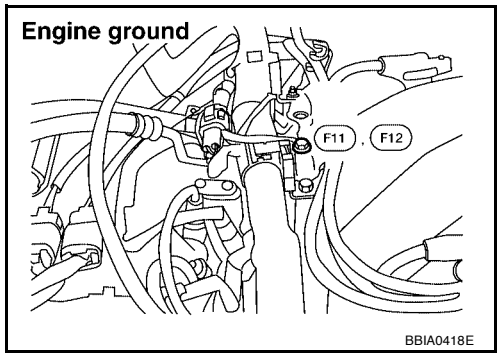
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	Y	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition.** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

Diagnostic Procedure

UBS00DNJ

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .



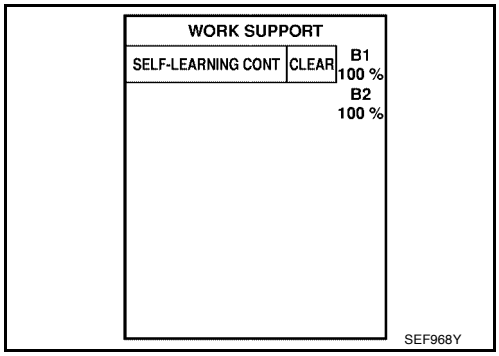
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

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 DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-638, "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-836 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

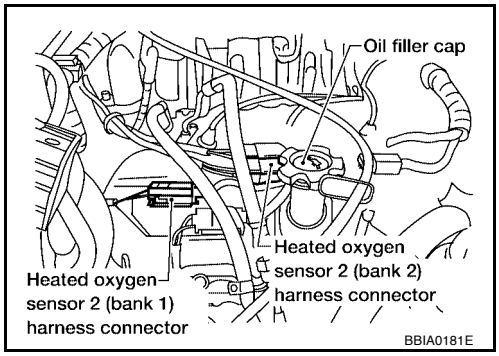
1. Disconnect heated oxygen sensor 2 harness connector.
2. Check harness continuity between HO2S2 terminal 4 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.



4. CHECK HO2S2 INPUT 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	
P1146	56	1	Bank 1
P1166	57	1	Bank 2

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1146	56	1	Bank 1
P1166	57	1	Bank 2

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

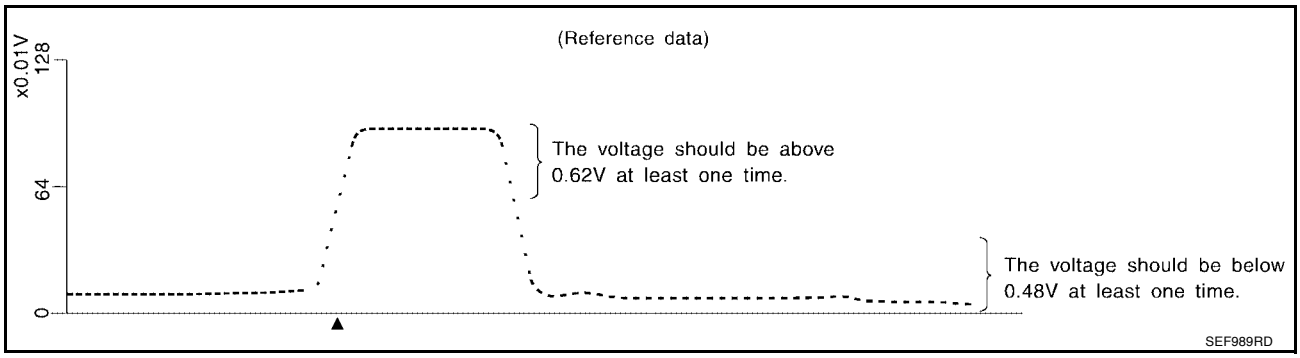
With CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperate.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

7. Check “HO2S2 (B1)/(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 oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

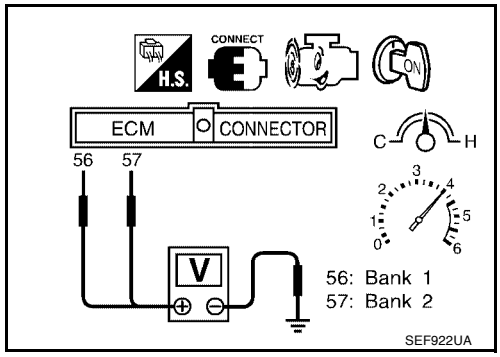
OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK HEATED OXYGEN SENSOR 2

Without CONSULT-II

1. Start engine warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.62V at least once during this procedure.
   If the voltage is above 0.62V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.48V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00DNK

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

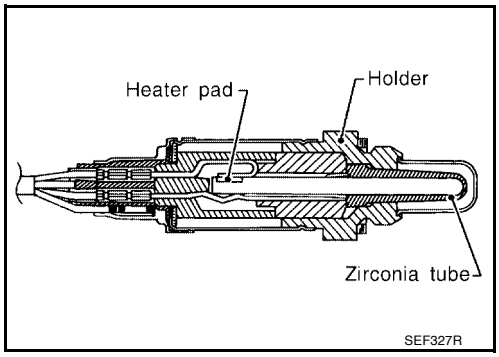
DTC P1147, P1167 HO2S2

PFP:226A0

Component Description

UBS00DNL

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DNM

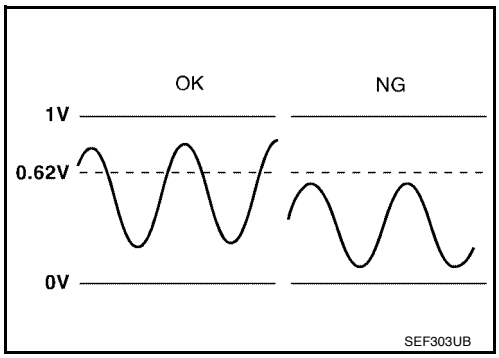
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Warm-up condition ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS00DNN

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1147 (Bank 1) P1167 (Bank 2)	Heated oxygen sensor 2 maximum voltage monitoring	The maximum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector ● Intake air leaks

DTC Confirmation Procedure

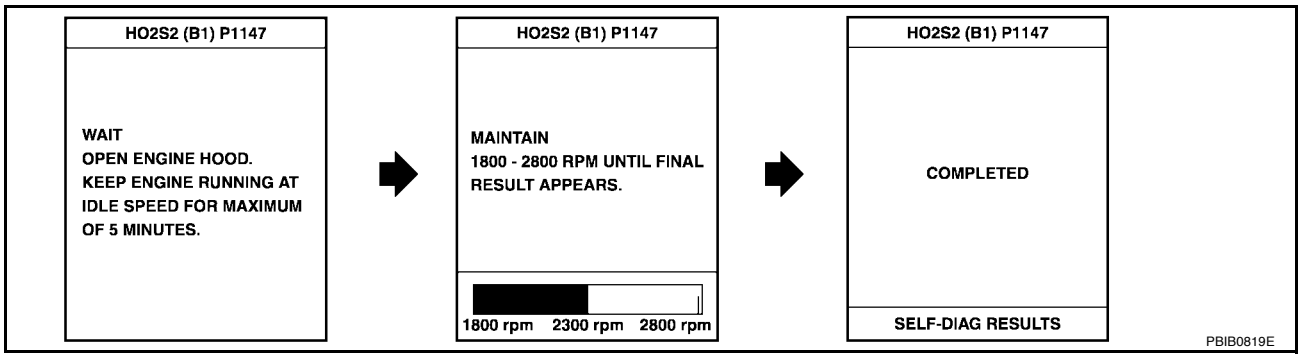
UBS00DNO

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “HO2S2 (B1) P1147” or “HO2S2 (B2) P1167” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.



6. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-1043, "Diagnostic Procedure" .
   If “CAN NOT 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

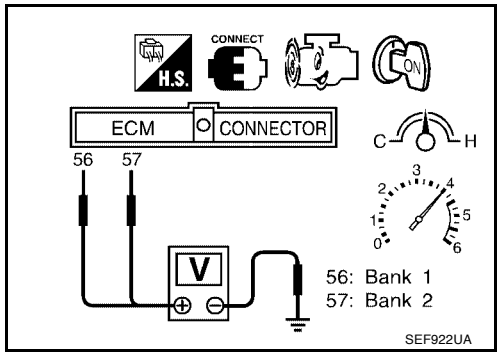
UBS00DNP

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

WITH GST

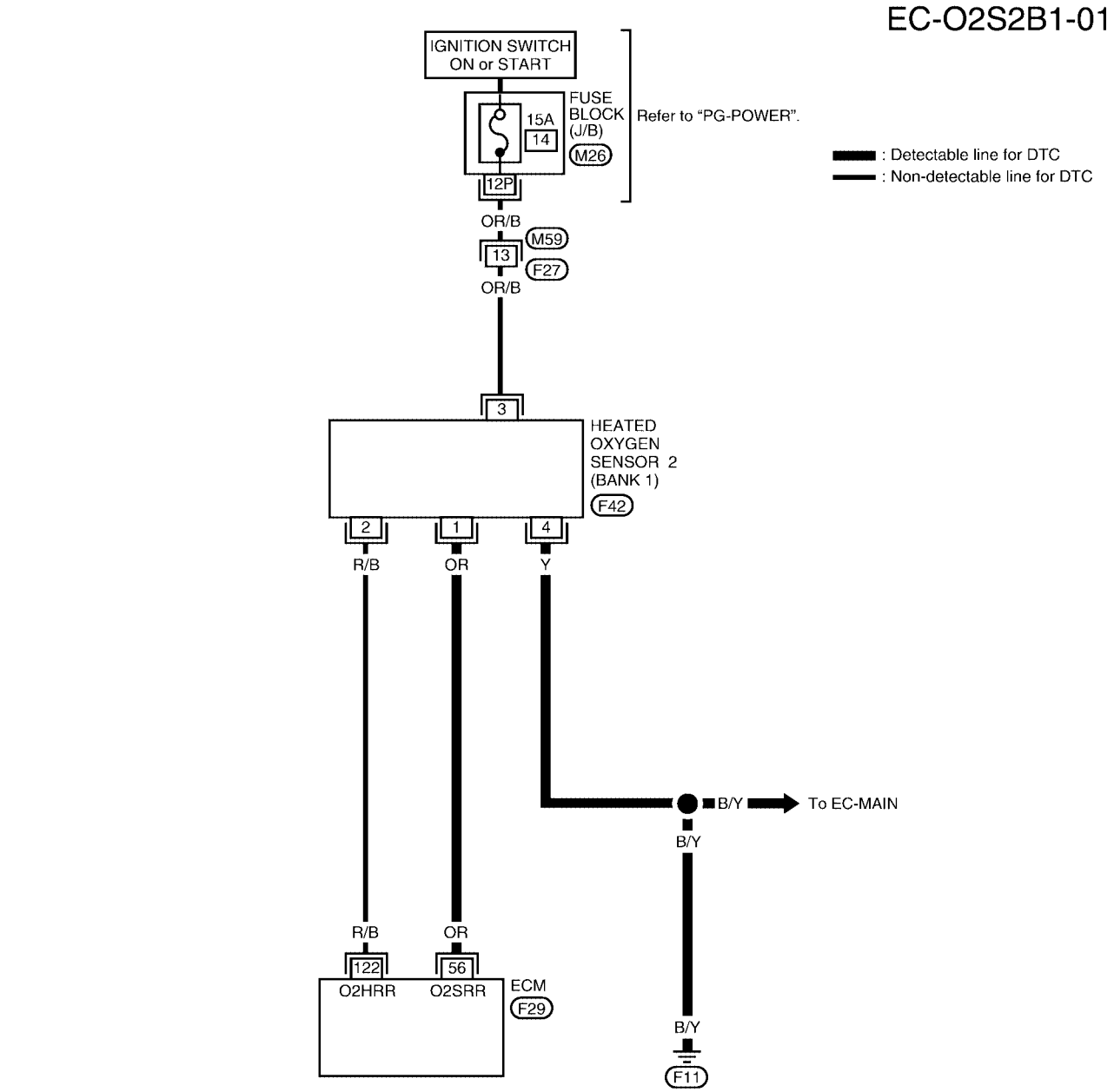
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.62V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.

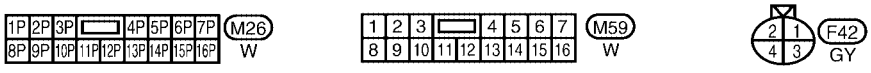


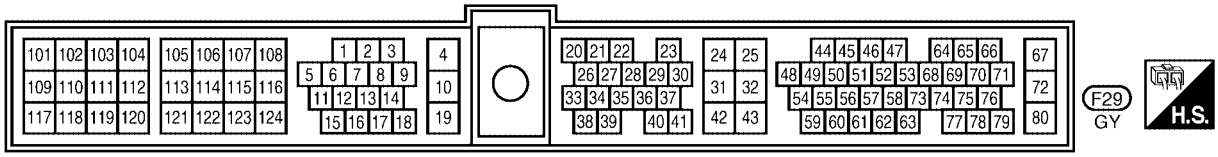
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be above 0.62V at least once during this procedure.
8. If NG, go to EC-1043, "Diagnostic Procedure" .

Wiring Diagram
BANK 1

UBS00DNQ







BBWA1079E

Specification data are reference values and are measured between each terminal and ground.

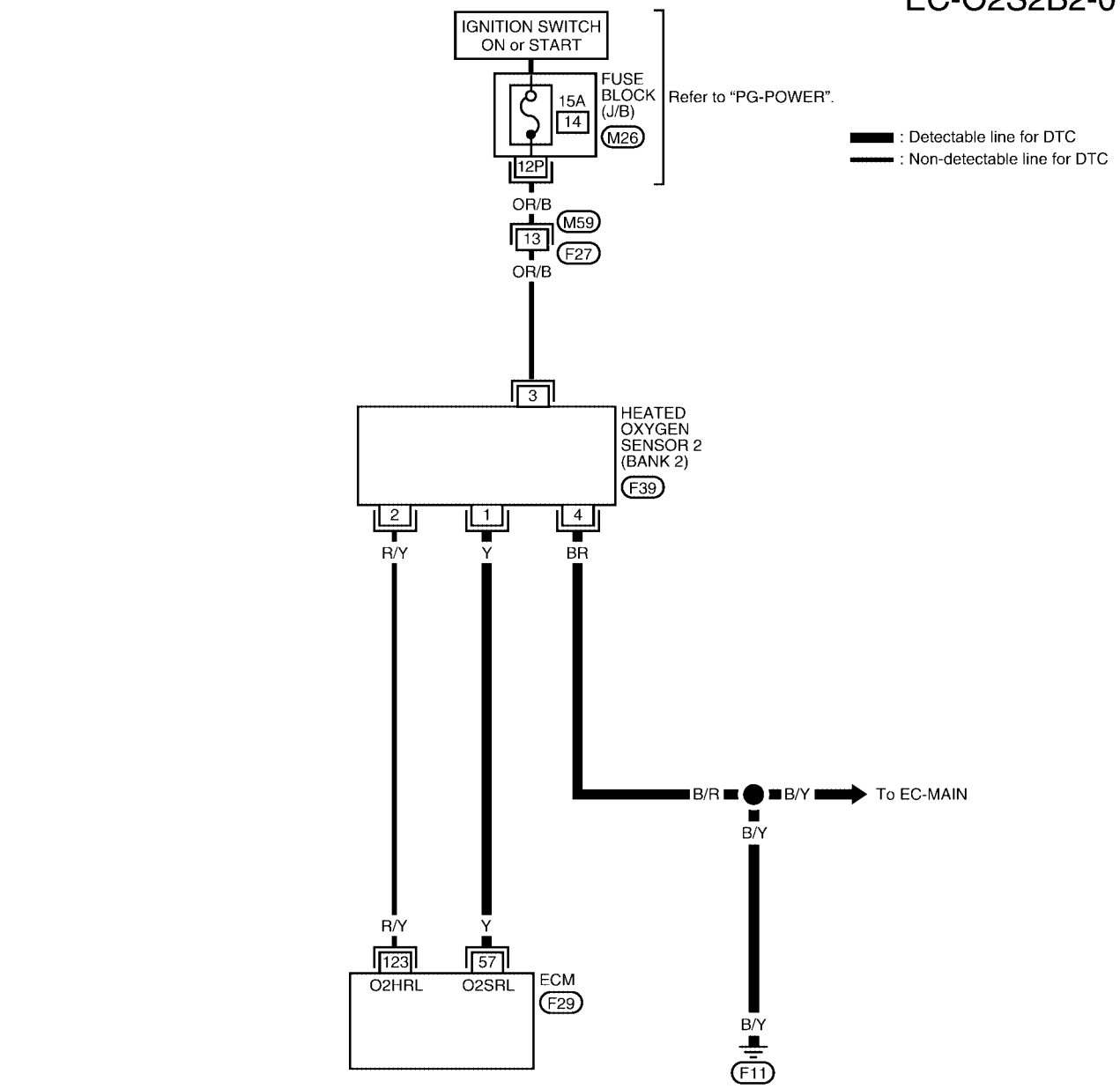
CAUTION:

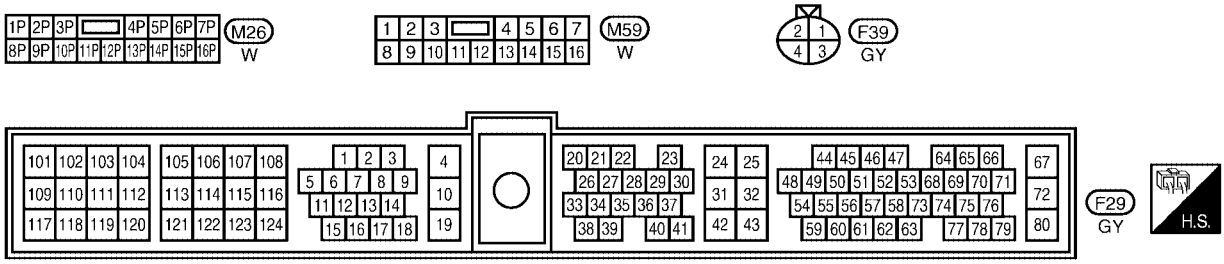
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition**. ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

BANK 2

EC-O2S2B2-01





BBWA1080E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

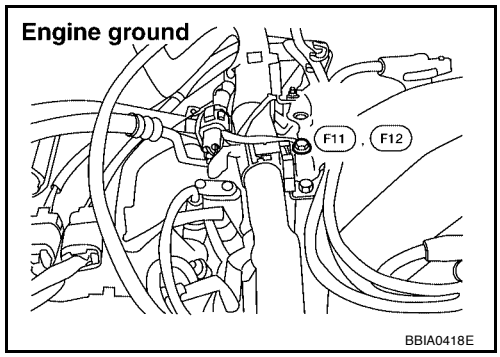
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	Y	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

Diagnostic Procedure

UBS00DNR

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .



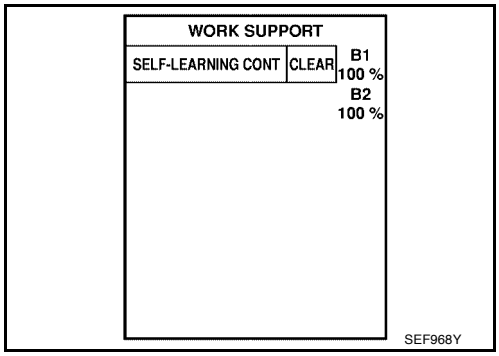
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or 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 DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-638, "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 toEC-828 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

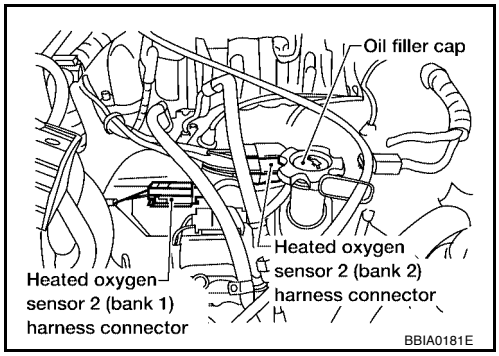
1. Disconnect heated oxygen sensor 2 harness connector.
2. Check harness continuity between HO2S2 terminal 4 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.



4. CHECK HO2S2 INPUT 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	
P1147	56	1	Bank 1
P1167	57	1	Bank 2

Continuity should exist.

4. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1147	56	1	Bank 1
P1167	57	1	Bank 2

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

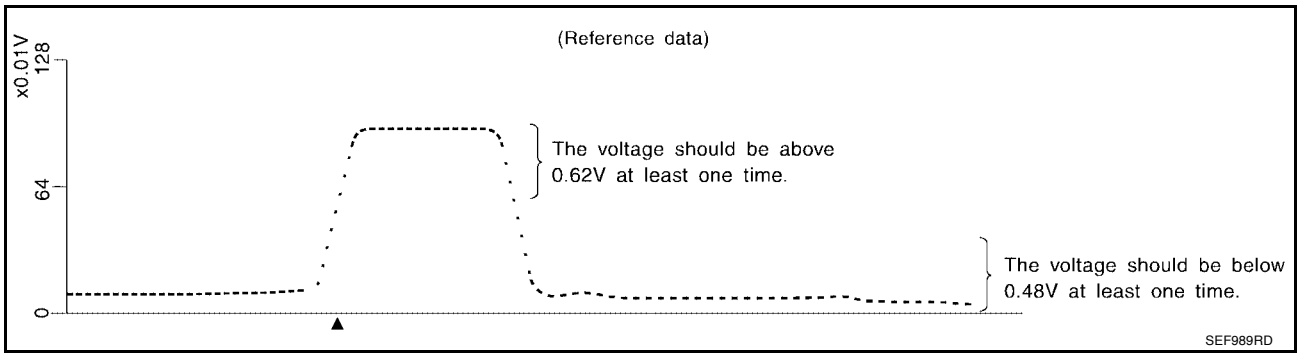
With CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperate.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

7. Check “HO2S2 (B1)/(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 oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

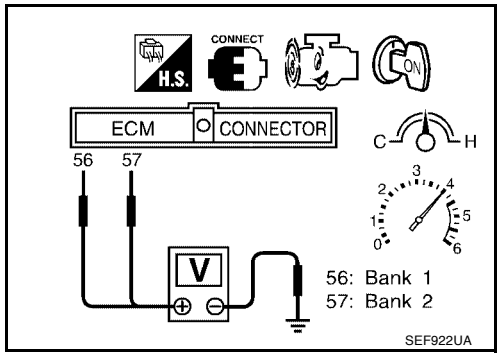
OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK HEATED OXYGEN SENSOR 2

Without CONSULT-II

1. Start engine warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.62V at least once during this procedure.
   If the voltage is above 0.62V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.48V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen SensorThread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00DNS

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

DTC P1148, P1168 CLOSED LOOP CONTROL

PFP:22690

On Board Diagnosis Logic

UBS00DNT

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148 (Bank 1)	Closed loop control function	The closed loop control function for bank 1 does not operate even when vehicle is driving in the specified condition.	● The heated oxygen sensor 1 circuit is open or shorted. ● Heated oxygen sensor 1 ● Heated oxygen sensor heater
P1168 (Bank 2)		The closed loop control function for bank 2 does not operate even when vehicle is driving in the specified condition.	

DTC Confirmation Procedure

UBS00DNU

CAUTION:
Always drive vehicle at a safe speed.

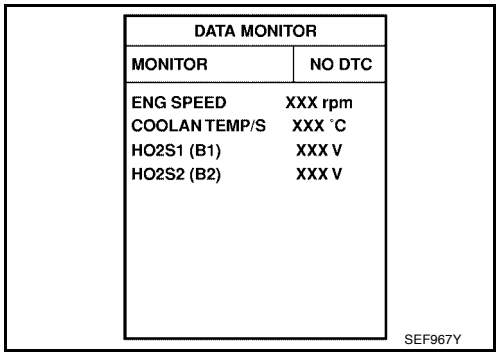
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Never raise engine speed above 2,800 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-1049, "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	3.3 msec or more
ENG SPEED	1,600 rpm or more
Selector lever	Suitable position
VHCL SPEED SE	More than 70 km/h (43 MPH)

During this test, P0134 and/or P0154 may be displayed on CONSULT-II screen.

6. If DTC is detected, go to EC-1049, "Diagnostic Procedure" .

Overall Function Check

UBS00DNV

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

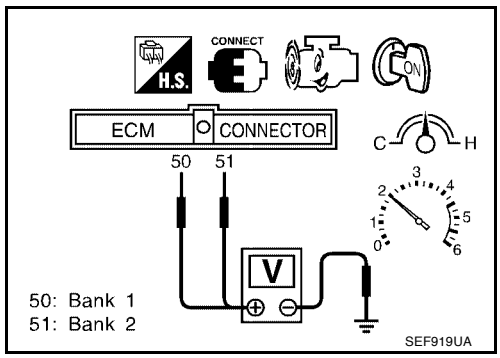
WITH GST

1. Start engine and warm it up to normal operating temperature.

2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and 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-1049, "Diagnostic Procedure" .



Diagnostic Procedure

UBS00DNW

Perform trouble diagnosis for DTC P0133, P0153, EC-793, "Diagnostic Procedure" .

DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

PFP:00021

On Board Diagnosis Logic

UBS00DNX

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

This self-diagnosis has one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over temperature (Overheat)	● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant was not added to the system using the proper filling method. ● Engine coolant is not within the specified range.	● Cooling fan (crankshaft driven) ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to EC-1052, "Main 12 Causes of Overheating" .

CAUTION:

When a malfunction is indicated be sure to replace the coolant, follow the procedure in MA-26, "Changing Engine Coolant" . Also, replace the engine oil. Refer to MA-30, "Changing Engine Oil" .

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "ANTIFREEZE COOLANT MIXTURE RATIO" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

UBS00DNY

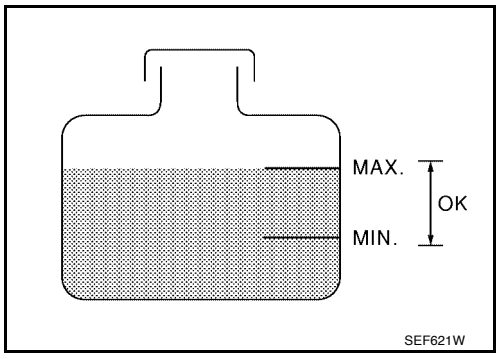
Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

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-1051, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1051, "Diagnostic Procedure" .
3. Start engine.
4. Make sure that cooling fan (crankshaft driven) operates.
5. If NG, go to EC-1051, "Diagnostic Procedure" .



WITH GST

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-1051, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1051, "Diagnostic Procedure" .
3. Start engine and make sure that cooling fan (crankshaft driven) operates.
   Be careful not to overheat engine.
4. If NG, go to EC-1051, "Diagnostic Procedure" .

Diagnostic Procedure

UBS00DNZ

1. CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION

Start engine and make sure that cooling fan (crankshaft driven) operates.

OK or NG

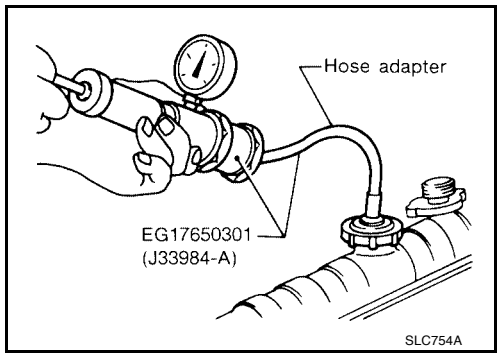
OK >> GO TO 2.
NG >> Check cooling fan (crankshaft driven). Refer to CO-32, "COOLING FAN (CRANKSHAFT DRIVEN)" .

2. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

CAUTION:
Higher than the specified pressure may cause radiator damage.

Testing pressure: 157 kPa (1.6 kg/cm, 23 psi)



Pressure should not drop.

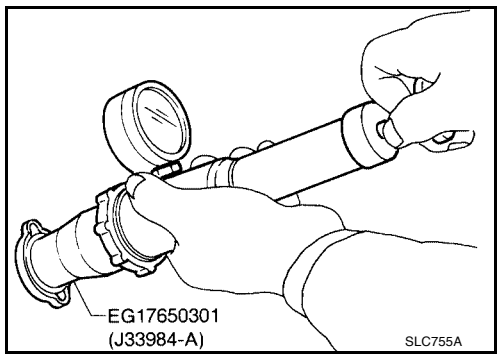
OK or NG

OK >> GO TO 3.
NG >> Check the following for leak
- Hose
- Radiator
- Water pump
  Refer to CO-25, "WATER PUMP" .

3. 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 4.
NG >> Replace radiator cap.

4. CHECK THERMOSTAT

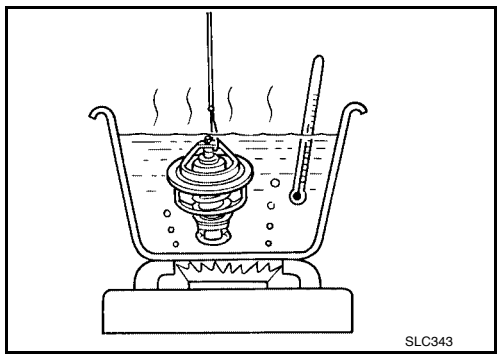
1. Check valve seating condition at normal room temperatures.
   It should seat tightly.
2. Check valve opening temperature and valve lift.

   Valve opening temperature : 82°C (180°F) [standard]

   Valve lift : More than 10 mm/95°C (0.39 in/203°F)

3. Check if valve is closed at 5°C (41°F) below valve opening temperature.

For details, refer to CO-28, "THERMOSTAT" .



OK or NG

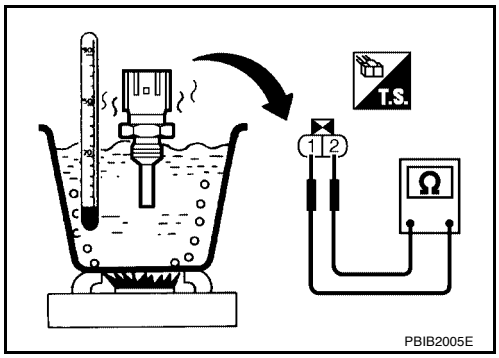
OK >> GO TO 5.
NG >> Replace thermostat

5. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.

<Reference data>

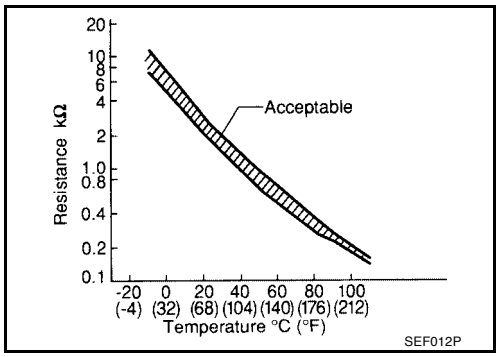
Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



OK or NG

OK >> GO TO 6.

NG >> Replace engine coolant temperature sensor.



6. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to EC-1052, "Main 12 Causes of Overheating" .

>> **INSPECTION END**.

Main 12 Causes of Overheating

UBS00DO0

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-14 .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-26 .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See CO-23 .
ON*1	5	● Coolant leaks	● Visual	No leaks	See CO-23 .
ON*1	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-28 .
ON*1	7	● Cooling fan (crankshaft driven)	● Visual	Operating	See CO-32 .
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*2	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 MA-26 .
OFF*3	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See MA-14 .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-102 .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-131 .

*1: Engine running at 3,000 rpm for 10 minutes.
*2: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*3: After 60 minutes of cool down time.
For more information, refer to CO-21, "OVERHEATING CAUSE ANALYSIS" .

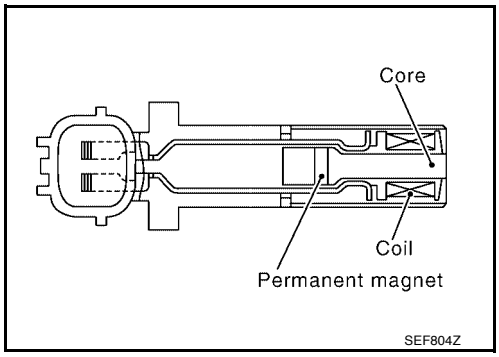
DTC P1336 CKP SENSOR (OBD)

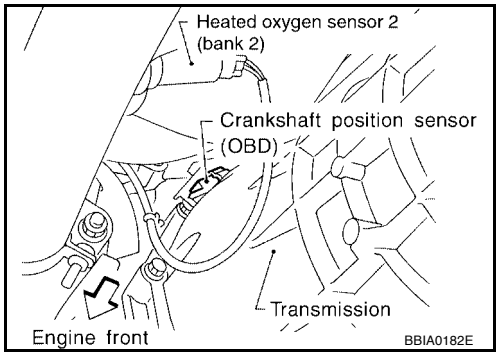
PFP:23731

Component Description

UBS00DO1

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
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.
This sensor is not used to control the engine system.
It is used only for the on board diagnosis.





On Board Diagnosis Logic

UBS00DO2

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1336	Crankshaft position sensor (OBD) range/ performance	A chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Crankshaft position sensor (OBD) ● Drive plate/Flywheel

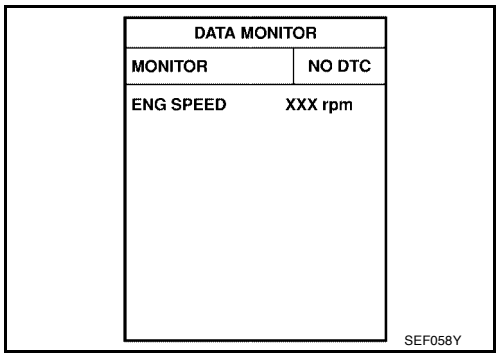
DTC Confirmation Procedure

UBS00DO3

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 run it for at least 2 minutes at idle speed.
3. If 1st trip DTC is detected, go to EC-1056, "Diagnostic Procedure" .



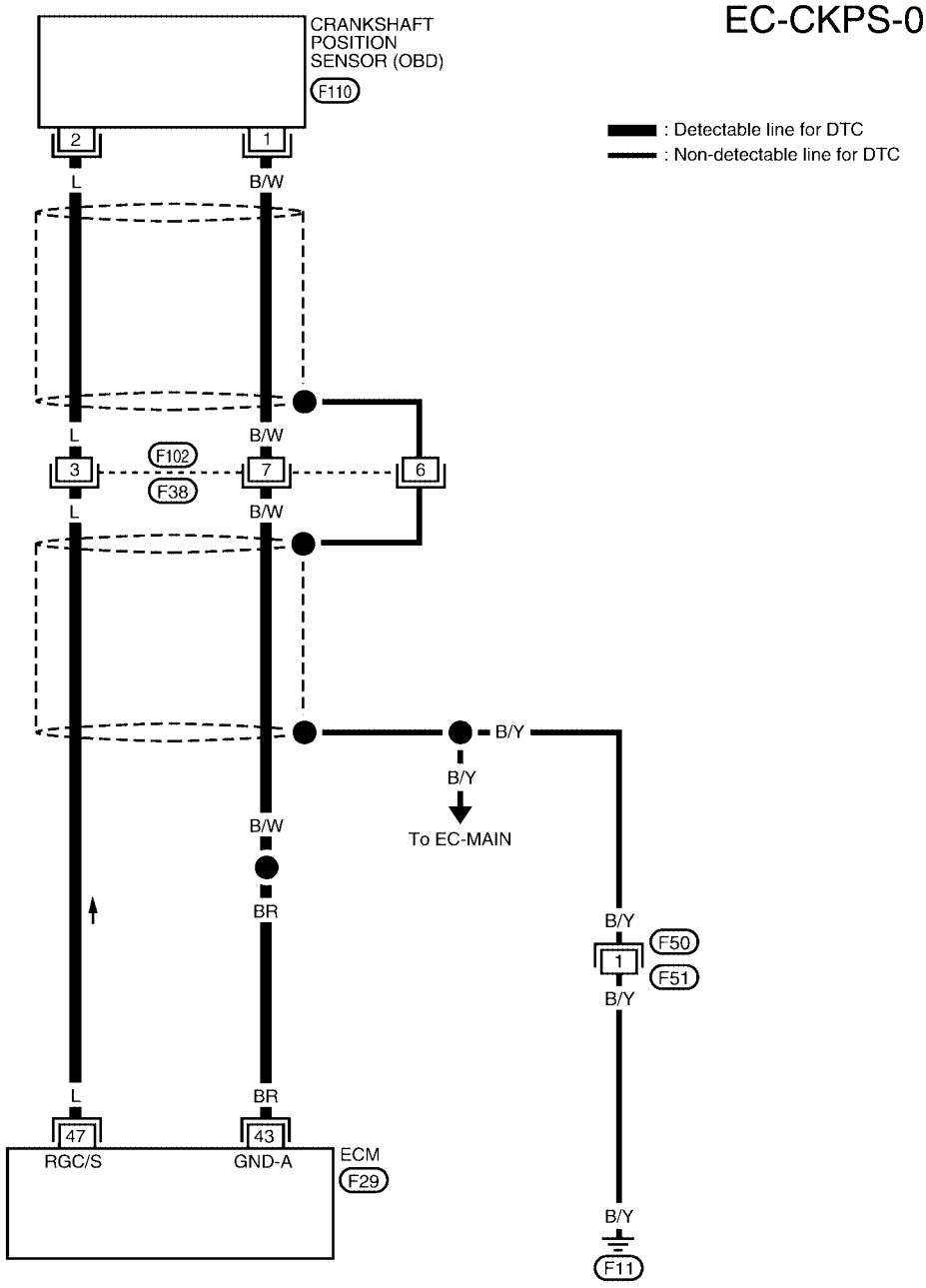
WITH GST

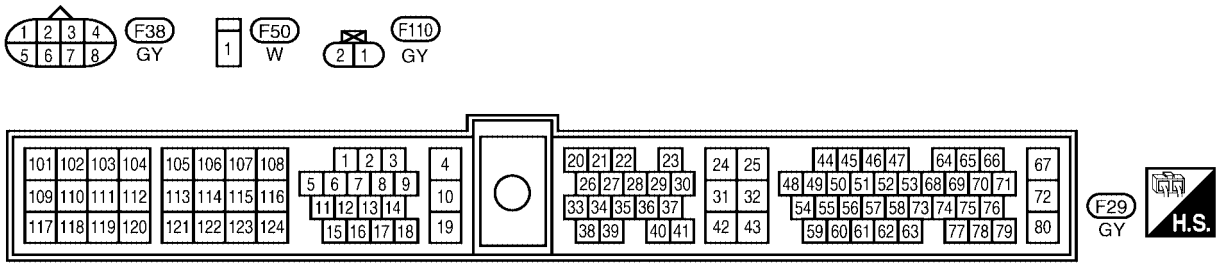
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DO4

EC-CKPS-01



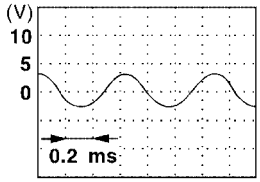
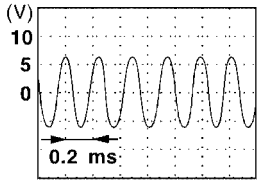


BBWA0481E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
43	BR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1 - 2V★ (AC range)  SEF690W
			[Engine is running] ● Engine speed is 2,000 rpm	3 - 4V★ (AC range)  SEF691W

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

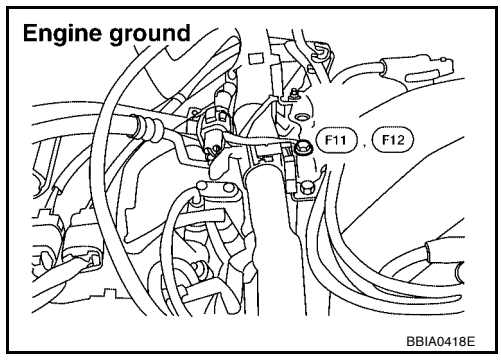
UBS00DO5

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-709, "Ground Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



BBIA0418E

2. CHECK CKP SENSOR (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

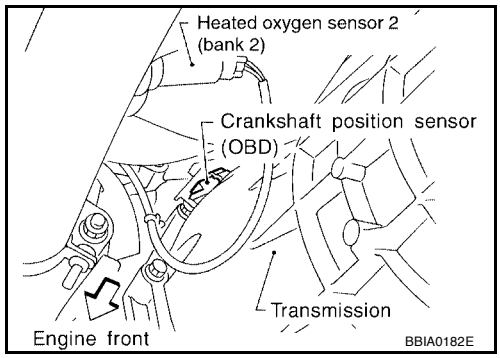
1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.
2. Check continuity between ECM terminal 47 and CKP sensor (OBD) terminal 2.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F38, F102
- Harness for open or short between ECM and crankshaft position sensor (OBD)

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR (OBD) GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between CKP sensor (OBD) terminal 1 and ECM terminal 43. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F38, F102
- Harness for open between crankshaft position sensor (OBD) and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CKP SENSOR (OBD) SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors F102, F38.
2. Check harness continuity between harness connector F38 terminal 6 and ground. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F38
- Harness connectors F50, F51
- Harness for open or short between harness connector F38 and ground

>> Repair open circuit or short to power in harness or connectors.

8. CHECK IMPROPER INSTALLATION

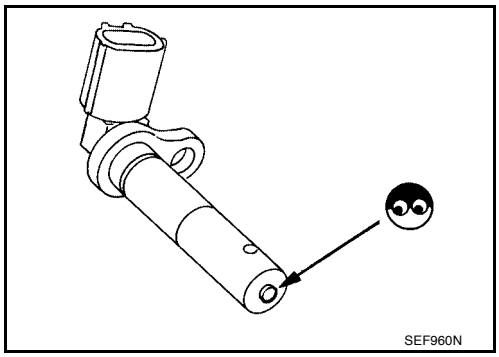
1. Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD).
2. Perform EC-1054, "DTC Confirmation Procedure" .

Is a 1st trip DTC P1336 detected?

Yes >> GO TO 9.
No >> **INSPECTION END**.

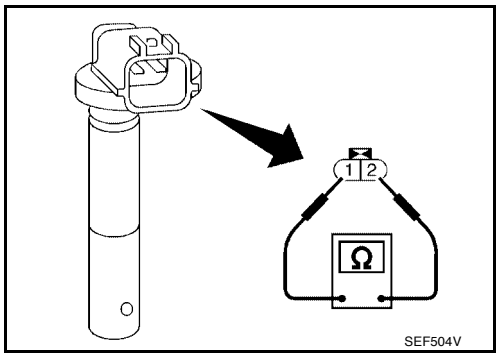
9. CHECK CRANKSHAFT POSITION SENSOR (OBD)

1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.


SEF960N

5. Check resistance as shown in the figure.

Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]



SEF504V

OK or NG

OK >> GO TO 10.
NG >> Replace crankshaft position sensor (OBD).

10. CHECK GEAR TOOTH

Visually check for chipping flywheel or drive plate gear tooth (cog).

OK or NG

OK >> GO TO 11.
NG >> Replace the flywheel or drive plate.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1400 EGRC-SOLENOID VALVE

PFP:14956

Component Description

UBS00DO6

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. The vacuum signal (from the intake manifold collector) passes through the solenoid valve. The signal then reaches the EGR valve.
When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal from the intake manifold collector to the EGR valve.

CONSULT-II Reference Value in Data Monitor Mode

UBS00DO7

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGRC SOL/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	OFF
		Rev engine up from idle to 3,000 rpm quickly.	ON

On Board Diagnosis Logic

UBS00DO8

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1400	EGRC-solenoid valve	● The improper voltage signal is sent to ECM through EGRC-solenoid valve.	● Harness or connectors (The EGRC-solenoid valve circuit is open or shorted.) ● EGRC-solenoid valve

DTC Confirmation Procedure

UBS00DO9

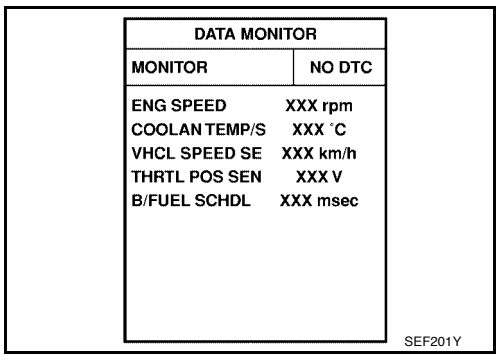
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Maintain the following conditions for at least 5 consecutive seconds.

ENG SPEED	Less than 3,200 rpm
B/FUEL SCHDL	Less than 13 msec
VHCL SPEED SE	Suitable speed

4. If 1st trip DTC is detected, go to EC-1062, "Diagnostic Procedure" .



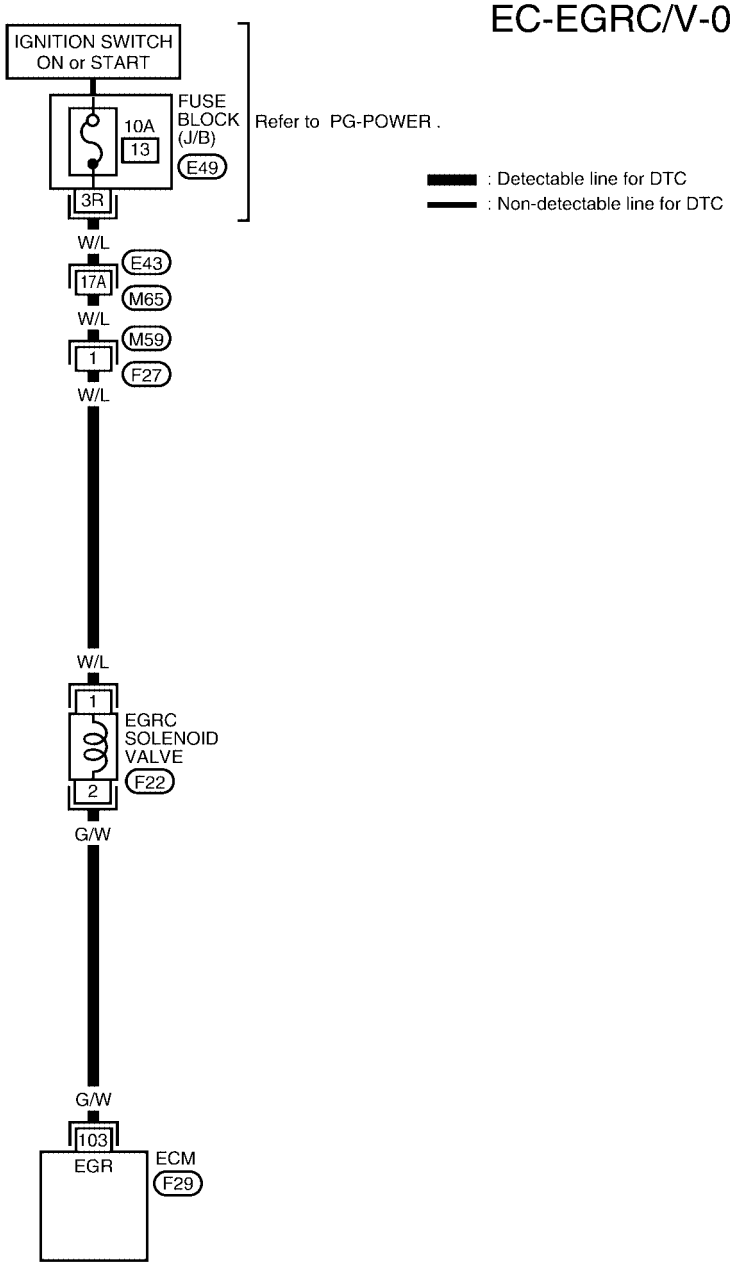
WITH GST

Follow the procedure WITH “CONSULT-II” above.

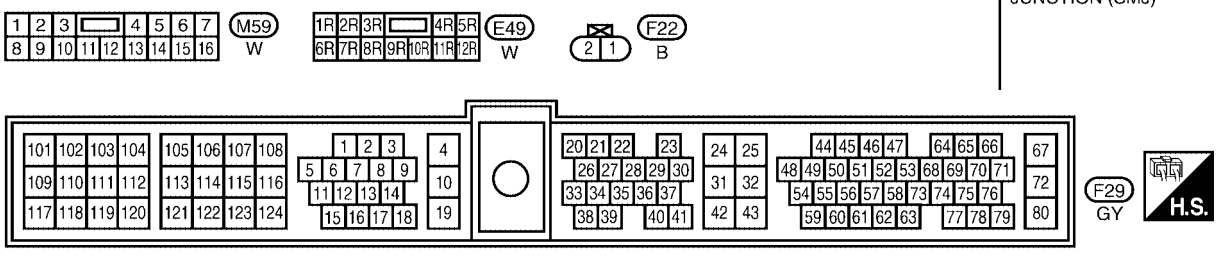
Wiring Diagram

UBS00DOB

EC-EGRC/V-01



Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)



BBWA0505E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
103	G/W	EGRC-solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Lift up the vehicle ● Shift lever: D (A/T), 1st (M/T) ● Revving engine from idle up to 3,000 rpm quickly	0 - 1V

Diagnostic Procedure

UBS00DOC

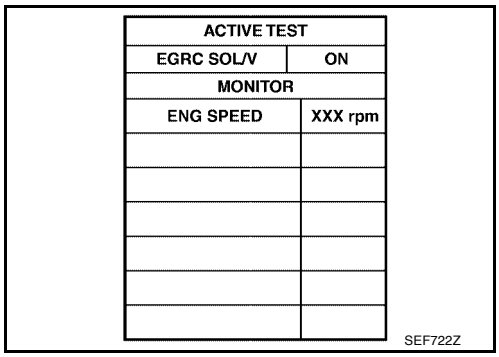
1. CHECK EGRC-SOLENOID VALVE

With CONSULT-II

1. Turn ignition switch ON.
2. Turn EGRC-solenoid valve “ON” and “OFF” in “ACTIVE TEST” mode with CONSULT-II and check operating sound.

Without CONSULT-II

1. Start engine and rev engine up to 3,000 rpm quickly.
2. When disconnecting and reconnecting the EGRC-solenoid valve harness connector, make sure that the EGRC-solenoid valve makes operating sound. (The DTC or the 1st trip DTC for the EGRC-solenoid valve will be displayed, however, ignore it.)

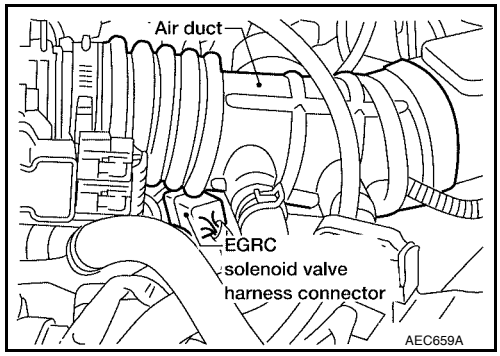


OK or NG

OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> GO TO 2

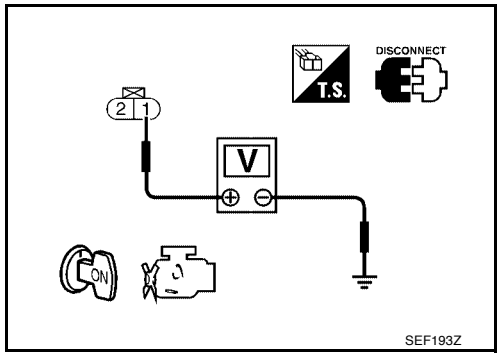
2. CHECK EGRC-SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EGRC-solenoid valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between EGRC-solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M59, F27
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between EGRC-solenoid valve and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EGRC-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 103 and EGRC-solenoid valve terminal 1.

Continuity should exist.

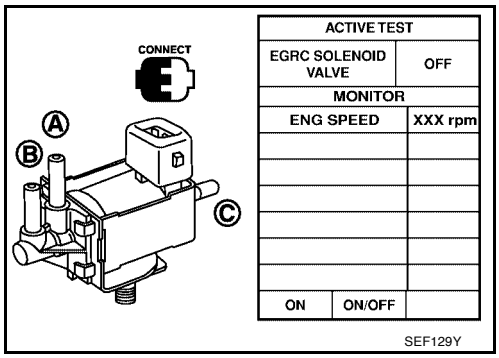
4. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EGRC-SOLENOID VALVE

1. Perform “EGRC SOLENOID VALVE” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time under the following conditions.



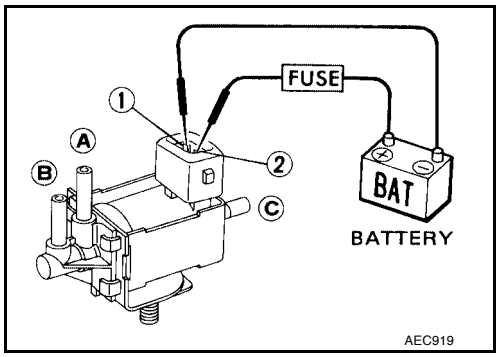
Conditions	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

OK or NG

OK >> GO TO 7.
NG >> Replace EGRC-solenoid valve.

6. CHECK EGRC-SOLENOID VALVE

1. Check air passage continuity and operation delay time under the following conditions.



Conditions	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

OK or NG

OK >> GO TO 7.
NG >> Replace EGRC-solenoid valve.

7. CHECK INTERMITTENT INCIDENT

Perform EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1402 EGR FUNCTION

PFP:14710

Description

UBS00DOD

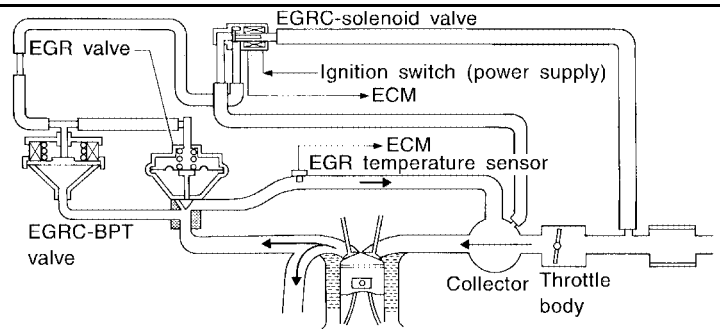
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	EGR control	EGRC-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		

This system cuts and controls vacuum applied to the EGR valve to suit engine operating conditions. This cut-and-control operation is accomplished through the ECM and the EGRC-solenoid valve. When the ECM detects any of the following conditions, current through the solenoid valve is cut. This causes the vacuum to be cut. The EGR valve remains closed.

- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction

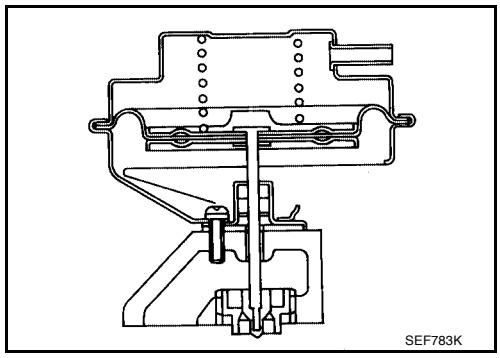
EGR and vacuum



COMPONENT DESCRIPTION

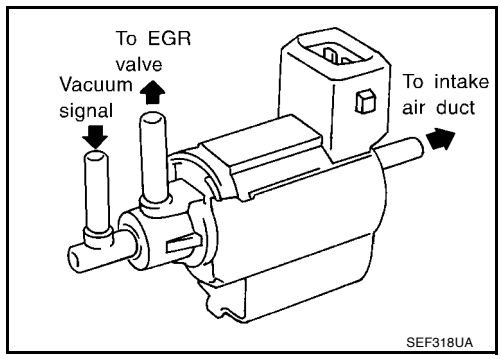
Exhaust Gas Recirculation (EGR) Valve

The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening and EGRC-BPT valve operation. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.



EGRC-solenoid Valve

The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. Vacuum signal (from the intake manifold collector) passes through the solenoid valve. The signal then reaches the EGR valve.
When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal from the intake manifold collector to the EGR valve.

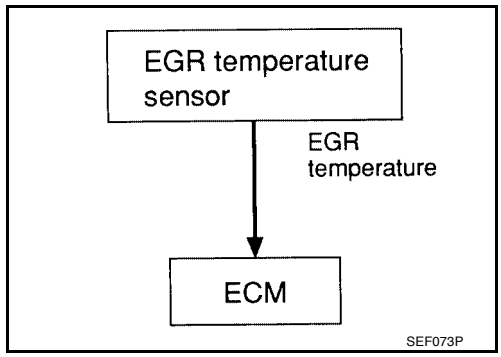


On Board Diagnosis Logic

UBS00DOE

If EGR temperature sensor detects EGR flow under the condition that does not call for EGR, a high-flow malfunction is diagnosed.

NOTE:
Diagnosis for this DTC will occur when engine coolant temperature is approx. 50 to 60°C (122 to 140°F). Therefore, it will be better to turn ignition switch ON (Start engine) at the engine coolant temperature below 40°C (104°F) when starting DTC confirmation procedure.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1402	EGRC-solenoid valve circuit open	● EGR flow is detected under conditions that do not call for EGR.	● EGRC-solenoid valve ● EGR valve leaking or stuck open ● EGR temperature sensor ● EGRC-BPT valve

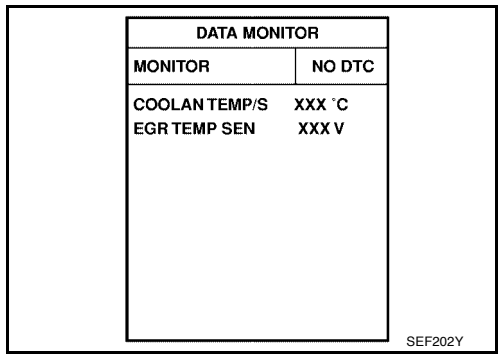
DTC Confirmation Procedure

UBS00DOF

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Engine coolant temperature and EGR temperature must be verified in "DATA MONITOR" mode with CONSULT-II before starting "DTC WORK SUPPORT" test. If it is out of range below, the test cannot be conducted.**
  COOLAN TEMP/S: −10 to 40°C (14 to 104°F)*
  EGR TEMP SEN: Less than 4.8V
  If the values are out of the ranges indicated above, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to reduce the engine coolant or EGR temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

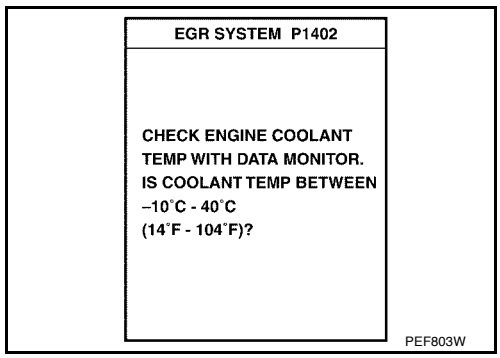


*: Although CONSULT-II screen displays "−10 to 40°C (14 to 104°F)" as a range of engine coolant temperature, ignore it.

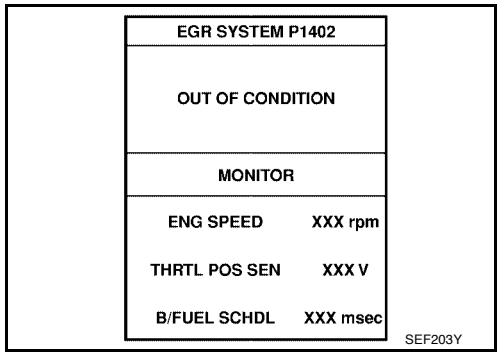
WITH CONSULT-II

1. Turn ignition switch OFF and wait at least 5 seconds, then turn ignition switch ON.

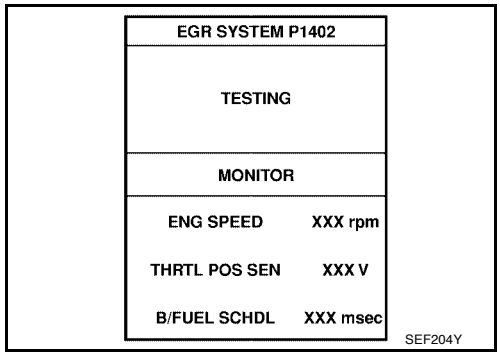
2. Select “EGR SYSTEM P1402” of “EGR SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.

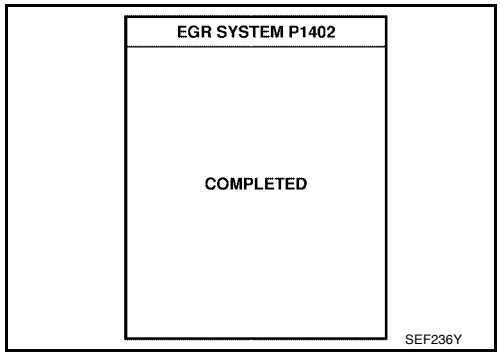


3. Touch “START”. Follow instruction of CONSULT-II.



4. Start engine and let it idle until “TESTING” on CONSULT-II screen is turned to “COMPLETED”. (It will take 60 seconds or more.)
If “TESTING” is not displayed after 5 minutes, turn ignition OFF and cool the engine coolant temperature to the range of –10 to 40°C (14 to 104°F). Retry from step 1.





5. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-1070, "Diagnostic Procedure" .

WITH GST

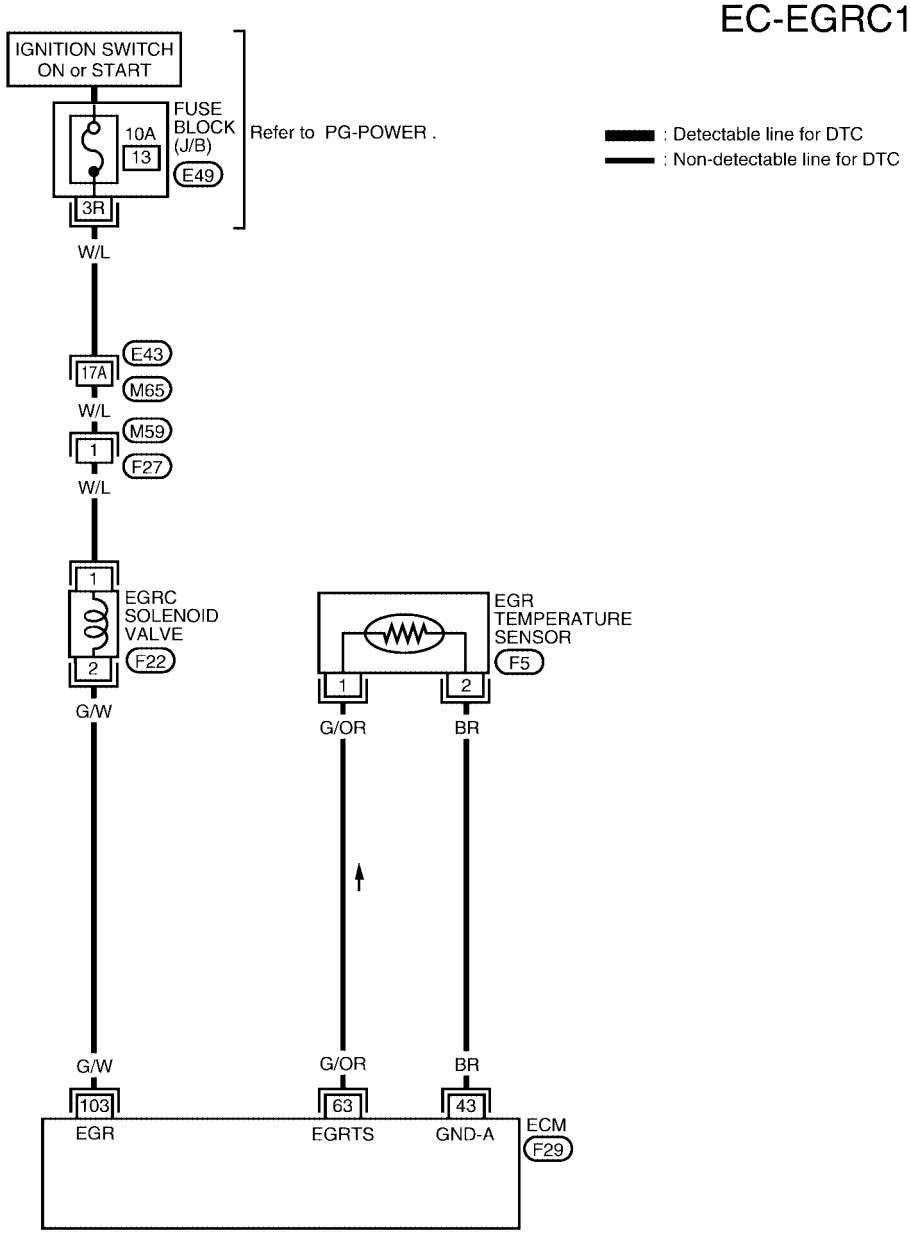
1. Turn ignition switch ON and select MODE 1 with GST.
2. Check that engine coolant temperature is within the range of –10 to 40°C (14 to 104°F).
3. Check that voltage between ECM terminal 63 (EGR temperature sensor signal) and ground is less than 4.8V.
4. Start engine and let it idle for at least 60 seconds.
5. Stop engine.
6. Perform from step 1 to 4.

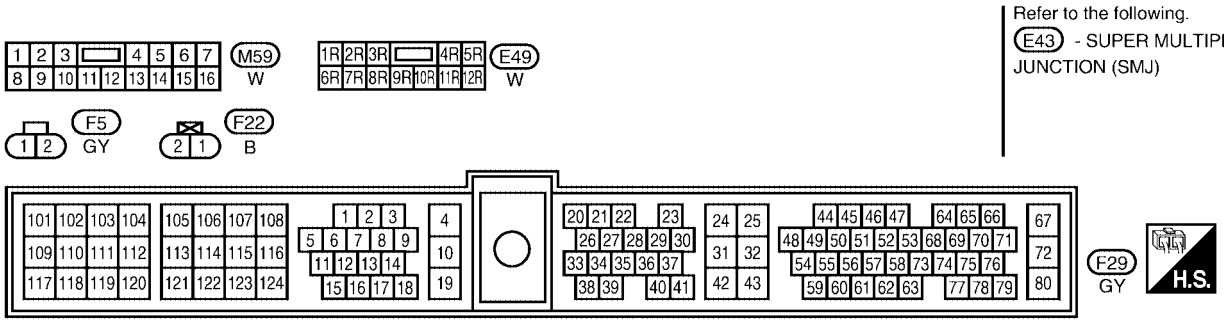
7. Select MODE 3 with GST.
8. If 1st trip DTC is detected, go to EC-1070, "Diagnostic Procedure" .

Wiring Diagram

UBS00DOG

EC-EGRC1-01





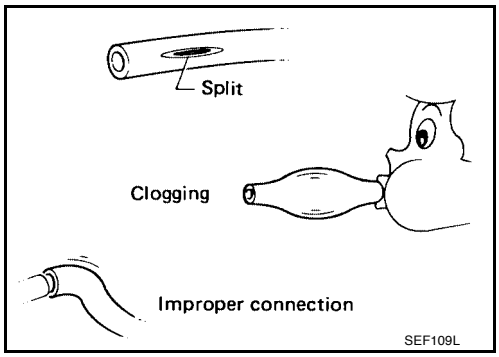
BBWA0504E

Diagnostic Procedure

UBS00DOH

1. CHECK VACUUM HOSE

Check vacuum hose for clogging, cracks or improper connection.



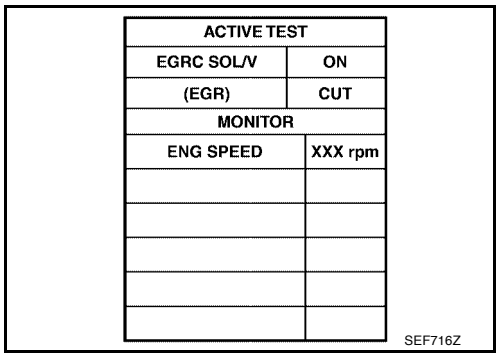
OK or NG

OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> Repair or replace vacuum hose.

2. CHECK EGRC-SOLENOID VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch ON.
2. Turn EGRC-solenoid valve “ON” and “OFF” in “ACTIVE TEST” mode with CONSULT-II and check operating sound.
   Clicking noise should be heard.



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

3. CHECK EGRC-SOLENOID VALVE CIRCUIT

Without CONSULT-II

1. Turn ignition switch OFF.
2. Disconnect EGRC-solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check operating sound of the solenoid valve when disconnecting and reconnecting EGRC-solenoid valve harness connector. (The DTC or the 1st trip DTC for the EGRC-solenoid valve will be displayed, however, ignore it.)

OK or NG

OK >> GO TO 6.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

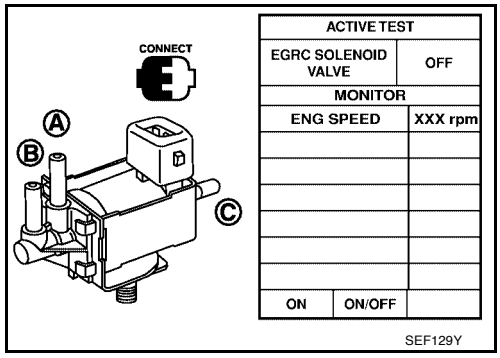
- Harness connectors E43, M65
- Harness connectors M59, F27
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between fuse and EGRC-solenoid valve
- Harness for open or short between ECM and EGRC-solenoid valve

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EGRC-SOLENOID VALVE

With CONSULT-II

1. Perform “EGRC SOLENOID VALVE” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time under the following conditions.



Conditions	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

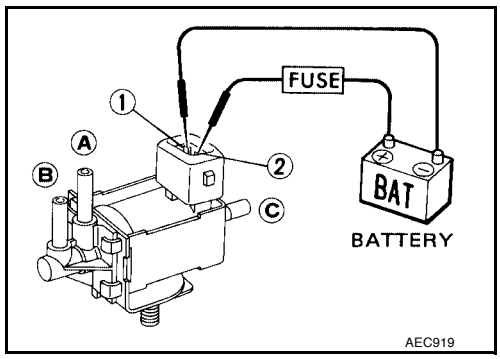
OK or NG

OK >> GO TO 7.
NG >> Replace EGRC-solenoid valve.

6. CHECK EGRC-SOLENOID VALVE

Without CONSULT-II

1. Check air passage continuity and operation delay time under the following conditions.



Conditions	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

OK or NG

OK >> GO TO 7.
NG >> Replace EGRC-solenoid valve.

7. CHECK EGR VALVE

Refer to EC-1072, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace EGR valve.

8. CHECK EGRC-BPT VALVE

Refer to EC-1072, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace EGRC-BPT valve.

9. CHECK EGR TEMPERATURE SENSOR

Refer to EC-902, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace EGR temperature sensor.

10. CHECK INTERMITTENT INCIDENT

Perform EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Component Inspection

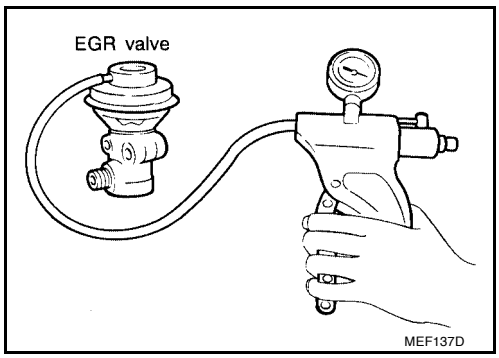
UBS00DOI

EGR VALVE

1. Apply vacuum to EGR vacuum port with a hand vacuum pump.

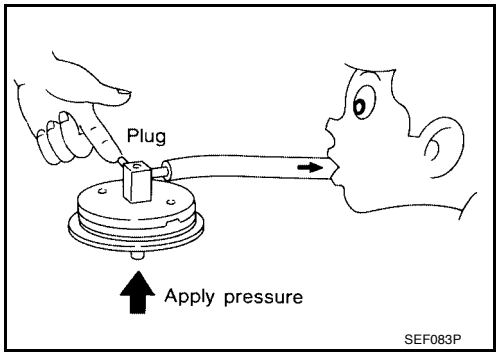
   EGR valve spring should lift.

2. Check for sticking.
3. If NG, repair or replace EGR valve.



EGRC-BPT VALVE

1. Plug one of two ports of EGRC-BPT valve.
2. Vacuum from the other port and check for leakage while applying a pressure above 0.981 kPa (100 mmH_2 O, 3.94 inH_2 O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.



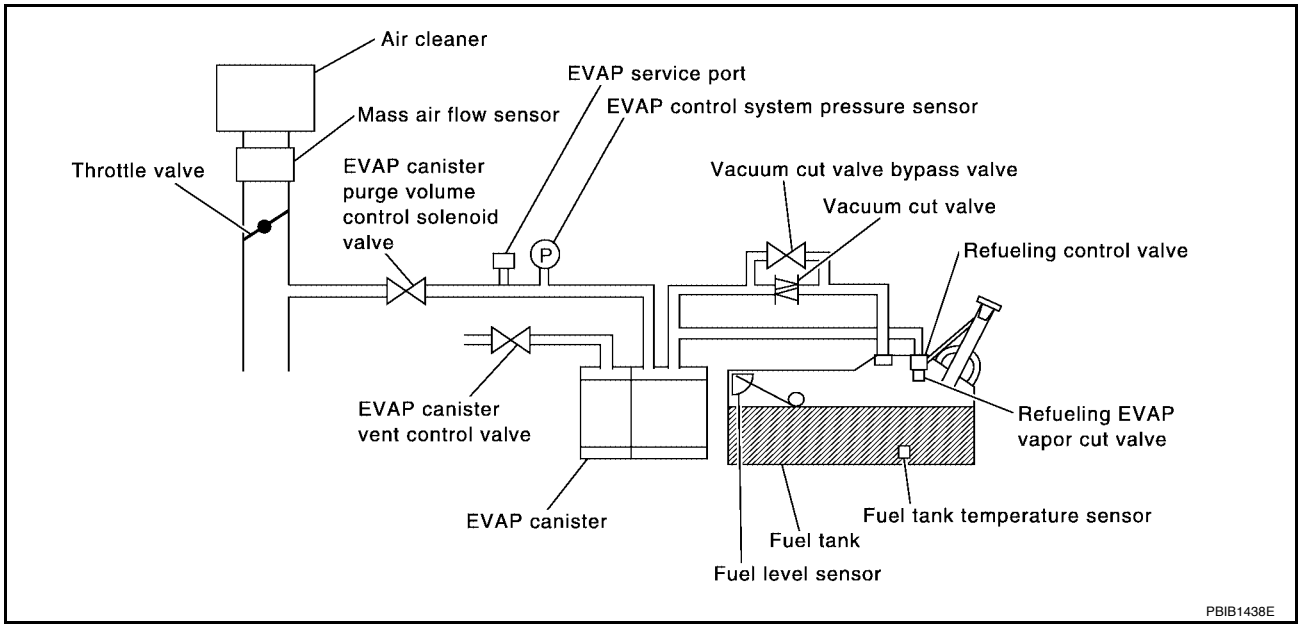
DTC P1442 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS00DOJ

NOTE:
If DTC P1442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1090 .)
This diagnosis detects leaks in the EVAP purge line using of 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.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1442	EVAP control system small leak detected (positive pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	● 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 ● 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 ● 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 ● Foreign matter caught in EVAP canister purge volume control solenoid valve

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.**

DTC Confirmation Procedure

UBS00DOK

Refer to EC-917, "DTC Confirmation Procedure" .

Diagnostic Procedure

UBS00DOL

Refer to EC-919, "Diagnostic Procedure" .

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

UBS00DOM

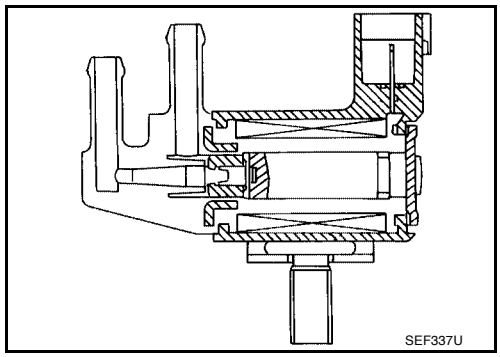
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	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		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	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

UBS00DON

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

On Board Diagnosis Logic

UBS00DOO

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1444	EVAP canister purge volume control solenoid valve	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	● 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.)

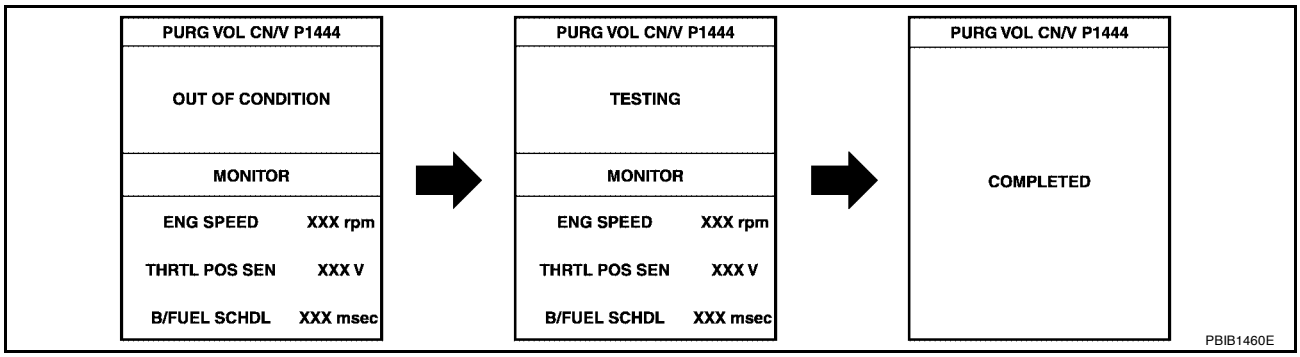
DTC Confirmation Procedure

UBS00DOP

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 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 for 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 EC-1079, "Diagnostic Procedure" .

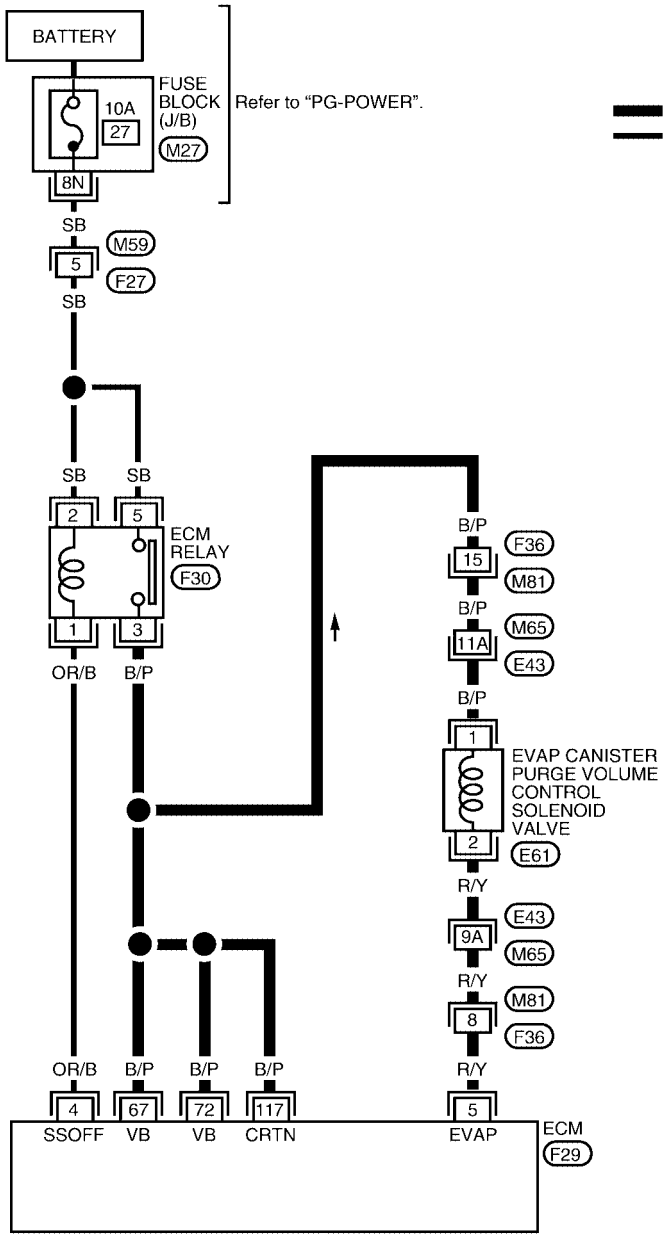
WITH GST

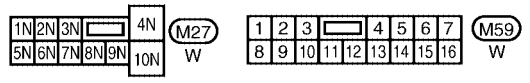
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Start engine and let it idle for at least 20 seconds.
4. Select MODE 7 with GST.
5. If 1st trip DTC is detected, go to EC-1079, "Diagnostic Procedure" .

Wiring Diagram

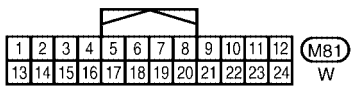
UBS00DOQ

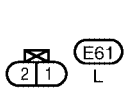
EC-PGC/V-01

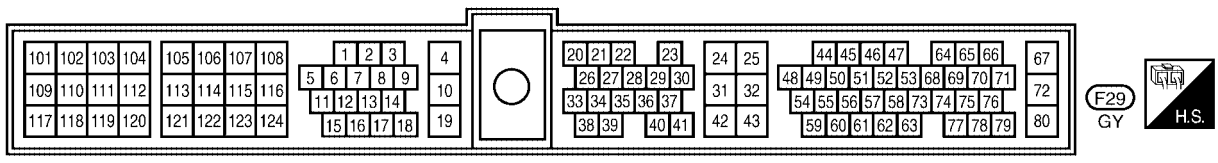




Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)





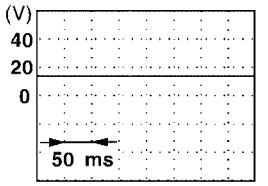
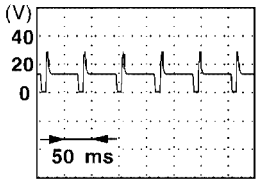


BBWA1085E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★  SEF995U
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

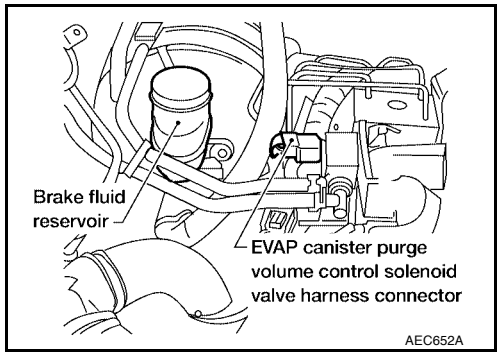
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00DOR

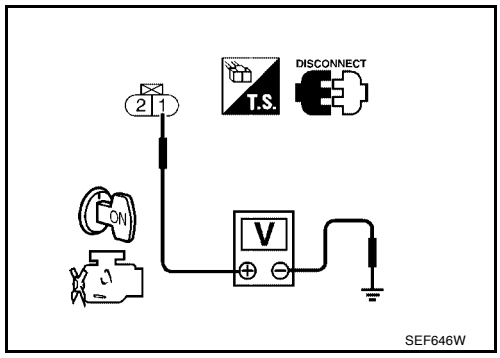
1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.



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.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F36, M81
- Harness connectors M65, E43
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 5 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 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M81, F36
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

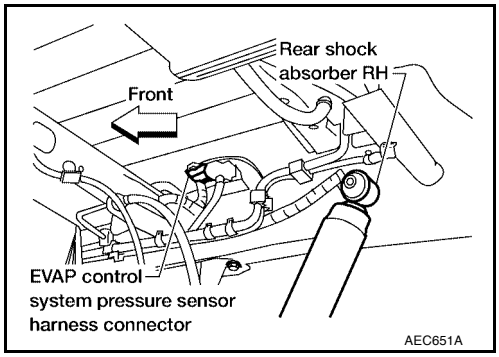
OK >> GO TO 6.
NG >> Repair it.

6. 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 7.
NG >> Replace EVAP control system pressure sensor.



7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
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.
5. Check input voltage between ECM terminal 62 and ground.

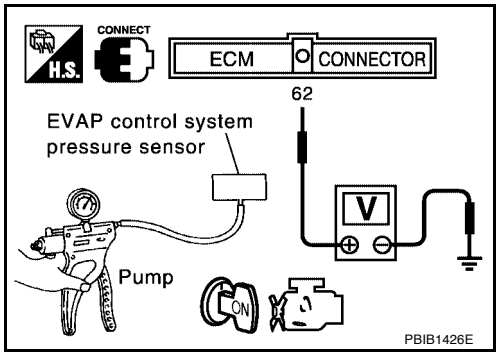
Applied vacuum	Voltage V
Not applied	1.4 - 4.8
-26.7 kpa (-200 mmHg, -7.87 inHg)	2.1 to 2.5V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

OK (with CONSULT-II)>>GO TO 8.
OK (without CONSULT-II)>>GO TO 9.
NG >> Replace EVAP control system pressure sensor.



8. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

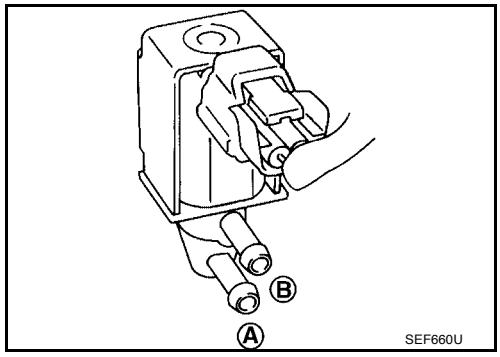
1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.
   If OK, inspection end. If NG, go to following step.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No



SEF660U

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

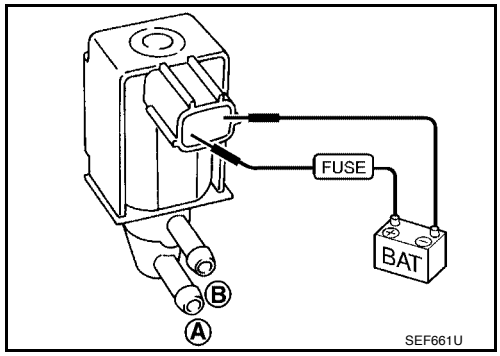
OK >> GO TO 10.
NG >> Replace EVAP canister purge volume control solenoid valve.

9. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Without CONSULT-II

Check air passage continuity.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



SEF661U

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP canister purge volume control solenoid valve.

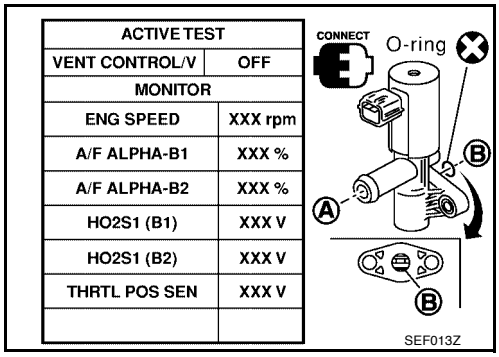
10. CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1second.

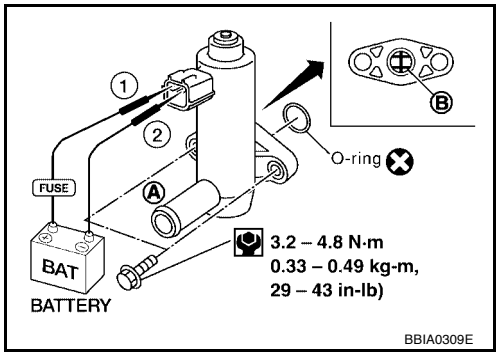


Without CONSULT-II

1. Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1second.



If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.
Make sure new O-ring is installed properly.

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP canister vent control valve.

11. CHECK RUBBER TUBE

Check for obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

OK >> GO TO 12.
NG >> Clean, repair or replace rubber tube.

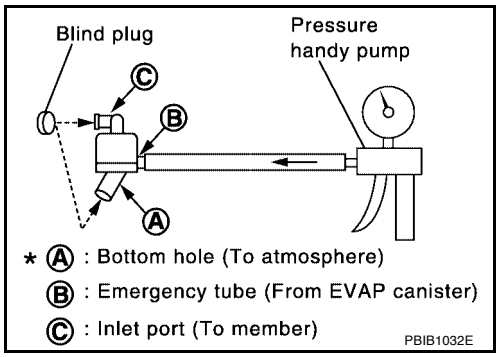
12. CHECK WATER SEPARATOR

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.

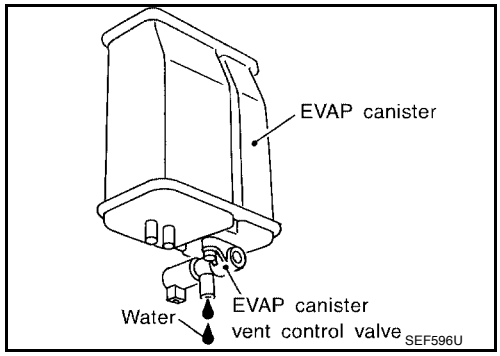
OK or NG

OK >> GO TO 13.
NG >> Replace water separator.



13. 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 14.
No >> GO TO 16.

14. 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 16.
NG >> GO TO 15.

15. 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.

16. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

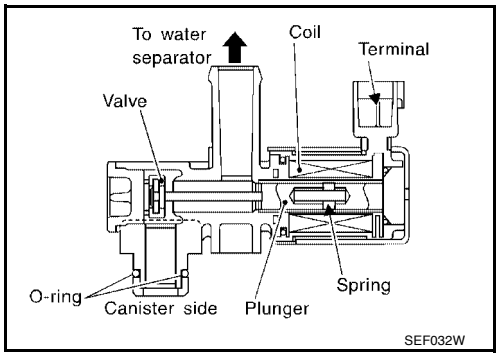
DTC P1446 EVAP CANISTER VENT CONTROL VALVE

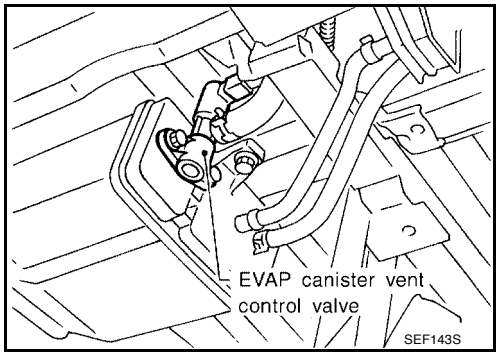
PFP:14935

Component Description

UBS00DOS

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

UBS00DOT

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00DOU

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1446	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	● 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

UBS00DOV

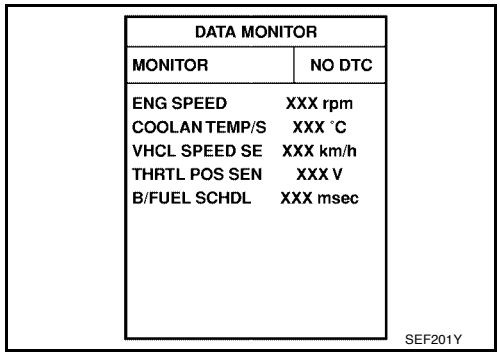
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 EC-1087, "Diagnostic Procedure" .

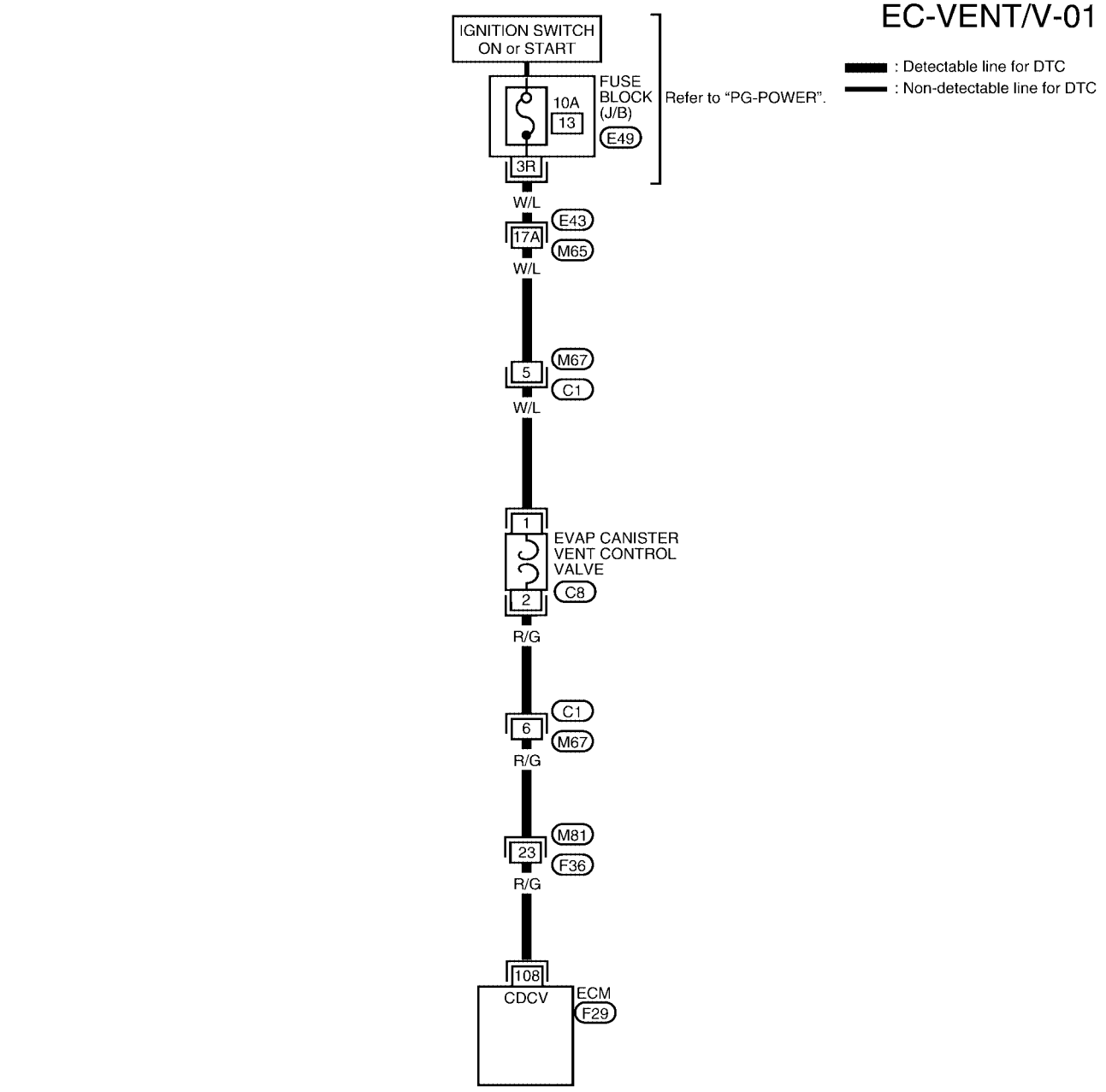


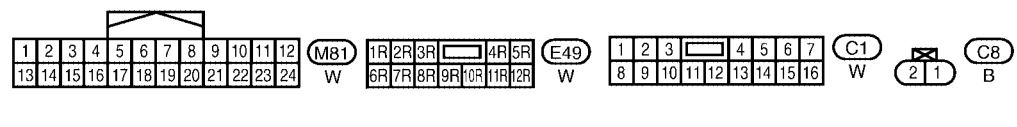
WITH GST

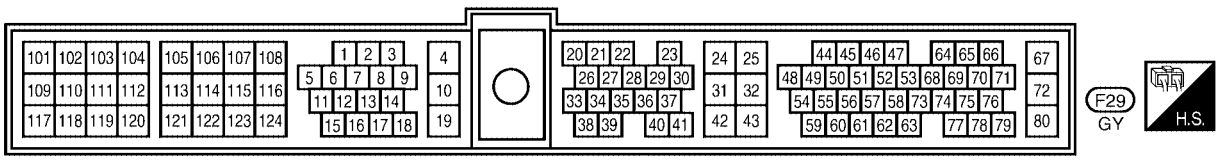
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DOW







BBWA1086E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

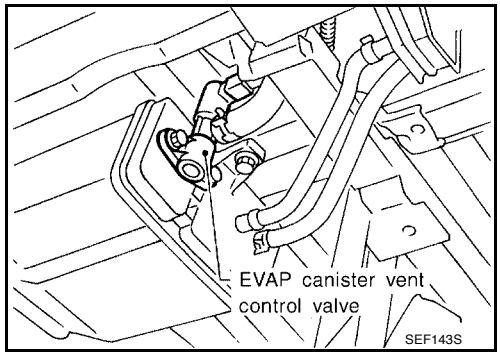
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00DOX

1. CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Check obstructed rubber tube connected to EVAP canister vent control valve.



OK or NG

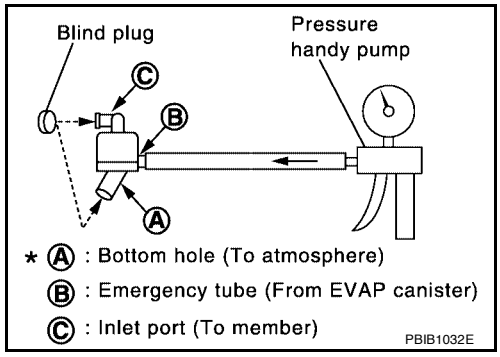
OK >> GO TO 2.
NG >> Clean, repair or replace rubber tube.

2. CHECK 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.



OK or NG

OK >> GO TO 3.
NG >> Replace water separator.

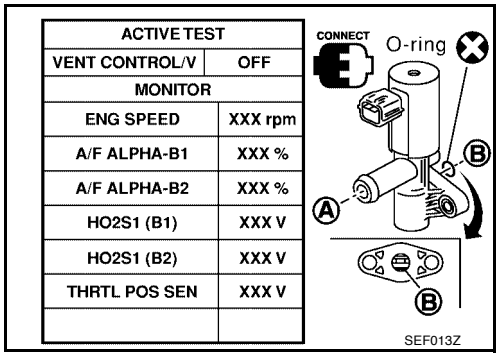
3. CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

With CONSULT-II

1. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1second.

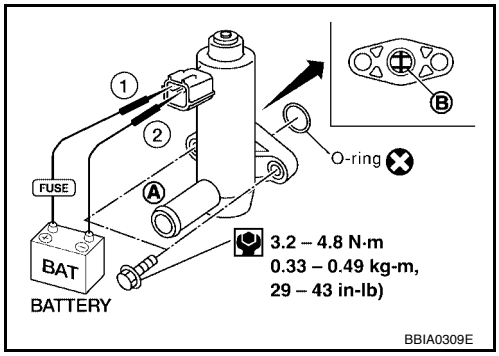


Without CONSULT-II

1. Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



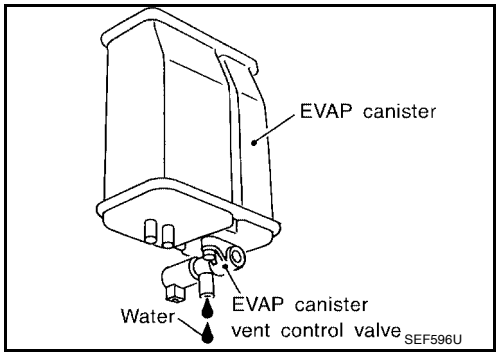
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.
Make sure new O-ring is installed properly.

OK or NG

OK >> GO TO 4.
NG >> Replace EVAP canister vent control valve and O-ring.

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

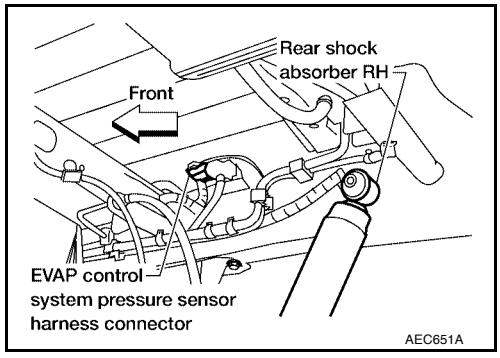
OK >> GO TO 8.
NG >> Repair it.

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 FUNCTION

Refer to EC-941, "DTC Confirmation Procedure" or EC-947, "DTC Confirmation Procedure" .

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

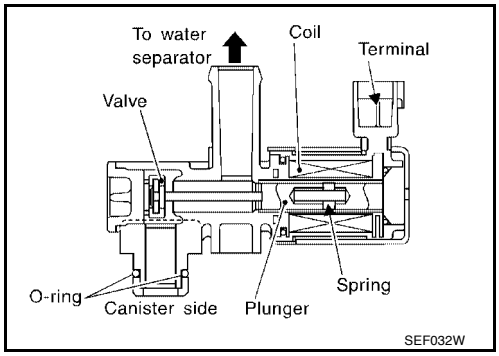
DTC P1448 EVAP CANISTER VENT CONTROL VALVE

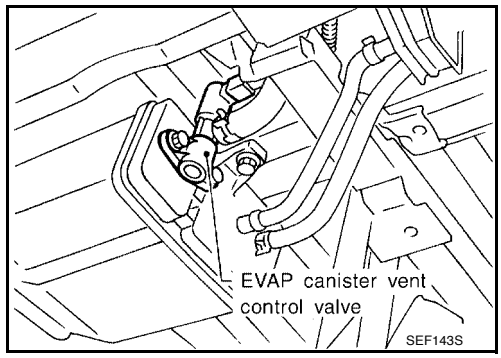
PFP:14935

Component Description

UBS00DOY

NOTE:
If DTC P1448 is displayed with P0442, 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

UBS00DOZ

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00DP0

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1448	EVAP canister vent control valve open	EVAP canister vent control valve remains open under specified driving conditions.	● 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 ● Vacuum cut valve

DTC Confirmation Procedure

UBS00DP1

NOTE:
- **If DTC P1448 is displayed with P0442, perform trouble diagnosis for DTC P1448 first.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

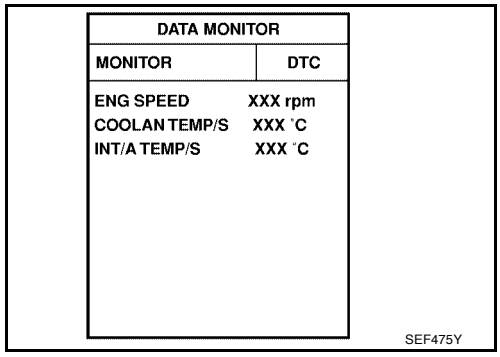
WITH CONSULT-II

TESTING CONDITION:
- **Perform "DTC WORK SUPPORT" when the fuel level is less than 3/4 full and vehicle is placed on flat level surface.**

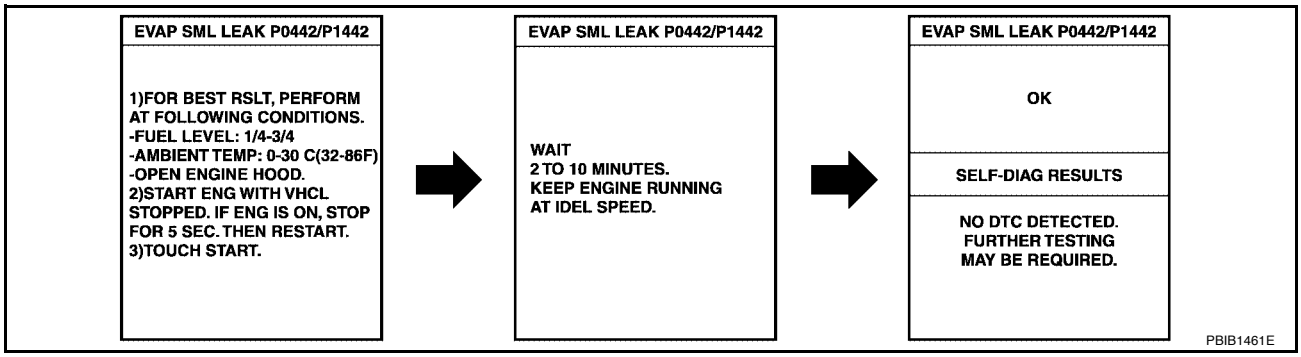
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**
- **It is better that the fuel level is low.**

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 5 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 - 32°C (32 - 90°F)
INT/A TEMP SE	More than 0°C (32°F)



5. Select “EVAP SML LEAK P0442/P1442” 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-652, "Basic Inspection" .

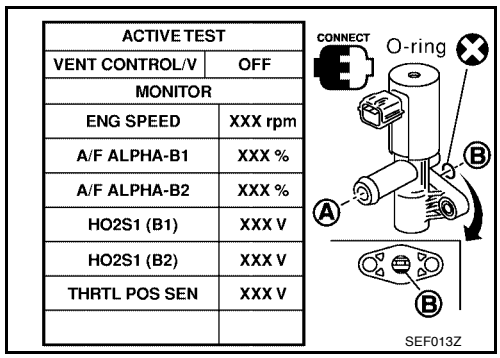
6. Make sure that “OK” is displayed.
   If “NG” is displayed, go to the following step.

NOTE:
Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

7. Stop engine and wait at least 5 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 EC-1094, "Diagnostic Procedure" .
If the result is OK, go to EC-919, "Diagnostic Procedure" .



Overall Function Check

UBS00DP2

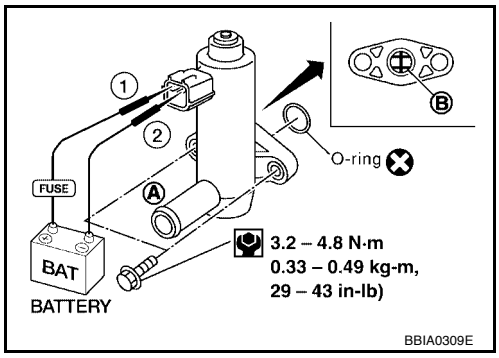
Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.

WITH GST

1. Disconnect hose from water separator.
2. Disconnect EVAP canister vent control valve harness connector.
3. Verify the following.

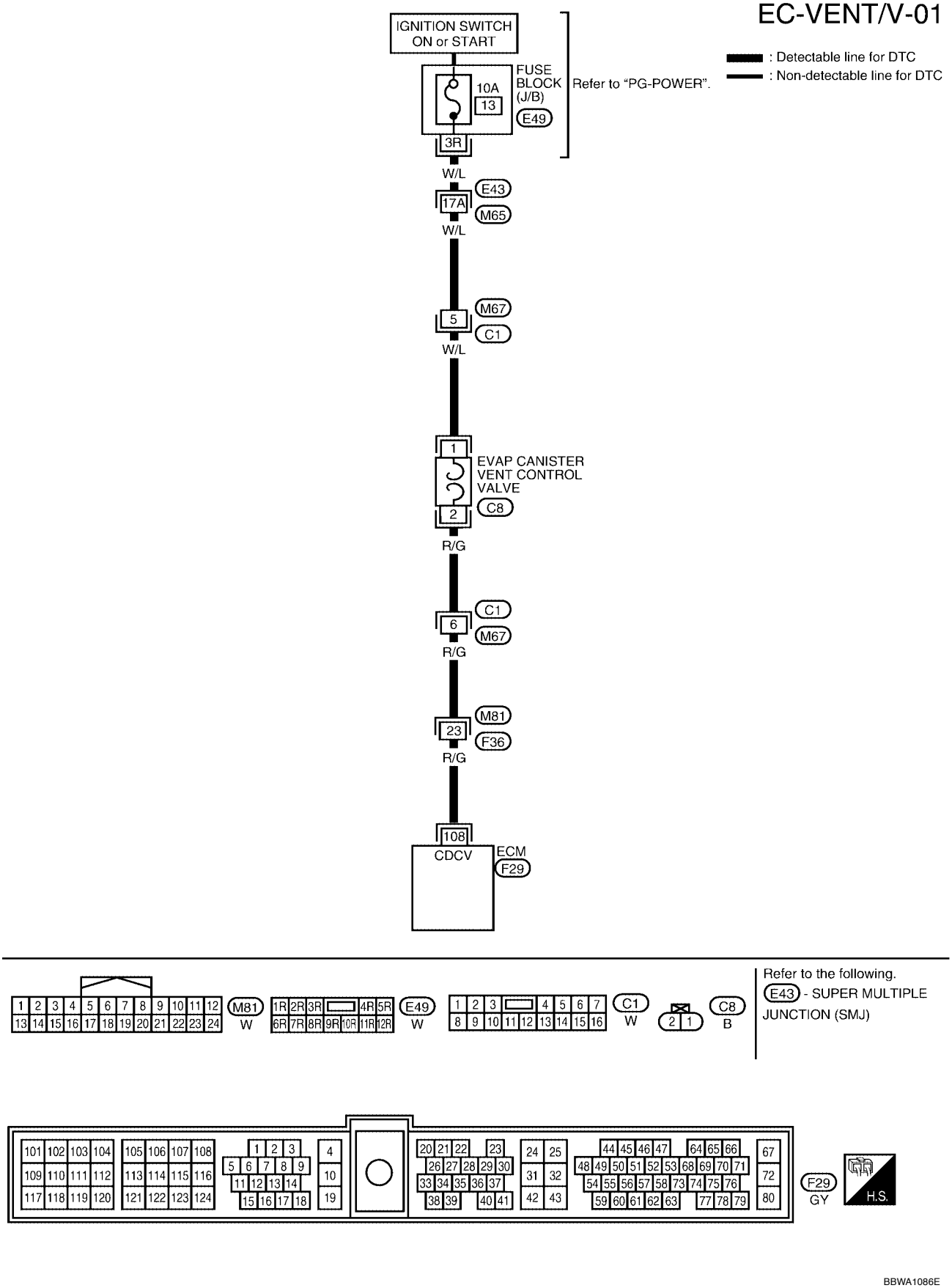
Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

If the result is NG, go to EC-1094, "Diagnostic Procedure" .
If the result is OK, go to EC-919, "Diagnostic Procedure" .



Wiring Diagram

UBS00DP3



BBWA1086E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

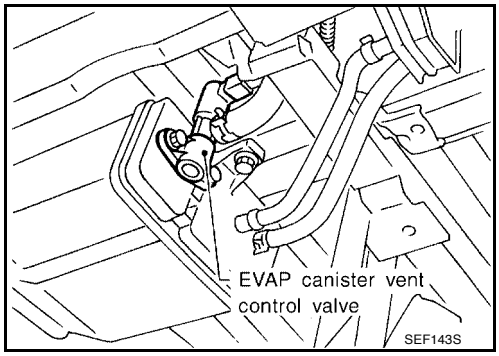
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00DP4

1. CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Check obstructed rubber tube connected to EVAP canister vent control valve.



OK or NG

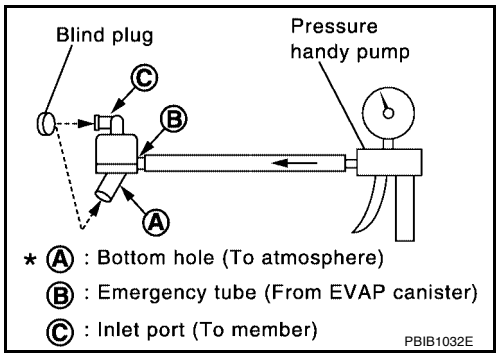
OK >> GO TO 2.
NG >> Clean, repair or replace rubber tube.

2. CHECK 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.



OK or NG

OK >> GO TO 3.
NG >> Replace water separator.

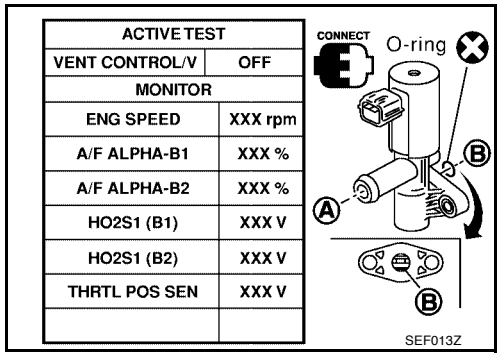
3. CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

With CONSULT-II

1. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1second.

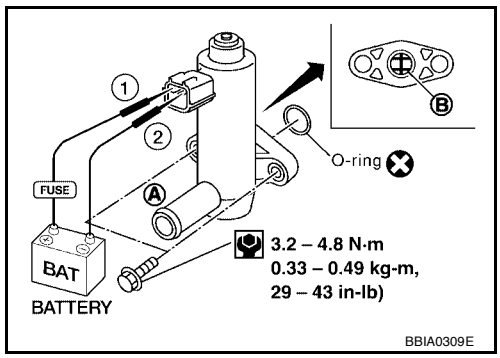


Without CONSULT-II

1. Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.
Make sure new O-ring is installed properly.

OK or NG

OK >> GO TO 4.
NG >> Replace EVAP canister vent control valve and O-ring.

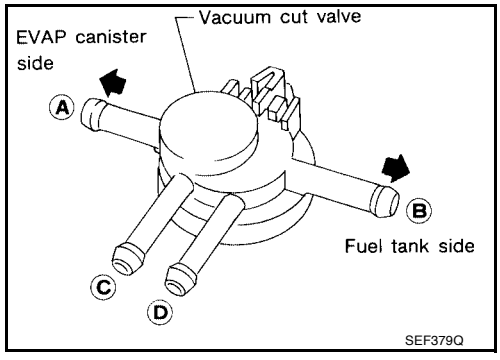
4. CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:

1. Plug port **C** and **D** with fingers.
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. Open port **C** and **D** .
6. Blow air in port **A** check that air flows freely out of port **C** .
7. Blow air in port **B** check that air flows freely out of port **D** .

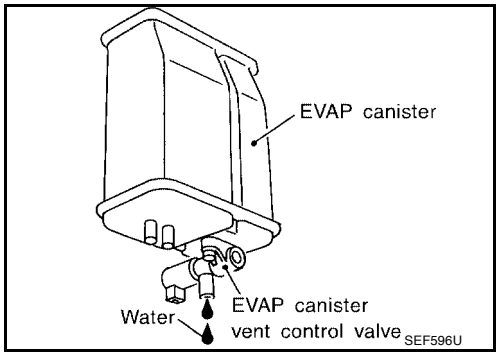
OK or NG

OK >> GO TO 5.
NG >> Replace vacuum cut valve.



5. 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.



OK or NG

OK >> GO TO 6.
NG >> GO TO 8.

6. 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 8.
NG >> GO TO 7.

7. 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.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

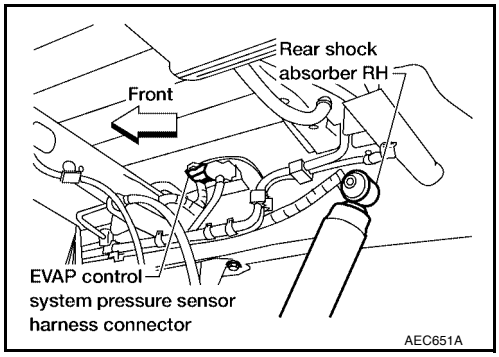
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 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 EC-941, "DTC Confirmation Procedure" or EC-941, "DTC Confirmation Procedure" .

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP control system pressure sensor.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

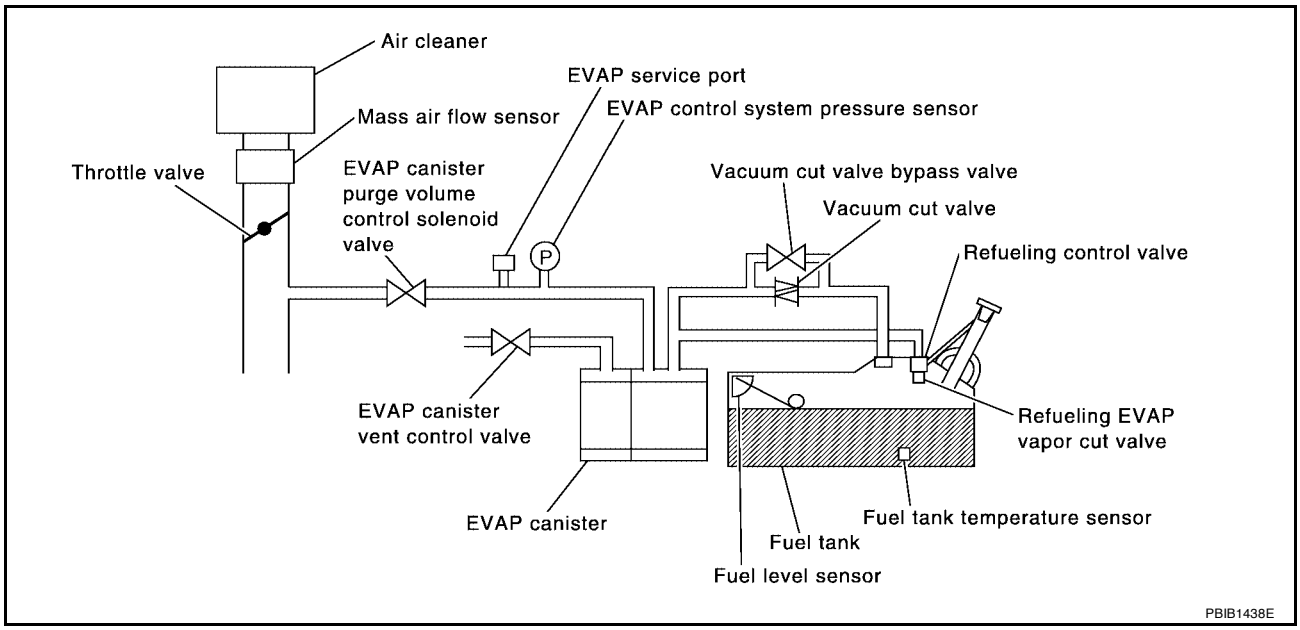
DTC P1456 EVAP CONTROL SYSTEM

PFP:14710

On Board Diagnosis Logic

UBS00DP5

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using of vapor pressure in the fuel tank in the same way as conventional EVAP small leak diagnosis.
If ECM judges a leak which corresponds to a very small leak, the very small leak P1456 will be detected.
If ECM judges a leak equivalent to a small leak, EVAP small leak P1442 will be detected.
If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1456	Evaporative emission control system very small leak (positive pressure check)	● EVAP system has a very small leak. ● EVAP system does not operate properly.	● 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 ● 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

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.**

DTC Confirmation Procedure

UBS00DP6

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

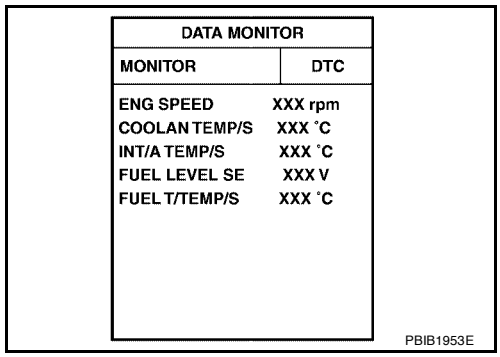
- **If DTC P0456 or P1456 is displayed with P0442 or P1442, perform trouble diagnosis for DTC P0456 or P1456 first.**
- **After repair, make sure that the hoses and clips are installed properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

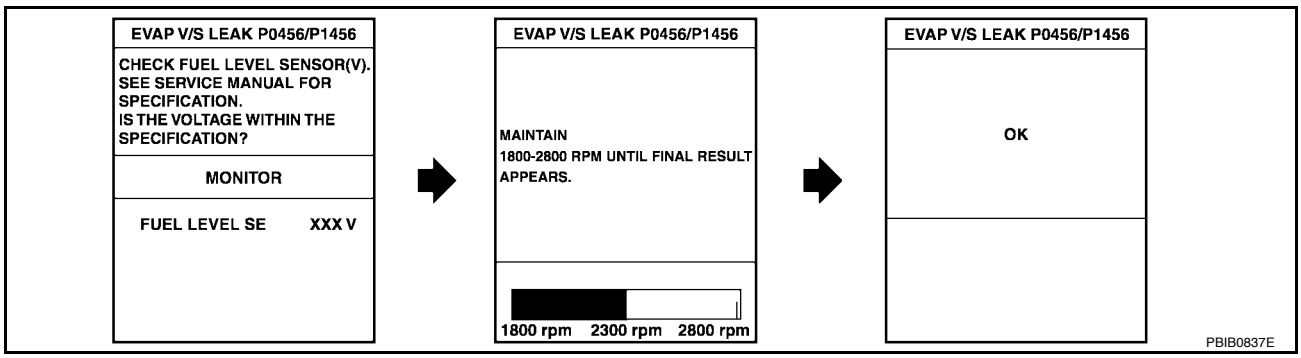
- **Open engine hood before conducting following procedure.**
- **If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**
  - **Fuel filler cap is removed.**
  - **Refilled or drained the fuel.**
  - **EVAP component parts is/are removed.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Make sure the following conditions are met.
   FUEL LEVEL SE: 1.08 - 0.2V
   COOLAN TEMP/S: 0 - 35°C (32 - 95°F)
   FUEL T/TMP SE: 0 - 32°C (32 - 90°F)
   INT A/TEMP SE: More than 0°C (32°F)
   If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the “FUEL LEVEL SE” meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).



3. Turn ignition switch OFF and wait at least 5 seconds.
4. Turn ignition switch ON.
5. Select “EVAP V/S LEAK P0456 / P1456” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.



6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-1100, "Diagnostic Procedure" .

NOTE:
- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to EC-652, "Basic Inspection" .**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

Overall Function Check

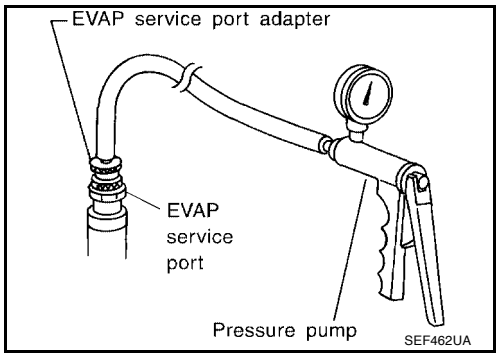
UBS00DP7

WITH GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

CAUTION:
- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2 , 0.6 psi).**

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Set the pressure pump and a hose.
3. Also set a vacuum gauge via 3-way connector and a hose.
4. Turn ignition switch ON.
5. Connect GST and select MODE 8.
6. Using MODE 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
7. Apply pressure and make sure the following conditions are satisfied.
   Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)
   Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg)
   If NG, go to EC-1100, "Diagnostic Procedure" .



NOTE:
For more information, refer to GST instruction manual.

Diagnostic Procedure

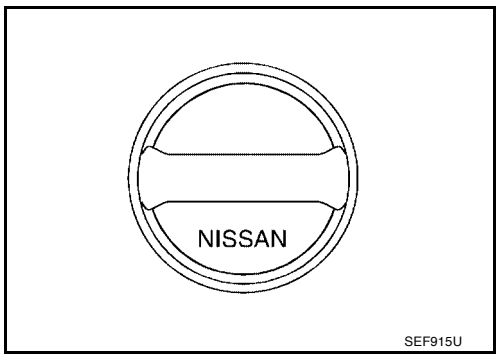
UBS00DP8

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 >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. 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

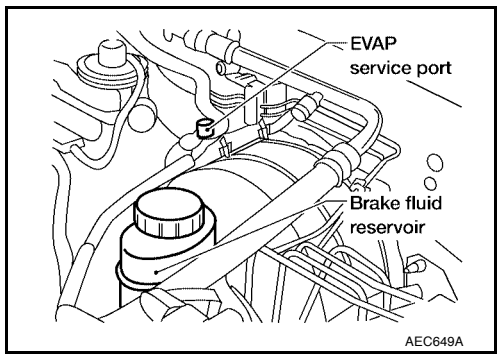
Refer to EC-1176, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

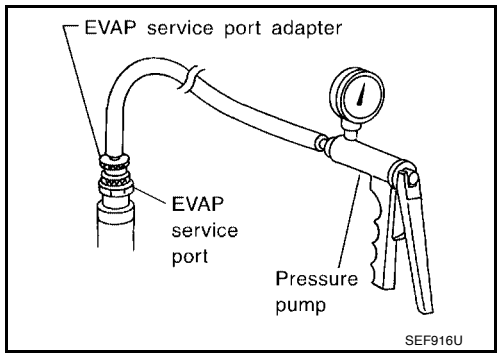
5. INSTALL THE PRESSURE PUMP

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.

With CONSULT-II>>GO TO 6.
Without CONSULT-II>>GO TO 7.

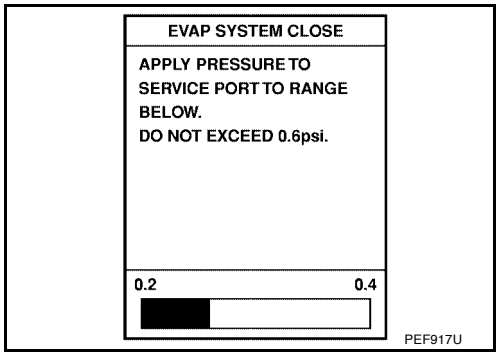


6. CHECK FOR EVAP LEAK

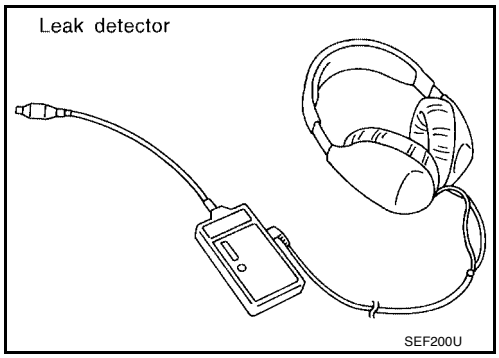
With CONSULT-II

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-1174, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

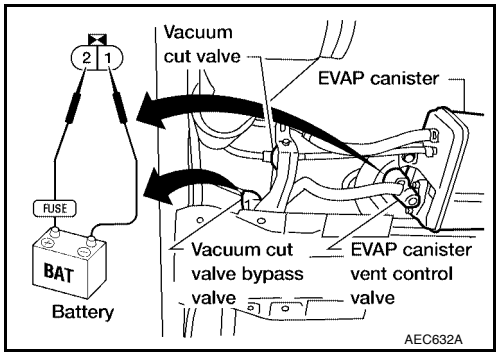
OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

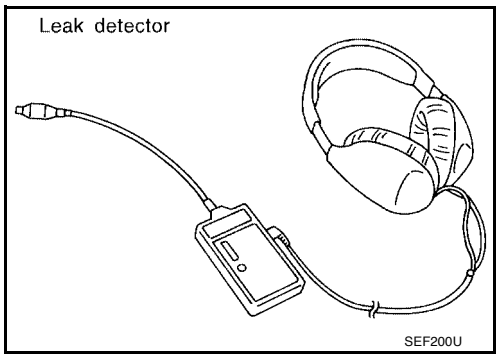
Without CONSULT-II

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-1174, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK WATER SEPARATOR

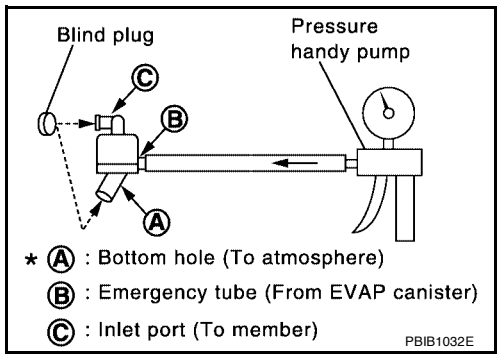
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

OK or NG

OK >> GO TO 9.
NG >> Replace water separator.



9. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

Refer to EC-1090, "DTC Confirmation Procedure" .

OK or NG

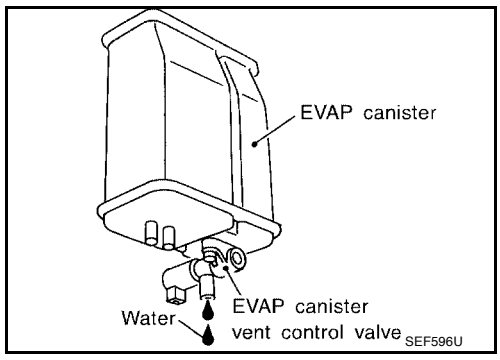
OK >> GO TO 10.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

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%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

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-604, "Vacuum Hose Drawing" .

OK or NG

OK (With CONSULT-II)>>GO TO 16.
OK (Without CONSULT-II)>>GO TO 17.
NG >> Repair or reconnect the hose.

16. 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	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

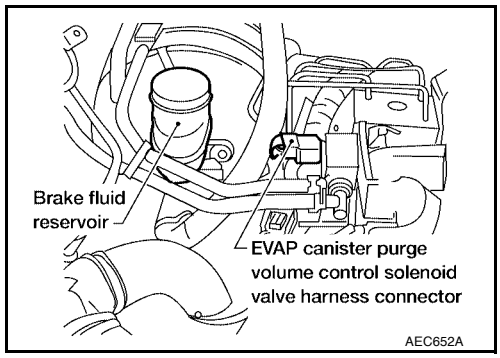
OK or NG

OK >> GO TO 18.
NG >> GO TO 17.

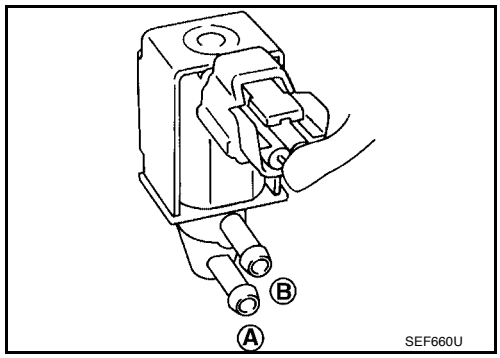
17. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

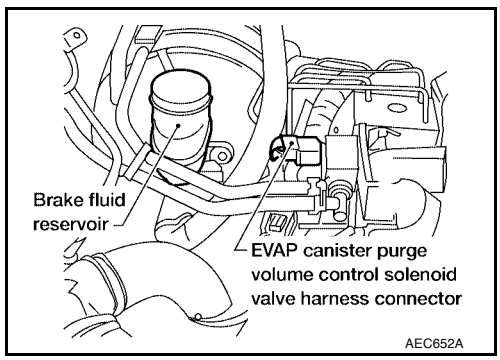


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100 %	Yes
0%	No

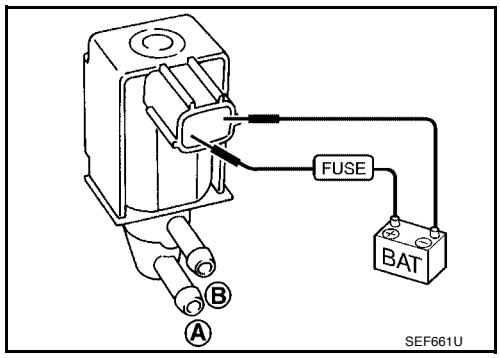


Without CONSULT-II

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



OK or NG

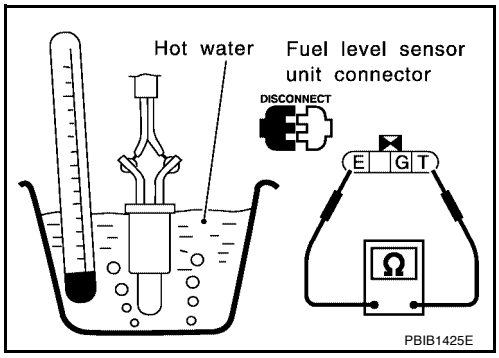
OK >> GO TO 18.

NG >> Replace EVAP canister purge volume control solenoid valve.

18. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit terminals T and E 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



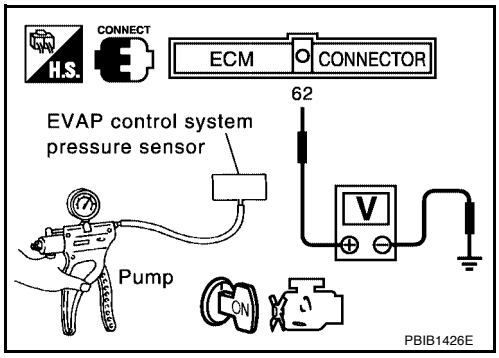
OK or NG

OK >> GO TO 19.
NG >> Replace fuel level sensor unit.

19. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
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.
5. Check input voltage between ECM terminal 62 and ground.

Applied vacuum	Voltage V
Not applied	1.8 - 4.8
-26.7 kpa (-200 mmHg, -7.87 inHg)	2.1 to 2.5V lower than above value



CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

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-1174, "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-1181, "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-1181, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 25.
NG >> Replace refueling control valve with fuel tank.

25. CHECK FUEL LEVEL SENSOR

Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 26.
NG >> Replace fuel level sensor unit.

26. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

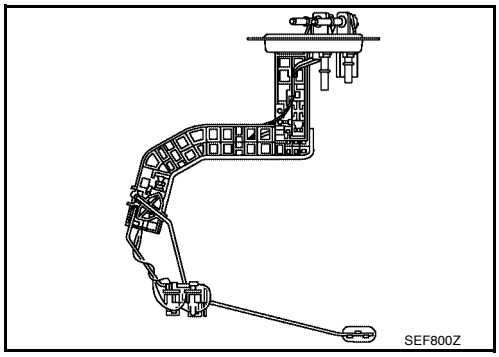
DTC P1464 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00DP9

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 is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnosis Logic

UBS00DPA

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.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1464	Fuel level sensor circuit ground signal	A high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted)

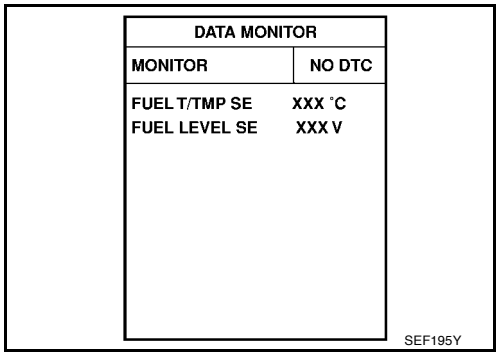
DTC Confirmation Procedure

UBS00DPB

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-1110, "Diagnostic Procedure" .



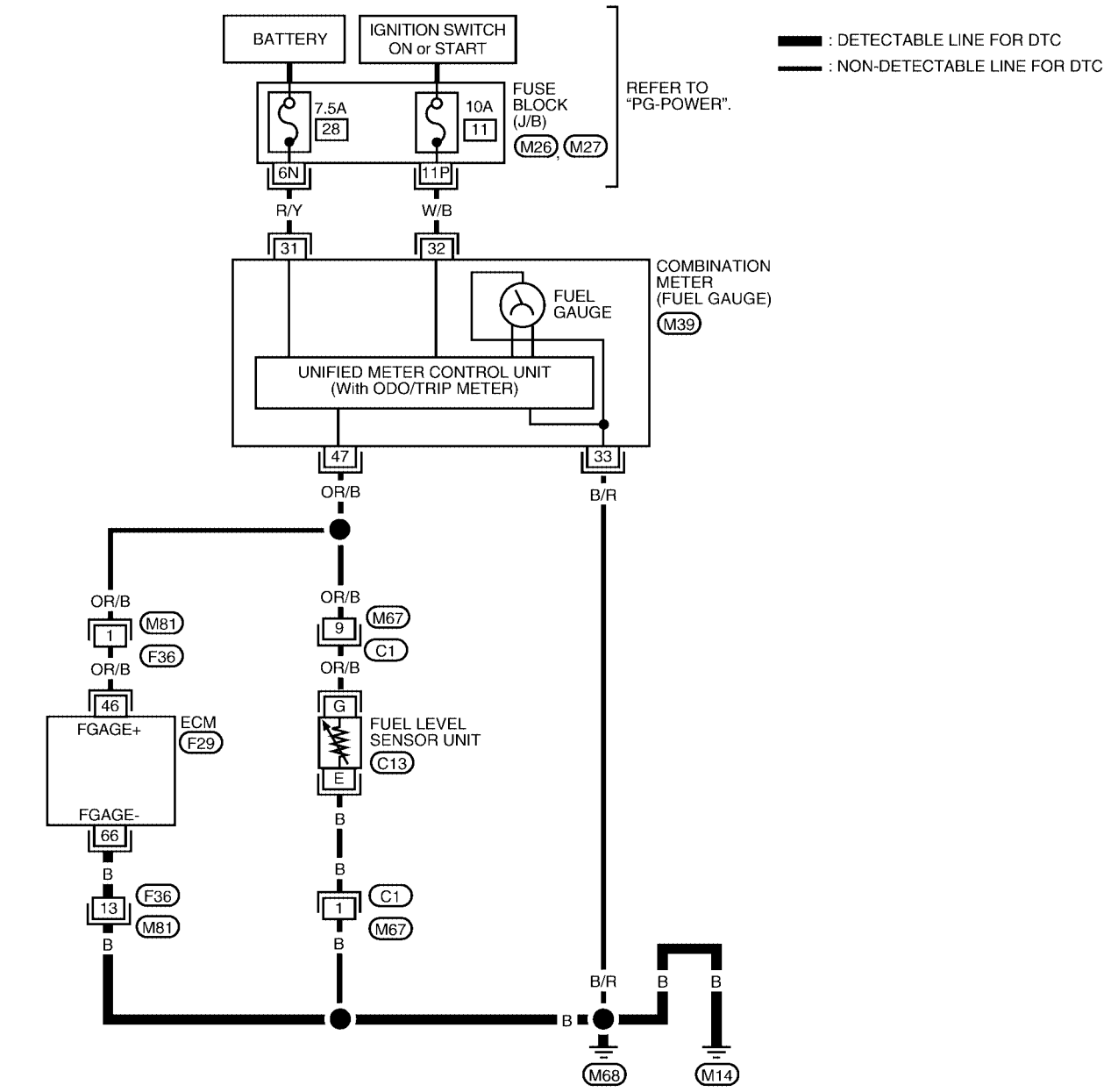
WITH GST

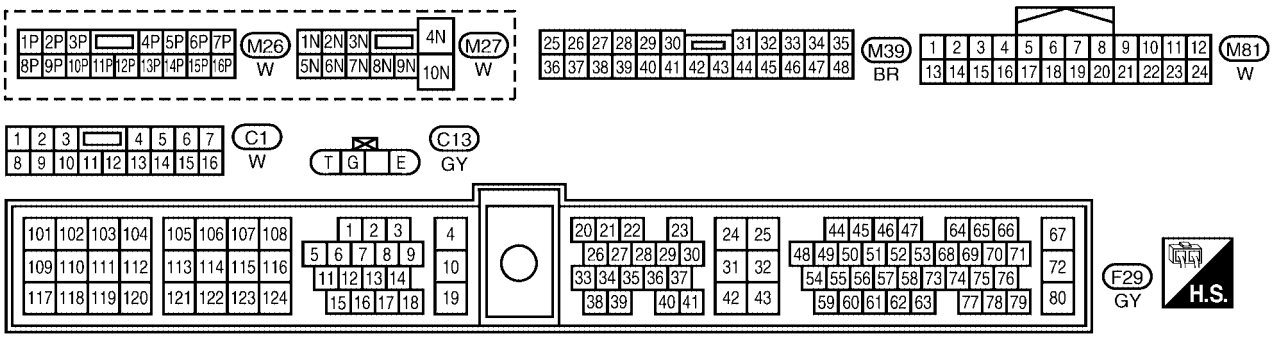
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DPC

EC-FLS3-01





BBWA1093E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	OR\B	Fuel level sensor	**[Ignition switch: ON]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00DPD

1. 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 66 and ground. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F36, M81
- Harness for open and short between ECM and ground

>> Replace open circuit or short to power in harness or connectors.

3. CHECK FUEL LEVEL SENSOR

Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel level sensor unit.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DPE

FUEL LEVEL SENSOR

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

DTC P1490 VACUUM CUT VALVE BYPASS VALVE

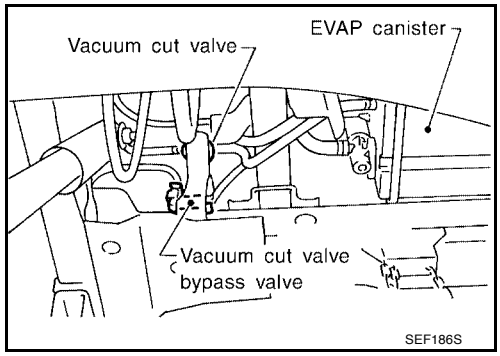
PFP:17372

Description

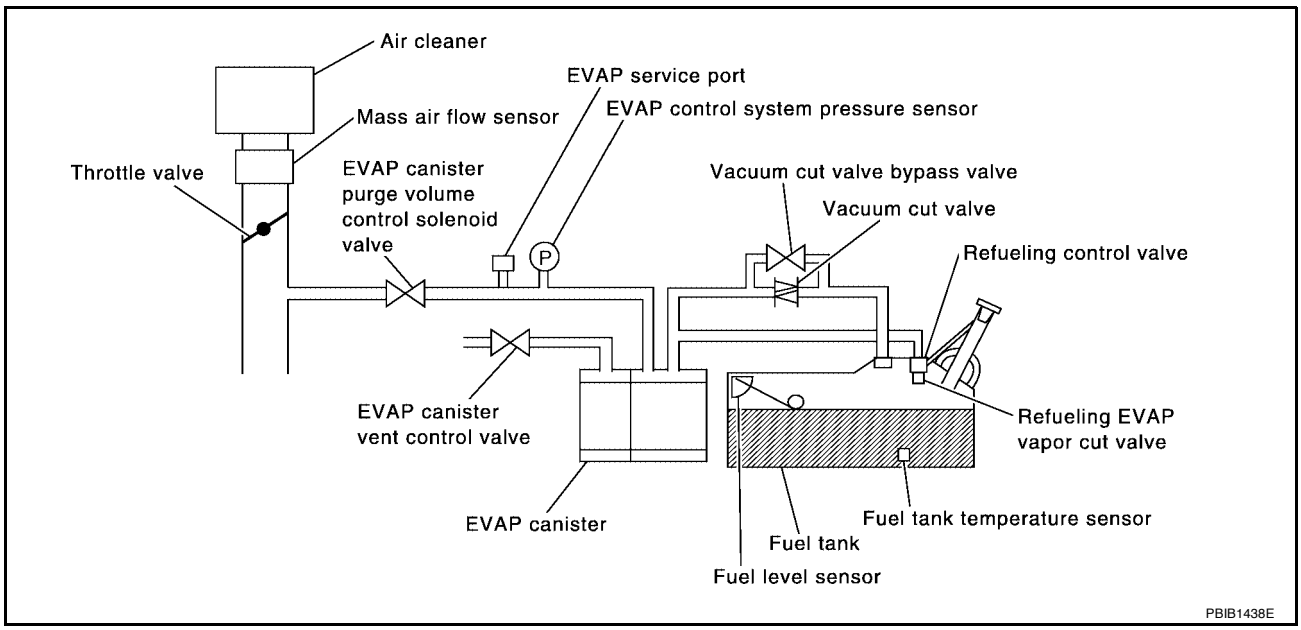
UBS00DPF

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

UBS00DPG

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00DPH

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1490	Vacuum cut valve bypass valve circuit	An improper voltage signal is sent to ECM through vacuum cut valve bypass valve.	● Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted) ● Vacuum cut valve bypass valve

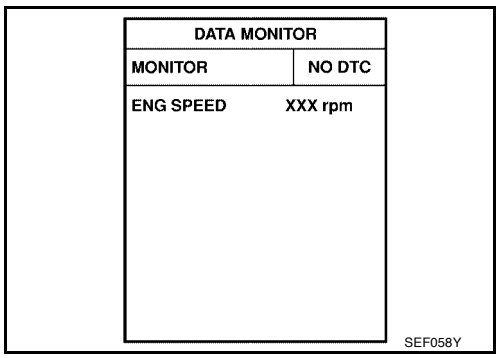
DTC Confirmation Procedure

UBS00DPI

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 EC-1114, "Diagnostic Procedure" .

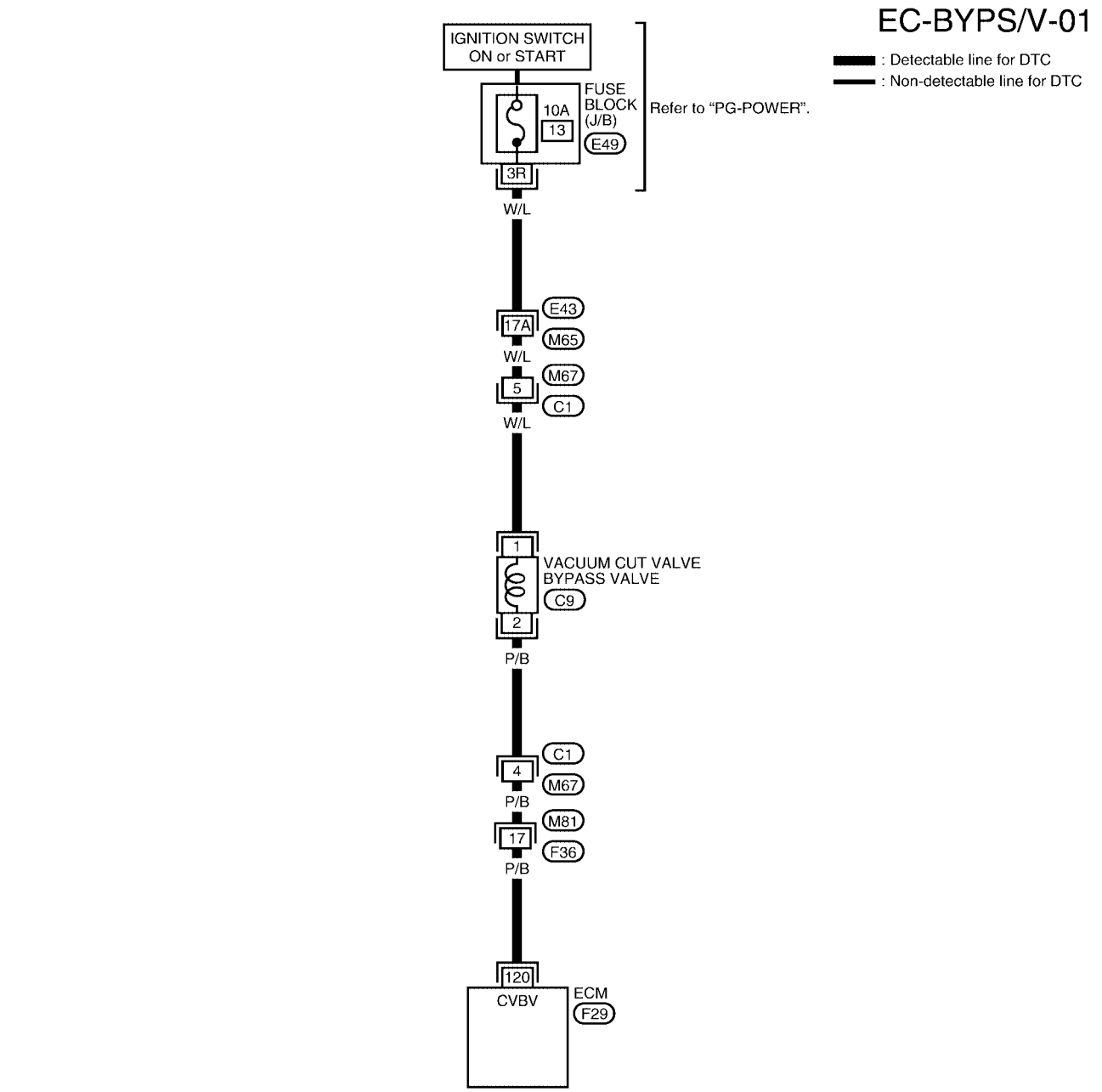


WITH GST

Follow the procedure “WITH CONSULT-II” above.

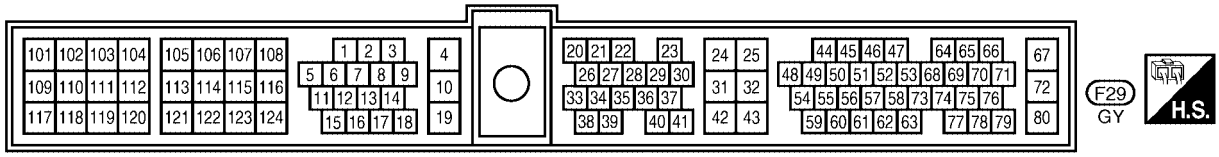
Wiring Diagram

UBS00DPJ





Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)



BBWA1094E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00DPK

1. INSPECTION START

Do you have CONSULT-II?

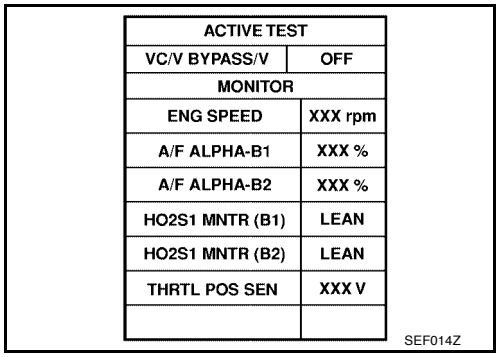
Yes or No

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.



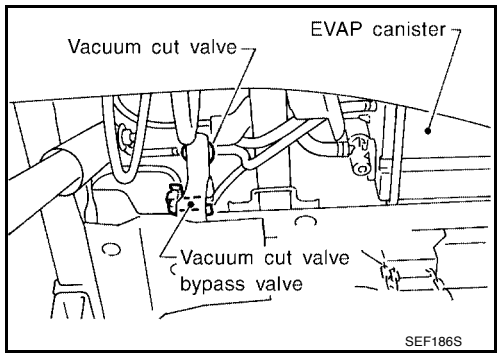
OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK VACUUM CUT VALVE BYPASS VALUE POWER SUPPLY CIRCUIT

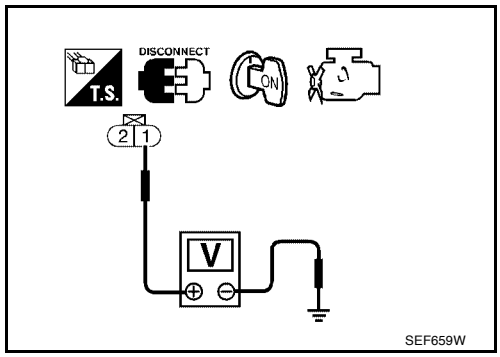
Without CONSULT-II

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 E43, M65
- Harness connectors M67, C1
- Fuse block (J/B) connector E49
- 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 120 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 C1, M67
- Harness connectors M81, F36
- 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

With CONSULT-II

1. Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.

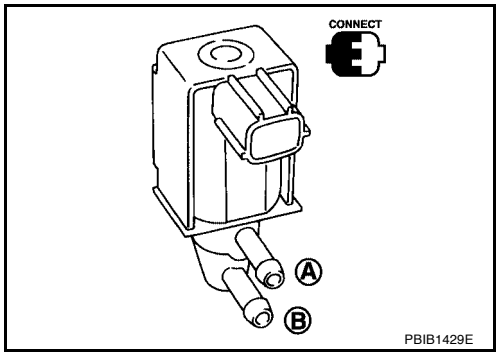
ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

SEF014Z

2. Check air passage continuity and operation delay time under the following conditions.

Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.



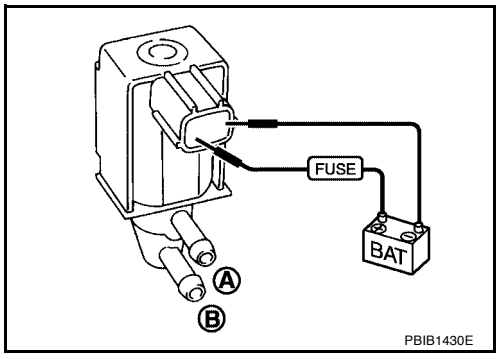
PBIB1429E

Without CONSULT-II

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.



PBIB1430E

OK or NG

OK >> GO TO 8.
NG >> Replace vacuum cut valve bypass valve.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

DTC P1491 VACUUM CUT VALVE BYPASS VALVE

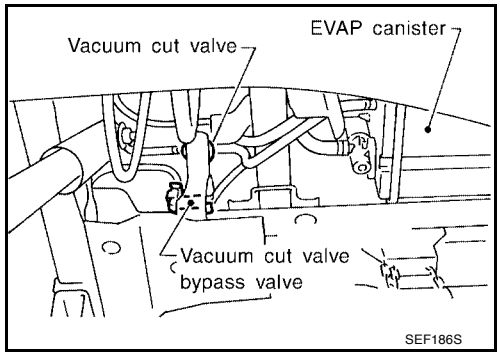
PFP:17372

Description

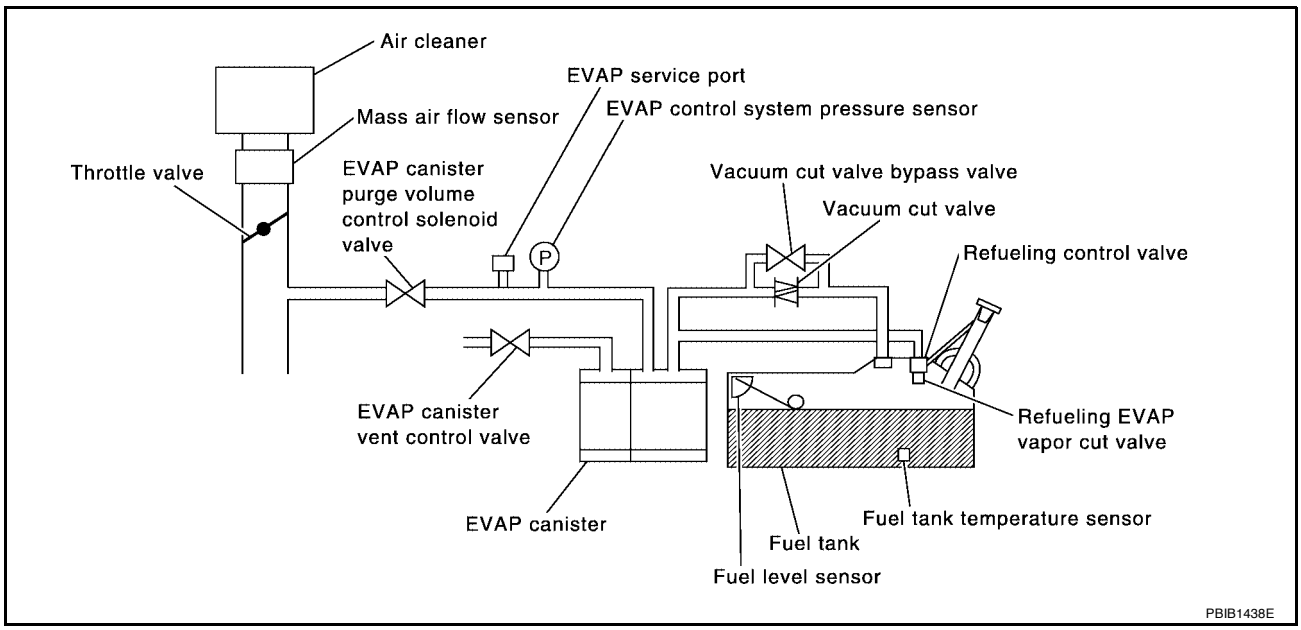
UBS00DPL

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

UBS00DPM

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00DPN

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1491	Vacuum cut valve bypass valve	Vacuum cut valve bypass valve does not operate properly.	● 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 ● Refueling control valve ● Refueling EVAP vapor cut valve

DTC Confirmation Procedure

UBS00DPO

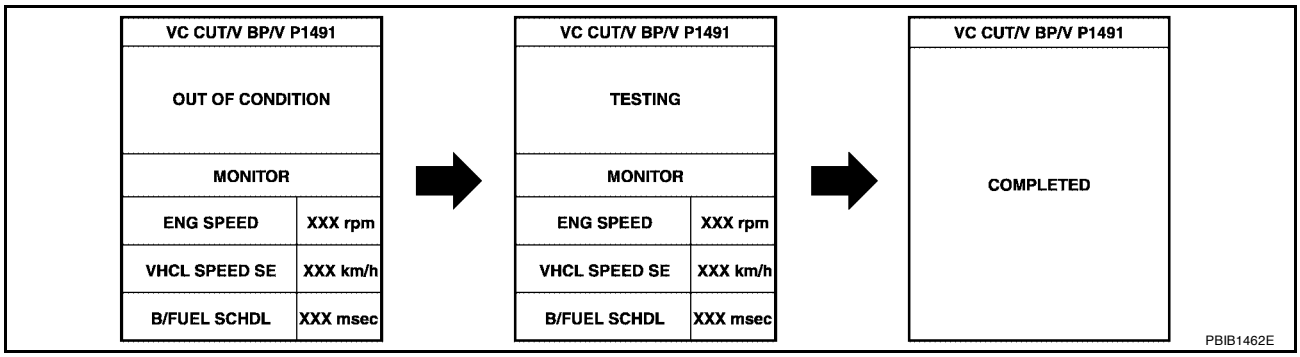
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 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.)

CMPS·RPM (POS)	More than 500 rpm
Selector lever	Suitable position
Vehicle speed	More than 36 km/h (22 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 EC-1121, "Diagnostic Procedure" .

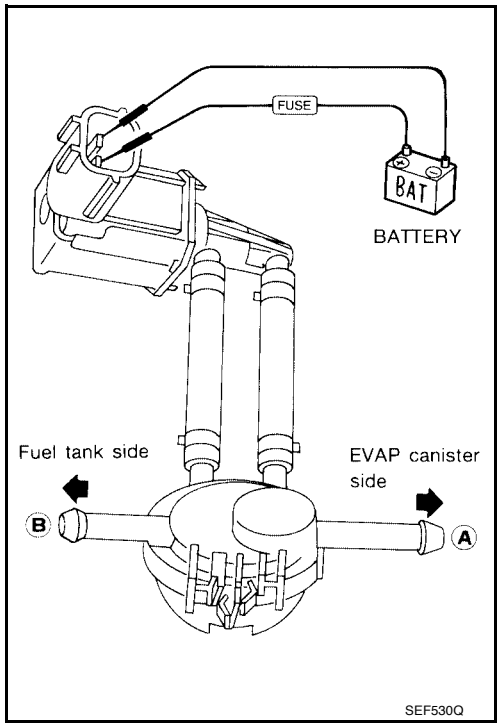
Overall Function Check

UBS00DPP

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.

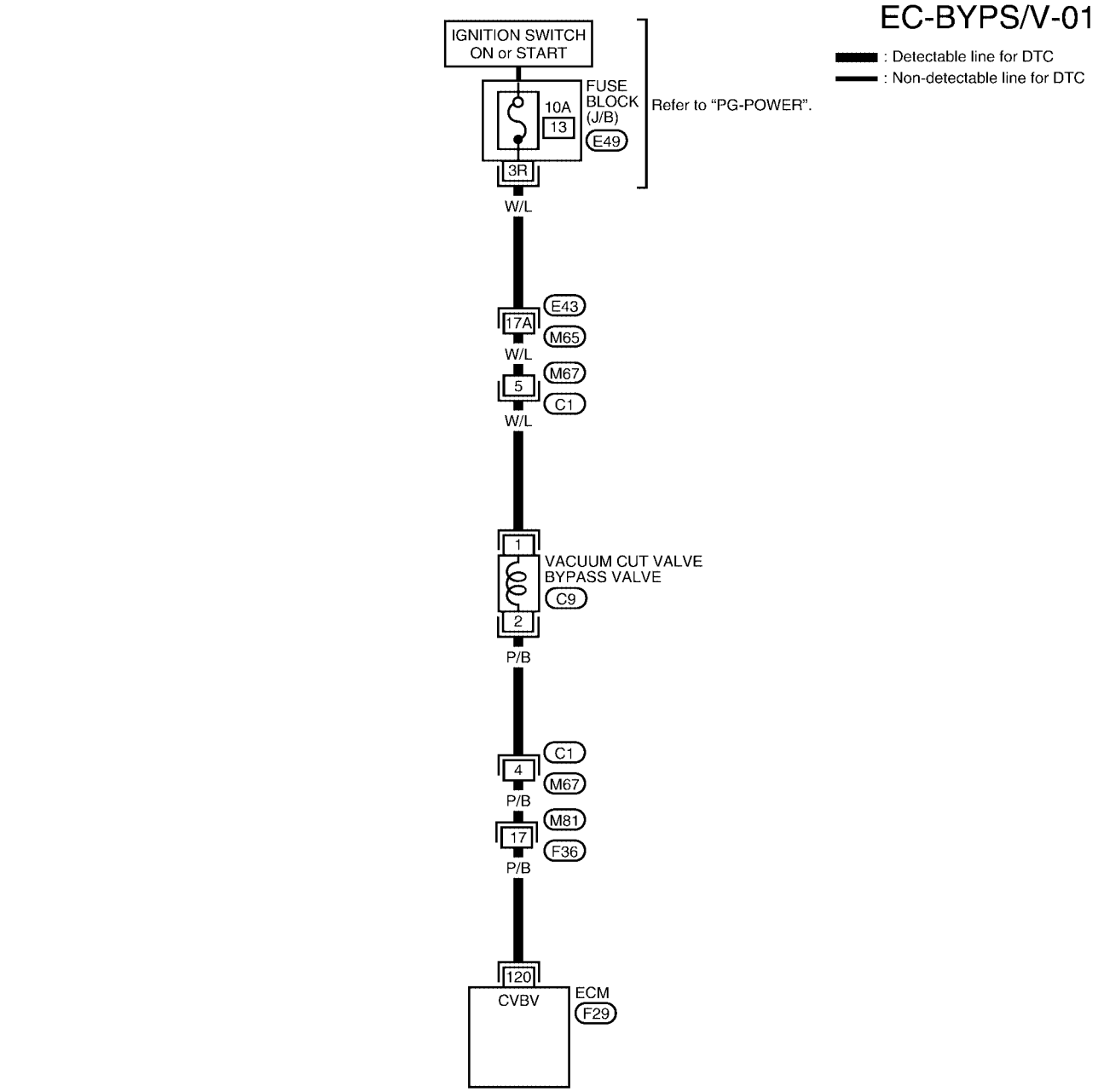
WITH GST

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 EC-1121, "Diagnostic Procedure" .



Wiring Diagram

UBS00DPQ



BBWA1094E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00DPR

1. INSPECTION START

Do you have CONSULT-II?

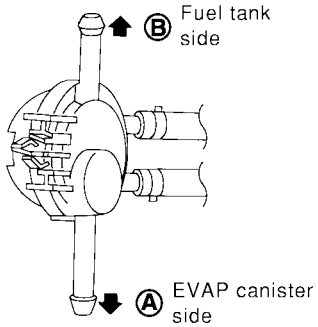
Yes or No

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
THRTL POS SEN	XXX V

SEF017Z

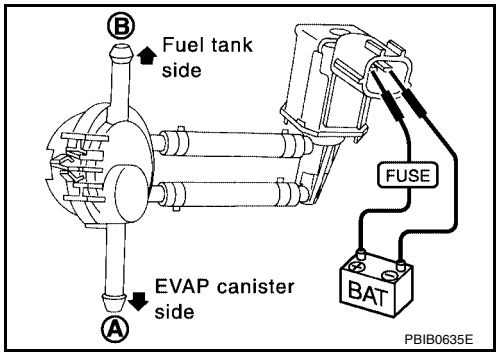
OK or NG

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 5.

4. CHECK EVAP PURGE LINE

1. Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.
2. Check EVAP purge port of fuel tank for clogging.
3. Check EVAP canister. Refer to EC-1176, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG (Step 1)>>Repair it.
NG (Step 2)>>Clean EVAP purge port.
NG (Step 3)>>Replace EVAP canister.

5. CHECK BYPASS HOSE

Check bypass hoses for clogging.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace hoses.

6. CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.

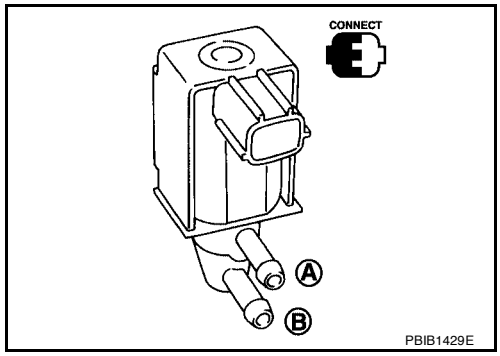
ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

SEF014Z

2. Check air passage continuity and operation delay time under the following conditions.

Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.



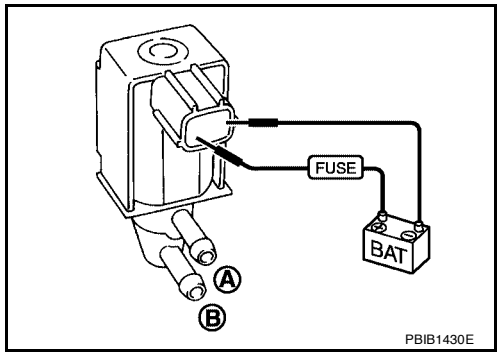
PBIB1429E

3. Check air passage continuity and operation delay time under the following conditions.

Without CONSULT-II

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.



PBIB1430E

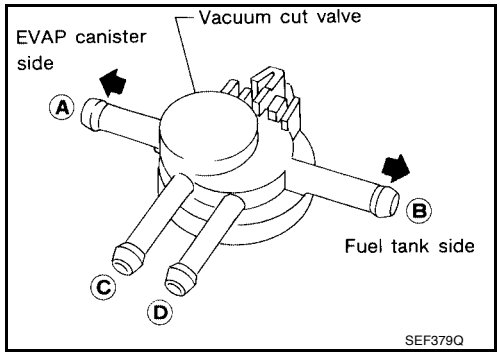
OK or NG

OK >> GO TO 7.
NG >> Replace vacuum cut valve bypass valve.

7. CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:

1. Plug port **C** and **D** with fingers.
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. Open port **C** and **D** .
6. Blow air in port **A** check that air flows freely out of port **C** .
7. Blow air in port **B** check that air flows freely out of port **D** .



SEF379Q

OK or NG

OK >> GO TO 8.
NG >> Replace vacuum cut 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

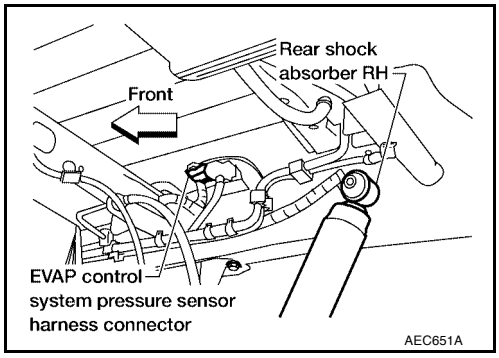
OK >> GO TO 9.
NG >> Repair or replace.

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 P0452 EC-941, "DTC Confirmation Procedure" or DTC P0453 EC-947, "DTC Confirmation Procedure" .

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP control system pressure sensor.

11. CHECK EVAP CANISTER VENT CONTROL VALVE

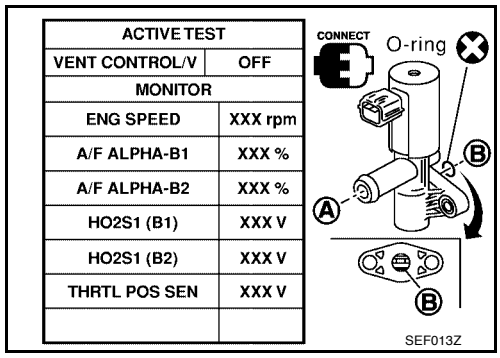
Check air passage continuity.

With CONSULT-II

1. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.

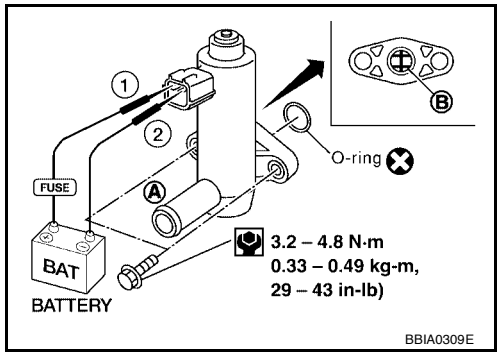


Without CONSULT-II

1. 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	No
OFF	Yes

Operation takes less than 1 second.



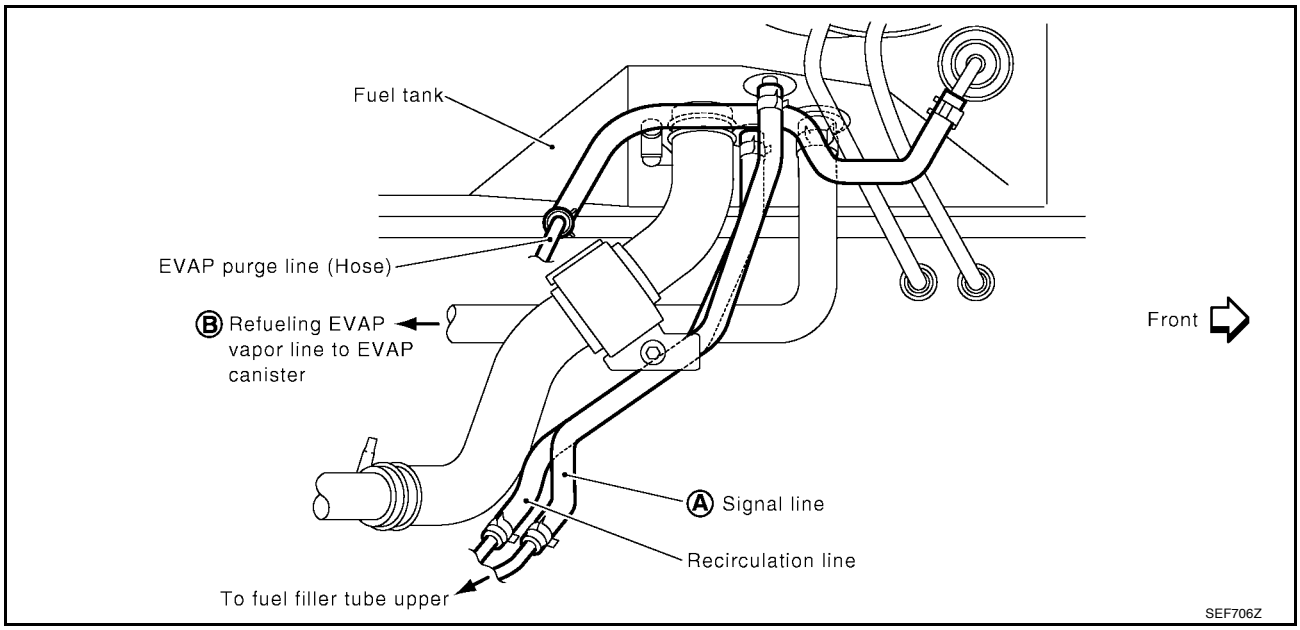
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.
Make sure new O-ring is installed properly.

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP canister vent control valve.

12. CHECK 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.



OK or NG

OK >> GO TO 13.
NG >> Replace fuel tank.

13. CHECK REFUELING EVAP VAPOR CUT VALVE

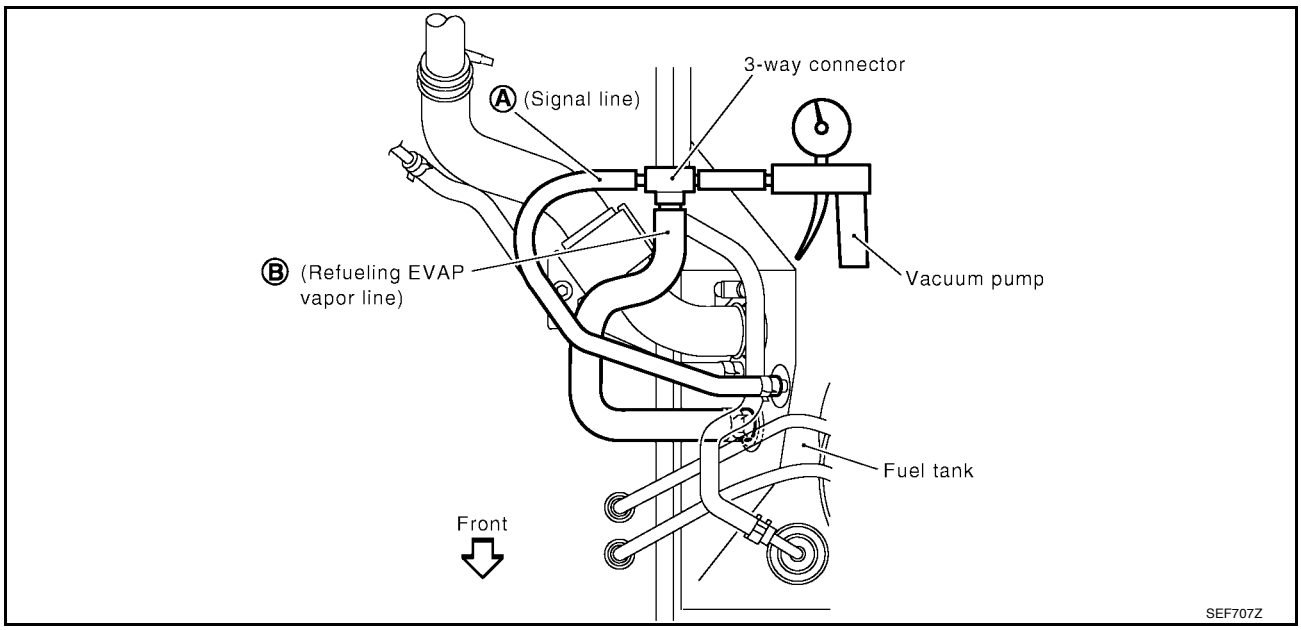
With CONSULT-II

1. Remove fuel tank. Refer to FL-3, "FUEL TANK" .
2. Drain fuel from the tank as follows:

- Remove fuel feed hose located on the fuel level sensor unit retainer.
- Connect a spare fuel hose, one side to fuel level sensor unit retainer where the hose was removed and the other side to a fuel container.
- 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.

- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel level sensor unit retainer with fuel level sensor unit.
Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



Without CONSULT-II

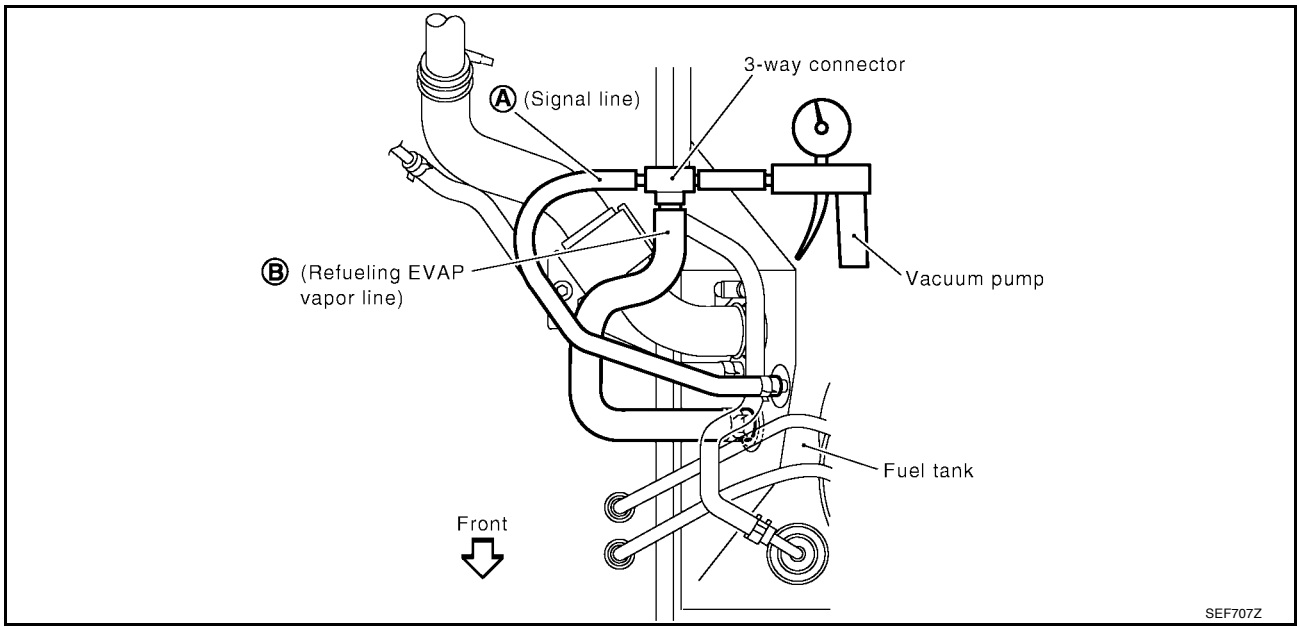
1. Remove fuel tank. Refer to FL-3, "FUEL TANK" .
2. Drain fuel from the tank as follows:

- Remove fuel level sensor unit retainer.
- 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.

- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel level sensor unit retainer with fuel level sensor unit.
Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel level

sensor unit retainer remaining open and check that the pressure is applicable.



OK or NG

OK >> GO TO 14.
NG >> Replace fuel tank.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

DTC P1605 A/T DIAGNOSIS COMMUNICATION LINE

PFP:23710

Component Description

UBS00DPS

The malfunction information related to A/T (Automatic Transmission) is transferred through the line (circuit) from TCM (Transmission control module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission control module) but also ECM after the A/T related repair.

On Board Diagnosis Logic

UBS00DPT

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1605	A/T diagnosis communication line	An incorrect signal from TCM (Transmission Control Module) is sent to ECM.	● Harness or connectors [The communication line circuit between ECM and TCM (Transmission Control Module) is open or shorted.] ● Dead (Weak) battery ● TCM (Transmission Control Module)

DTC Confirmation Procedure

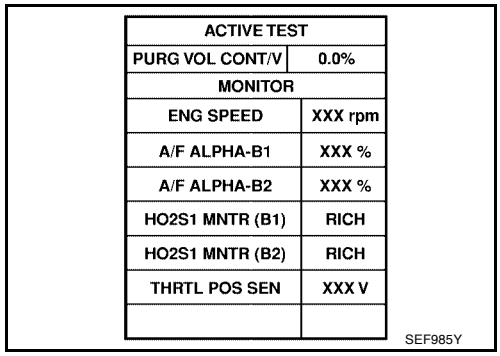
UBS00DPU

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 70 seconds.
4. If 1st trip DTC is detected, go to EC-1133, "Diagnostic Procedure" .

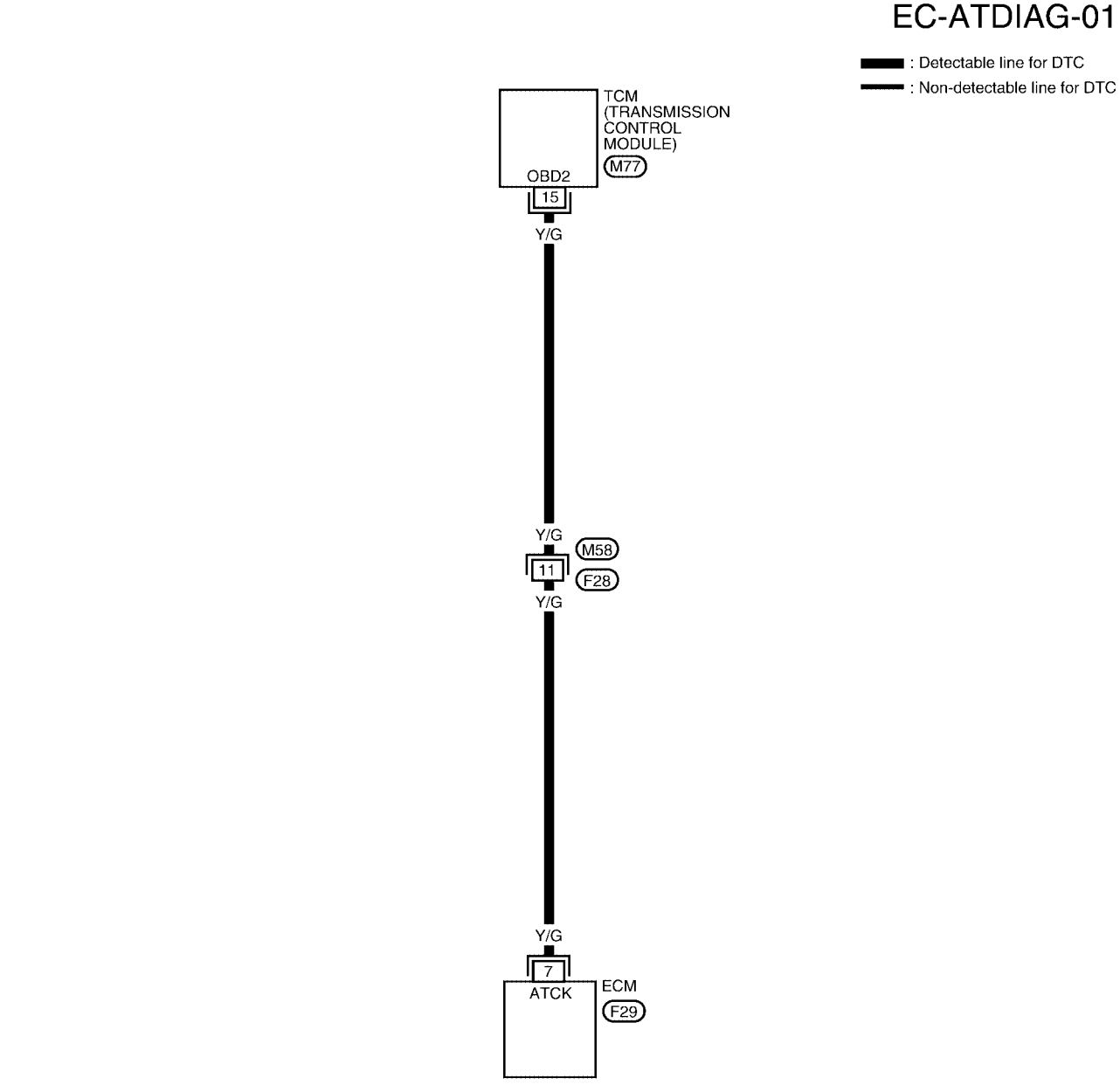


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram
WITHOUT VDC

UBS00DPV



BBWA1095E

Specification data are reference values and are measured between each terminal and ground.

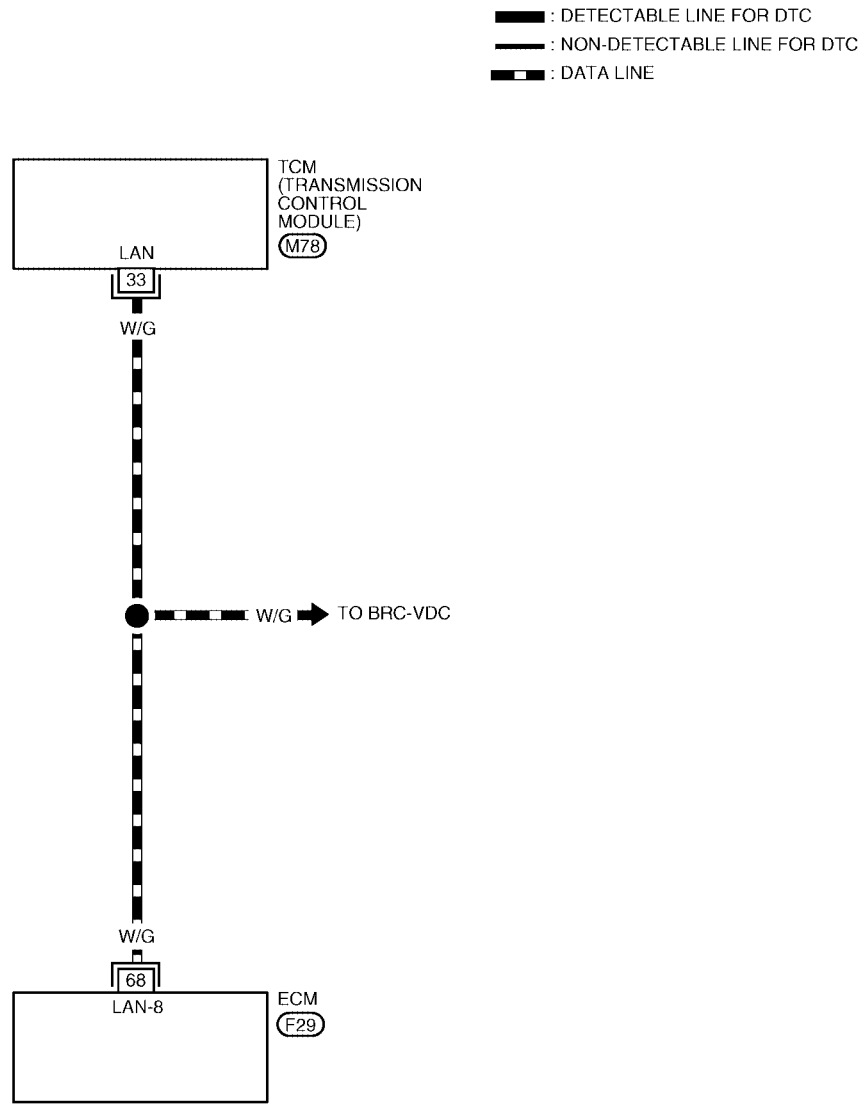
CAUTION:

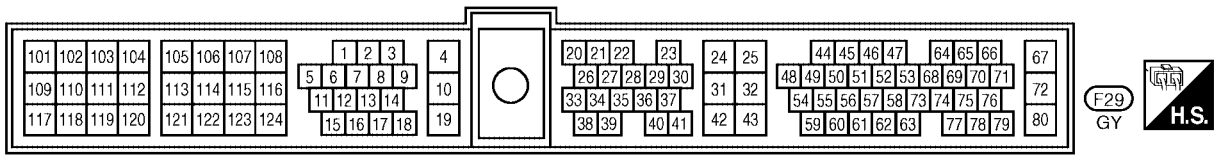
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

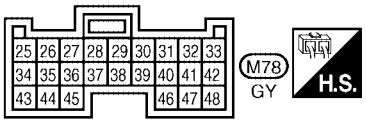
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
7	Y/G	A/T check signal	**[Ignition switch: ON]** **[Engine is running]**	0 - 3.0V

WITH VDC

EC-AT/C-02







BBWA1329E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
68	W/G	A/T signal	**[Ignition switch: ON]** ● Idle speed	0 - 5.0V

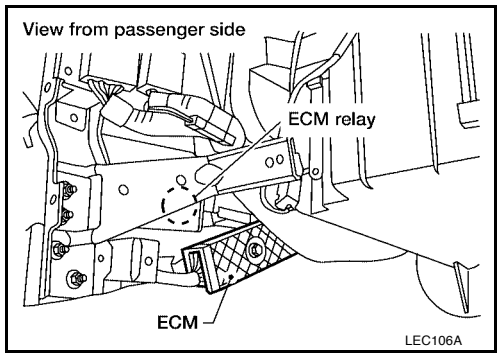
Diagnostic Procedure

UBS00DPW

WITHOUT VDC

1. CHECK A/T DIAGNOSIS COMMUNICATION LINE INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.



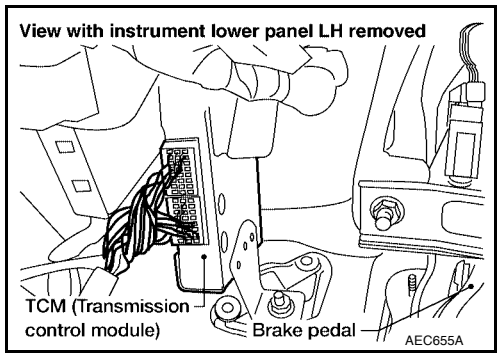
3. Check harness continuity between ECM terminal 7 and TCM terminal 15. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F28
- Harness for open or short between ECM and TCM (Transmission Control Module)

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK INTERMITTENT INCIDENT

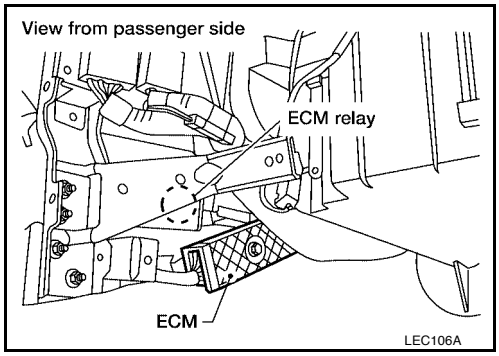
Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

WITH VDC

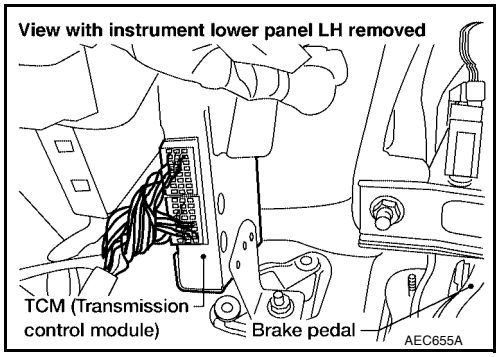
1. CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR OPEN

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.



3. Disconnect TCM harness connector.
4. Check harness continuity between ECM terminal 68 and TCM terminal 33.
   Refer to Wiring Diagram.

Continuity should exist.



OK or NG

OK >> GO TO 2.
NG >> Repair harness or connectors.

2. CHECK A/T CONTROL INPUT SIGNAL FOR SHORT

1. Check harness continuity between ECM terminal 68 and ground.
   Refer to Wiring Diagram.

Continuity should not exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair short to ground or short to power in harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END.**

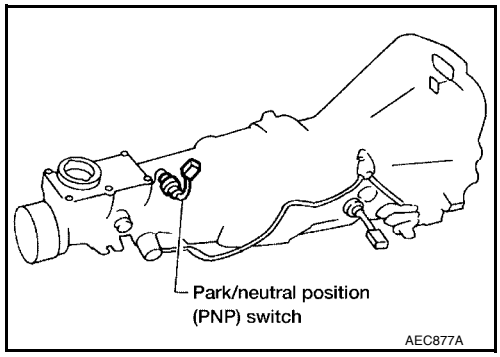
DTC P1706 PNP SWITCH

PFP:32006

Component Description

UBS00DPX

When the gear position is P or N (A/T), Neutral (M/T), 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

UBS00DPY

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Except above	OFF

On Board Diagnosis Logic

UBS00DPZ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	● Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] ● Park/neutral position (PNP) switch

DTC Confirmation Procedure

UBS00DQ0

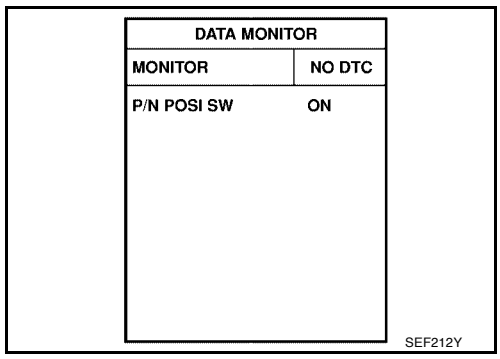
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 or P position (A/T) Neutral position (M/T)	ON
Except above position	OFF

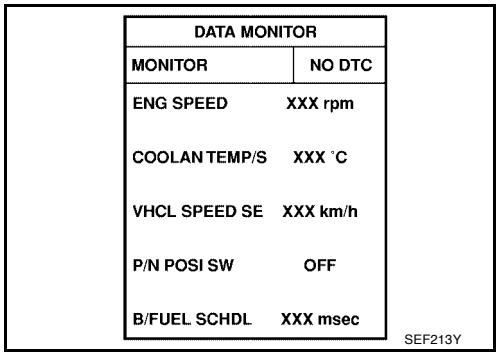


If NG, go to EC-1138, "Diagnostic Procedure" .
If OK, go to following step.

3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and warm it up to normal operating temperature.

5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,600 - 2,700 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.3 - 13.0 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position



6. If 1st trip DTC is detected, go to EC-1138, "Diagnostic Procedure" .

Overall Function Check

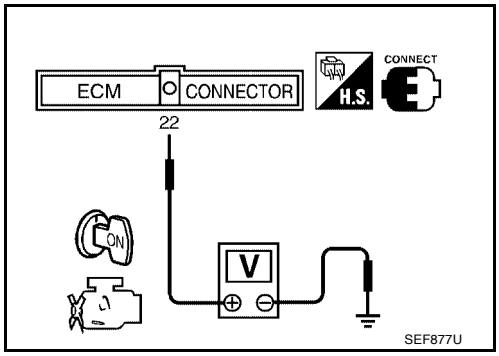
UBS00DQ1

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 22 and ground under the following conditions.

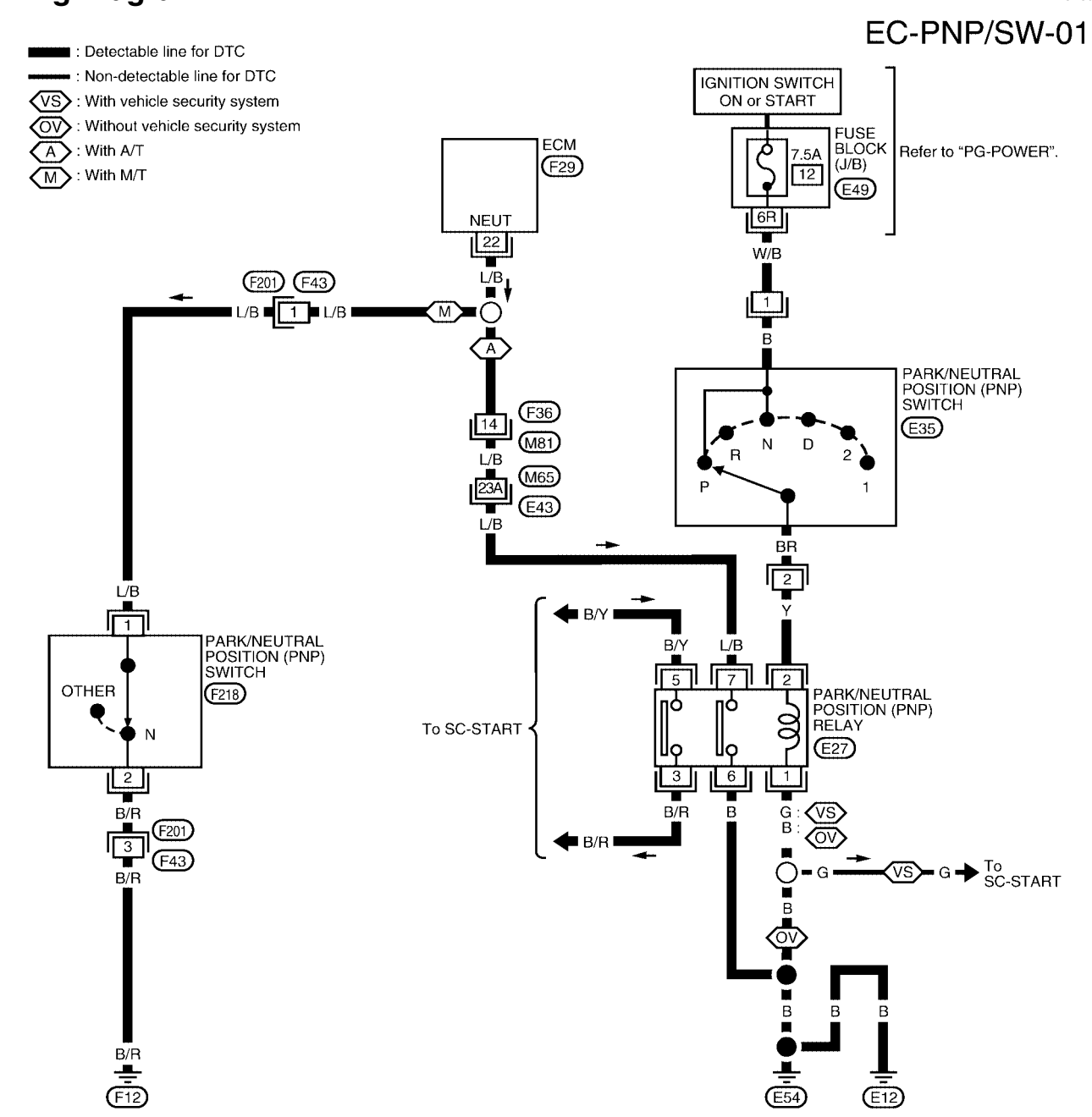
Condition (Gear position)	Voltage (V) (Known-good data)
P or N position (A/T) Neutral position (M/T)	Approx. 0
Except above position	Approx. 5

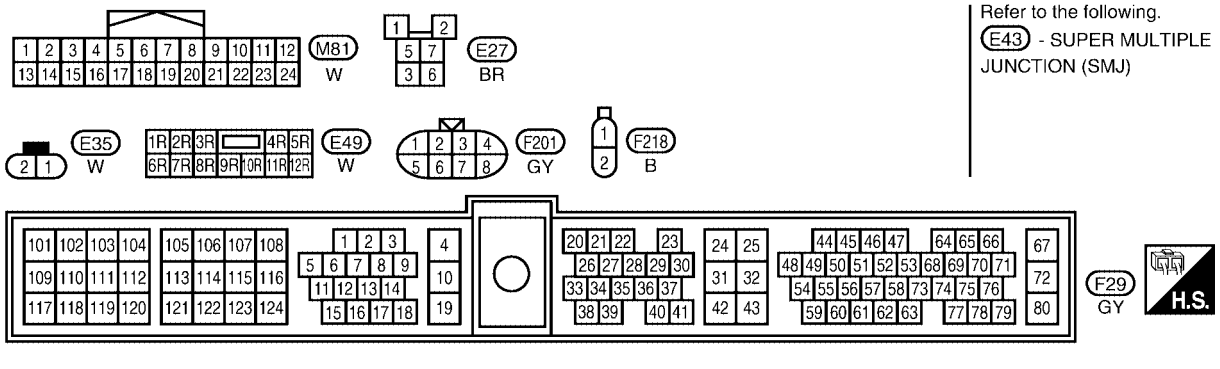


3. If NG, go to EC-1138, "Diagnostic Procedure" .

Wiring Diagram

UBS00DQ2





Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)

BBWA1096E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	L/B	Park/neutral position (PNP) switch	**[Ignition switch: ON]** ● Shift lever: N or P (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] ● Except above position	Approximately 5V

Diagnostic Procedure

UBS00DQ3

FOR M/T MODELS

1. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

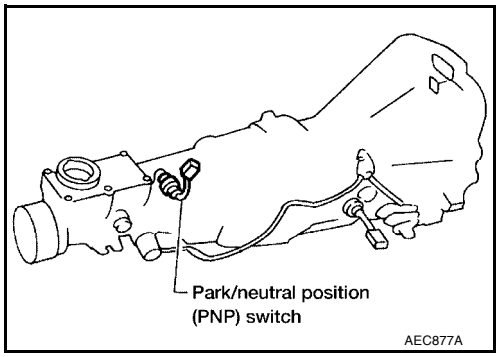
1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F201, F43
- Harness for open between park/neutral position (PNP) switch and ground

>> Repair open circuit or short to power in harness or connectors.

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 22 and PNP switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F43, F201
- Harness for open or short between ECM and park/neutral position (PNP) switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH

Refer to MT-46, "Position Switch Check" .

OK or NG

OK >> GO TO 6.
NG >> Replace park/neutral position (PNP) switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

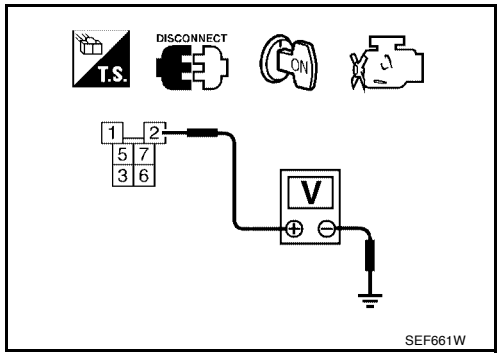
>> **INSPECTION END**.

FOR A/T MODELS

1. CHECK PNP SWITCH POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) relay.
3. Turn ignition switch ON.
4. Shift selector lever to P or N position.
5. Check voltage between PNP relay terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

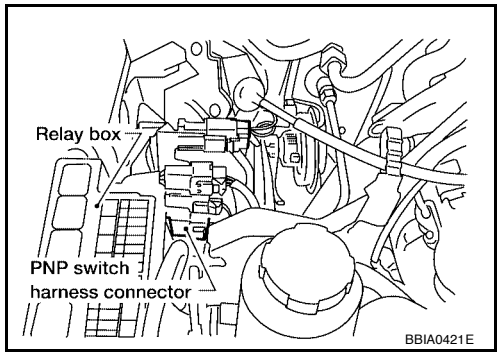
OK >> GO TO 6.
NG >> GO TO 2.

2. CHECK PNP SWITCH POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and PNP relay 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 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK PNP SWITCH POWER SUPPLY CIRCUIT-III

1. Turn ignition switch ON.
2. Check voltage between PNP switch terminal 1 and ground with CONSULT-II or tester. Refer to Wiring Diagram.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E49
- 7.5A fuse
- Harness for open or short between PNP switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH

Refer to AT-254, "PNP SWITCH" .

OK or NG

OK >> GO TO 11.
NG >> Replace park/neutral position (PNP) switch.

6. CHECK PNP RELAY GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between PNP relay terminals 1, 6 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 8.
NG (With vehicle security system)>>GO TO 7
NG (Without vehicle security system)>>Repair open circuit or short to power in harness or connectors.

7. DETECT MALFUNCTIONING PART

Check the circuit between PNP relay and ground.
Refer to SC-9, "STARTING SYSTEM" .

OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

8. CHECK PNP RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 22 and PNP relay terminal 7. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

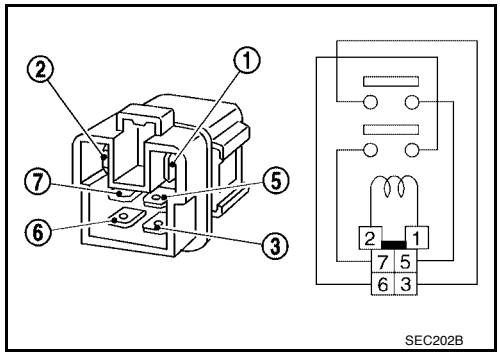
- Harness connectors F36, M81
- Harness connectors M65, E43
- Harness for open or short between ECM and park/neutral position (PNP) relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK PARK/NEUTRAL POSITION (PNP) RELAY

1. Apply 12V direct current between park/neutral position (PNP) relay terminals 1 and 2.
2. Check continuity between park/neutral position (PNP) relay terminals 3 and 5, 6 and 7.

12V (1 and 2) applied : Continuity should exist.
No voltage applied : Continuity should not exist.



OK or NG

OK >> GO TO 11.
NG >> Replace park/neutral position (PNP) relay.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

IGNITION SIGNAL

PFP:22448

Component Description

UBS00DQ4

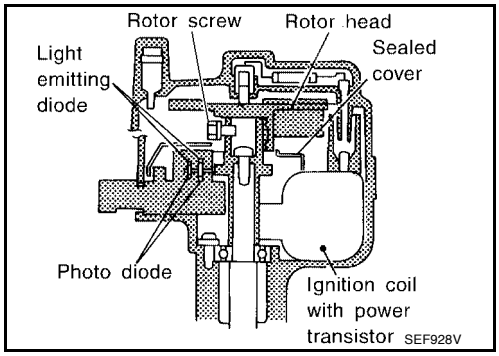
IGNITION COIL & POWER TRANSISTOR

The power transistor switches ON and OFF the ignition coil primary circuit according to the ECM signal. As the primary circuit is turned ON and OFF, the proper high voltage is induced in the secondary circuit. The distributor is not repairable except for the distributor cap and rotor head.

NOTE:

The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

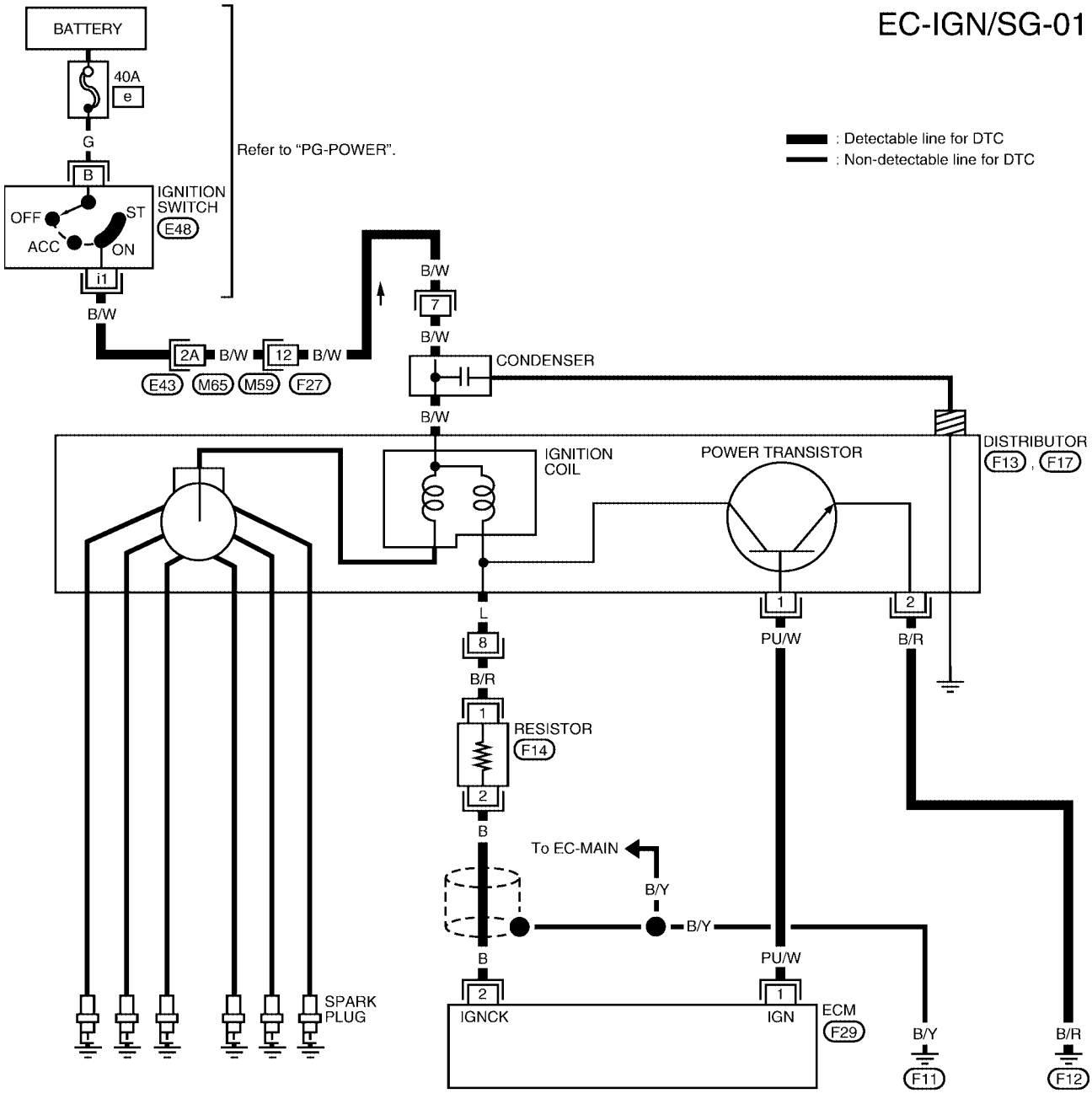
: 3.6±0.3 N·m (37±3 kg-cm, 32±3 in-lb)

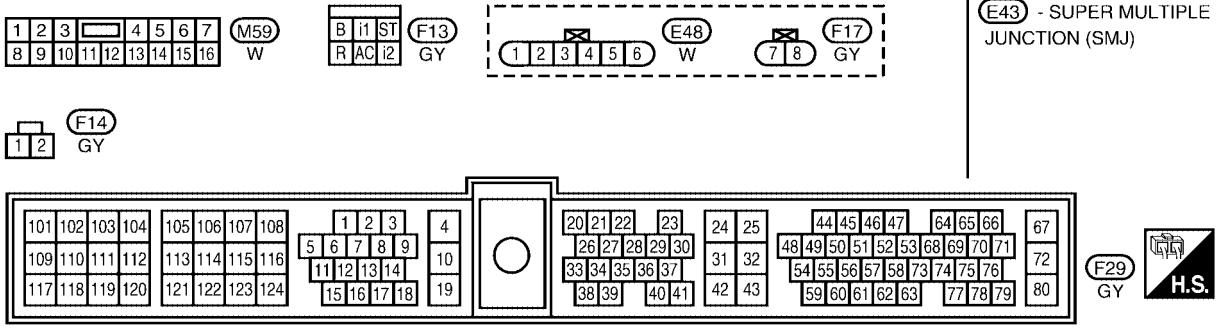


Wiring Diagram

UBS00DQ5

EC-IGN/SG-01



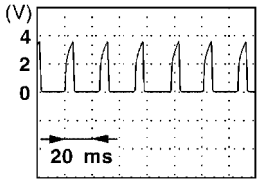
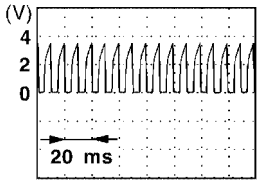


BBWA0496E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	**[Engine is running]** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 0.7V★  SEF988U
			[Engine is running] ● Engine speed is 2,000 rpm	1.1 - 1.5V★  SEF989U

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00DQ6

1. INSPECTION START

Turn ignition switch OFF, and restart engine.

Is engine running?

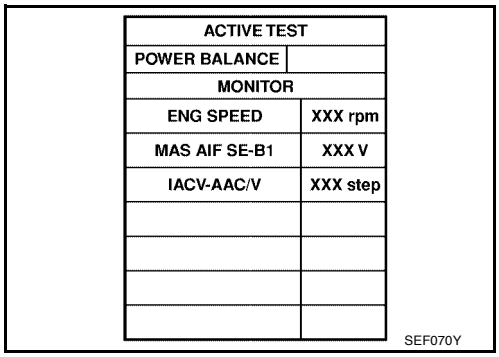
Yes or No

Yes (With CONSULT-II)>>GO TO 2.
Yes (Without CONSULT-II)>>GO TO 3.
No >> GO TO 4.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
2. Make sure that all circuits do not produce a momentary engine speed drop.



SEF070Y

OK or NG

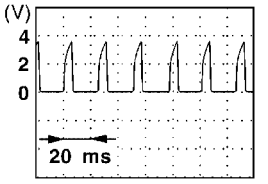
OK >> **INSPECTION END**.
NG >> GO TO 4.

3. CHECK OVERALL FUNCTION

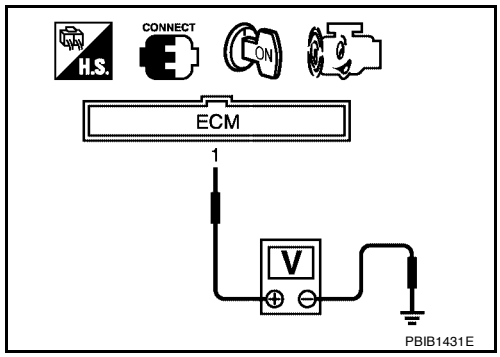
Without CONSULT-II

1. Let engine idle.
2. Read the voltage signal between ECM terminal 1 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.

NOTE:
The pulse cycle changes depending on rpm at idle.



SEF988U



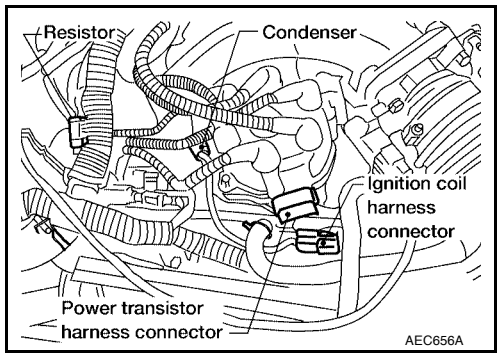
PBIB1431E

OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 4.

4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT

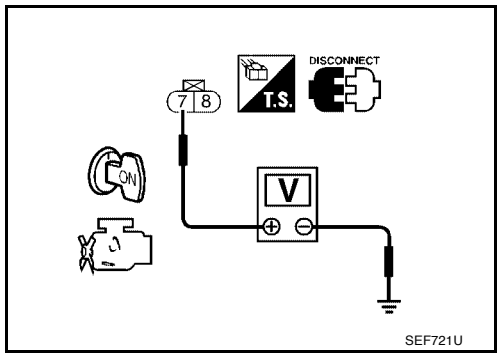
1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.



AEC656A

4. Check voltage between ignition coil terminal 7 and ground with CONSULT-II or tester.

Voltage: Battery voltage



SEF721U

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M59, F27
- Harness for open or short between ignition coil and ignition switch

>> Repair harness or connectors.

6. CHECK POWER TRANSISTOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect power transistor harness connector.
3. Check harness continuity between power transistor terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to power in harness or connectors.

7. CHECK INPUT SIGNAL CIRCUIT

1. Strip tape covering resistor.
2. Disconnect resistor harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ignition coil terminal 8 and resistor terminal 1, resistor terminal 2 and ECM terminal 2. Refer to Wiring Diagram.

Continuity should exist.

5. Also check for short to ground and short to power.

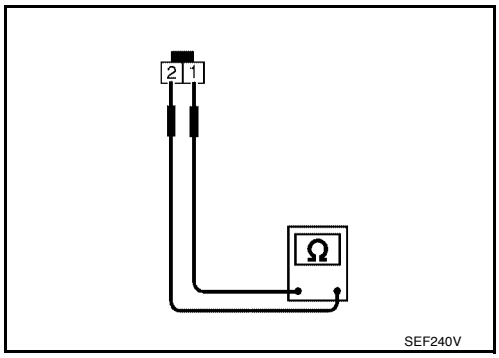
OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK RESISTOR

Check resistance between resistor terminals 1 and 2.

Resistance: Approximately 2.2 kΩ [at 25°C (77°F)]



OK or NG

OK >> GO TO 9.
NG >> Replace resistor.

9. CHECK POWER TRANSISTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 1 and power transistor terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

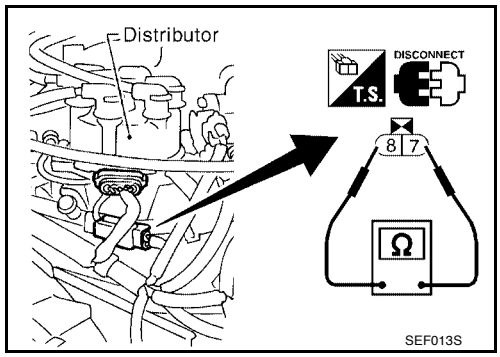
OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

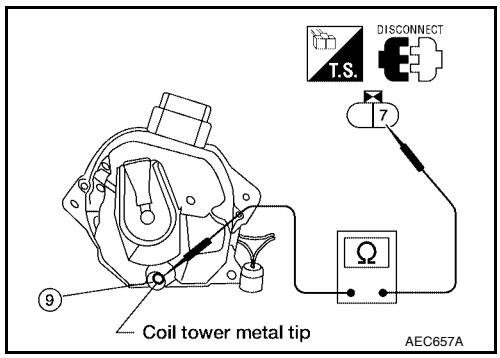
10. CHECK IGNITION COIL

1. Disconnect ignition coil harness connector.
2. Check resistance as shown in the figure.

Terminal	Resistance [at 20°C (68°F)]
7 - 8 (Primary coil)	Approx. 1.0Ω
7 - 9 (secondary coil)	Approx. 10 kΩ



For checking secondary coil, remove distributor cap and measure resistance between coil tower metal tip 9 and terminal 7.



OK or NG

OK >> GO TO 11.
NG >> Replace distributor assembly.

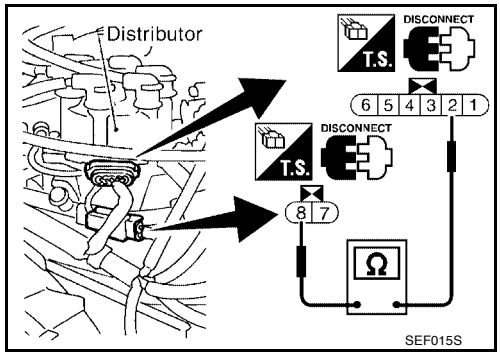
11. CHECK POWER TRANSISTOR

1. Disconnect camshaft position sensor & power transistor harness connector and ignition coil harness connector.
2. Check power transistor resistance between terminals 2 and 8.

Terminals	Resistance	Result
2 and 8	Except 0Ω	OK
	0Ω	NG

OK or NG

OK >> GO TO 12.
NG >> Replace distributor assembly.



12. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00DQ7

DISTRIBUTOR

Refer to EM-80, "OUTER COMPONENT PARTS" .

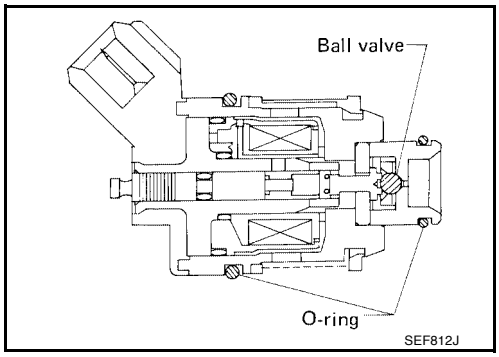
INJECTOR CIRCUIT

PFP:16600

Component Description

UBS00DQ8

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 ball 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

UBS00DQ9

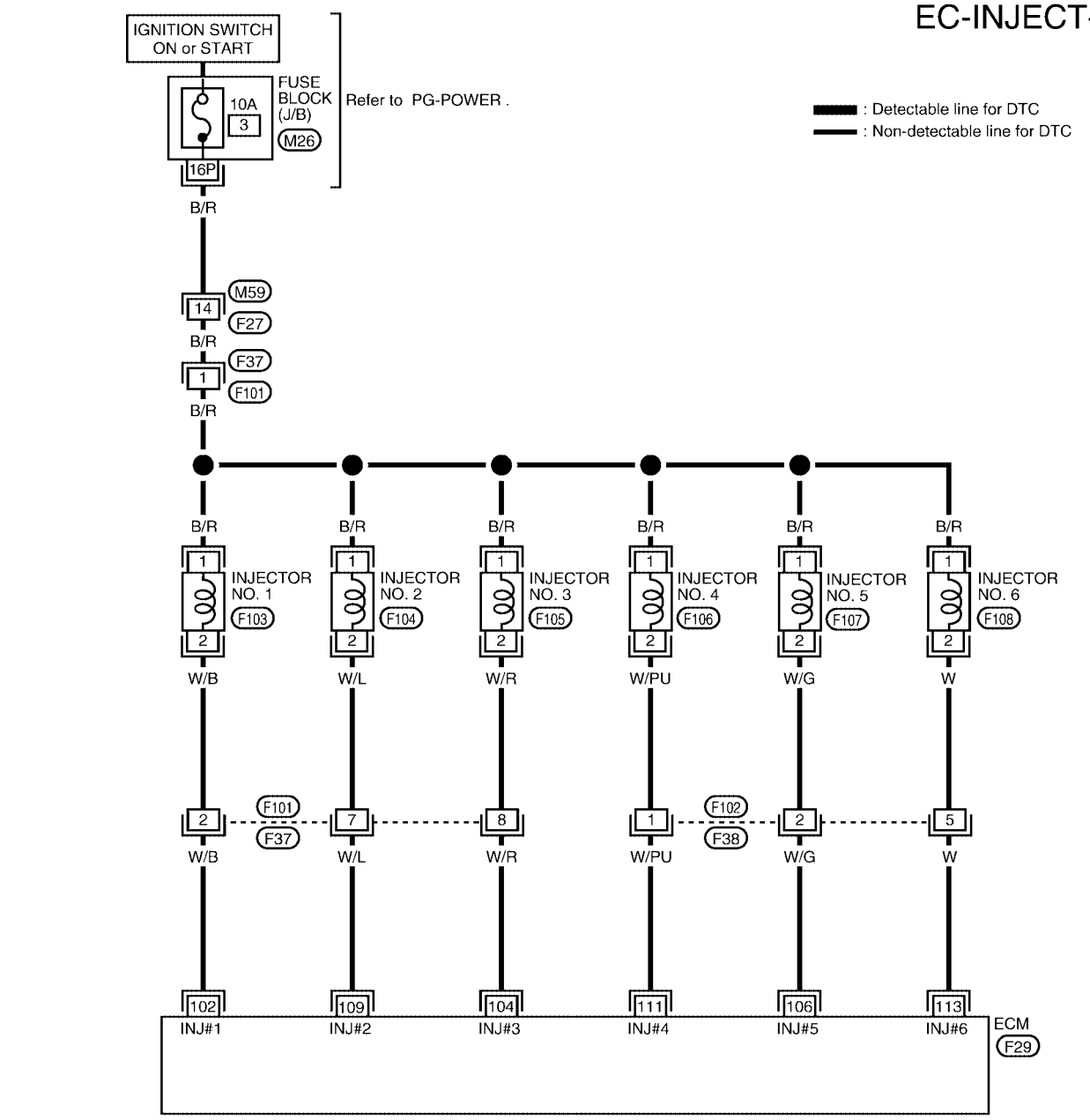
Specification data are reference values.

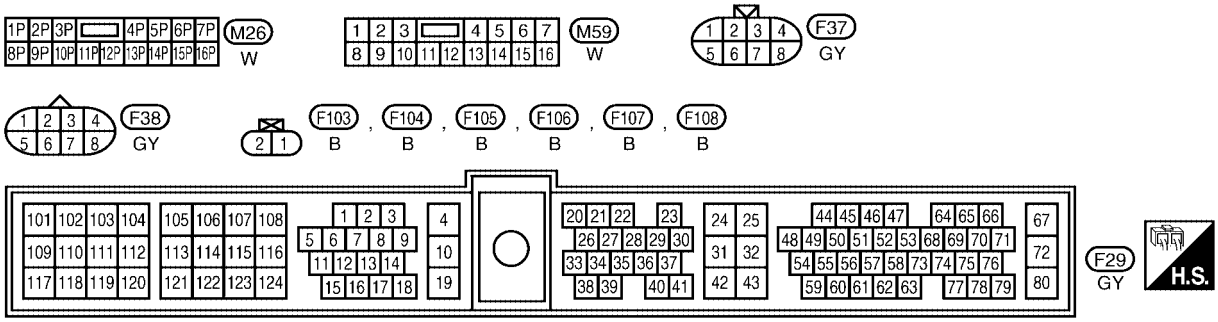
MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE-B1 INJ PULSE-B2	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	2.4 - 3.7 msec
		2,000 rpm	1.9 - 3.3 msec
B/FUEL SCHDL	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.4 msec

Wiring Diagram

UBS00DQA

EC-INJECT-01



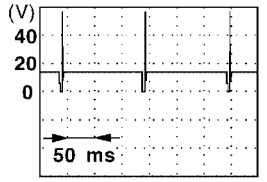
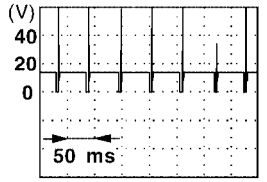


BBWA0497E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 106 109 111 113	W/B W/R W/G W/L W/PU W	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEF007V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEF008V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00DQB

1. INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

Yes or No

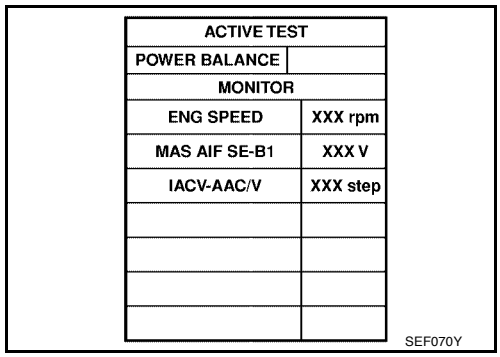
Yes >> GO TO 2.

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.

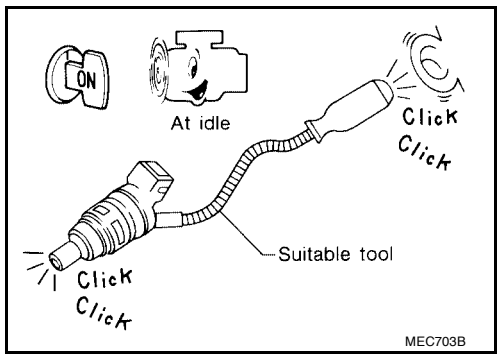


Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
   Clicking noise should be heard.

OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 3.



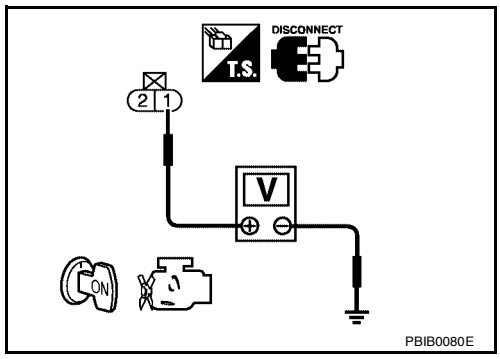
3. CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect injector harness connector.
3. Turn ignition switch ON.
4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness connectors F37, F101
- Fuse block (J/B) connector M26
- 10A fuse
- Harness for open or short between injector and fuse

>> Repair harness or connectors.

5. CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 102, 104, 106, 109, 111, 113. 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.

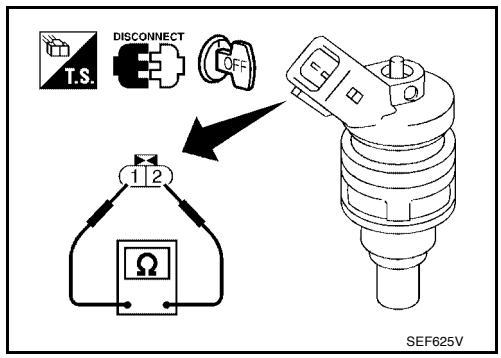
- Harness connectors F37, F101
- Harness connectors F38, F102
- Harness for open or short between ECM and injector

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 10.4 - 15.3Ω [at 10 - 60°C (50 -140°F)]



OK or NG

OK >> GO TO 8.
NG >> Replace injector.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00DQC

INJECTOR

Refer to EM-80, "OUTER COMPONENT PARTS" .

START SIGNAL

PFP:48750

CONSULT-II Reference Value in Data Monitor Mode

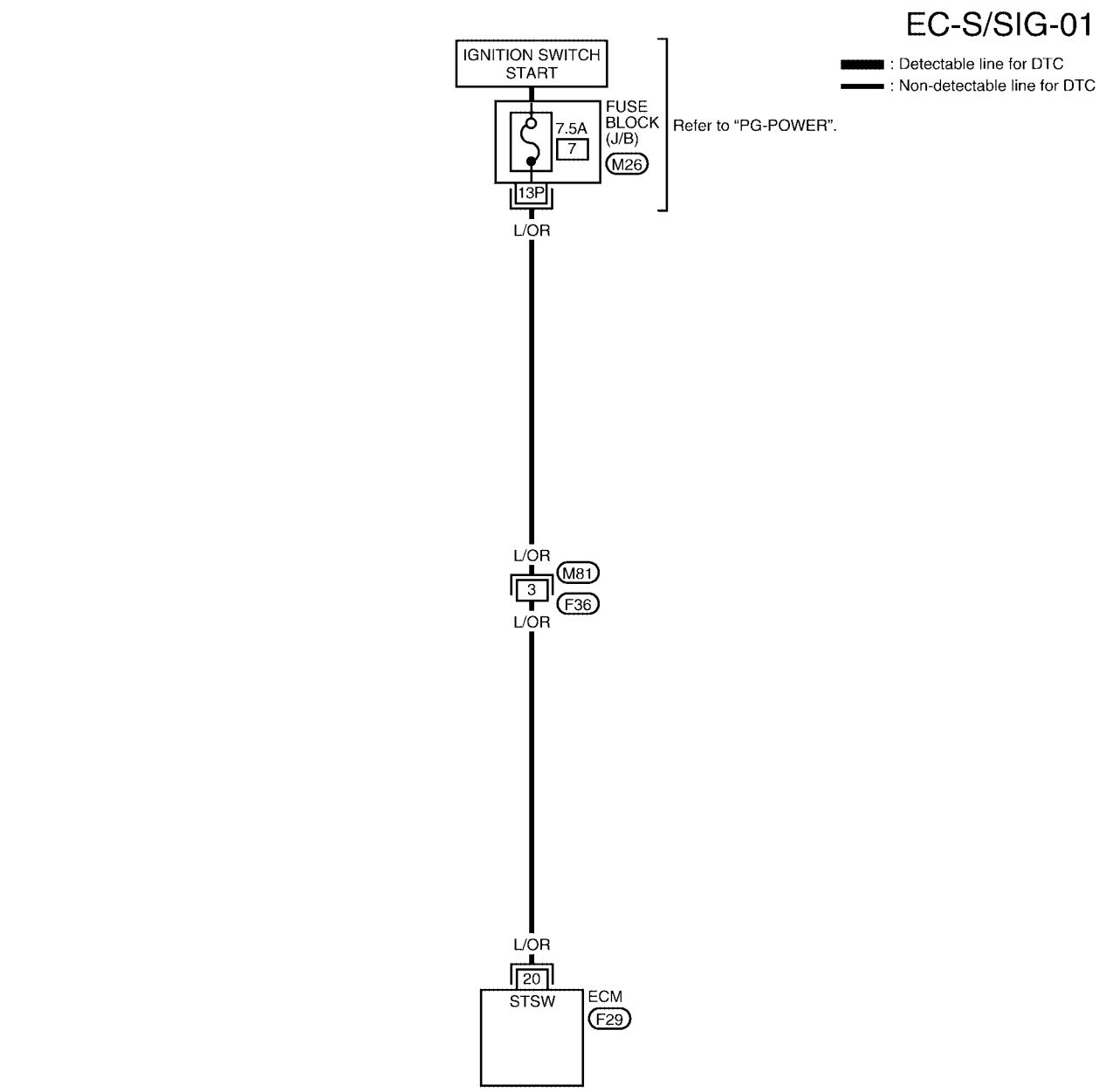
UBS00DQD

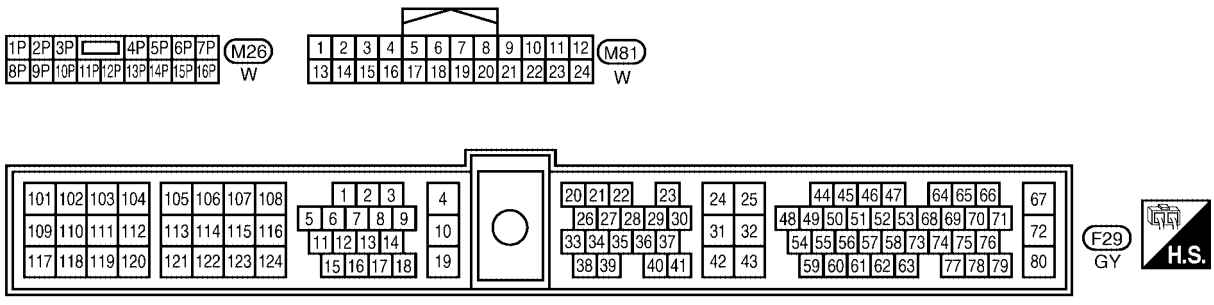
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

Wiring Diagram

UBS00DQE





BBWA1097E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	L/OR	Start signal	**[Ignition switch: ON]**	Approximately 0V
			[Ignition switch: START]	9 - 12V

Diagnostic Procedure

UBS00DQF

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

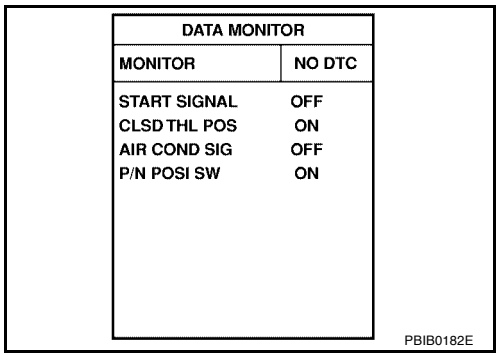
Yes >> GO TO 2.
No >> GO TO 3.

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 START	ON



OK or NG

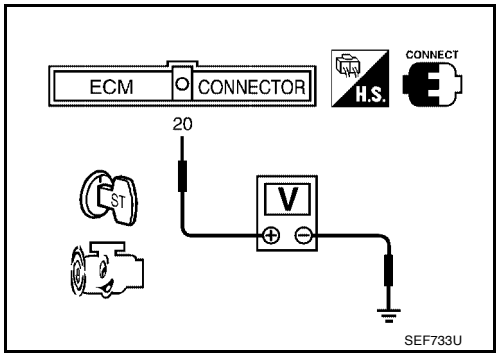
OK >> **INSPECTION END.**
NG >> GO TO 4.

3. CHECK OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 20 and ground under the following conditions.

Condition	Voltage
Ignition switch START	Battery voltage
Other positions	Approx. 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-9, "STARTING SYSTEM" .

5. CHECK FUSE

1. Turn ignition switch OFF.
2. Disconnect 7.5A fuse.
3. Check if 7.5A fuse is OK.

OK or NG

OK >> GO TO 6.
NG >> Replace 7.5A fuse.

6. CHECK START SIGNAL INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 20 and fuse block. 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 M81, F36
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

FUEL PUMP CIRCUIT

PFP:17042

Description

UBS00DQG

SYSTEM DESCRIPTION

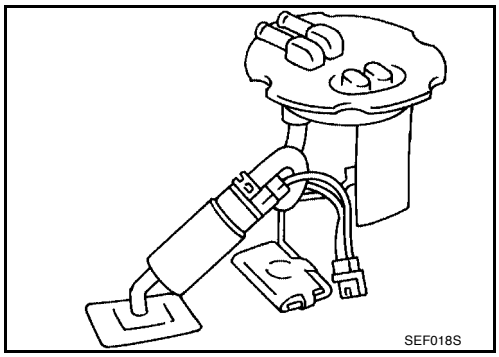
Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Fuel pump control	Fuel pump relay
Ignition switch	Start signal		

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 120° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to operate. If the 120° 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 5 seconds
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

UBS00DQH

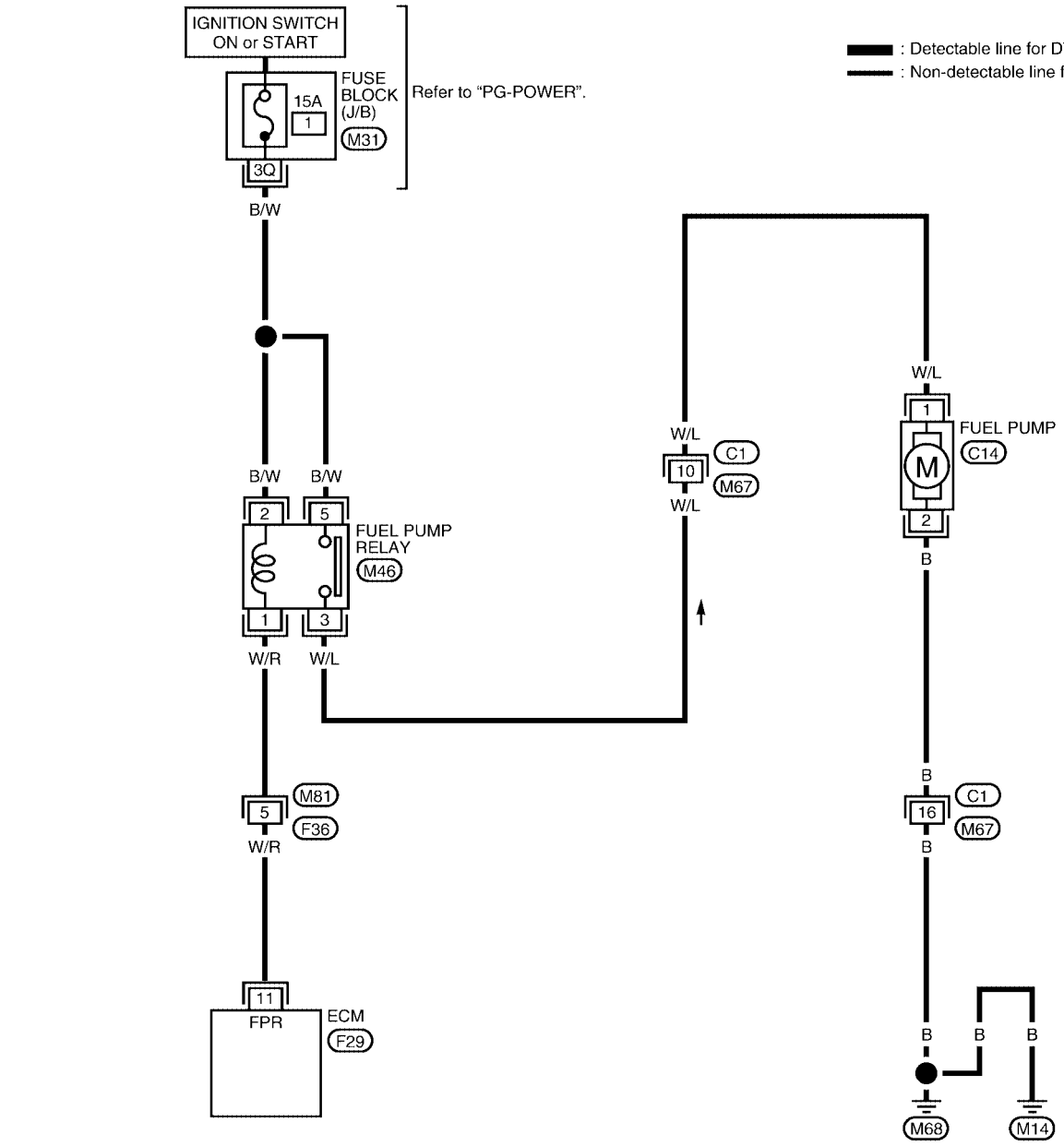
Specification data are reference values.

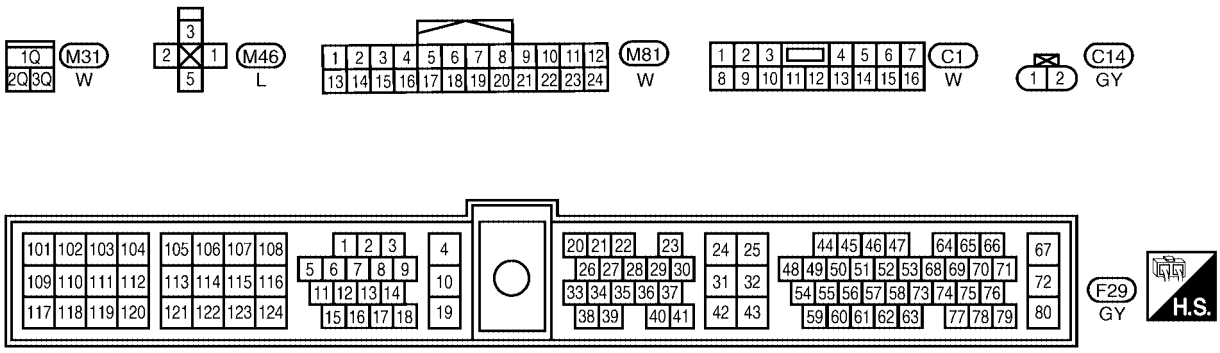
MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● Ignition switch is turned to ON. (Operates for 5 seconds.) ● Engine running or cranking	ON
	● Except as shown above	OFF

Wiring Diagram

UBS00DQI

EC-F/PUMP-01





BBWA1098E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

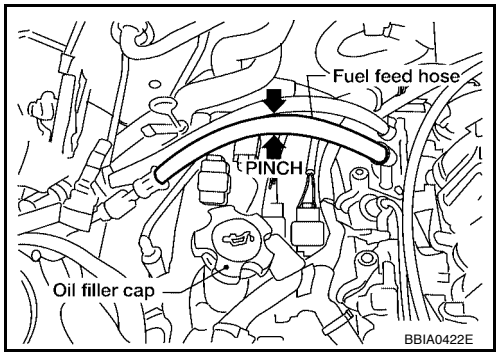
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	W/R	Fuel pump relay	**[Ignition switch: ON]** ● For a few seconds after turning ignition switch ON **[Engine is running]**	0 - 1V
			[Ignition switch: ON] ● More than a few seconds after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00DQJ

1. CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with fingers.
   Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned ON.

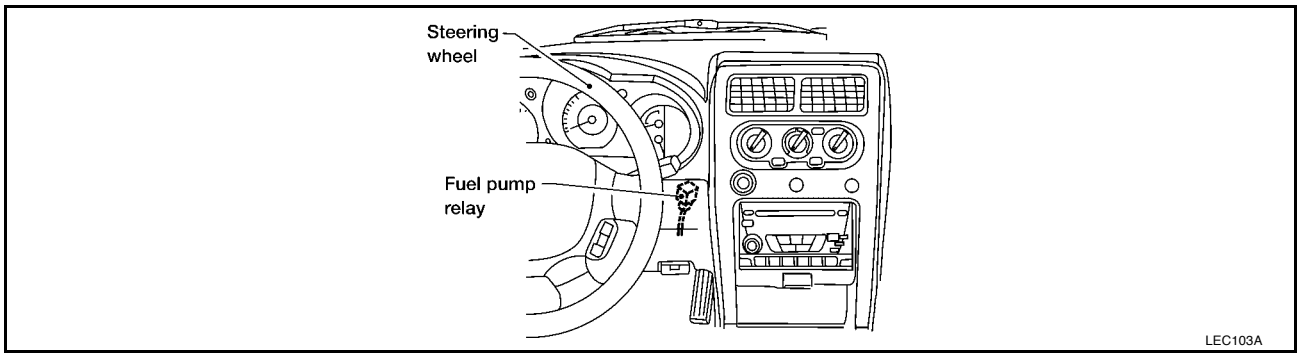


OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 2.

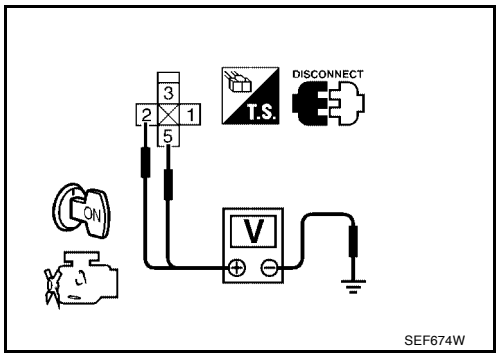
2. CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel pump relay.



3. Turn ignition switch ON.
4. Check voltage between fuel pump relay terminals 2, 5 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.

- Fuse block (J/B) connector M31
- 15A fuse
- Harness for open or short between fuse and fuel pump relay

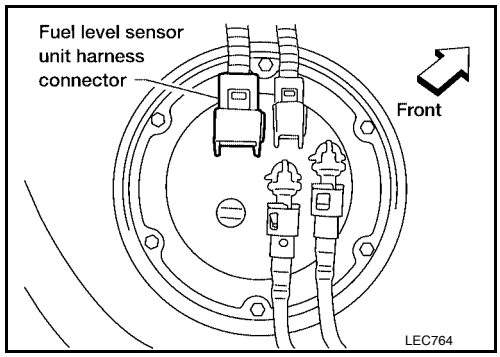
>> Repair harness or connectors.

4. CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.
3. Check harness continuity between fuel pump terminal 2 and ground, fuel pump terminal 1 and fuel pump relay terminal 3. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M67, C1
- Harness for open or short between fuel pump and ground
- Harness for open or short between fuel pump and fuel pump relay

>> 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 11 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.

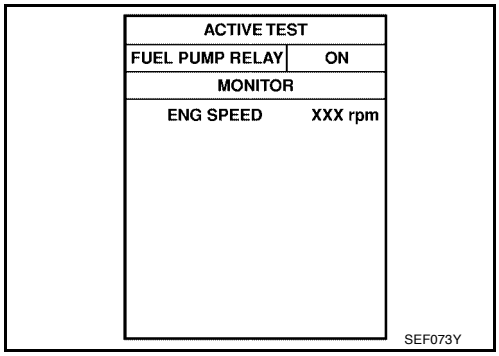
- Harness connectors M81, F36
- Harness for open or short between ECM and fuel pump relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK FUEL PUMP RELAY

With CONSULT-II

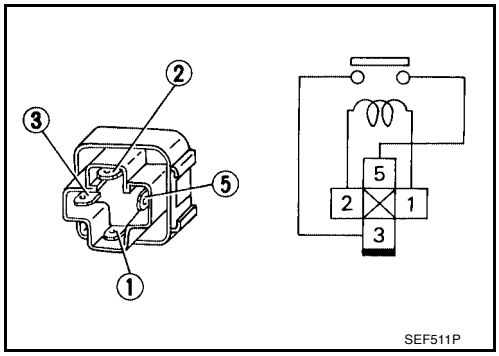
1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2. Turn ignition switch ON.
3. Turn fuel pump relay “ON” and “OFF” in “ACTIVE TEST” mode with CONSULT-II and check operating sound.



Without CONSULT-II

Check continuity between fuel pump relay terminals 3 and 5.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No



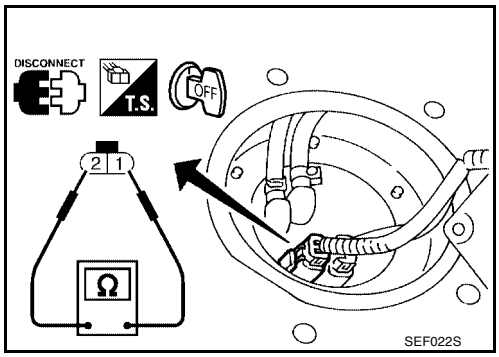
OK or NG

OK >> GO TO 9.
NG >> Replace fuel pump relay.

9. CHECK FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]



OK or NG

OK >> GO TO 10.
NG >> Replace fuel pump.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00DQK

FUEL PUMP

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

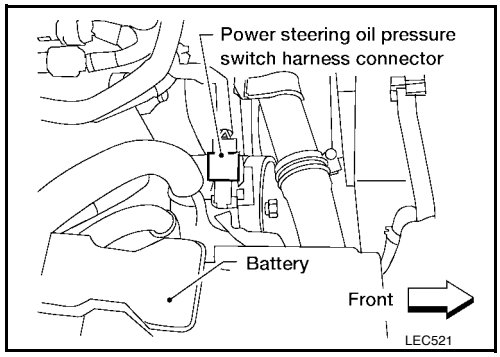
POWER STEERING OIL PRESSURE SWITCH

PFP:49761

Component Description

UBS00DQL

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load.
When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DQM

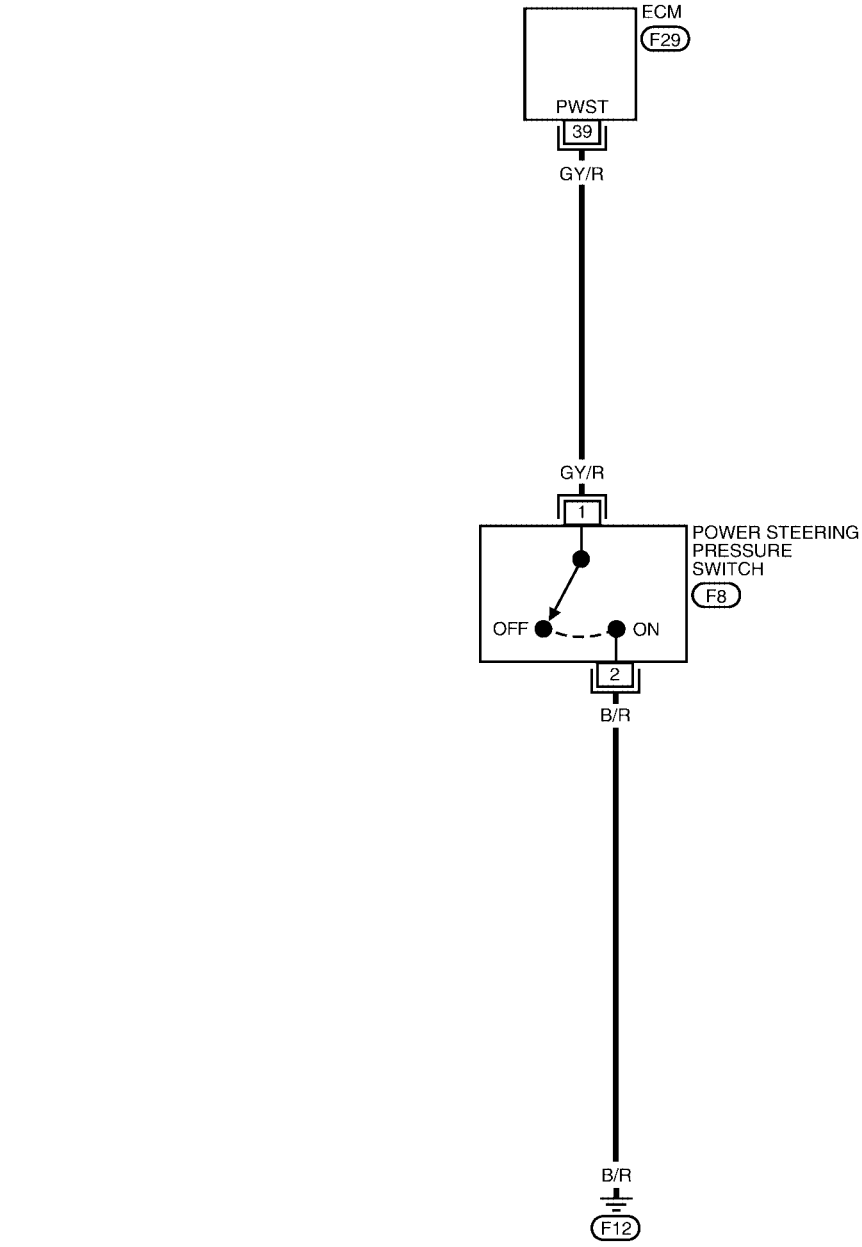
Specification data are reference values.

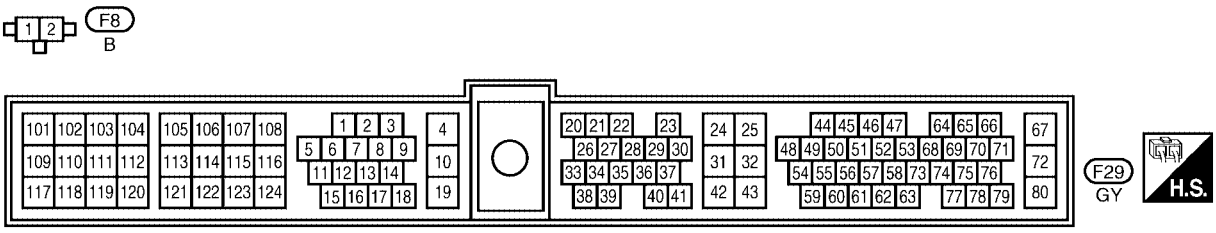
MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned.	ON

Wiring Diagram

UBS00DQN

EC-PST/SW-01





BBWA0500E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	GY/R	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being turned	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned	Approximately 5V

Diagnostic Procedure

UBS00DQO

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

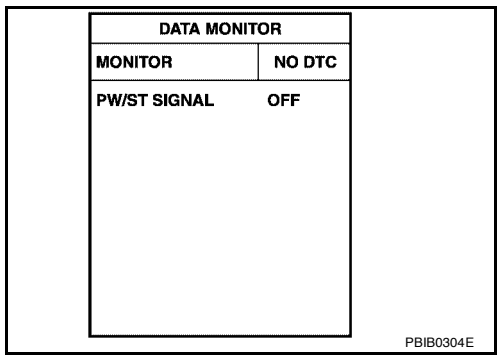
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Check “PW/ST SIGNAL” in “DATA MONITOR” mode with CONSULT-II.

Condition	PW/ST SIGNAL
Steering is in neutral position	OFF
Steering is turned	ON



OK or NG

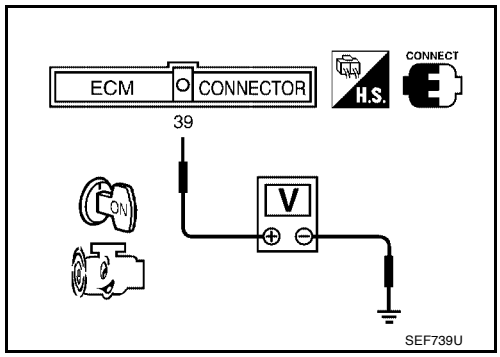
OK >> **INSPECTION END**.
NG >> GO TO 4.

3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 39 and ground.

Condition	Voltage [V]
Steering is neutral position	Approx. 5
Steering is turned to full position	Approx. 0



OK or NG

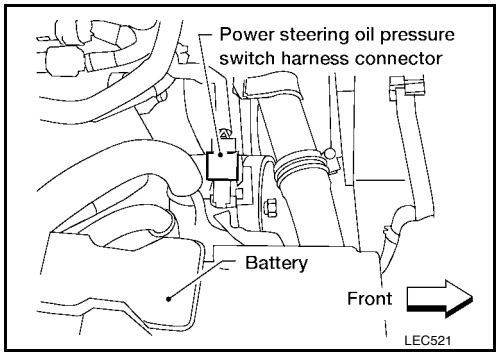
OK >> **INSPECTION END**.
NG >> GO TO 4.

4. CHECK POWER STEERING OIL PRESSURE SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect power steering oil pressure switch harness connector.
3. Check harness continuity between power steering oil pressure switch terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.



OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to power in harness or connectors.

5. CHECK POWER STEERING OIL PRESSURE SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 39 and power steering oil pressure switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

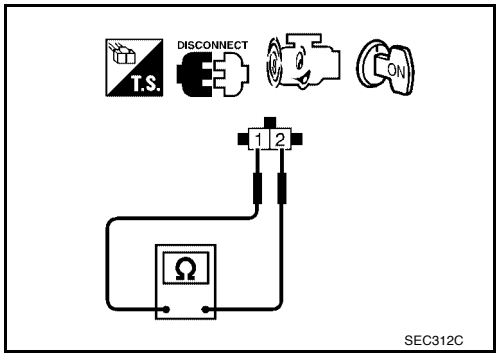
OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK POWER STEERING OIL PRESSURE SWITCH

1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between power steering oil pressure switch terminals 1 and 2.

Conditions	Continuity
Steering wheel is being fully turned	Yes
Steering wheel is not being turned	No



OK or NG

OK >> GO TO 7.
NG >> Replace power steering oil pressure switch.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

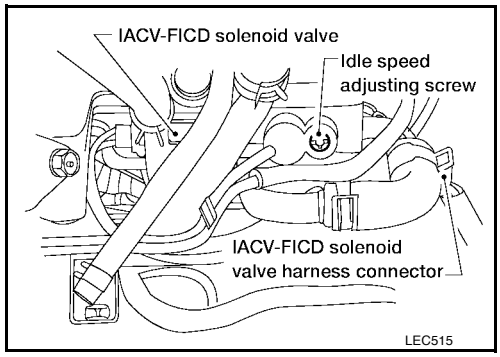
IACV-FICD SOLENOID VALVE

PFP:23781

Component Description

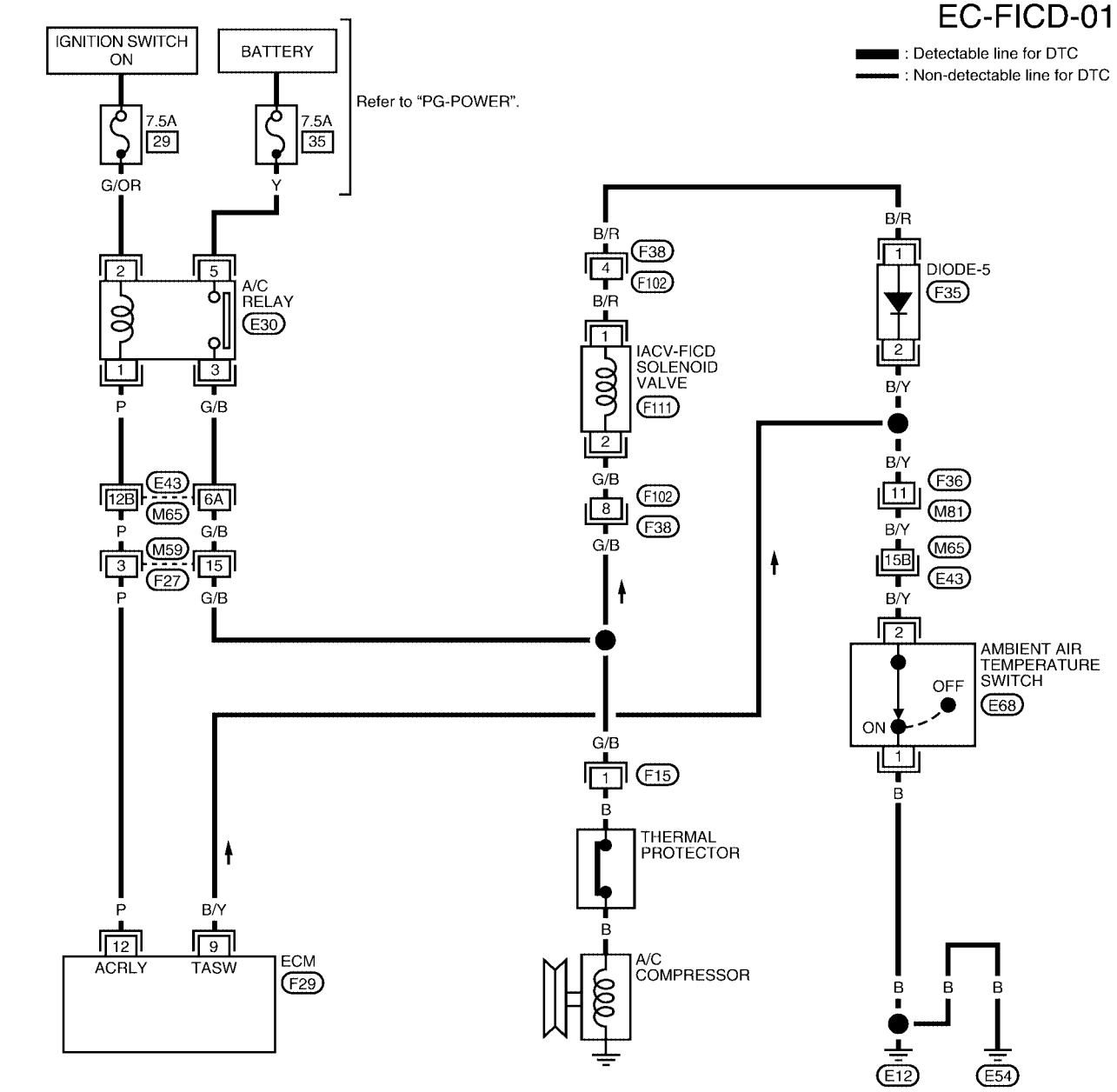
UBS00DQP

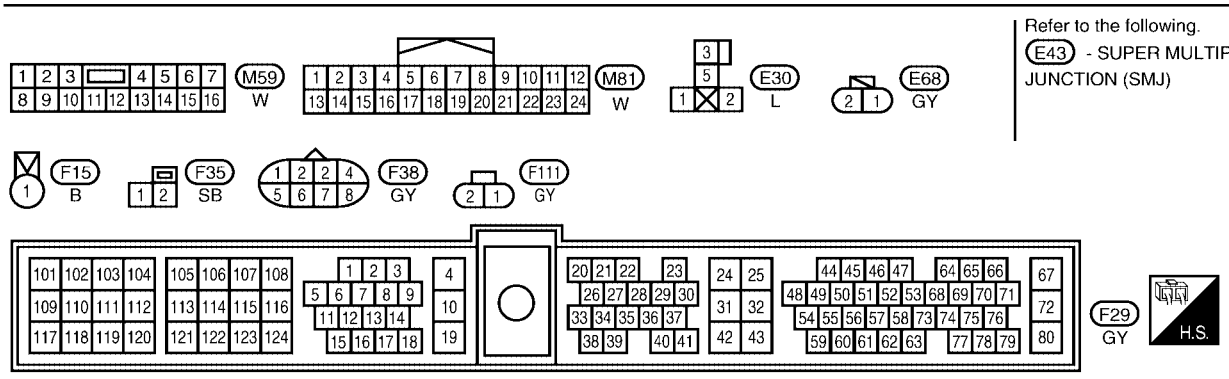
When the air conditioner is on, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load.



Wiring Diagram

UBS00DQQ





Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)

BBWA1099E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	B/Y	Ambient air temperature switch	**[Engine is running]** ● Idle speed ● Ambient air temperature is above 25°C (77°F) ● Air conditioner is operating	0V
			[Engine is running] ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is not operating	Approximately 5V
12	P	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are ON*	0 - 1V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)

*: Any mode except OFF, ambient air temperature is above 25°C (77°F).

Diagnostic Procedure

UBS00DQR

1. CHECK OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

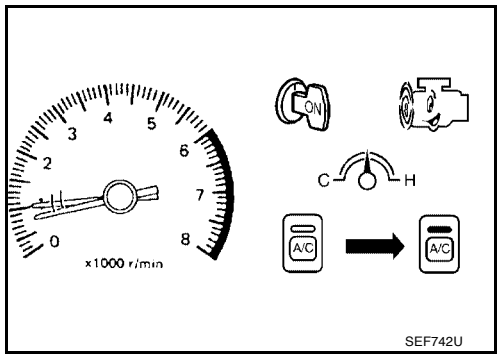
   M/T: 750±50 rpm (in Neutral position)

   A/T: 750±50 rpm (in P or N position)

   If NG, adjust idle speed.
3. Turn air conditioner switch and blower fan switch ON.
4. Recheck idle speed.

   M/T: 850 rpm or more (in Neutral position)

   A/T: 850 rpm or more (in P or N position)



SEF742U

OK or NG

OK >> **INSPECTION END**.

NG >> GO TO 2.

2. CHECK AIR CONDITIONER FUNCTION

Check if air conditioner compressor functions normally.

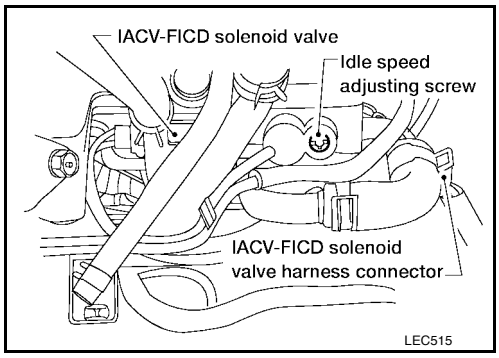
OK or NG

OK >> GO TO 3.

NG >> Refer to MTC-22, "Symptom Table" .

3. CHECK IACV-FICD SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn air conditioner switch and blower fan switch OFF.
2. Stop engine.
3. Disconnect IACV-FICD solenoid valve harness connector.
4. Start engine, then turn air conditioner switch and blower fan switch ON.

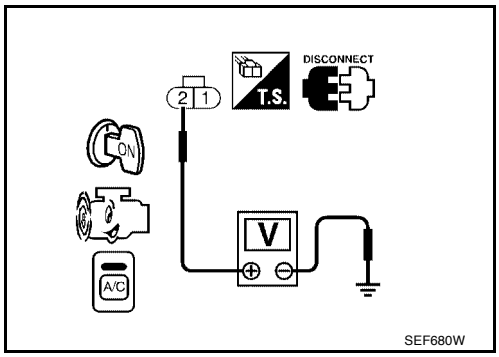


5. Check voltage between IACV-FICD solenoid valve terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F38, F102
- Harness connectors E43, M65
- Harness connectors M59, F27
- Harness for open or short between IACV-FICD solenoid valve and A/C relay

>> Repair harness or connectors.

5. CHECK IACV-FICD SOLENOID VALVE GROUND CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ambient air temperature switch harness connector.
3. Check harness continuity between ambient air temperature switch terminal 1 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to power in harness or connectors.

6. CHECK IACV-FICD SOLENOID VALVE GROUND CIRCUIT-II

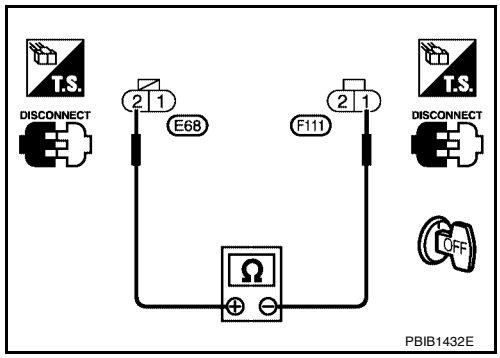
1. Check harness continuity between ambient air temperature switch terminal 2 and IACV-FICD solenoid valve terminal 1.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

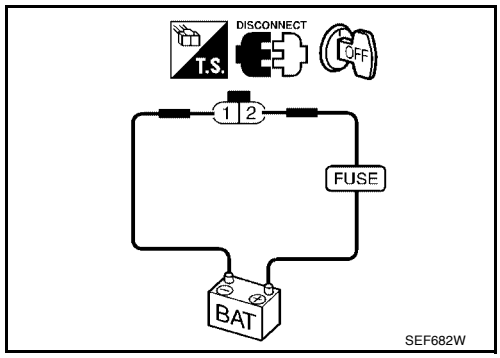
Check the following.

- Harness connectors F38, F102
- Harness connectors F36, M81
- Harness connectors M65, E43
- Diode-5
- Harness for open or short between IACV-FICD solenoid valve and ambient air temperature switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK IACV-FICD SOLENOID VALVE

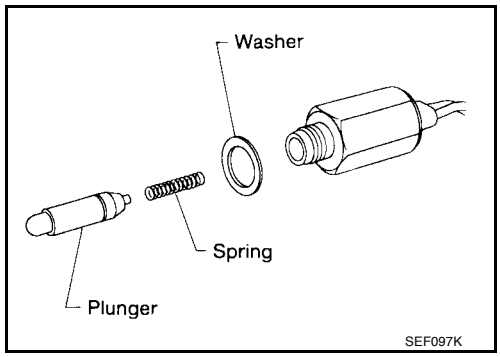
1. Disconnect IACV-FICD solenoid valve harness connector.
2. Check for clicking sound when applying 12V direct current to terminals.
3. Check plunger for seizing or sticking.



4. Check for broken spring.

OK or NG

OK >> GO TO 9.
NG >> Replace IACV-FICD solenoid valve.



9. CHECK INTERMITTENT INCIDENT

Refer to EC-703, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

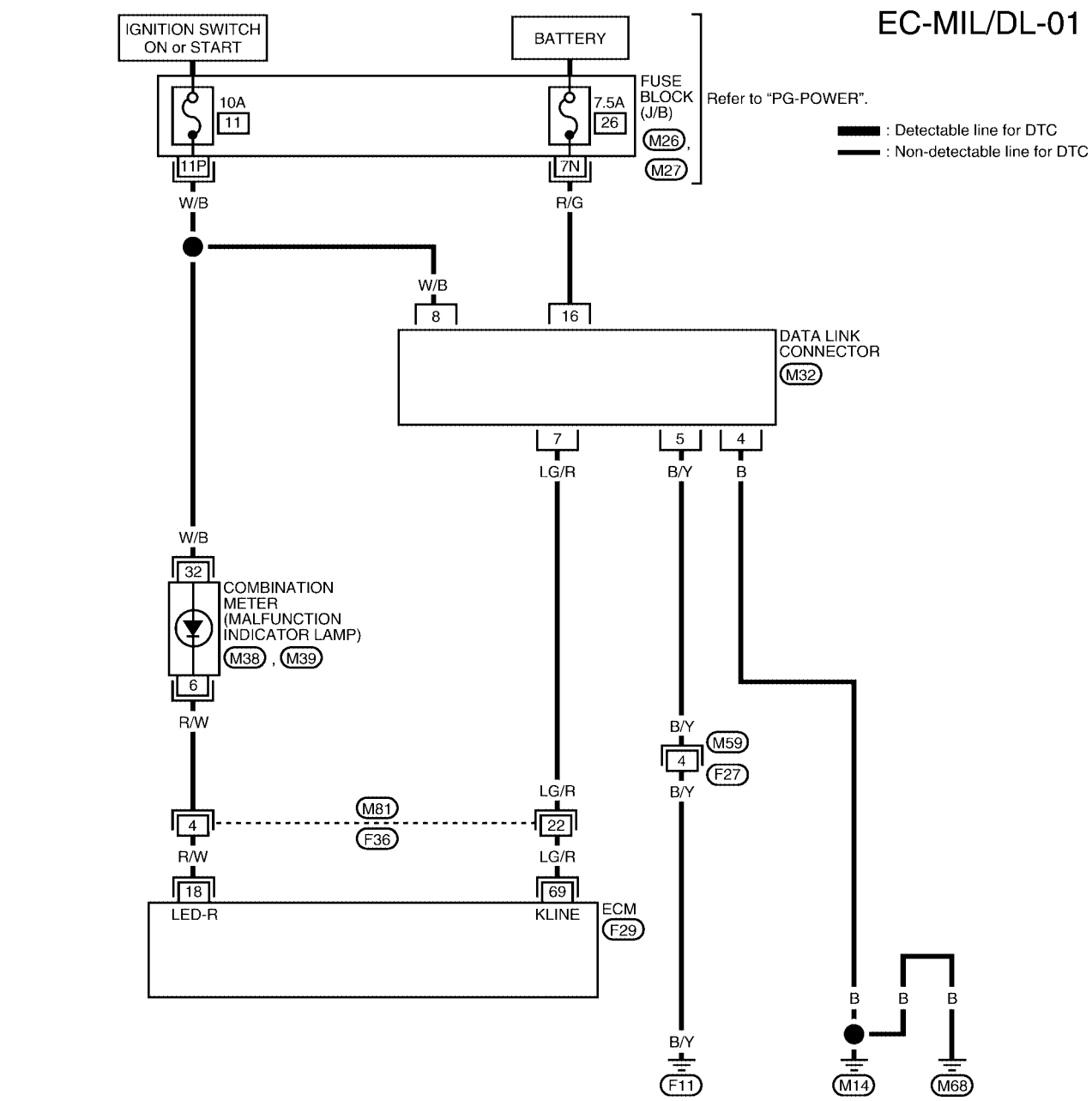
>> **INSPECTION END**.

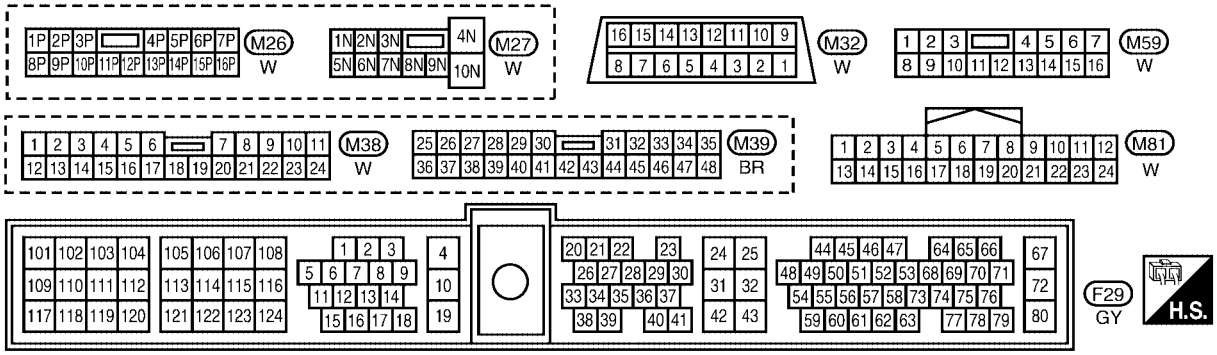
MIL AND DATA LINK CONNECTOR

PFP:24814

Wiring Diagram

UBS00DQS





BBWA1100E

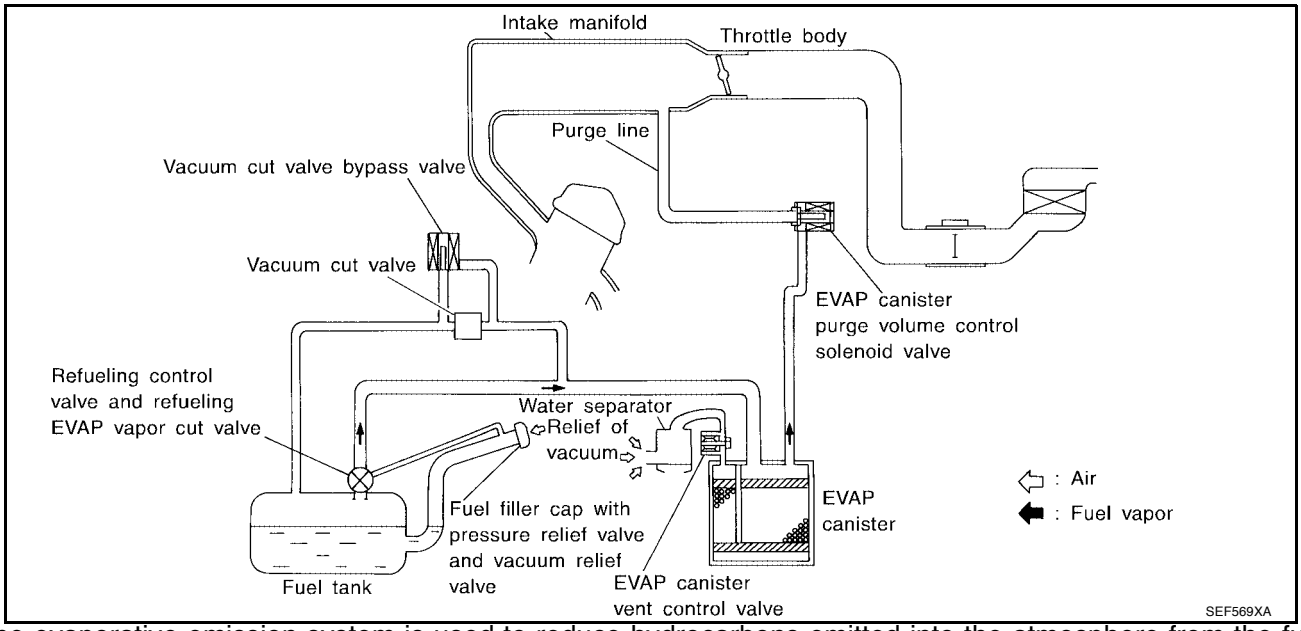
EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description

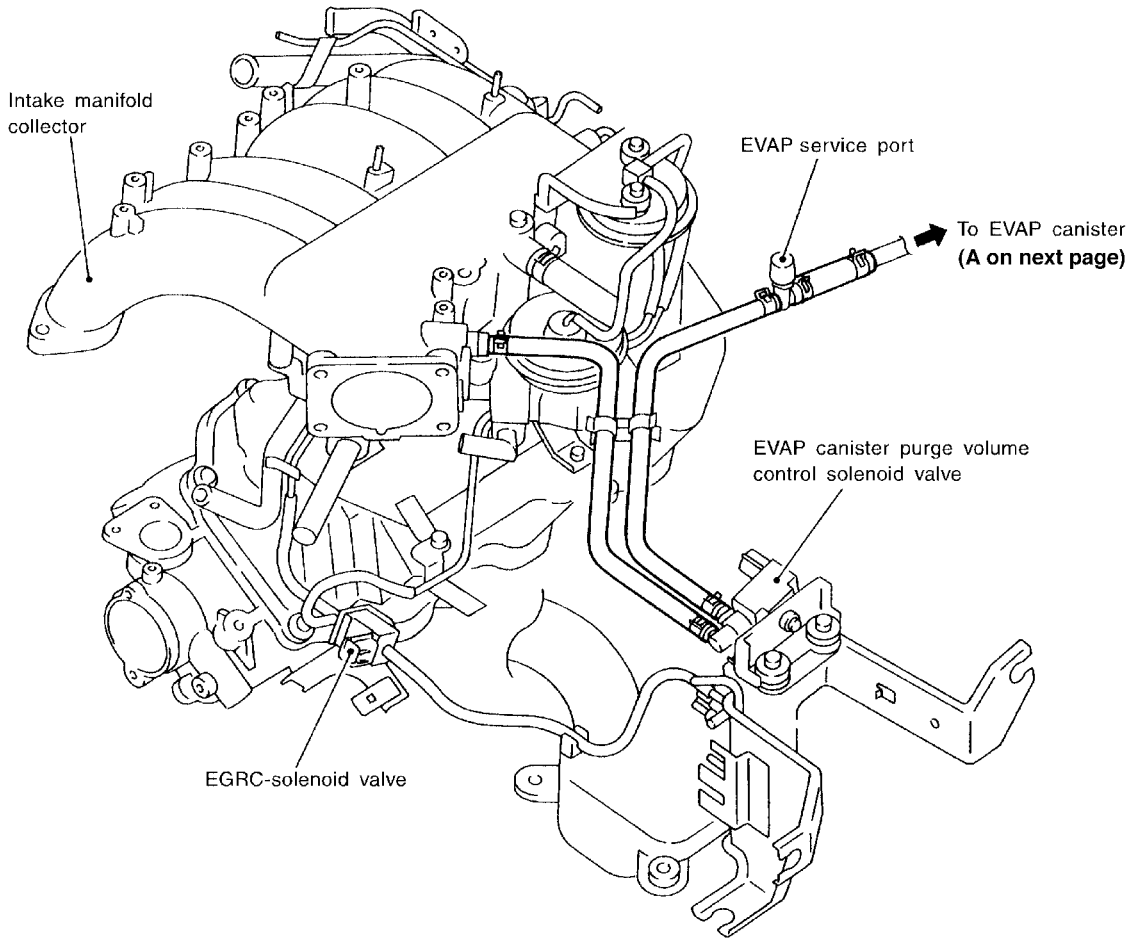
UBS00DQT

SYSTEM DESCRIPTION



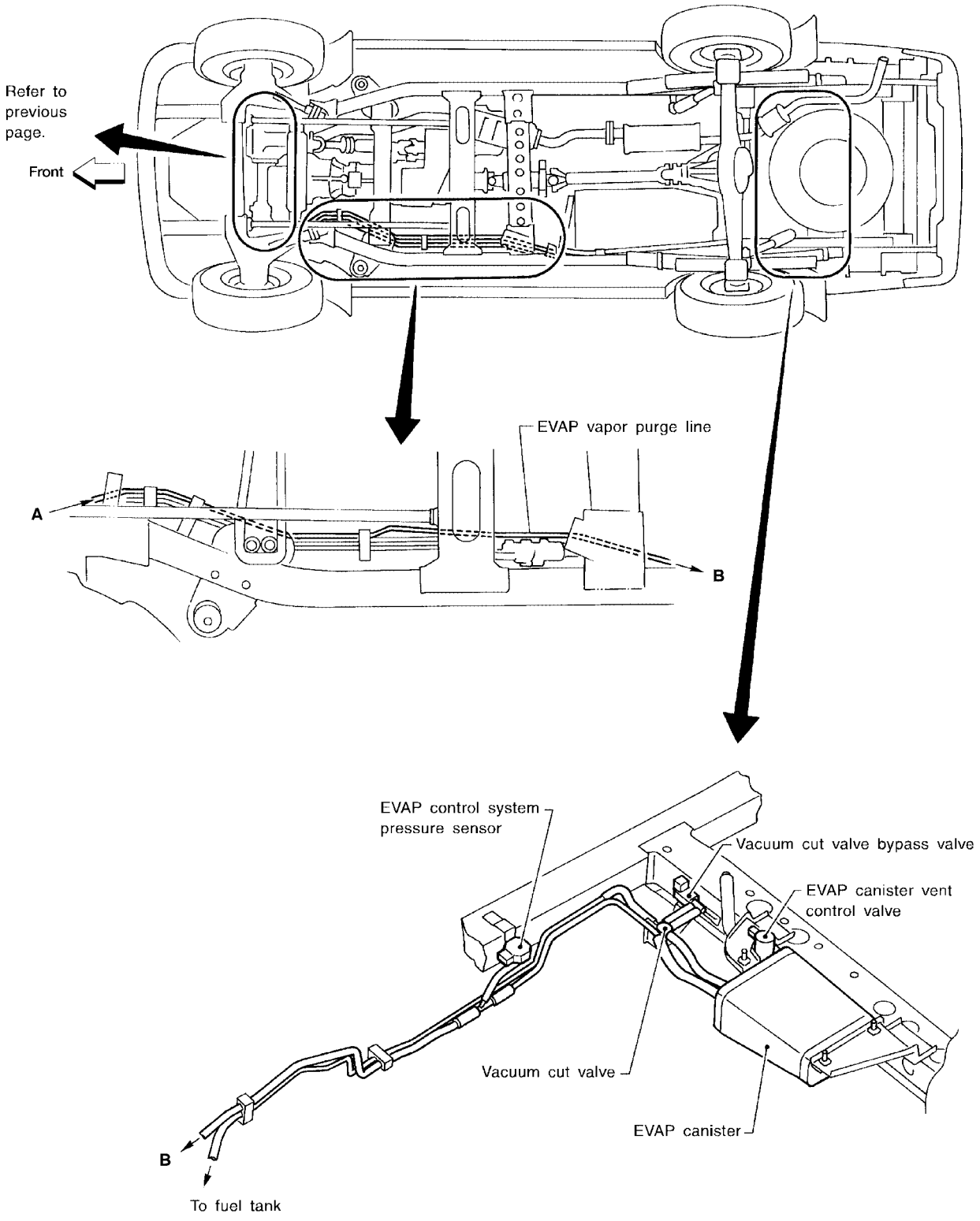
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon 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.

BBIA0184E


Refer to previous page.
Front
EVAP vapor purge line
A
B
EVAP control system pressure sensor
Vacuum cut valve bypass valve
EVAP canister vent control valve
Vacuum cut valve
EVAP canister
B
To fuel tank

AEC886A

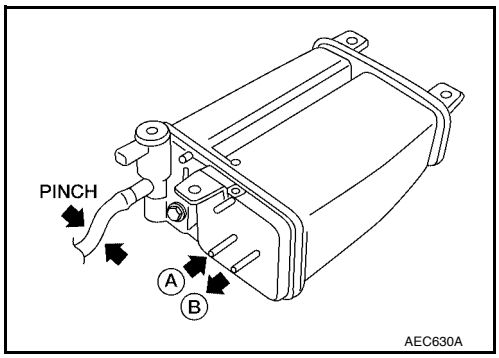
Component Inspection

UBS00DQU

EVAP CANISTER

Check EVAP canister as follows:

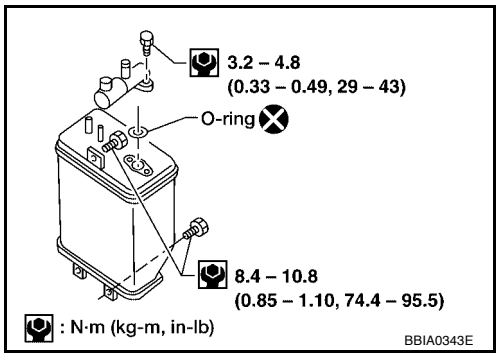
1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B** .



Tightening Torque

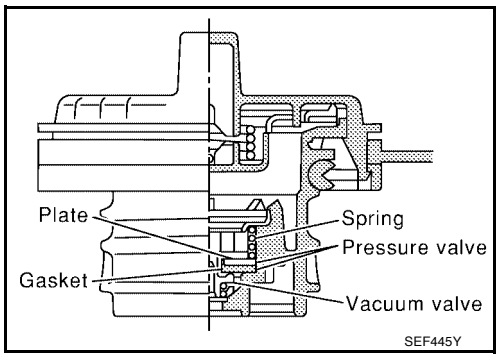
Tighten EVAP canister as shown in the figure.

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.

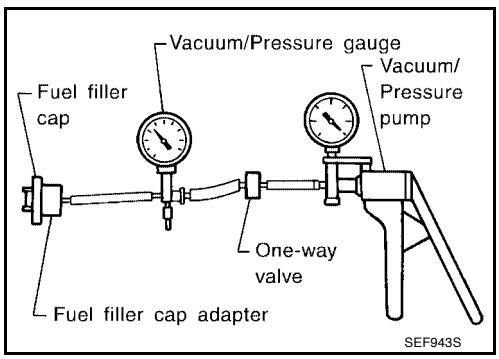


2. Check valve opening pressure and vacuum.

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:

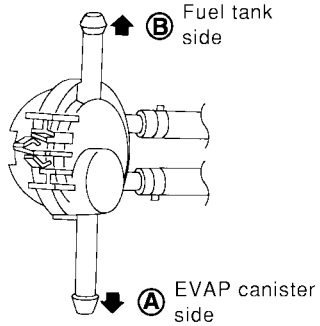
Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come ON

VACUUM CUT VALVE AND VACUUM CUT VALVE BYPASS VALVE

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.

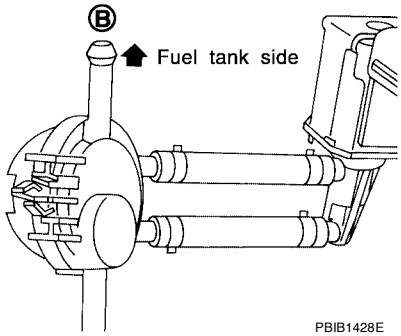


ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

SEF017Z

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.



PBIB1428E

EVAPORATIVE EMISSION (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.
   If OK, inspection end. If NG, go to following step.

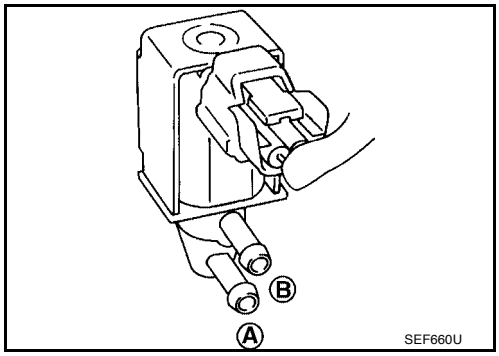
ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No

If NG, replace the EVAP canister purge volume control solenoid valve.

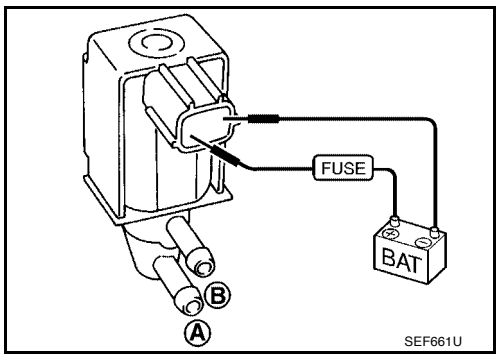


Without CONSULT-II

1. Check air passage continuity.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

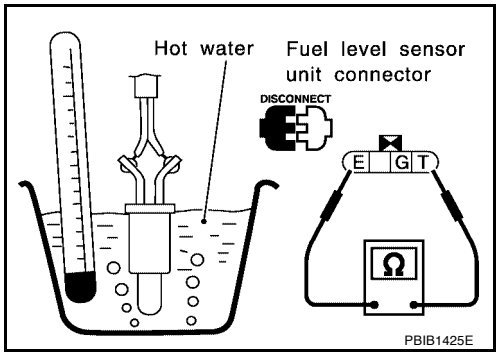
2. If NG, replace the EVAP canister purge volume control solenoid valve.



FUEL TANK TEMPERATURE SENSOR

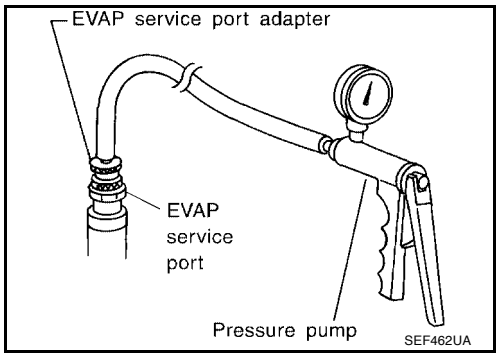
1. Remove fuel level sensor unit.
2. Check resistance fuel level sensor unit terminals T and E by heating with hot water or heat gun as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90



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

UBS00DQV

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.**

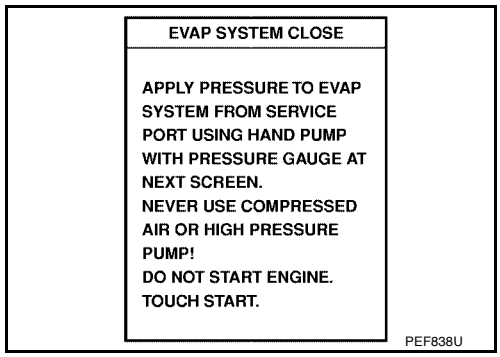
NOTE:

- Do not start engine.

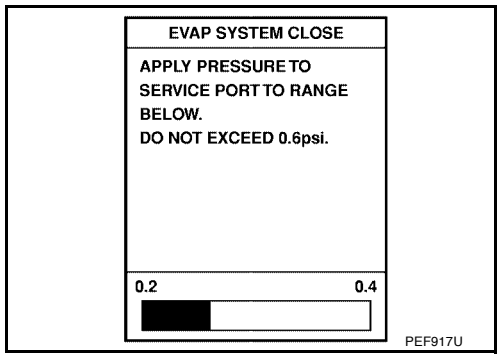
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

WITH CONSULT-II

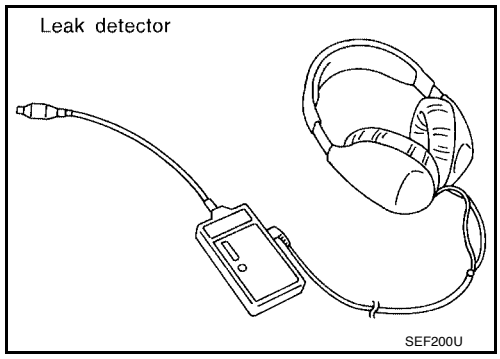
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose to the EVAP service port adapter.
3. Turn ignition switch ON.
4. Select the “EVAP SYSTEM CLOSE” of “WORK SUPPORT MODE” with CONSULT-II.
5. Touch “START”. A bar graph (Pressure indicating 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.

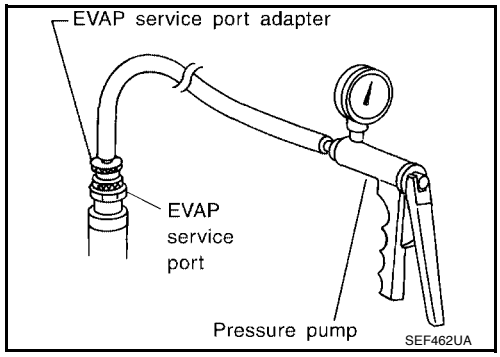


8. Locate the leak using a leak detector. Refer to EC-1174, "EVAPORATIVE EMISSION LINE DRAWING" .

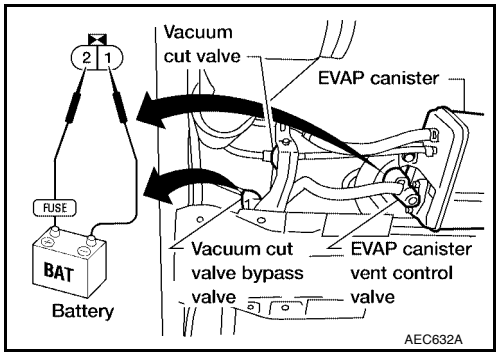


WITHOUT CONSULT-II

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 EC-1174, "EVAPORATIVE EMISSION LINE DRAWING" .

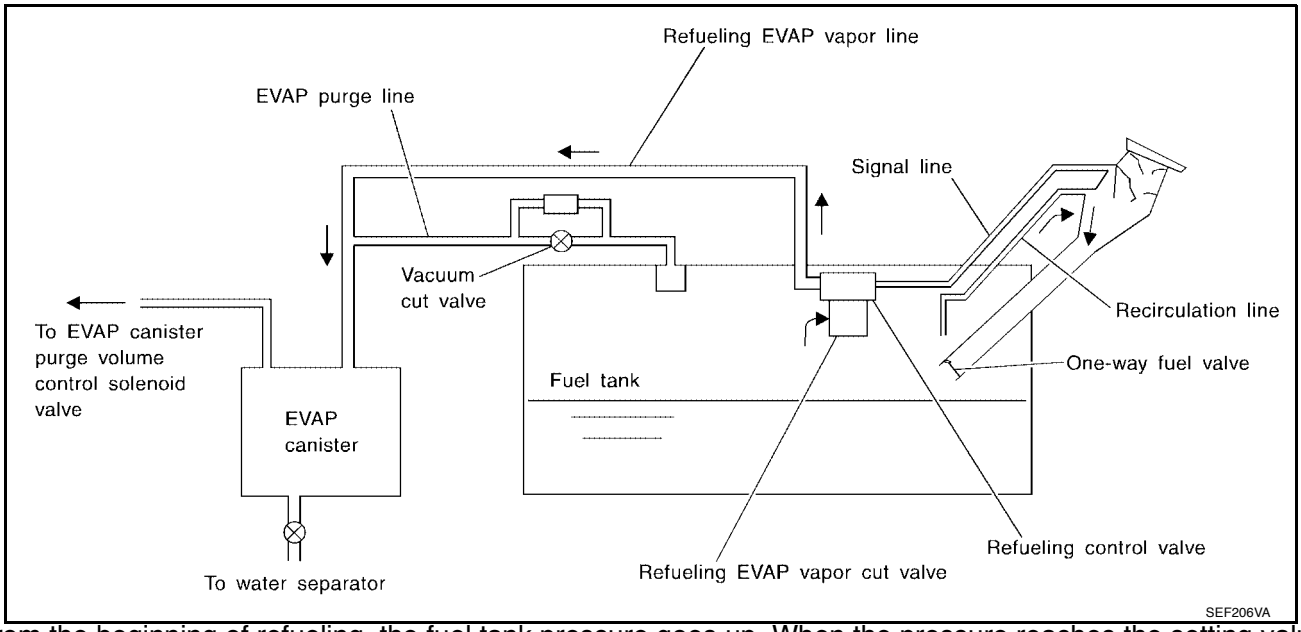


ON BOARD REFUELING VAPOR RECOVERY (ORVR)

PFP:00032

System Description

UBS00DQW



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 EC-622, "FUEL PRESSURE RELEASE" .**
  - **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

UBS00DQX

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

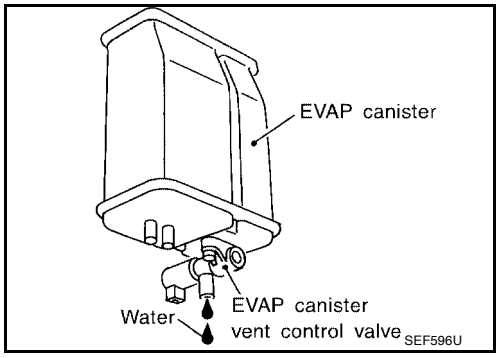
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

- Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No (With CONSULT-II)>>GO TO 6.
No (Without CONSULT-II)>>GO TO 7.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. CHECK WATER SEPARATOR

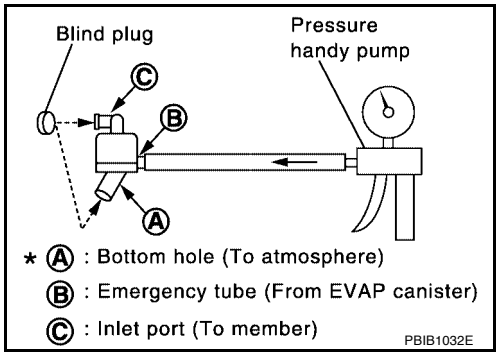
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

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

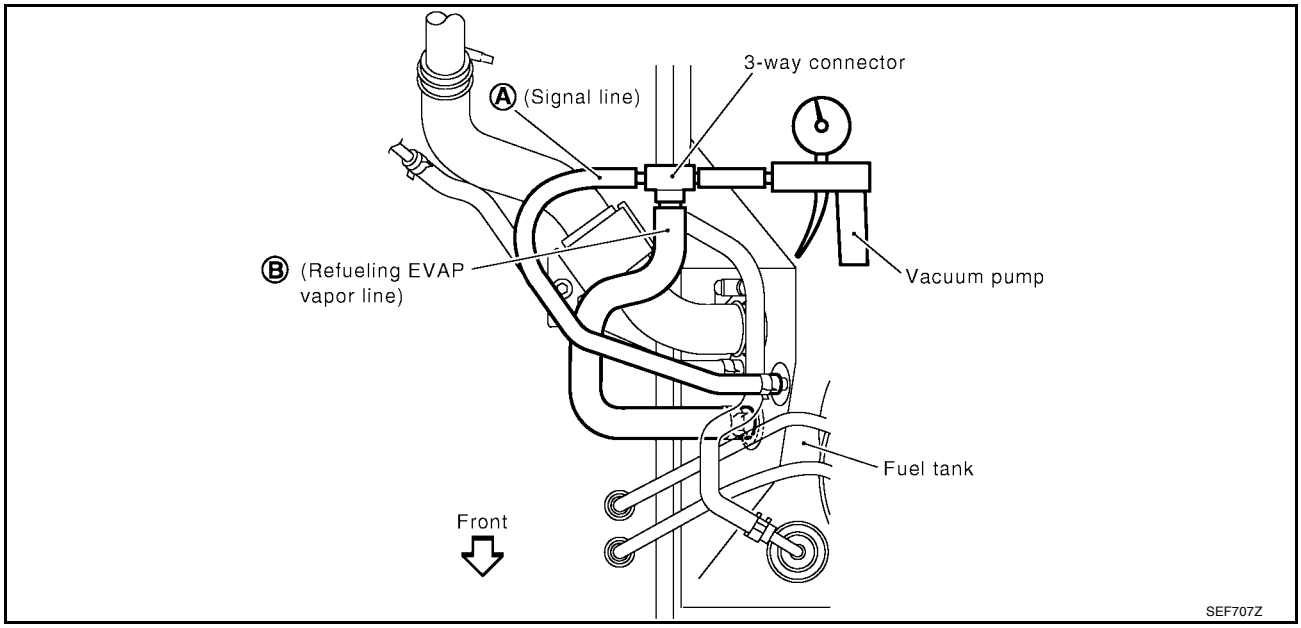
With CONSULT-II

1. Remove fuel tank. Refer to FL-3, "FUEL TANK" .
2. Drain fuel from the tank as follows:

- Remove fuel feed hose located on the fuel level sensor unit retainer.
- Connect a spare fuel hose, one side to fuel level sensor unit retainer where the hose was removed and the other side to a fuel container.
- 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.

- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel level sensor unit retainer with fuel level sensor unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



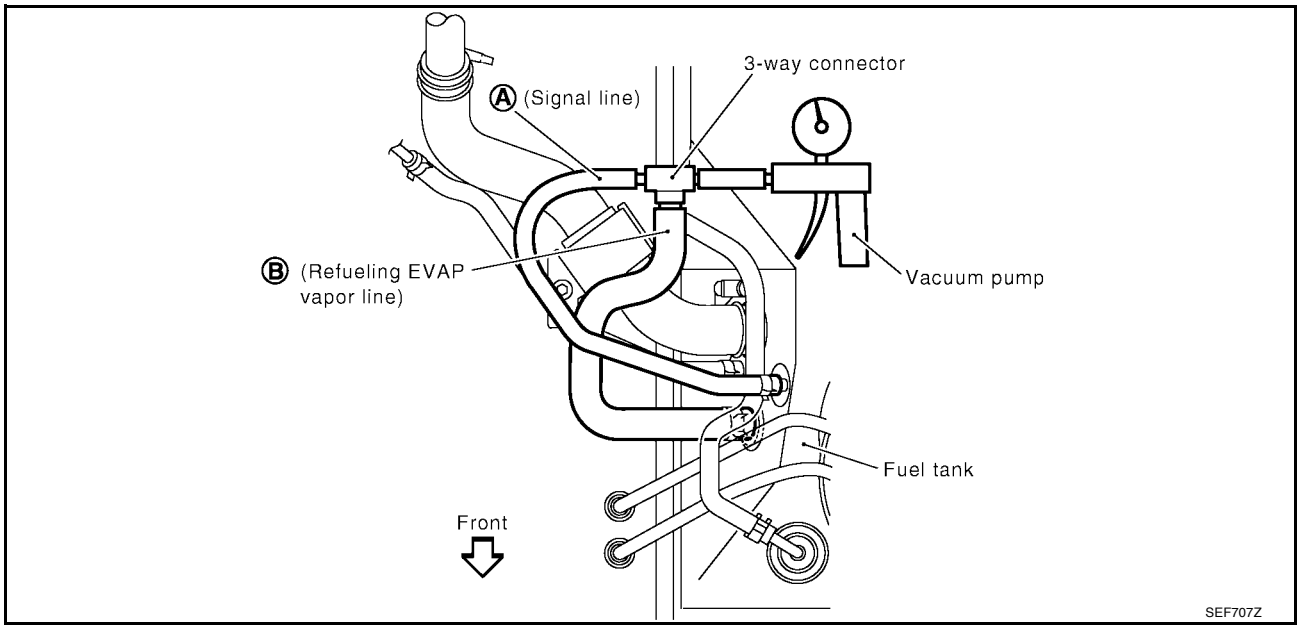
OK or NG

OK >> GO TO 8.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

7. CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT-II

1. Remove fuel tank. Refer to FL-3, "FUEL TANK" .
2. Drain fuel from the tank as follows:
- Remove fuel level sensor unit retainer.
- 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.
- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel level sensor unit retainer with fuel level sensor unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.

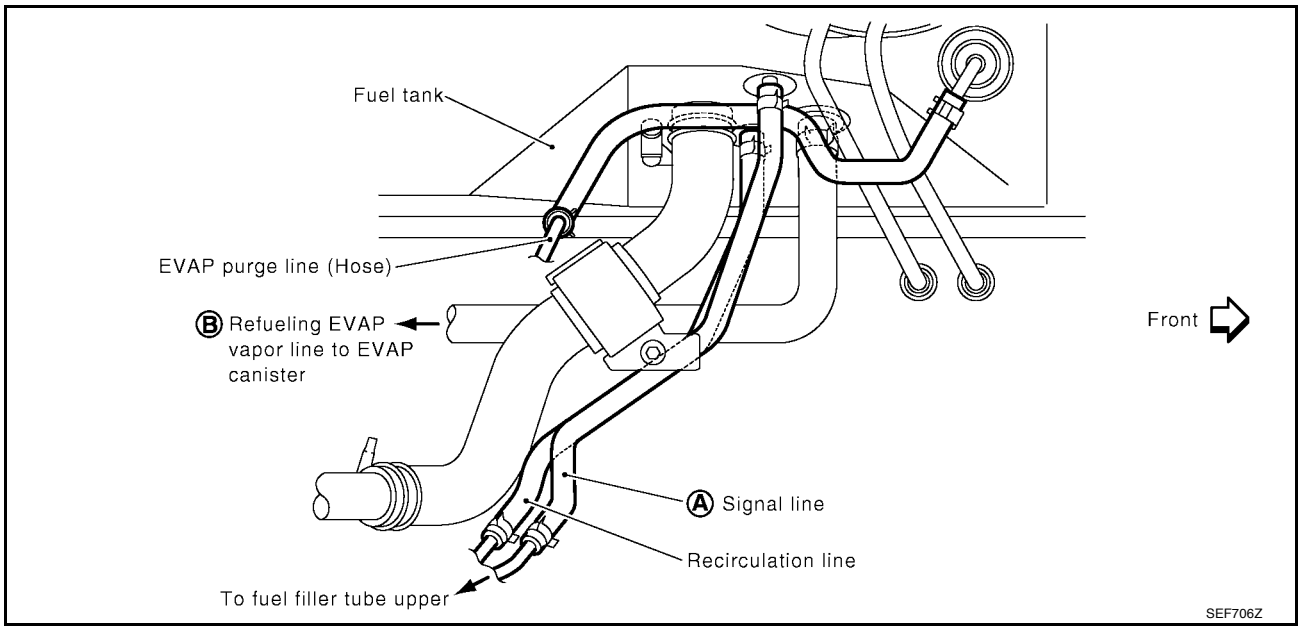


OK or NG

OK >> GO TO 8.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

8. CHECK 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.



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

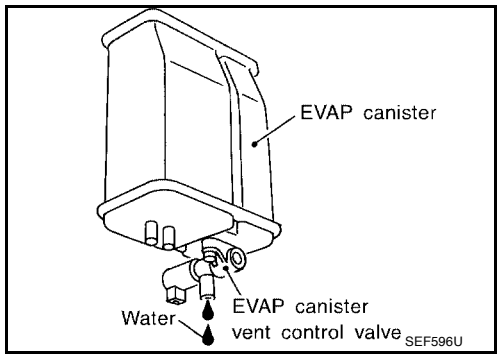
OK >> GO TO 2.
NG >> GO TO 3.

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

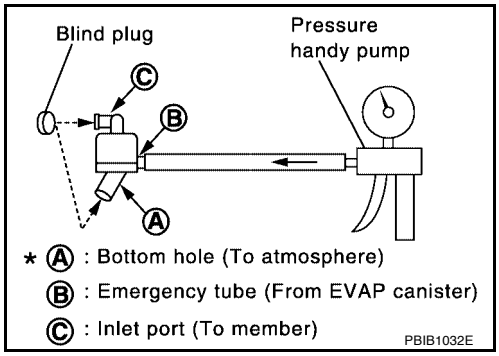
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

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

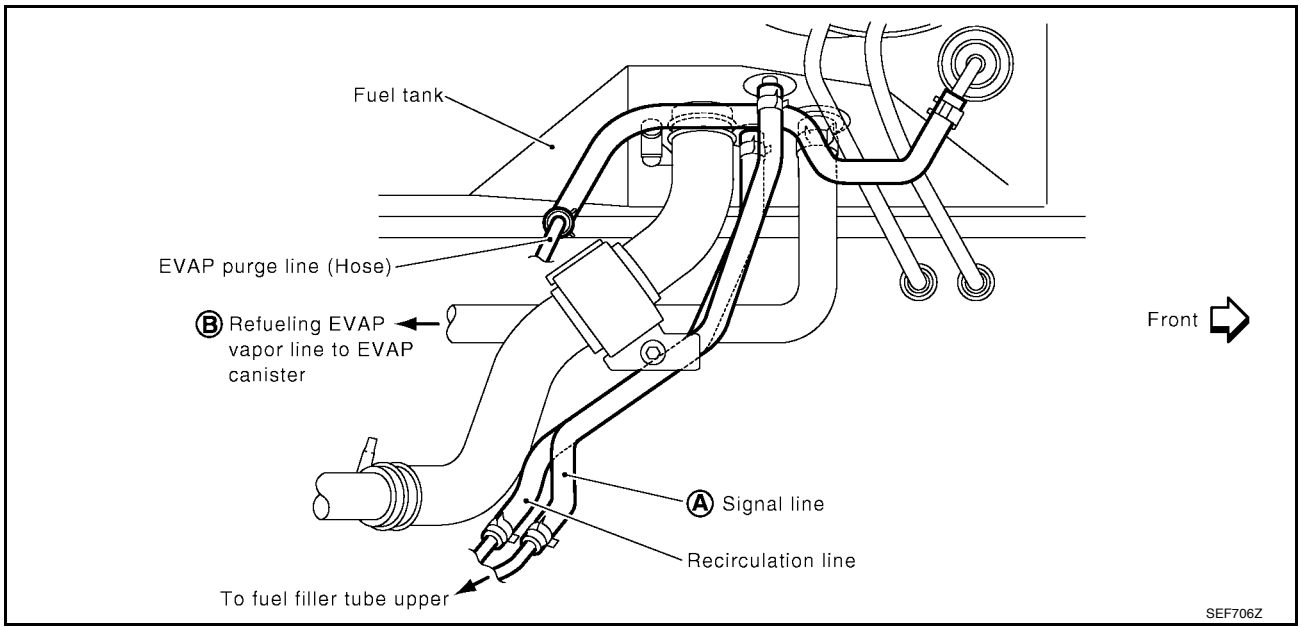
Check signal line and recirculation line for clogging, dents and cracks.

OK or NG

OK >> GO TO 8.
NG >> Replace filler neck tube.

8. CHECK REFUELING CONTROL VALVE

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.



OK or NG

OK (With CONSULT-II)>>GO TO 9.
OK (Without CONSULT-II)>>GO TO 10.
NG >> Replace refueling control valve with fuel tank.

9. CHECK REFUELING EVAP VAPOR CUT VALVE

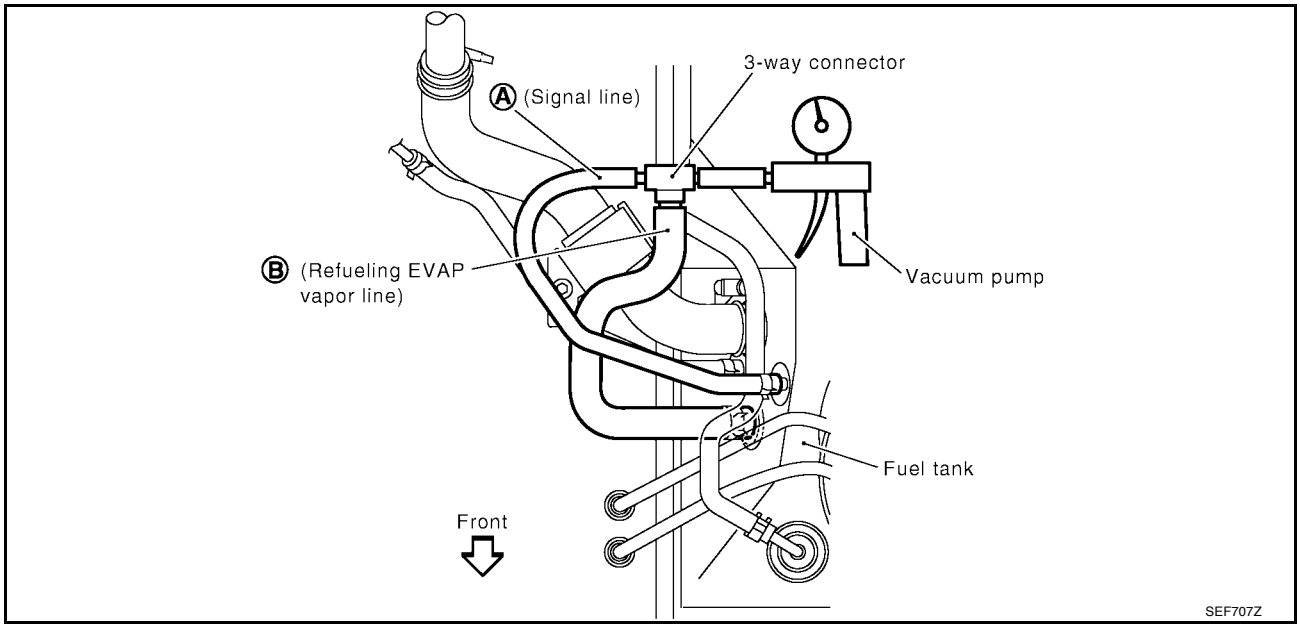
With CONSULT-II

1. Remove fuel tank. Refer to FL-3, "FUEL TANK" .
2. Drain fuel from the tank as follows:

- Remove fuel feed hose located on the fuel level sensor unit retainer.
- Connect a spare fuel hose, one side to fuel level sensor unit retainer where the hose was removed and the other side to a fuel container.
- 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.

- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel level sensor unit retainer with fuel level sensor unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



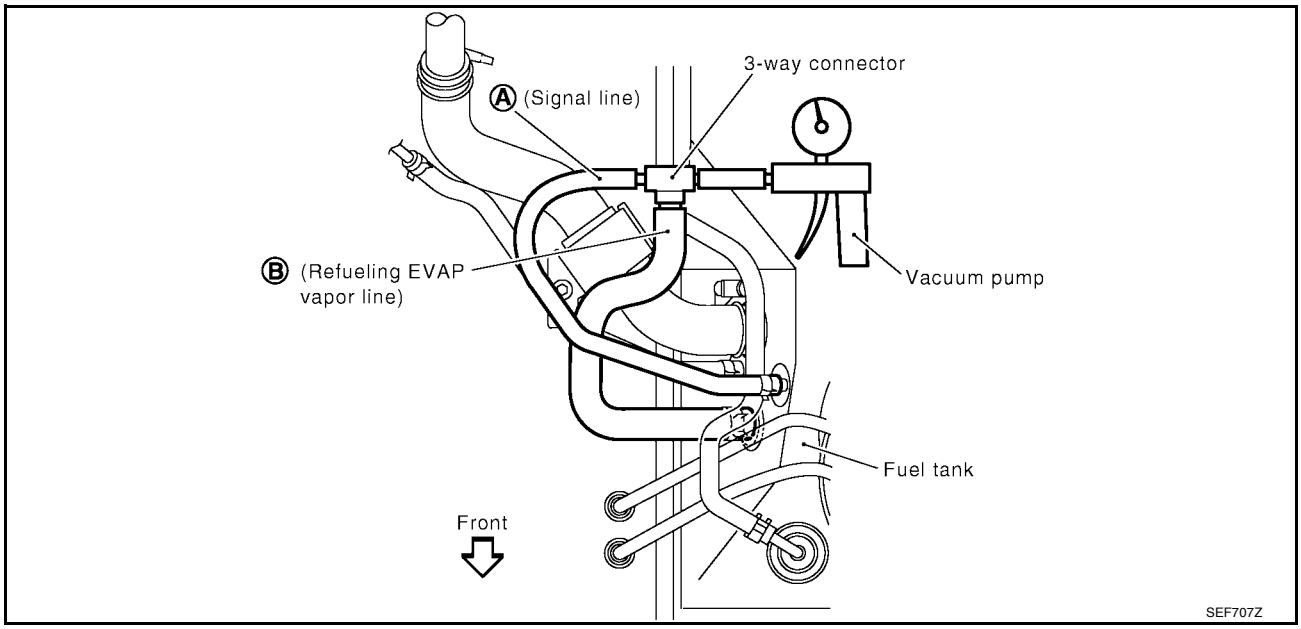
OK or NG

OK >> GO TO 11.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

10. CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT-II

1. Remove fuel tank. Refer to FL-3, "FUEL TANK" .
2. Drain fuel from the tank as follows:
- Remove fuel level sensor unit retainer.
- 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.
- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel level sensor unit retainer with fuel level sensor unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



OK or NG

OK >> GO TO 11.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

11. 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 12.
NG >> Replace fuel filler tube.

12. CHECK ONE-WAY FUEL VALVE-I

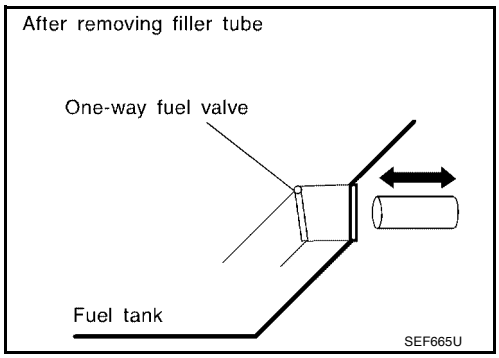
Check one-way valve for clogging.

OK or NG

OK >> GO TO 13.
NG >> Repair or replace one-way fuel valve with fuel tank.

13. 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.

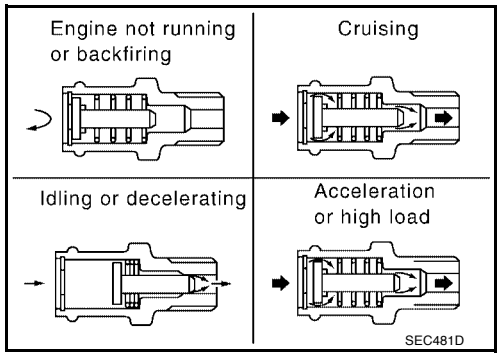
POSITIVE CRANKCASE VENTILATION

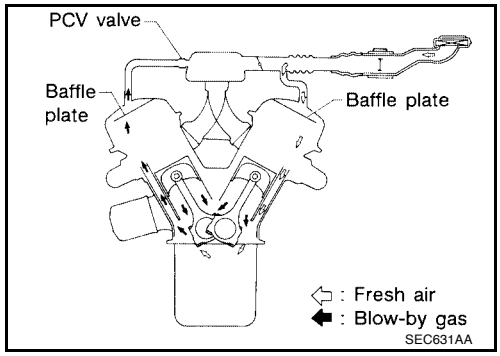
PFP:11810

Description

UBS00DQY

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.
This system returns blow-by gas to the intake manifold.



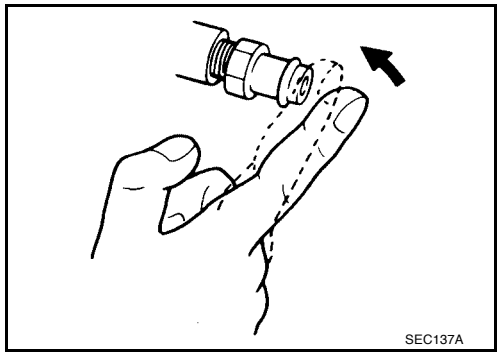


Component Inspection

UBS00DQZ

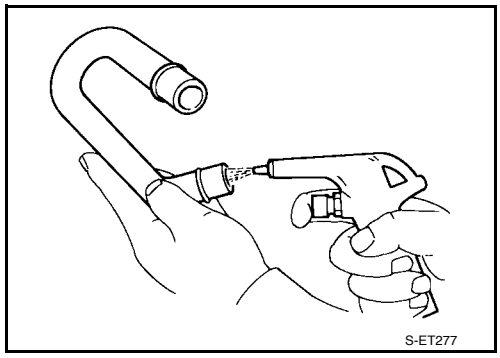
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

With engine running at idle, remove PCV valve from rocker cover; 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

UBS00DR0

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

UBS00DR1

Base idle speed*1	A/T	No load*4 (in P or N position)	700±50 rpm
	M/T	No load*4 (in Neutral position)	
Target idle speed*2	A/T	No-load*4 (in P or N position)	750±50 rpm
	M/T	No load*4 (in Neutral position)	
Air conditioner: ON	A/T	In P or N position	850 rpm or more
	M/T	In Neutral position	
Ignition timing*3	A/T	In P or N position	10±5° BTDC
	M/T	In Neutral position	
Throttle position sensor idle position			0.15 - 0.85V

*1: Throttle position sensor harness connector disconnected or using CONSULT-II “WORK SUPPORT” mode
*2: Throttle position sensor harness connector connected
*3: Throttle position sensor harness connector disconnected
*4: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Coil

UBS00DR2

Primary voltage	12V
Primary resistance [at 20°C (68°F)]	Approximately 1.0Ω
Secondary resistance [at 20°C (68°F)]	Approximately 10 kΩ

Mass Air Flow Sensor

UBS00DR3

Supply voltage	Battery voltage (11 - 14)V
Output voltage at idle	1.0 - 1.7*V
Mass air flow (Using CONSULT-II or GST)	3.3 - 4.8 g·m/sec at idle* 12.0 - 14.9 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.

Engine Coolant Temperature Sensor

UBS00DR4

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Heated Oxygen Sensor 1 Heater

UBS00DR5

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Fuel Pump

UBS00DR6

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω

IACV-AAC Valve

UBS00DR7

Resistance [at 20°C (68°F)]	Approximately 10.0Ω

Injector

UBS00DR8

Resistance [at 10 - 60°C (50 - 140°F)]	10.4 - 15.3Ω

Throttle Position Sensor

UBS00DR9

Throttle valve conditions	Voltage (at normal operating temperature, engine off, ignition switch ON)
Completely closed	0.15 - 0.85V
Completely open	3.5 - 4.7V

Calculated Load Value

UBS00DRA

	Calculated load value% (Using CONSULT or GST)
At idle	18.0 - 26.0
At 2,500 rpm	18.0 - 21.0

Intake Air Temperature Sensor

UBS00DRB

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

Heated Oxygen Sensor 2 Heater

UBS00DRC

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Crankshaft Position Sensor (OBD)

UBS00DRD

Resistance [at 20°C (68°F)]	512 - 632Ω

Fuel Tank Temperature Sensor

UBS00DRE

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

INDEX FOR DTC

PFP:00024

Alphabetical Index

UBS00DRF

×: Applicable —: Not applicable

Item (CONSULT-II screen terms)	DTC*1 *2 CONSULT-II GST	Trip	MIL Lighting up	Reference page
Unable to access ECM	—	—	—	EC-1255
A/T 1ST GR FNCTN	P0731	2	×	AT-270
A/T 2ND GR FNCTN	P0732	2	×	AT-276
A/T 3RD GR FNCTN	P0733	2	×	AT-281
A/T 4TH GR FNCTN	P0734	2	×	AT-286
A/T COMM LINE	P0600*3	2	—	EC-1596
A/T DIAG COMM LINE	P1605	2	×	EC-1706
A/T TCC S/V FNCTN	P0744	2	×	AT-298
ATF TEMP SEN/CIRC	P0710	2	×	AT-255
CKP SEN/CIRCUIT	P0335	2	×	EC-1481
CKP SENSOR (COG)	P1336	2	×	EC-1645
CLOSED LOOP-B1	P1148	1	×	EC-1639
CLOSED LOOP-B2	P1168	1	×	EC-1639
CLOSED TP SW/CIRC	P0510	2	×	EC-1589
CMP SEN/CIRCUIT	P0340	2	×	EC-1487
CYL1 MISFIRE	P0301	2	×	EC-1469
CYL2 MISFIRE	P0302	2	×	EC-1469
CYL3 MISFIRE	P0303	2	×	EC-1469
CYL4 MISFIRE	P0304	2	×	EC-1469
CYL5 MISFIRE	P0305	2	×	EC-1469
CYL6 MISFIRE	P0306	2	×	EC-1469
ECM	P0605	2	×	EC-1602
ECT SEN/CIRCUIT	P0117	1	×	EC-1356
ECT SEN/CIRCUIT	P0118	1	×	EC-1356
ECT SENSOR	P0125	2	×	EC-1379
ENG OVER TEMP	P0217	1	×	EC-1461
ENG OVER TEMP	P1217	1	×	EC-1641
ENG SPEED SIG	P0725	2	×	AT-266
EVAP GROSS LEAK	P0455	2	×	EC-1547
EVAP PURG FLOW/MON	P0441	2	×	EC-1500
EVAP SMALL LEAK	P0442	2	×	EC-1508
EVAP SMALL LEAK	P1442	2	×	EC-1650
EVAP SYS PRES SEN	P0452	2	×	EC-1533
EVAP SYS PRES SEN	P0453	2	×	EC-1539
EVAP VERY SML LEAK	P0456	2	×	EC-1556
EVAP VERY SML LEAK	P1456	2	×	EC-1675
FTT SEN/CIRCUIT	P0182	2	×	EC-1457
FTT SEN/CIRCUIT	P0183	2	×	EC-1457
FTT SENSOR	P0181	2	×	EC-1452

Item (CONSULT-II screen terms)	DTC*1 *2 CONSULT-II GST	Trip	MIL Lighting up	Reference page
FUEL LEV SEN SLOSH	P0460	2	×	EC-1567
FUEL LEVEL SEN/CIRC	P1464	2	×	EC-1685
FUEL LEVEL SENSOR	P0461	2	×	EC-1571
FUEL LEVL SEN/CIRC	P0462	2	×	EC-1573
FUEL LEVL SEN/CIRC	P0463	2	×	EC-1573
FUEL SYS-LEAN-B1	P0171	2	×	EC-1437
FUEL SYS-LEAN-B2	P0174	2	×	EC-1437
FUEL SYS-RICH-B1	P0172	2	×	EC-1445
FUEL SYS-RICH-B2	P0175	2	×	EC-1445
HO2S1 (B1)	P0132	2	×	EC-1387
HO2S1 (B1)	P0133	2	×	EC-1396
HO2S1 (B1)	P0134	2	×	EC-1408
HO2S1 (B1)	P1143	2	×	EC-1604
HO2S1 (B1)	P1144	2	×	EC-1610
HO2S1 (B2)	P0152	2	×	EC-1387
HO2S1 (B2)	P0153	2	×	EC-1396
HO2S1 (B2)	P0154	2	×	EC-1408
HO2S1 (B2)	P1163	2	×	EC-1604
HO2S1 (B2)	P1164	2	×	EC-1610
HO2S1 HTR (B1)	P0031	2	×	EC-1313
HO2S1 HTR (B1)	P0032	2	×	EC-1313
HO2S1 HTR (B2)	P0051	2	×	EC-1313
HO2S1 HTR (B2)	P0052	2	×	EC-1313
HO2S2 (B1)	P0138	2	×	EC-1418
HO2S2 (B1)	P0139	2	×	EC-1427
HO2S2 (B1)	P1146	2	×	EC-1617
HO2S2 (B1)	P1147	2	×	EC-1628
HO2S2 (B2)	P0158	2	×	EC-1418
HO2S2 (B2)	P0159	2	×	EC-1427
HO2S2 (B2)	P1166	2	×	EC-1617
HO2S2 (B2)	P1167	2	×	EC-1628
HO2S2 HTR (B1)	P0037	2	×	EC-1327
HO2S2 HTR (B1)	P0038	2	×	EC-1327
HO2S2 HTR (B2)	P0057	2	×	EC-1327
HO2S2 HTR (B2)	P0058	2	×	EC-1327
IAT SEN/CIRCUIT	P0112	2	×	EC-1350
IAT SEN/CIRCUIT	P0113	2	×	EC-1350
IAT SENSOR	P0127	2	×	EC-1382
ISC SYSTEM/CIRC	P0505	2	×	EC-1582
KNOCK SEN/CIRC-B1	P0327	2	—	EC-1477
KNOCK SEN/CIRC-B1	P0328	2	—	EC-1477
L/PRESS SOL/CIRC	P0745	2	×	AT-306

Item (CONSULT-II screen terms)	DTC*1 *2 CONSULT-II GST	Trip	MIL Lighting up	Reference page
MAF SEN/CIRCUIT	P0101	2	×	EC-1335
MAF SEN/CIRCUIT	P0102	1	×	EC-1343
MAF SEN/CIRCUIT	P0103	2	×	EC-1343
MULTI CYL MISFIRE	P0300	2	×	EC-1469
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	—	—	—
O/R CLTCH SOL/CIRC	P1760	2	×	AT-329
P-N POS SW/CIRCUIT	P1706	2	×	EC-1712
PNP SW/CIRC	P0705	2	×	AT-249
PURG VOLUME CONT/V	P0444	2	×	EC-1520
PURG VOLUME CONT/V	P0445	2	×	EC-1520
PURG VOLUME CONT/V	P1444	2	×	EC-1652
SC FUNCTION	P0299	2	×	EC-1466
SCB/V CONT SOL/V	P0034	2	×	EC-1321
SFT SOL A/CIRC	P0750	1	×	AT-311
SFT SOL B/CIRC	P0755	1	×	AT-316
TCC SOLENOID/CIRC	P0740	2	×	AT-293
THERMSTAT FNCTN	P0128	2	×	EC-1385
TP SEN/CIRC A/T	P1705	1	×	AT-321
TP SEN/CIRCUIT	P0121	2	×	EC-1362
TP SEN/CIRCUIT	P0122	1	×	EC-1371
TP SEN/CIRCUIT	P0123	1	×	EC-1371
TW CATALYST SYS-B1	P0420	2	×	EC-1494
TW CATALYST SYS-B2	P0430	2	×	EC-1494
VC CUT/V BYPASS/V	P1491	2	×	EC-1694
VC/V BYPASS/V	P1490	2	×	EC-1688
VEH SPEED SEN/CIRC AT	P0720	2	×	AT-261
VEH SPEED SEN/CIRC	P0500	2	×	EC-1577
VENT CONTROL VALVE	P0447	2	×	EC-1527
VENT CONTROL VALVE	P1446	2	×	EC-1661
VENT CONTROL VALVE	P1448	2	×	EC-1667

*1: 1st trip DTC No. 1 is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: This DTC is displayed with CONSULT-II only.

DTC No. Index

UBS00DRG

×: Applicable —: Not applicable

DTC*1 *2 CONSULT-II GST	Items (CONSULT-II screen terms)	Trip	MIL Lighting up	Reference page
—	Unable to access ECM	—	—	EC-1255
P0000	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	—
P0031	HO2S1 HTR (B1)	2	×	EC-1313
P0032	HO2S1 HTR (B1)	2	×	EC-1313

DTC*1 *2 CONSULT-II GST	Items (CONSULT-II screen terms)	Trip	MIL Lighting up	Reference page
P0034	SCB/V CONT SOL/V	2	×	EC-1321
P0037	HO2S2 HTR (B1)	2	×	EC-1327
P0038	HO2S2 HTR (B1)	2	×	EC-1327
P0051	HO2S1 HTR (B2)	2	×	EC-1313
P0052	HO2S1 HTR (B2)	2	×	EC-1313
P0057	HO2S2 HTR (B2)	2	×	EC-1327
P0058	HO2S2 HTR (B2)	2	×	EC-1327
P0101	MAF SEN/CIRCUIT	2	×	EC-1335
P0102	MAF SEN/CIRCUIT	1	×	EC-1343
P0103	MAF SEN/CIRCUIT	2	×	EC-1343
P0112	IAT SEN/CIRCUIT	2	×	EC-1350
P0113	IAT SEN/CIRCUIT	2	×	EC-1350
P0117	ECT SEN/CIRCUIT	1	×	EC-1356
P0118	ECT SEN/CIRCUIT	1	×	EC-1356
P0121	TP SEN/CIRCUIT	2	×	EC-1362
P0122	TP SEN/CIRCUIT	1	×	EC-1371
P0123	TP SEN/CIRCUIT	1	×	EC-1371
P0125	ECT SENSOR	2	×	EC-1379
P0127	IAT SENSOR	2	×	EC-1382
P0128	THERMSTAT FNCTN	2	×	EC-1385
P0132	HO2S1 (B1)	2	×	EC-1387
P0133	HO2S1 (B1)	2	×	EC-1396
P0134	HO2S1 (B1)	2	×	EC-1408
P0138	HO2S2 (B1)	2	×	EC-1418
P0139	HO2S2 (B1)	2	×	EC-1427
P0152	HO2S1 (B2)	2	×	EC-1387
P0153	HO2S1 (B2)	2	×	EC-1396
P0154	HO2S1 (B2)	2	×	EC-1408
P0158	HO2S2 (B2)	2	×	EC-1418
P0159	HO2S2 (B2)	2	×	EC-1427
P0171	FUEL SYS-LEAN-B1	2	×	EC-1437
P0172	FUEL SYS-RICH-B1	2	×	EC-1445
P0174	FUEL SYS-LEAN-B2	2	×	EC-1437
P0175	FUEL SYS-RICH-B2	2	×	EC-1445
P0181	FTT SENSOR	2	×	EC-1452
P0182	FTT SEN/CIRCUIT	2	×	EC-1457
P0183	FTT SEN/CIRCUIT	2	×	EC-1457
P0217	ENG OVER TEMP	1	×	EC-1461
P0299	SC FUNCTION	2	×	EC-1466
P0300	MULTI CYL MISFIRE	2	×	EC-1469
P0301	CYL1 MISFIRE	2	×	EC-1469
P0302	CYL2 MISFIRE	2	×	EC-1469

DTC*1 *2 CONSULT-II GST	Items (CONSULT-II screen terms)	Trip	MIL Lighting up	Reference page
P0303	CYL3 MISFIRE	2	×	EC-1469
P0304	CYL4 MISFIRE	2	×	EC-1469
P0305	CYL5 MISFIRE	2	×	EC-1469
P0306	CYL6 MISFIRE	2	×	EC-1469
P0327	KNOCK SEN/CIRC-B1	2	—	EC-1477
P0328	KNOCK SEN/CIRC-B1	2	—	EC-1477
P0335	CKP SEN/CIRCUIT	2	×	EC-1481
P0340	CMP SEN/CIRCUIT	2	×	EC-1487
P0420	TW CATALYST SYS-B1	2	×	EC-1494
P0430	TW CATALYST SYS-B2	2	×	EC-1494
P0441	EVAP PURG FLOW/MON	2	×	EC-1500
P0442	EVAP SMALL LEAK	2	×	EC-1508
P0444	PURG VOLUME CONT/V	2	×	EC-1520
P0445	PURG VOLUME CONT/V	2	×	EC-1520
P0447	VENT CONTROL VALVE	2	×	EC-1527
P0452	EVAP SYS PRES SEN	2	×	EC-1533
P0453	EVAP SYS PRES SEN	2	×	EC-1539
P0455	EVAP GROSS LEAK	2	×	EC-1547
P0456	EVAP VERY SML LEAK	2	×	EC-1556
P0460	FUEL LEV SEN SLOSH	2	×	EC-1567
P0461	FUEL LEVEL SENSOR	2	×	EC-1571
P0462	FUEL LEVL SEN/CIRC	2	×	EC-1573
P0463	FUEL LEVL SEN/CIRC	2	×	EC-1573
P0500	VEH SPEED SEN/CIRC	2	×	EC-1577
P0505	ISC SYSTEM/CIRC	2	×	EC-1582
P0510	CLOSED TP SW/CIRC	2	×	EC-1589
P0600*3	A/T COMM LINE	2	—	EC-1596
P0605	ECM	2	×	EC-1602
P0705	PNP SW/CIRC	2	×	AT-249
P0710	ATF TEMP SEN/CIRC	2	×	AT-255
P0720	VEH SPD SEN/CIR AT	2	×	AT-261
P0725	ENGINE SPEED SIG	2	×	AT-266
P0731	A/T 1ST GR FNCTN	2	×	AT-270
P0732	A/T 2ND GR FNCTN	2	×	AT-276
P0733	A/T 3RD GR FNCTN	2	×	AT-281
P0734	A/T 4TH GR FNCTN	2	×	AT-286
P0740	TCC SOLENOID/CIRC	2	×	AT-293
P0744	A/T TCC S/V FNCTN	2	×	AT-298
P0745	L/PRESS SOL/CIRC	2	×	AT-306
P0750	SFT SOL A/CIRC	1	×	AT-311
P0755	SFT SOL B/CIRC	1	×	AT-316
P1143	HO2S1 (B1)	2	×	EC-1604

DTC*1 *2 CONSULT-II GST	Items (CONSULT-II screen terms)	Trip	MIL Lighting up	Reference page
P1144	HO2S1 (B1)	2	×	EC-1610
P1146	HO2S2 (B1)	2	×	EC-1617
P1147	HO2S2 (B1)	2	×	EC-1628
P1148	CLOSED LOOP-B1	1	×	EC-1639
P1163	HO2S1 (B2)	2	×	EC-1604
P1164	HO2S1 (B2)	2	×	EC-1610
P1166	HO2S2 (B2)	2	×	EC-1617
P1167	HO2S2 (B2)	2	×	EC-1628
P1168	CLOSED LOOP-B2	1	×	EC-1639
P1217	ENG OVER TEMP	1	×	EC-1641
P1336	CKP SENSOR (COG)	2	×	EC-1645
P1442	EVAP SMALL LEAK	2	×	EC-1650
P1444	PURG VOLUME CONT/V	2	×	EC-1652
P1446	VENT CONTROL VALVE	2	×	EC-1661
P1448	VENT CONTROL VALVE	2	×	EC-1667
P1456	EVAP VERY SML LEAK	2	×	EC-1675
P1464	FUEL LEVL SEN/CIRC	2	×	EC-1685
P1490	VC/V BYPASS/V	2	×	EC-1688
P1491	VC CUT/V BYPASS/V	2	×	EC-1694
P1605	A/T DIAG COMM LINE	2	×	EC-1706
P1705	TP SEN/CIRC A/T	1	×	AT-321
P1706	P-N POS SW/CIRCUIT	2	×	EC-1712
P1760	O/R CLTCH SOL/CIRC	2	×	AT-329

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: This DTC is displayed with CONSULT-II only.

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

UBS00EM7

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. This system may include seat belt switch inputs and dual stage front air bag modules. If equipped with dual stage front air bag modules, the SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

The vehicle may be equipped with a passenger air bag deactivation switch. Because no rear seat exists where a rear-facing child restraint can be placed, the switch is designed to turn off the passenger air bag so that a rear-facing child restraint can be used in the front passenger seat. The switch is located in the center of the instrument panel, near the ashtray. When the switch is turned to the ON position, the passenger air bag is enabled and could inflate for certain types of collision. When the switch is turned to the OFF position, the passenger air bag is disabled and will not inflate. A passenger air bag OFF indicator on the instrument panel lights up when the passenger air bag is switched OFF. The driver air bag always remains enabled and is not affected by the passenger air bag deactivation switch.

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.**
- **The vehicle may be equipped with a passenger air bag deactivation switch which can be operated by the customer. When the passenger air bag is switched OFF, the passenger air bag is disabled and will not inflate. When the passenger air bag is switched ON, the passenger air bag is enabled and could inflate for certain types of collision. After SRS maintenance or repair, make sure the passenger air bag deactivation switch is in the same position (ON or OFF) as when the vehicle arrived for service.**

On Board Diagnostic (OBD) System of Engine and A/T

UBS00DRI

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-4, "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 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.**

Precautions

UBS00DRJ

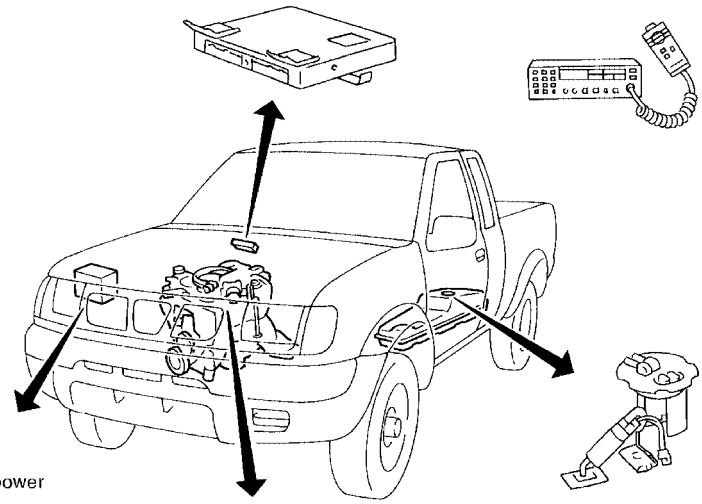
ECM

- 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.

WIRELESS EQUIPMENT

- When installing CB ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on its installation location.

1) Keep the antenna as far away as possible from the electronic control units.
2) Keep the antenna feeder line more than 20 cm (7.9 in) away from the harness of electronic controls.
   Do not let them run parallel for a long distance.
3) Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.
4) Be sure to ground the radio to vehicle body.



BATTERY

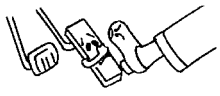
- Always use a 12 volt battery as power source.
- Do not attempt to disconnect battery cables while engine is running.

WHEN STARTING

- 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.

ECM PARTS HANDLING

- 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 IACV-AAC valve.
- Even a slight leak in the air intake system can cause serious problems.
- Do not shock or jar the camshaft position sensor or crankshaft position sensor (OBD).



FUEL PUMP

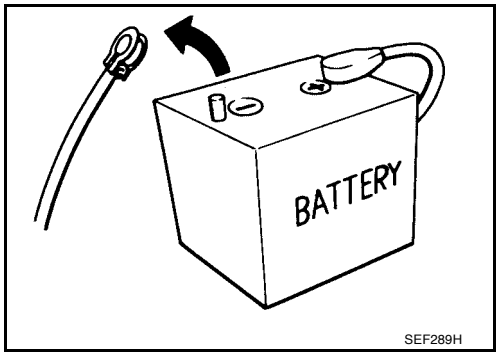
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque. (Refer to MA section.)

ECM HARNESS HANDLING

- 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 ECM harness at least 10 cm (3.9 in.) away from adjacent harnesses to prevent an engine control system malfunction due to recieving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harnesses dry.
- Before removing parts, turn off ignition switch and then disconnect battery ground cable.

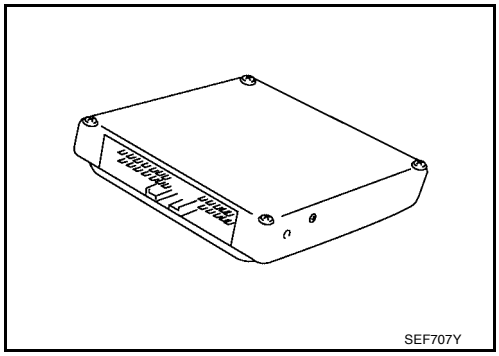
LEC027A

- 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.



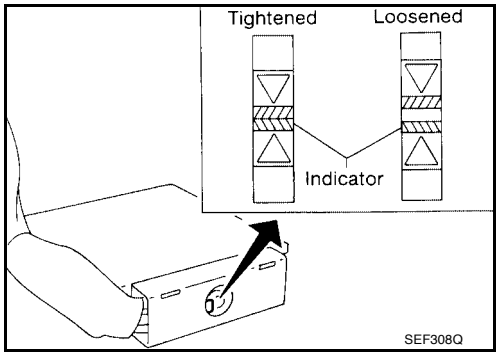
SEF289H

- Do not disassemble ECM.
- If a battery terminal is disconnected, the memory will return to the ECM value.
  The ECM will not start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.


SEF707Y

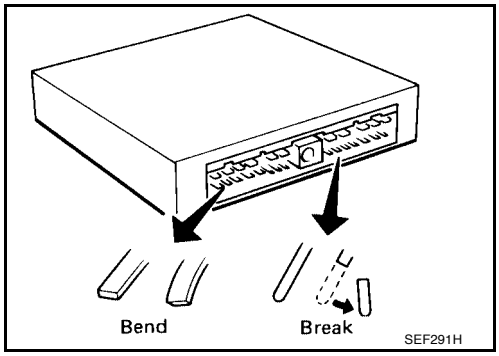
- When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.

  : 3 - 5 N·m (0.3 - 0.5 kg-m, 26 - 43 in-lb)



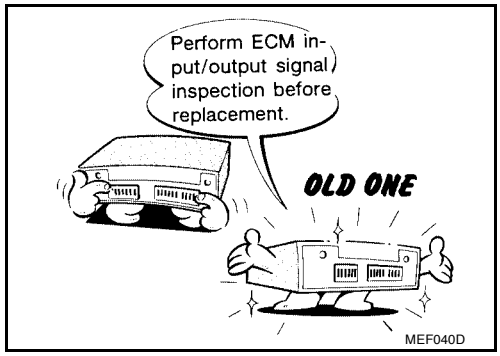
SEF308Q

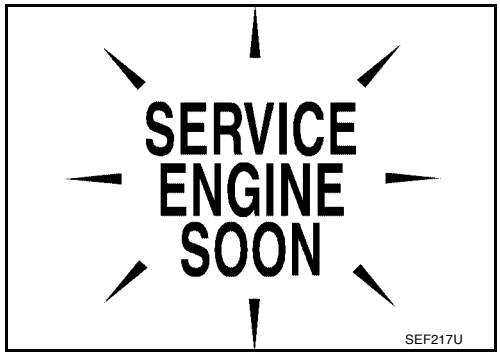
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.
- Keep engine control system parts and harness dry.



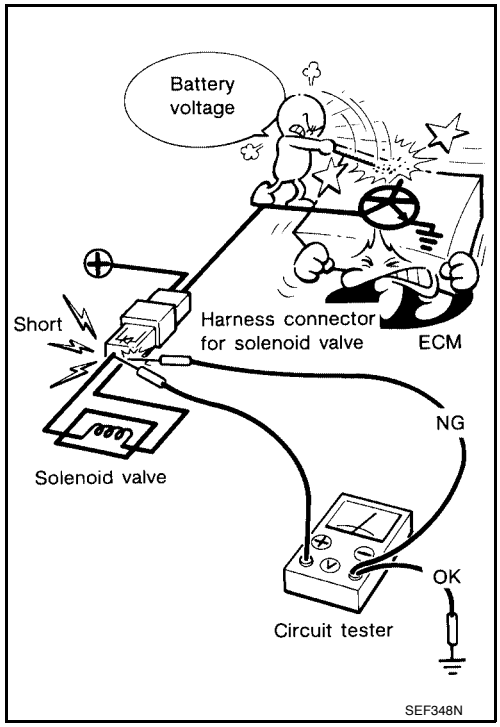
SEF291H

- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-1276, "ECM Terminals and Reference Value" .**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor, crankshaft position sensor (OBD).**
- **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.

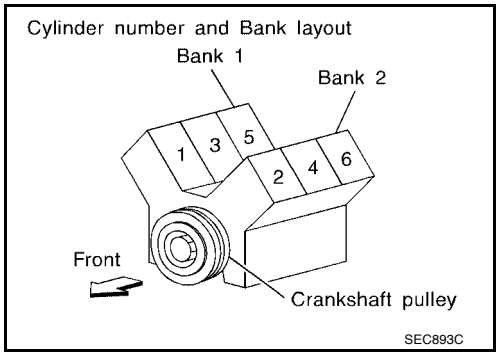




- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**



- **B1 indicates the bank 1, B2 indicates the bank 1 as shown in the figure.**



Wiring Diagrams and Trouble Diagnosis

UBS00DRK

When you read Wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams"
- PG-9, "POWER SUPPLY ROUTING"

When you perform trouble diagnosis, refer to the following:

- GI-9, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident"

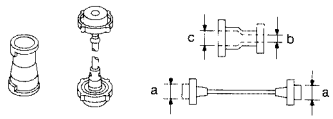
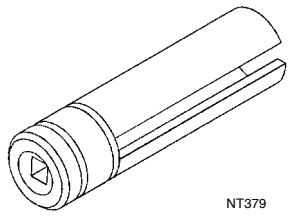
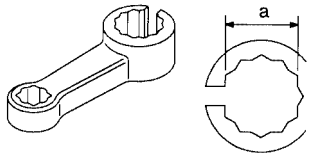
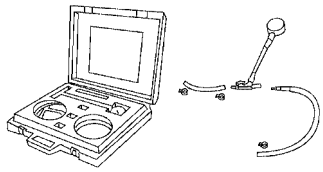
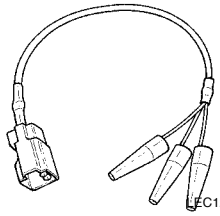
PREPARATION

PFP:00002

Special Service Tools

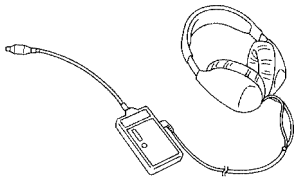
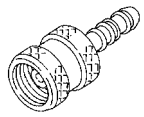
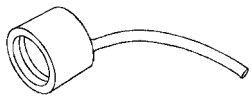
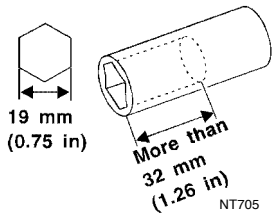
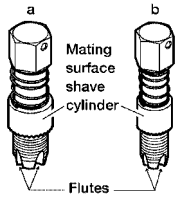
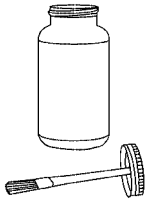
UBS00DRL

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	
EG17650301 (J-33984-A) Radiator cap tester adapter	 S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
KV10117100 (J-36471-A) Heated oxygen sensor wrench	 NT379	Loosening or tightening heated oxygen sensor 1 with 22 mm (0.87 in) hexagon nut
KV10114400 (J-38365) Heated oxygen sensor wrench	 NT636	Loosening or tightening heated oxygen sensor 2 **a: 22 mm (0.87 in)**
J-44321 Fuel pressure gauge kit	 LEC642	Checking fuel pressure
(J-45178) TPS test connector	 LEC120A	Used to test the throttle position sensor

Commercial Service Tools

UBS00DRM

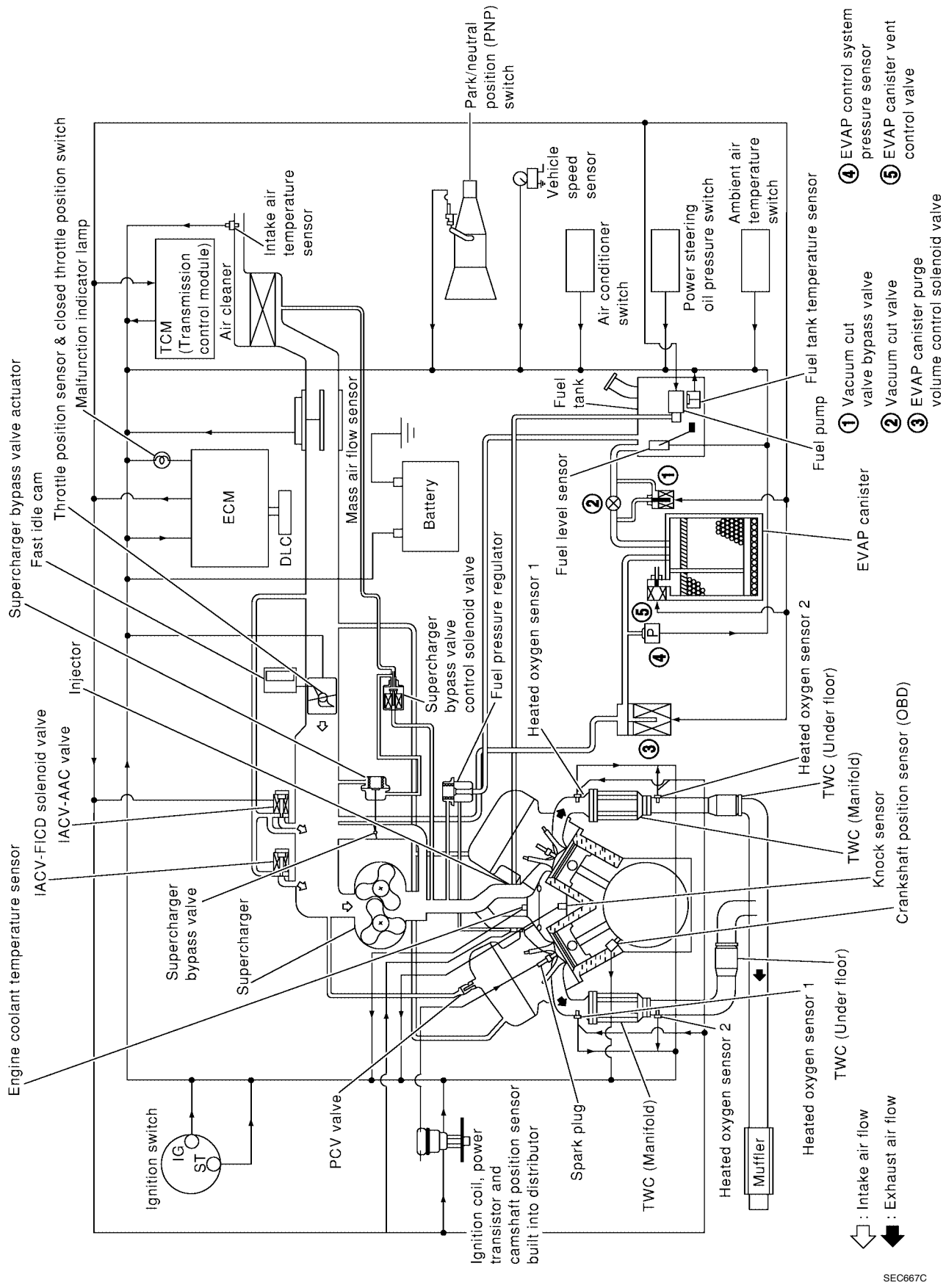
Tool name (Kent-Moore No.)	Description	
Leak detector i.e: (J-41416)	 NT703	Locating the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)	 NT704	Applying positive pressure through EVAP service port
Fuel filler cap adapter	 NT653	Checking fuel tank vacuum relief valve opening pressure
Socket wrench	 NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner i.e.:(J-43897-18) (J-43897-12)	 AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown in “Commercial Service Tools”. a: J-43897-18 (18 mm diameter with pitch 1.5 mm) for Zirconia Oxygen Sensor b: J-43897-12 (12 mm diameter with pitch 1.25 mm) for Titania Oxygen Sensor
Anti-seize lubricant i.e.:(Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 AEM489	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

ENGINE CONTROL SYSTEM

PFP:23710

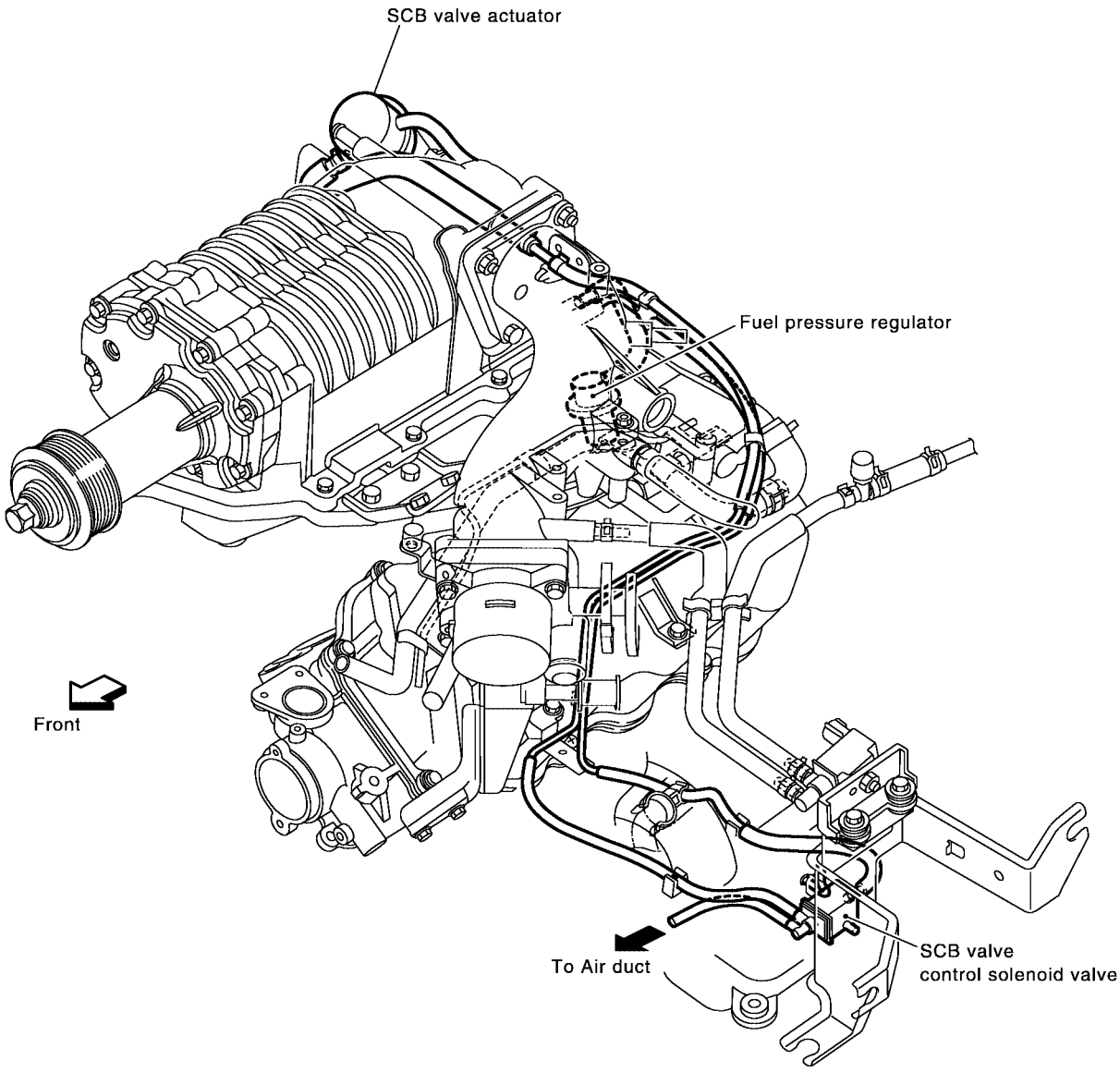
System Diagram

UBS00DRN



Vacuum Hose Drawing

UBS00DRO



NOTE:
Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

PBIB1342E

Refer to EC-1207, "System Diagram" for Vacuum Control System.

System Chart

UBS00DRP

Input (Sensor)	ECM Function	Output (Actuator)
• Camshaft position sensor • Mass air flow sensor • Engine coolant temperature sensor • Heated oxygen sensor 1 • Ignition switch • Throttle position sensor • Closed throttle position switch*4 • Park/neutral position (PNP) switch • Air conditioner switch • Knock sensor • Intake air temperature sensor • EVAP control system pressure sensor*1 • Battery voltage • Power steering oil pressure switch • Vehicle speed sensor • Fuel tank temperature sensor*1 • Crankshaft position sensor (OBD)*1 • Heated oxygen sensor 2*3 • TCM (Transmission control module)*2 • Ambient air temperature switch	Fuel injection & mixture ratio control	Fuel injector
	Distributor ignition system	Power transistor
	Idle air control system	IACV-AAC valve and IACV-FICD solenoid valve
	Fuel pump control	Fuel pump relay
	On board diagnostic system	MIL (On the instrument panel)
	Supercharged air control	SCB valve 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
	ON BOARD DIAGNOSIS for EVAP system	• EVAP canister vent control valve • Vacuum cut valve bypass valve

*1: This sensor is not used to control the engine system. This is used only for the on board diagnosis.
*2: The DTC related to A/T will be sent to ECM.
*3: This sensor is not used to control the engine system under normal conditions.
*4: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

Multiport Fuel Injection (MFI) System

UBS00DRQ

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Fuel injection & mixture ratio control	Fuel injector
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 Throttle valve idle position		
Park/neutral position (PNP) switch	Gear position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Air conditioner switch	Air conditioner operation		
Knock sensor	Engine knocking condition		
Battery	Battery voltage		
Power steering oil pressure switch	Power steering operation		
Heated oxygen sensor 2*	Density of oxygen in exhaust gas		

*: This sensor is not used to control the engine system under normal conditions.

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 camshaft position sensor and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

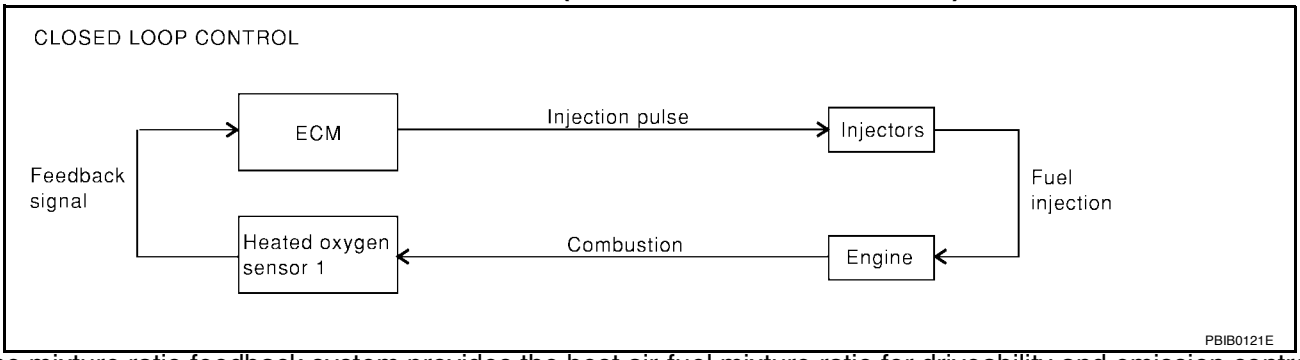
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (A/T models)
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses a heated oxygen sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1, refer to EC-1387 . 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 the heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from the 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.

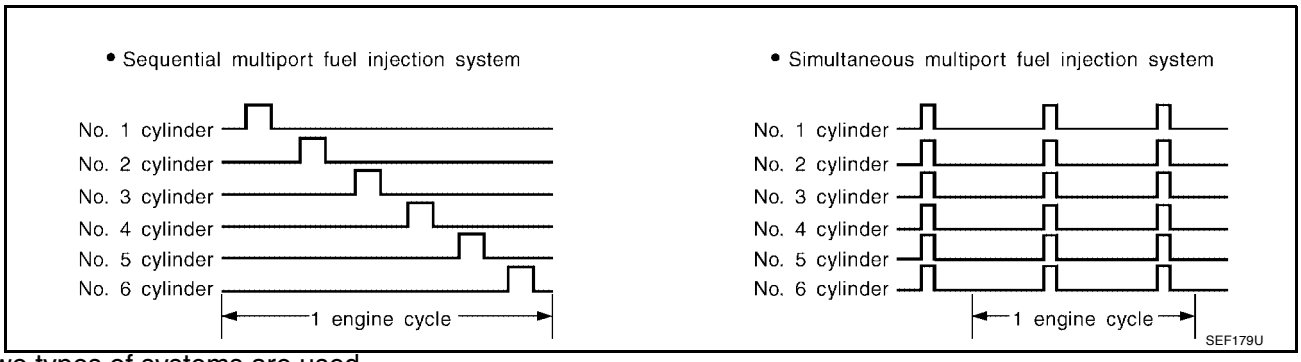
- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 or its circuit
- Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from the 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 wire) 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 the 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 six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The six 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.

Distributor Ignition (DI) System

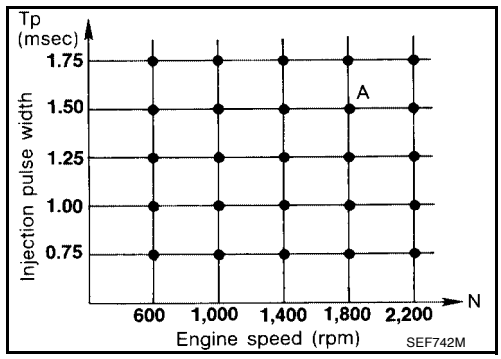
UBS00DRR

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed and piston position	Ignition timing control	Power transistor
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position Throttle valve idle position		
Vehicle speed sensor	Vehicle speed		
Ignition switch	Start signal		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage		

SYSTEM DESCRIPTION

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM. This data forms the map shown.
The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
e.g., N: 1,800 rpm, Tp: 1.50 msec
A °BTDC



During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Air Conditioner Cut Control

UBS00DRS

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner ON signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Camshaft position sensor	Engine speed		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Vehicle speed sensor	Vehicle speed		
Power steering oil pressure switch	Power steering operation		

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.

Fuel Cut Control (at No Load and High Engine Load)

UBS00DRT

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed	Fuel cut control	Fuel injector
Park/neutral position (PNP) switch	Neutral position		
Throttle position sensor	Throttle position		
Engine coolant temperature sensor	Engine coolant temperature		
Camshaft position sensor	Engine speed		

SYSTEM DESCRIPTION

If the engine speed is above 2,500 rpm under no load (for example, the shift position is neutral and engine speed is over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.
Fuel cut will be operated until the engine speed reaches 2,000 rpm, then fuel cut will be cancelled.

NOTE:
This function is different from deceleration control listed under EC-1209, "Multiport Fuel Injection (MFI) System" .

BASIC SERVICE PROCEDURE

PFP:00018

Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment

UBS00DRU

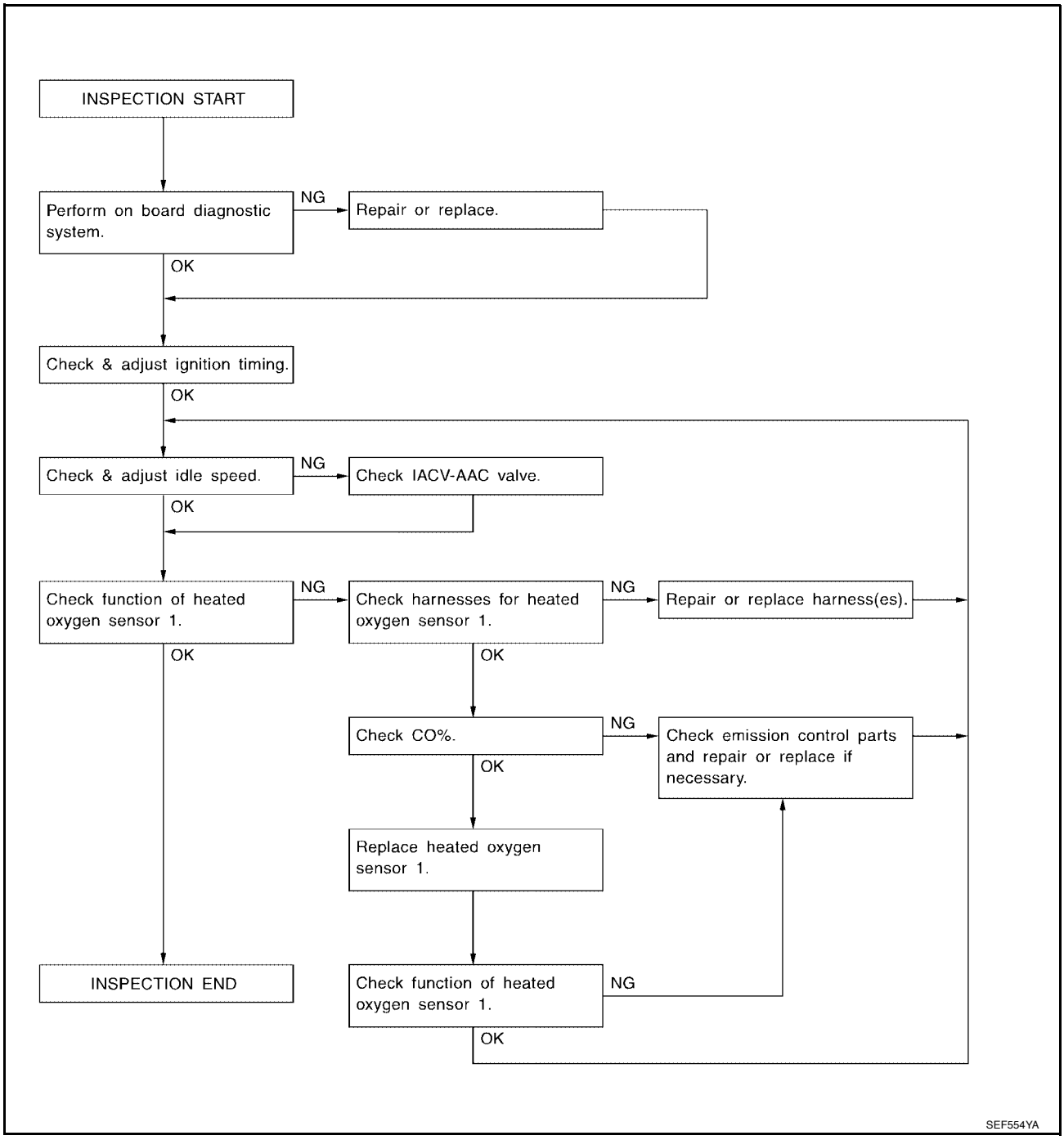
PREPARATION

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 defogger.
6. Keep front wheels pointed straight ahead.
7. Make the check after the cooling fan has stopped.

OVERALL INSPECTION SEQUENCE

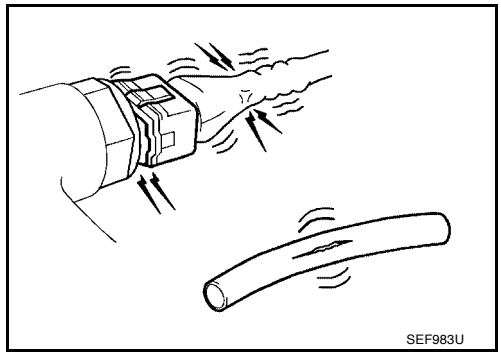


NOTE:
If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be expected to detect the resulting malfunction.

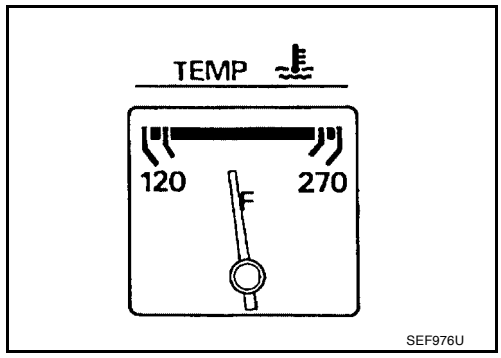
INSPECTION PROCEDURE

1. INSPECTION START

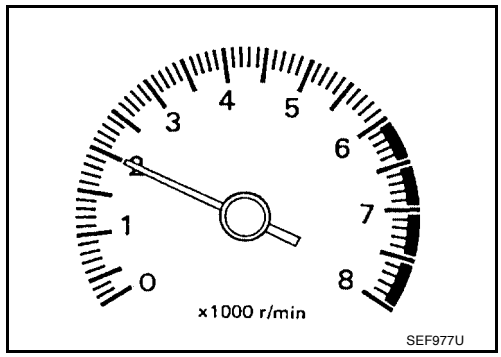
1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket



3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
4. Visually check the following:
- Air cleaner clogging
- Hoses and ducts for leaks
- Electrical connectors
- Gasket
- Throttle valve and throttle position sensor operation
5. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge. Ensure engine stays below 1,000 rpm.



6. Open engine hood and run engine at about 2,000 rpm for about 2 minutes under no load.
7. Make sure that no DTC is displayed with CONSULT-II or GST.

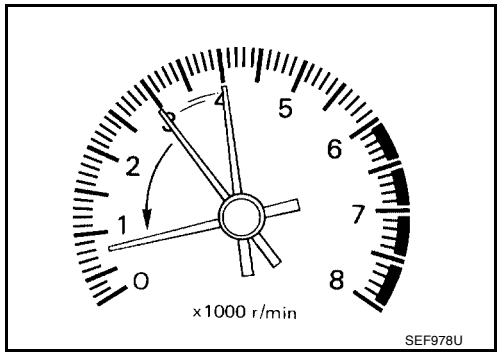


OK or NG

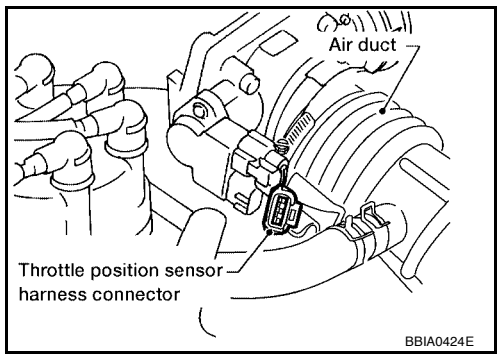
OK >> GO TO 2.
NG >> 1. Repair or replace components as necessary.
2. GO TO 2.

2. CHECK IGNITION TIMING

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.



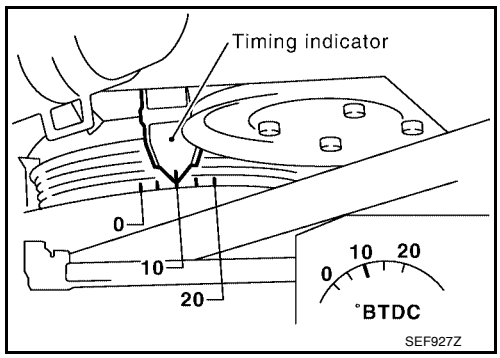
3. Stop engine and disconnect throttle position sensor harness connector.
4. Start and rev engine (2,000 to 3,000 rpm) two or three times under no load, then run at idle speed.



5. Check ignition timing with a timing light.

M/T: 10±5° BTDC (in Neutral position)

A/T: 10±5° BTDC (in P or N position)



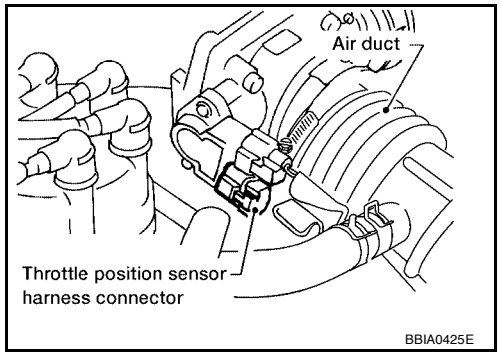
OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. ADJUST IGNITION TIMING

1. Adjust ignition timing by turning distributor after loosening securing bolts.
2. Stop engine and connect throttle position sensor harness connector to throttle position sensor.

>> GO TO 2.

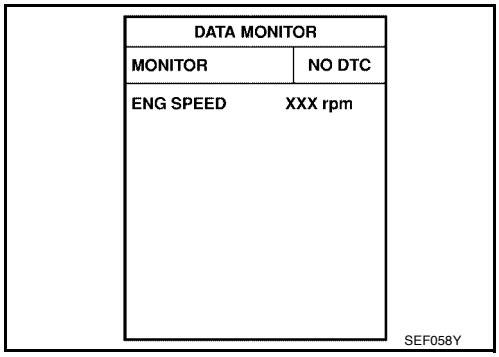


4. CHECK BASE IDLE SPEED

With CONSULT-II

1. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

   M/T: 700±50 rpm (in Neutral position)
   A/T: 700±50 rpm (in P or N position)



Without CONSULT-II

1. Check idle speed.

   M/T: 700±50 rpm (in Neutral position)
   A/T: 700±50 rpm (in P or N position)

OK or NG

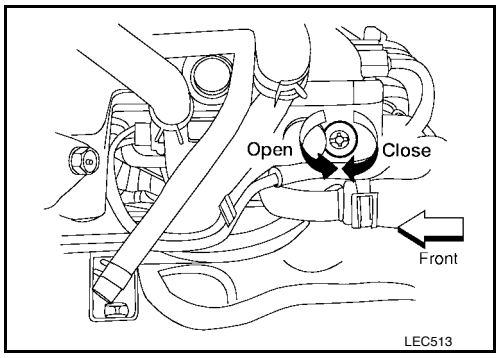
OK >> GO TO 6.
NG >> GO TO 5.

5. ADJUST BASE IDLE SPEED

1. Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no load then run engine at idle speed.
2. Adjust idle speed by turning idle speed adjusting screw.

   M/T: 700±50 rpm (in Neutral position)
   A/T: 700±50 rpm (in P or N position)

   >> GO TO 6.

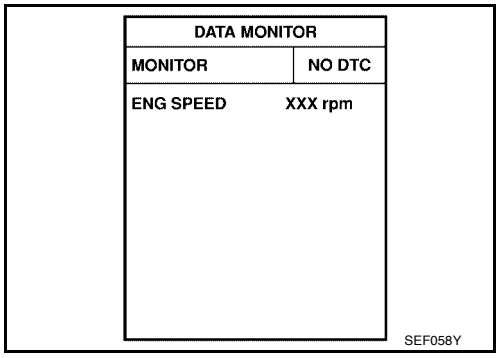


6. CHECK TARGET IDLE SPEED

With CONSULT-II

1. Stop engine and connect throttle position sensor harness connector.
2. Start and rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed.
3. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

   M/T: 750±50 rpm (in Neutral position)
   A/T: 750±50 rpm (in P or N position)



Without CONSULT-II

1. Stop engine and connect throttle position sensor harness connector.
2. Start and rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load then run at idle speed.
3. Check idle speed.

   M/T: 750±50 rpm (in Neutral position)
   A/T: 750±50 rpm (in P or N position)

OK or NG

OK (With CONSULT-II)>>GO TO 8.
OK (Without CONSULT-II)>>GO TO 9.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

1. Check IACV-AAC valve and replace if necessary. Refer to EC-1582 .
2. Check IACV-AAC valve harness and repair if necessary. Refer to EC-1582 .
3. Check ECM function by substituting another known-good ECM.
   (ECM may be the cause of an incident, but this is a rare case.)

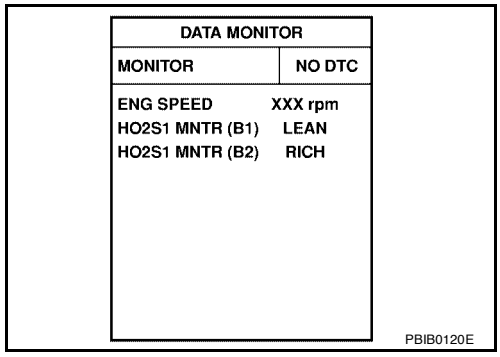
With CONSULT-II>>GO TO 8.
Without CONSULT-II>>GO TO 9.

8. CHECK HEATED OXYGEN SENSOR 1 (BANK 2) SIGNAL

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no load.
2. See “HO2S1 MNTR (B2)” in “DATA MONITOR” mode.
3. Running engine at 2,000 rpm under no load (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



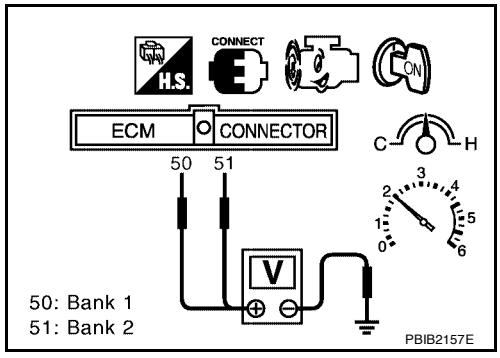
OK or NG

OK >> GO TO 12.
NG (Monitor does not fluctuate.)>>GO TO 17.
NG (Monitor fluctuates less than 5 times.)>>GO TO 10.

9. CHECK HEATED OXYGEN SENSOR 1 (BANK 2) SIGNAL

Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no load.
2. Set voltmeter probe between ECM terminal 51 and ground.
3. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   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



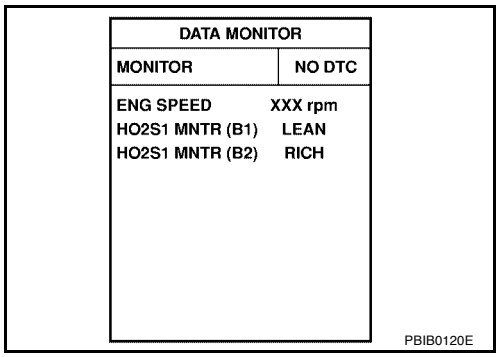
OK or NG

OK >> GO TO 12.
NG (Voltage does not fluctuate.)>>GO TO 17.
NG (Voltage fluctuates less than 5 times.)>>GO TO 10.

10. CHECK HEATED OXYGEN SENSOR 1 (BANK 2) SIGNAL

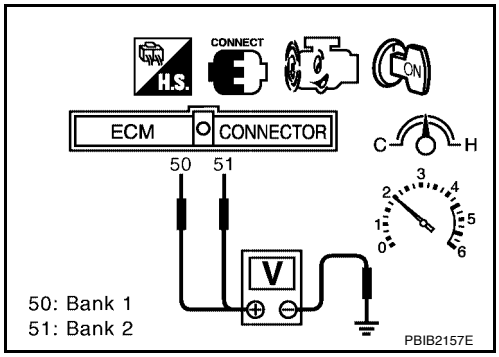
With CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (bank 2).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no load.
5. See “HO2S1 MNTR (B2)” in “DATA MONITOR” mode.
6. Running engine at 2,000 rpm under no load (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



Without CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (bank 2).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no load.
5. Set voltmeter probe between ECM terminal 51 and ground.
6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   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



OK or NG

OK (With CONSULT-II)>>GO TO 12.
OK (Without CONSULT-II)>>GO TO 13.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

1. Check fuel pressure regulator. Refer to EC-1228 .
2. Check mass air flow sensor and its circuit. Refer to EC-1335 .
3. Check injector and its circuit. Refer to EC-1725 .
   Clean or replace if necessary.
4. Check engine coolant temperature sensor and its circuit. Refer to EC-1356 .
5. Check ECM function by substituting another known-good ECM.
   (ECM may be the cause of an incident, but this is a rare case.)

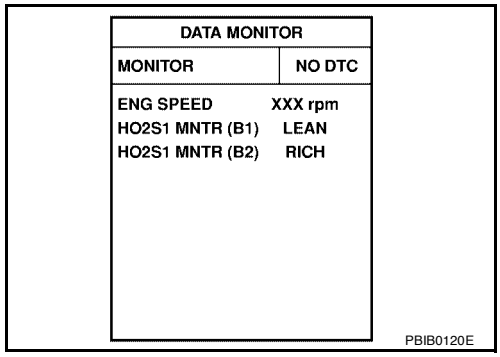
>> GO TO 2.

12. CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL

With CONSULT-II

1. See “HO2S1 (B1)” in “DATA MONITOR” mode.
2. Maintaining engine at 2,000 rpm under no load (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



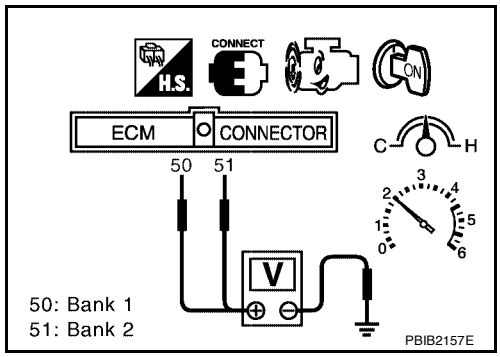
OK or NG

OK >> **INSPECTION END**.
NG (Monitor does not fluctuate.)>>GO TO 16.
NG (Monitor fluctuates less than 5 times.)>>GO TO 14.

13. CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL

Without CONSULT-II

1. Set voltmeter probe between ECM terminal 50 and ground.
2. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   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



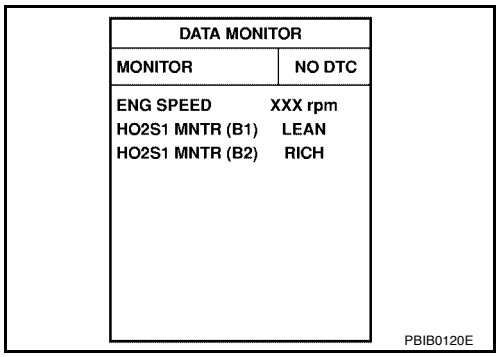
OK or NG

OK >> **INSPECTION END**.
NG (Voltage does not fluctuate.)>>GO TO 16.
NG (Voltage fluctuates less than 5 times.)>>GO TO 14.

14. CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL

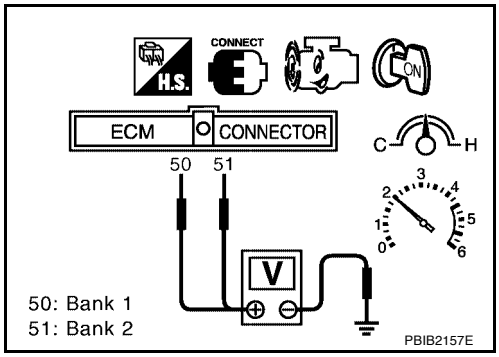
With CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (bank 1).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no load.
5. See “HO2S1 MNTR (B1)” in “DATA MONITOR” mode.
6. Maintaining engine at 2,000 rpm under no-load (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



Without CONSULT-II

1. Stop engine.
2. Replace heated oxygen sensor 1 (bank 1).
3. Start engine and warm it up to normal operating temperature.
4. Run engine at approx. 2,000 rpm for approx. 2 minutes under no load.
5. Set voltmeter probe between ECM terminal 50 and ground.
6. Make sure that the voltage fluctuates between 0 - 0.3V and 0.6 - 1.0V more than 5 times during 10 seconds at 2,000 rpm.
   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



OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.

1. Check fuel pressure regulator. Refer to EC-1228 .
2. Check mass air flow sensor and its circuit. Refer to EC-1335 .
3. Check injector and its circuit. Refer to EC-1725 .
   Clean or replace if necessary.
4. Check engine coolant temperature sensor and its circuit. Refer to EC-1356 .
5. Check ECM function by substituting another known-good ECM.
   (ECM may be the cause of an incident, but this is a rare case.)

>> GO TO 2.

16. CHECK HEATED OXYGEN SENSOR 1 (BANK 1) HARNESS

1. Stop engine 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 50 and heated oxygen sensor 1 (bank 1) harness connector.

Continuity should exist.

OK or NG

OK >> 1. Connect ECM harness connector.
2. GO TO 18.

NG >> 1. Repair or replace harness.
2. GO TO 8 (With CONSULT-II).
GO TO 9 (Without CONSULT-II).

17. CHECK HEATED OXYGEN SENSOR 1 (BANK 2) HARNESS

1. Stop engine 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 51 and heated oxygen sensor 1 (bank 2) harness connector.

Continuity should exist.

OK or NG

OK >> 1. Connect ECM harness connector.
2. GO TO 18.

NG >> 1. Repair or replace harness.
2. GO TO 8 (With CONSULT-II).
GO TO 9 (Without CONSULT-II).

18. PREPARATION FOR CO% CHECK

With CONSULT-II

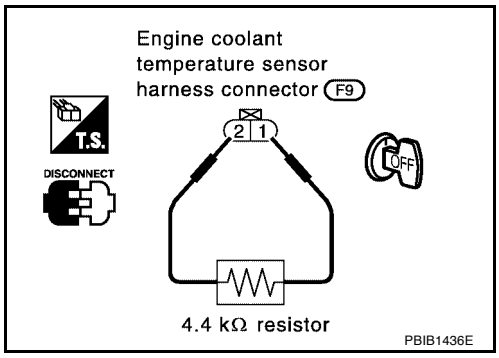
1. Select “ENG COOLANT TEMP” in “ACTIVE TEST” mode.
2. Set “ENG COOLANT TEMP” to 5°C (41°F) by touching “DWN” and “Qd”.

ACTIVE TEST	
ENG COOLANT TEMP	XXX °C
MONITOR	
ENG SPEED	XXX rpm
INJ PULSE-B1	XXX msec
IGN TIMING	XXX BTDC

SEF172Y

Without CONSULT-II

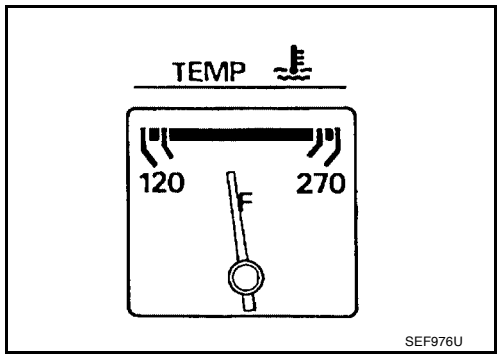
1. Disconnect engine coolant temperature sensor harness connector.
2. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.



>> GO TO 19.

19. CHECK CO%

1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.

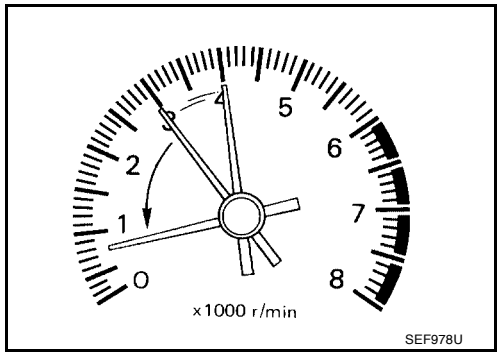


2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
3. Check CO%.

Idle CO: 1.5 - 9.5%

4. **Without CONSULT-II**
After checking CO%,

- Disconnect the resistor from terminals of engine coolant temperature sensor.
- Connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.



OK or NG

OK >> GO TO 10.
NG >> GO TO 20.

20. DETECT MALFUNCTIONING PART

Check the following.

1. Connect heated oxygen sensor 1 harness connectors to heated oxygen sensors 1.
2. Check fuel pressure regulator. Refer to EC-1228 .
3. Check mass air flow sensor and its circuit. Refer to EC-1335 .
4. Check injector and its circuit. Refer to EC-1725 .
Clean or replace if necessary.
5. Check engine coolant temperature sensor and its circuit. Refer to EC-1356 .
6. Check ECM function by substituting another known-good ECM.
(ECM may be the cause of an incident, but this is a rare case.)

>> GO TO 2.

Fast Idle Cam (FIC) Inspection and Adjustment

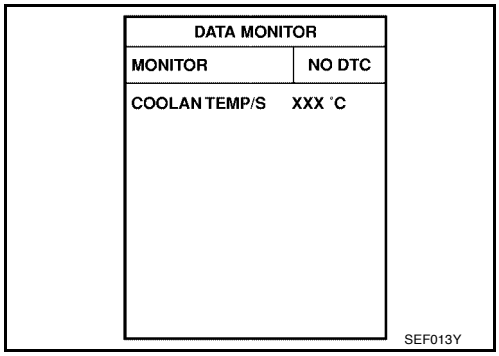
UBS00DRV

OPERATION PROCEDURE

With CONSULT-II

1. Turn ignition switch ON.

2. See “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.



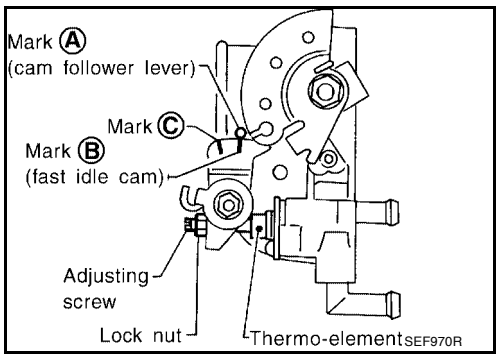
3. When engine coolant temperature is 20 to 30°C (68 to 86°F), make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.

- If NG, adjust by turning adjusting screw.

Lock nut

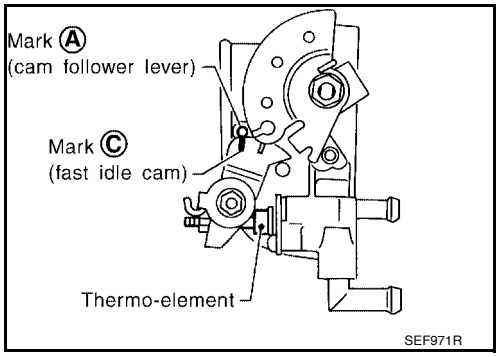
: 0.98 - 1.96 N·m (10 - 20 kg-cm, 8.7 - 17.4 in-lb)

4. Start engine and warm it up.



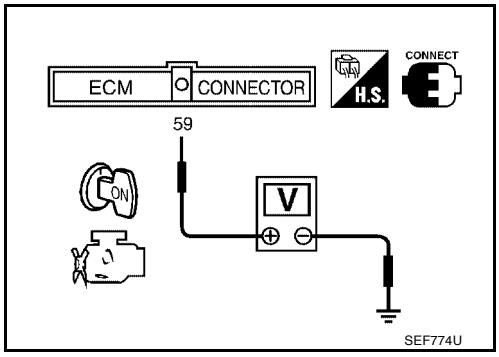
5. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.
   - The center of mark **A** is aligned with mark **C** .
   - The cam follower lever's roller is not touching the fast idle cam.

- If NG, replace thermo-element and perform the above inspection and adjustment again.



With GST

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.



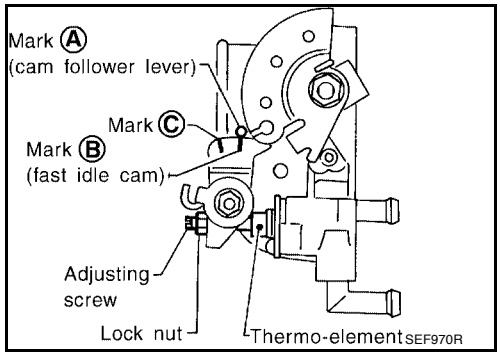
3. When the voltage is between 3.12 to 3.52V, make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.

- If NG, adjust by turning adjusting screw.

Lock nut

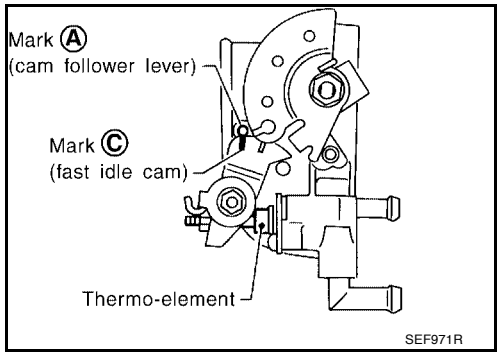
: 0.98 - 1.96 N·m (10 - 20 kg-cm, 8.7 - 17.4 in-lb)

4. Start engine and warm it up.



5. When the voltage is between 1.10 to 1.36V, check the following.
   - The center of mark **A** is aligned with mark **C** .
   - The cam follower lever's roller is not touching the fast idle cam.

- If NG, replace thermo-element and perform the above inspection and adjustment again.



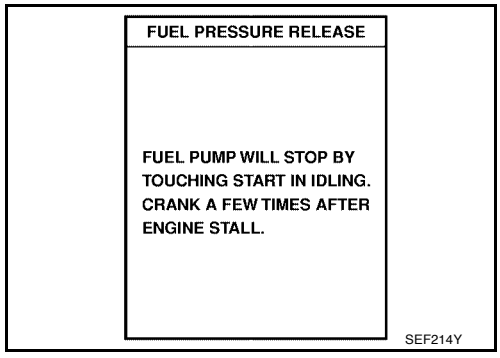
Fuel Pressure Check

UBS00DRW

FUEL PRESSURE RELEASE

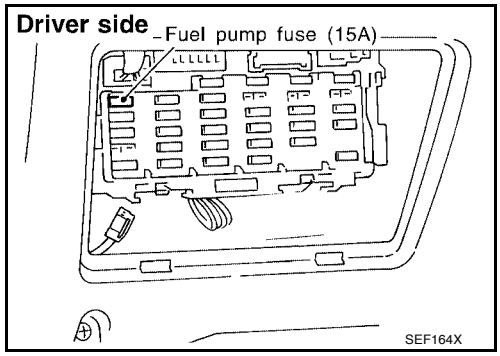
With CONSULT-II

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

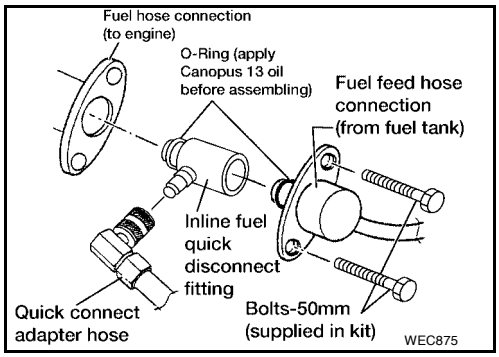
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

NOTE:

- **Use Fuel Pressure Gauge Kit J-44321 to check fuel pressure.**

- **Do not perform fuel pressure check with electrical system operating (i.e. lights, A/C etc.). Fuel pressure gauge may indicate false readings due to varying engine loads and changes in manifold vacuum.**

1. Release fuel pressure to zero.
2. Install the inline fuel quick disconnect fitting between the connection of the fuel feed hose (from tank) and the fuel hose (to engine).
3. Connect the fuel pressure test gauge (quick connect adapter hose) to the quick disconnect fitting.
4. Turn ignition switch ON and check for fuel leakage.
5. Start engine and check for fuel leakage.
6. Read the indication of fuel pressure gauge.



At idling:

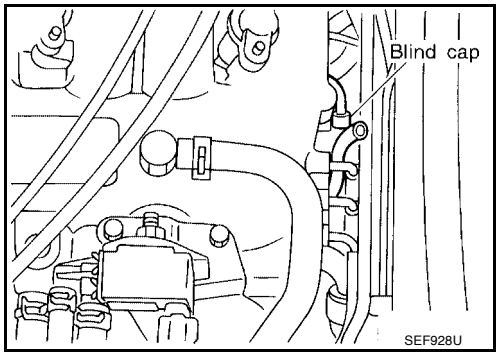
With vacuum hose connected	**Approximately 235 kPa (2.4 kg/cm^2 , 34 psi)**
With vacuum hose disconnected	**Approximately 294 kPa (3.0 kg/cm^2 , 43 psi)**

If results are unsatisfactory, perform Fuel Pressure Regulator Check.

Fuel Pressure Regulator Check

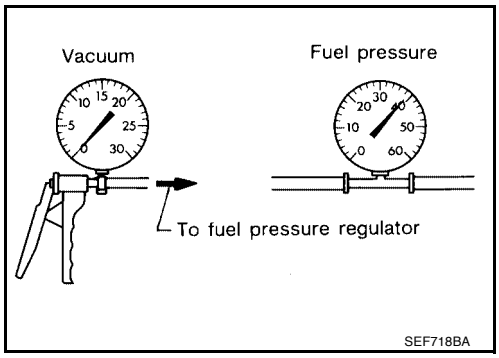
UBS00DRX

1. Stop engine and disconnect fuel pressure regulator vacuum hose from intake manifold.
2. Plug intake manifold 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

UBS00DRY

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.

X: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
CONSULT-II	×	×	×	×	×	—
GST	×	×*	×	—	×	×

*: 1st trip DTCs for self-diagnoses concerning SRT items cannot be shown on the GST display.

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-1255 .)

Two Trip Detection Logic

UBS00DRZ

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.

X: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnosis (refer to EC-1194 .)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

Emission-related Diagnostic Information

UBS00DS0

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1 *2 CONSULT-II GST	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	—	—	—	—
HO2S1 HTR (B1)	P0031	×	×	×*4	EC-1313
HO2S1 HTR (B1)	P0032	×	×	×*4	EC-1313
SCB/V CONT SOL/V	P0034	—	—	×	EC-1321
HO2S2 HTR (B1)	P0037	×	×	×*4	EC-1327
HO2S2 HTR (B1)	P0038	×	×	×*4	EC-1327
HO2S1 HTR (B2)	P0051	×	×	×*4	EC-1313
HO2S1 HTR (B2)	P0052	×	×	×*4	EC-1313
HO2S2 HTR (B2)	P0057	×	×	×*4	EC-1327
HO2S2 HTR (B2)	P0058	×	×	×*4	EC-1327
MAF SEN/CIRCUIT	P0101	—	—	×	EC-1335
MAF SEN/CIRCUIT	P0102	—	—	—	EC-1343
MAF SEN/CIRCUIT	P0103	—	—	—	EC-1343
IAT SEN/CIRCUIT	P0112	—	—	—	EC-1350
IAT SEN/CIRCUIT	P0113	—	—	—	EC-1350
ECT SEN/CIRCUIT	P0117	—	—	—	EC-1356
ECT SEN/CIRCUIT	P0118	—	—	—	EC-1356
TP SEN/CIRCUIT	P0121	—	—	×	EC-1362
TP SEN/CIRCUIT	P0122	—	—	—	EC-1371
TP SEN/CIRCUIT	P0123	—	—	—	EC-1371
ECT SENSOR	P0125	—	—	×	EC-1379
IAT SENSOR	P0127	—	—	×	EC-1382
THERMSTAT FNCTN	P0128	—	—	×	EC-1385
HO2S1 (B1)	P0132	—	×	×	EC-1387
HO2S1 (B1)	P0133	×	×	×*4	EC-1396
HO2S1 (B1)	P0134	—	×	×	EC-1408
HO2S2 (B1)	P0138	—	×	×	EC-1418
HO2S2 (B1)	P0139	×	×	×*4	EC-1427
HO2S1 (B2)	P0152	—	×	×	EC-1387
HO2S1 (B2)	P0153	×	×	×*4	EC-1396
HO2S1 (B2)	P0154	—	×	×	EC-1408
HO2S2 (B2)	P0158	—	×	×	EC-1418
HO2S2 (B2)	P0159	×	×	×*4	EC-1427
FUEL SYS-LEAN-B1	P0171	—	—	×	EC-1437
FUEL SYS-RICH-B1	P0172	—	—	×	EC-1445
FUEL SYS-LEAN-B2	P0174	—	—	×	EC-1437
FUEL SYS-RICH-B2	P0175	—	—	×	EC-1445

Items (CONSULT-II screen terms)	DTC*1 *2 CONSULT-II GST	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
FTT SENSOR	P0181	—	—	×	EC-1452
FTT SEN/CIRCUIT	P0182	—	—	×	EC-1457
FTT SEN/CIRCUIT	P0183	—	—	×	EC-1457
ENG OVER TEMP	P0217	—	—	×	EC-1461
SC FUNCTION	P0299	—	—	×	EC-1466
MULTI CYL MISFIRE	P0300	—	—	×	EC-1469
CYL1 MISFIRE	P0301	—	—	×	EC-1469
CYL2 MISFIRE	P0302	—	—	×	EC-1469
CYL3 MISFIRE	P0303	—	—	×	EC-1469
CYL4 MISFIRE	P0304	—	—	×	EC-1469
CYL5 MISFIRE	P0305	—	—	×	EC-1469
CYL6 MISFIRE	P0306	—	—	×	EC-1469
KNOCK SEN/CIRC-B1	P0327	—	—	×	EC-1477
KNOCK SEN/CIRC-B1	P0328	—	—	×	EC-1477
CKP SEN/CIRCUIT	P0335	—	—	×	EC-1481
CMP SEN/CIRCUIT	P0340	—	—	×	EC-1487
TW CATALYST SYS-B1	P0420	×	×	×*4	EC-1494
TW CATALYST SYS-B2	P0430	×	×	×*4	EC-1494
EVAP PURG FLOW/MON	P0441	×	×	×*4	EC-1500
EVAP SMALL LEAK	P0442	×	×	×*4	EC-1508
PURG VOLUME CONT/V	P0444	—	—	×	EC-1520
PURG VOLUME CONT/V	P0445	—	—	×	EC-1520
VENT CONTROL VALVE	P0447	—	—	×	EC-1527
EVAP SYS PRES SEN	P0452	—	—	×	EC-1533
EVAP SYS PRES SEN	P0453	—	—	×	EC-1539
EVAP GROSS LEAK	P0455	—	×	×	EC-1547
EVAP VERY SML LEAK	P0456	×*3	×	×*4	EC-1556
FUEL LEV SEN SLOSH	P0460	—	—	×	EC-1567
FUEL LEVEL SENSOR	P0461	—	—	×	EC-1571
FUEL LEVL SEN/CIRC	P0462	—	—	×	EC-1573
FUEL LEVL SEN/CIRC	P0463	—	—	×	EC-1573
VEH SPEED SEN/CIRC	P0500	—	—	×	EC-1577
ISC SYSTEM/CIRC	P0505	—	—	×	EC-1582
CLOSED TP SW/CIRC	P0510	—	—	×	EC-1589
A/T COMM LINE	P0600	—	—	—	EC-1596
ECM	P0605	—	—	×	EC-1602
PNP SW/CIRC	P0705	—	—	×	AT-249
ATF TEMP SEN/CIRC	P0710	—	—	×	AT-255
VEH SPD SEN/CIR AT	P0720	—	—	×	AT-261
ENGINE SPEED SIG	P0725	—	—	×	AT-266
A/T 1ST GR FNCTN	P0731	—	—	×	AT-270
A/T 2ND GR FNCTN	P0732	—	—	×	AT-276

Items (CONSULT-II screen terms)	DTC*1 *2 CONSULT-II GST	SRT code	Test value/ Test limit (GST only)	1st trip DTC*1	Reference page
A/T 3RD GR FNCTN	P0733	—	—	×	AT-281
A/T 4TH GR FNCTN	P0734	—	—	×	AT-286
TCC SOLENOID/CIRC	P0740	—	—	×	AT-293
A/T TCC S/V FNCTN	P0744	—	—	×	AT-298
L/PRESS SOL/CIRC	P0745	—	—	×	AT-306
SFT SOL A/CIRC	P0750	—	—	×	AT-311
SFT SOL B/CIRC	P0755	—	—	×	AT-316
HO2S1 (B1)	P1143	×	×	×*4	EC-1604
HO2S1 (B1)	P1144	×	×	×*4	EC-1610
HO2S2 (B1)	P1146	×	×	×*4	EC-1617
HO2S2 (B1)	P1147	×	×	×*4	EC-1628
CLOSED LOOP-B1	P1148	—	—	—	EC-1639
HO2S1 (B2)	P1163	×	×	×*4	EC-1604
HO2S1 (B2)	P1164	×	×	×*4	EC-1610
HO2S2 (B2)	P1166	×	×	×*4	EC-1617
HO2S2 (B2)	P1167	×	×	×*4	EC-1628
CLOSED LOOP-B2	P1168	—	—	×	EC-1639
ENG OVER TEMP	P1217	—	—	×	EC-1641
CKP SENSOR (COG)	P1336	—	—	×	EC-1645
EVAP SMALL LEAK	P1442	×	×	×*4	EC-1650
PURG VOLUME CONT/V	P1444	—	—	×	EC-1652
VENT CONTROL VALVE	P1446	—	—	×	EC-1661
VENT CONTROL VALVE	P1448	—	—	×	EC-1667
EVAP VERY SML LEAK	P1456	×*3	×	×*4	EC-1675
FUEL LEVEL SEN/CIRC	P1464	—	—	×	EC-1685
VC/V BYPASS/V	P1490	—	—	×	EC-1688
VC CUT/V BYPASS/V	P1491	—	—	×	EC-1694
A/T DIAG COMM LINE	P1605	—	—	×	EC-1706
TP SEN/CIRC A/T	P1705	—	—	×	AT-321
P-N POS SW/CIRCUIT	P1706	—	—	×	EC-1712
O/R CLTCH SOL/CIRC	P1760	—	—	×	AT-329

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: SRT code will not be set if the self-diagnostic result is NG.
*4: This is not displayed with GST.

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 consec-

utive 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 EC-1241, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
For malfunctions in which 1st trip DTCs are displayed, refer to EC-1230, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" . These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.
1st trip DTC is specified in Mode 7 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step II, refer to EC-1250, "WORK FLOW" . Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

With CONSULT-II

With GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P0705, P0750, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, GST do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.**

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.
If the DTC is being detected currently, the time data will be [0].
If a 1st trip DTC is stored in the ECM, the time data will be [1t].

DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	1t

PBIB0911E

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed and absolute pressure 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-1287, "Freeze Frame Data and 1st Trip Freeze Frame Data" .
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/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 - P0306 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 EC-1241, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Mode 1 of SAE J1979.
As part of enhanced emissions test for Inspection and Maintenance (I/M), certain states require that 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 and 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 following table shows required self-diagnostic items to set the SRT to “CMPLT”.

SRT item (CONSULT-II indication)	Performance Priority *	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420, P0430
EVAPRATIVE SYSTEM	1	EVAP control system	P0442, P1442
	2	EVAP control system	P0456, P1456
	2	EVAP control system purge flow monitoring	P0441
HO2S	2	Heated oxygen sensor 1	P0133, P0153
		Heated oxygen sensor 1	P1143, P1163
		Heated oxygen sensor 1	P1144, P1164
		Heated oxygen sensor 2	P0139, P0157
		Heated oxygen sensor 2	P1146, P1166
		Heated oxygen sensor 2	P1147, P1167

SRT item (CONSULT-II indication)	Performance Priority *	Required self-diagnostic items to set the SRT to "CMPLT"	Corresponding DTC No.
HO2S HEATER	2	Heated oxygen sensor 1 heater	P0031, P0032, P0051, P0052
		Heated oxygen sensor 2 heater	P0037, P0038, P0057, P0058

*: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure) one by one based on the priority for models with CONSULT-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 OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF	Ignition OFF – ON – OFF
All OK	Case 1	P0400	OK (1)	– (1)	OK (2)	– (2)
		P0402	OK (1)	– (1)	– (1)	OK (2)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	"CMPLT"	"CMPLT"	"CMPLT"	"CMPLT"
	Case 2	P0400	OK (1)	– (1)	– (1)	– (1)
		P0402	– (0)	– (0)	OK (1)	– (1)
		P1402	OK (1)	OK (2)	– (2)	– (2)
		SRT of EGR	"INCMP"	"INCMP"	"CMPLT"	"CMPLT"
NG exists	Case 3	P0400	OK	OK	–	–
		P0402	–	–	–	–
		P1402	NG	–	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	–	1st trip DTC	DTC (=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 OK.
–: Self-diagnosis is not carried out.

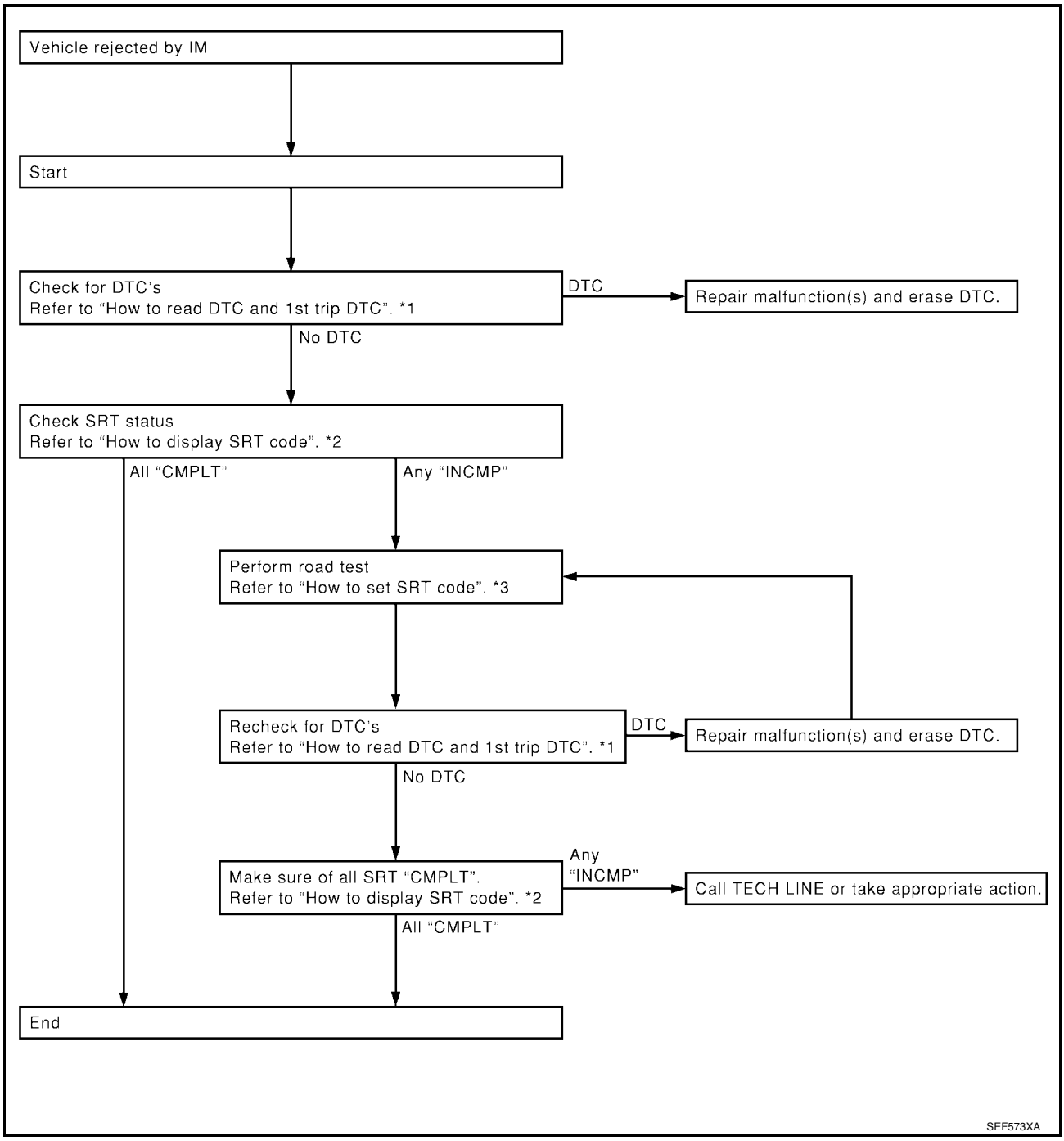
When all SRT related self-diagnoses showed OK results in a same cycle (Ignition OFF – ON – OFF), the SRT will indicate "CMPLT". → Case 1 above
When all SRT related self-diagnoses show OK results through several different cycles, the SRT will indicate "CMPLT" at the time the respective self-diagnoses 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 and 2) or two (2) for one self-diagnosis (Case 3). However, in preparation for the State emissions inspection, it is unnecessary of 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 result.
- 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 following flowchart diagnostic sequence on the next page.



*1 EC-1233 *2 EC-1237 *3 EC-1237

How to Display SRT Code

WITH CONSULT-II

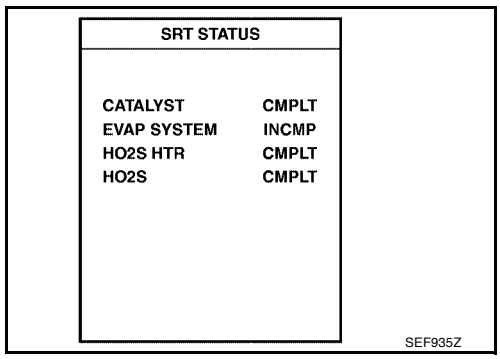
Selecting “SRT STATUS” in “DTC CONFIRMATION” mode with CONSULT-II.

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 below.

“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

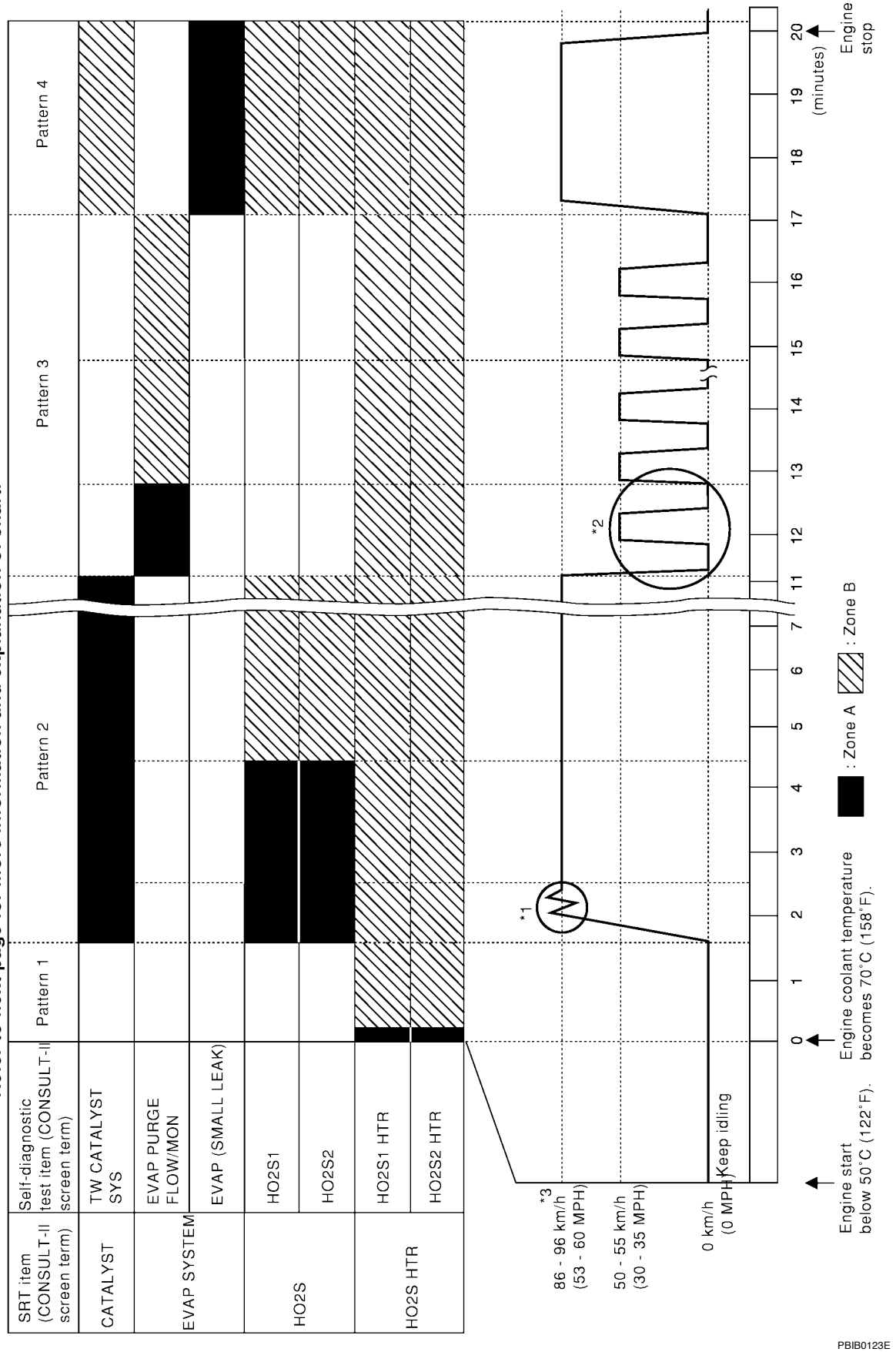
Perform corresponding DTC confirmation procedure one by one based on Performance Priority in the table on EC-1234 .

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

Driving pattern **Note: Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.**
Refer to next page for more information and explanation of chart.



PBIB0123E

- 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 59 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 59 and ground is lower than 1.4V).**
- **The engine is started at the tank fuel temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 60 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:

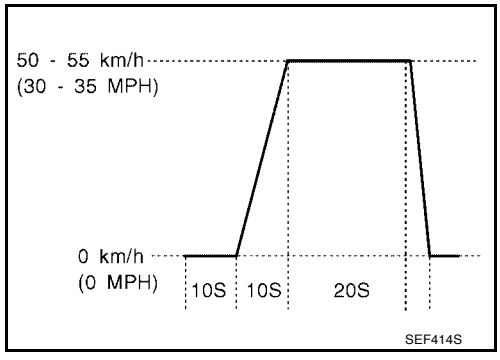
- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

*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 below at least 10 times.

– **During acceleration, hold the accelerator pedal as steady as possible.**

*3: Checking the vehicle speed with CONSULT-II or 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.
Suggested upshift speeds for M/T models
Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:	For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	24 (15)
2nd to 3rd	40 (25)	40 (25)
3rd to 4th	64 (40)	64 (40)
4th to 5th	72 (45)	72 (45)

Suggested Maximum Speed in Each Gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.
Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	km/h (MPH) 2WD (AUTO mode)
1st	50 (30)
2nd	95 (60)

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.
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.

Item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit	Conversion
			TID	CID		
CATALYST	Three way catalyst function (Bank 1)	P0420	01H	01H	Max.	1/128
		P0420	02H	81H	Min.	1
	Three way catalyst function (Bank 2)	P0430	03H	02H	Max.	1/128
		P0430	04H	82H	Min.	1
EVAP SYSTEM	EVAP control system (Small leak)	P0442	05H	03H	Max.	1/128mm^2
	EVAP control system purge flow monitoring	P0441	06H	83H	Min.	20mV
	EVAP control system (Very small leak)	P0456	07H	03H	Max.	1/128mm^2
		P1456	07H	03H	Max.	1/128mm^2

Item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit	Conversion
			TID	CID		
HO2S	Heated oxygen sensor 1 (bank 1)	P0133	09H	04H	Max.	16ms
		P1143	0AH	84H	Min.	10mV
		P1144	0BH	04H	Max.	10mV
		P0132	0CH	04H	Max.	10mV
		P0134	0DH	04H	Max.	1s
	Heated oxygen sensor 1 (bank 2)	P0153	11H	05H	Max.	16ms
		P1163	12H	85H	Min.	10mV
		P1164	13H	05H	Max.	10mV
		P0152	14H	05H	Max.	10mV
		P0154	15H	05H	Max.	1s
	Heated oxygen sensor 2 (bank 1)	P0139	19H	86H	Min.	10mV/500ms
		P1147	1AH	86H	Min.	10mV
		P1146	1BH	06H	Max.	10mV
		P0138	1CH	06H	Max.	10mV
	Heated oxygen sensor 2 (bank 2)	P0159	21H	87H	Min.	10mV/500ms
		P1167	22H	87H	Min.	10mV
		P1166	23H	07H	Max.	10mV
		P0158	24H	07H	Max.	10mV
HO2S HEATER	Heated oxygen sensor 1 (bank 1)	P0032	29H	08H	Max.	20mV
		P0031	2AH	88H	Min.	20mV
	Heated oxygen sensor 1 (bank 2)	P0052	2BH	09H	Max.	20mV
		P0051	2CH	89H	Min.	20mV
	Heated oxygen sensor 2 (bank 1)	P0038	2DH	0AH	Max.	20mV
		P0037	2EH	8AH	Min.	20mV
	Heated oxygen sensor 2 (bank 2)	P0058	2FH	0BH	Max.	20mV
		P0057	30H	8BH	Min.	20mV

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC

With CONSULT-II

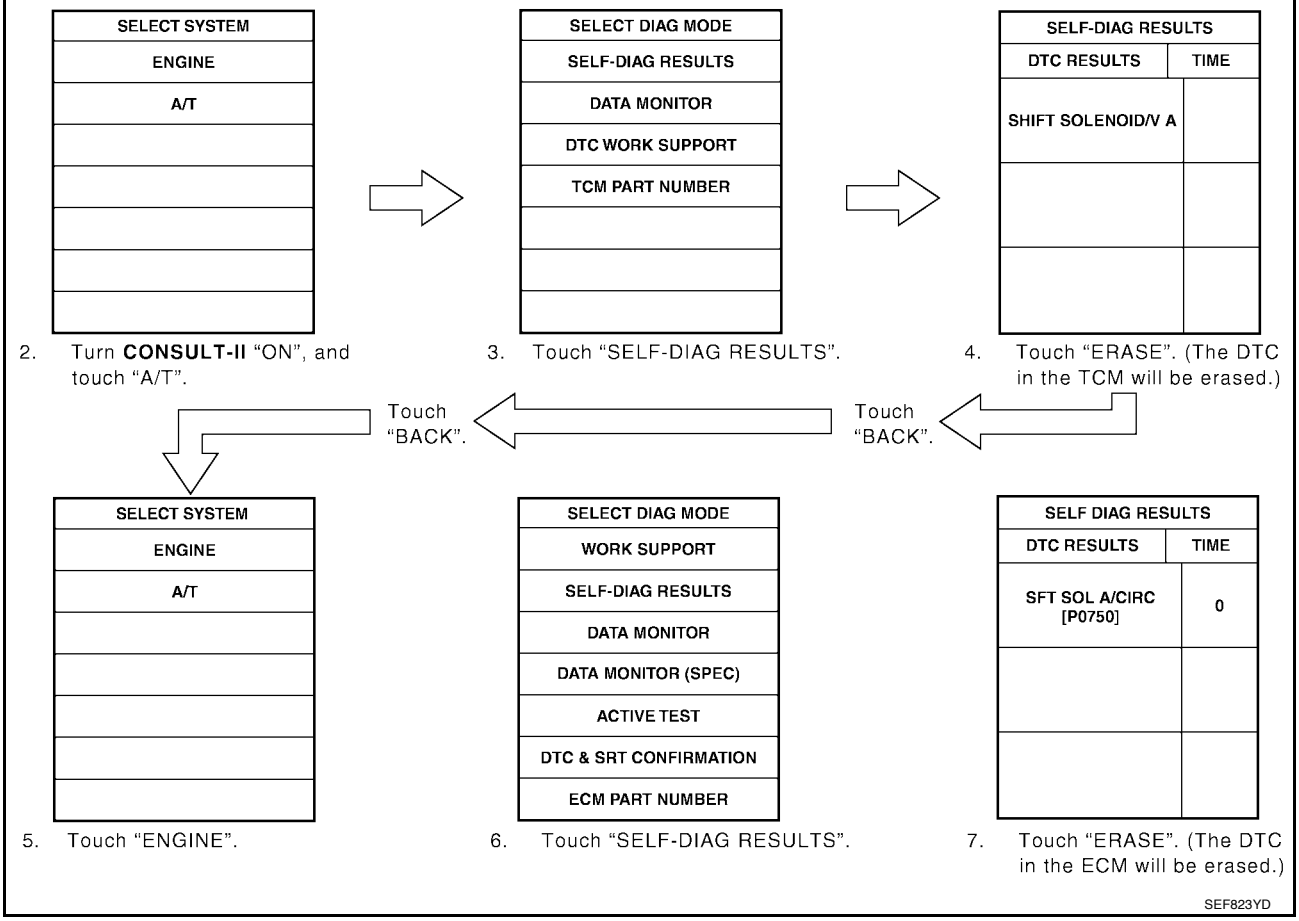
NOTE:
If the DTC is not for A/T related items (see EC-1194), skip steps 2 through 4.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 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.)

- 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).

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 5 seconds and then turn it "ON" (engine stopped) again.



The emission related diagnostic information in the ECM can be erased by selecting "ERASE" in the "SELF-DIAG RESULTS" mode with CONSULT-II.

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-1194), skip step 2.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Perform AT-188 . (The DTC in TCM will be erased.)
3. Select MODE 4 with GST (Generic Scan Tool).

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values
- 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.

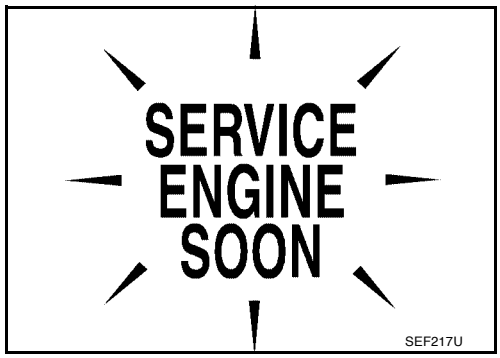
Malfunction Indicator Lamp (MIL)

UBS00DS1

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-25, "WARNING LAMPS" or see EC-1749 .
2. When the engine is started, the MIL should go OFF.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following two 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. (See EC-1749, "MIL AND DATA LINK CONNECTOR")
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. ● Misfire (Possible three way catalyst damage) ● One trip detection diagnosis

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-25, "WARNING LAMPS" or see EC-1749 .

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

MIL	Condition
ON	When the malfunction is detected or the ECM's CPU is malfunctioning.
OFF	No malfunction.

OBD System Operation Chart

UBS00DS2

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 “Two Trip Detection Logic” on EC-1229, "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

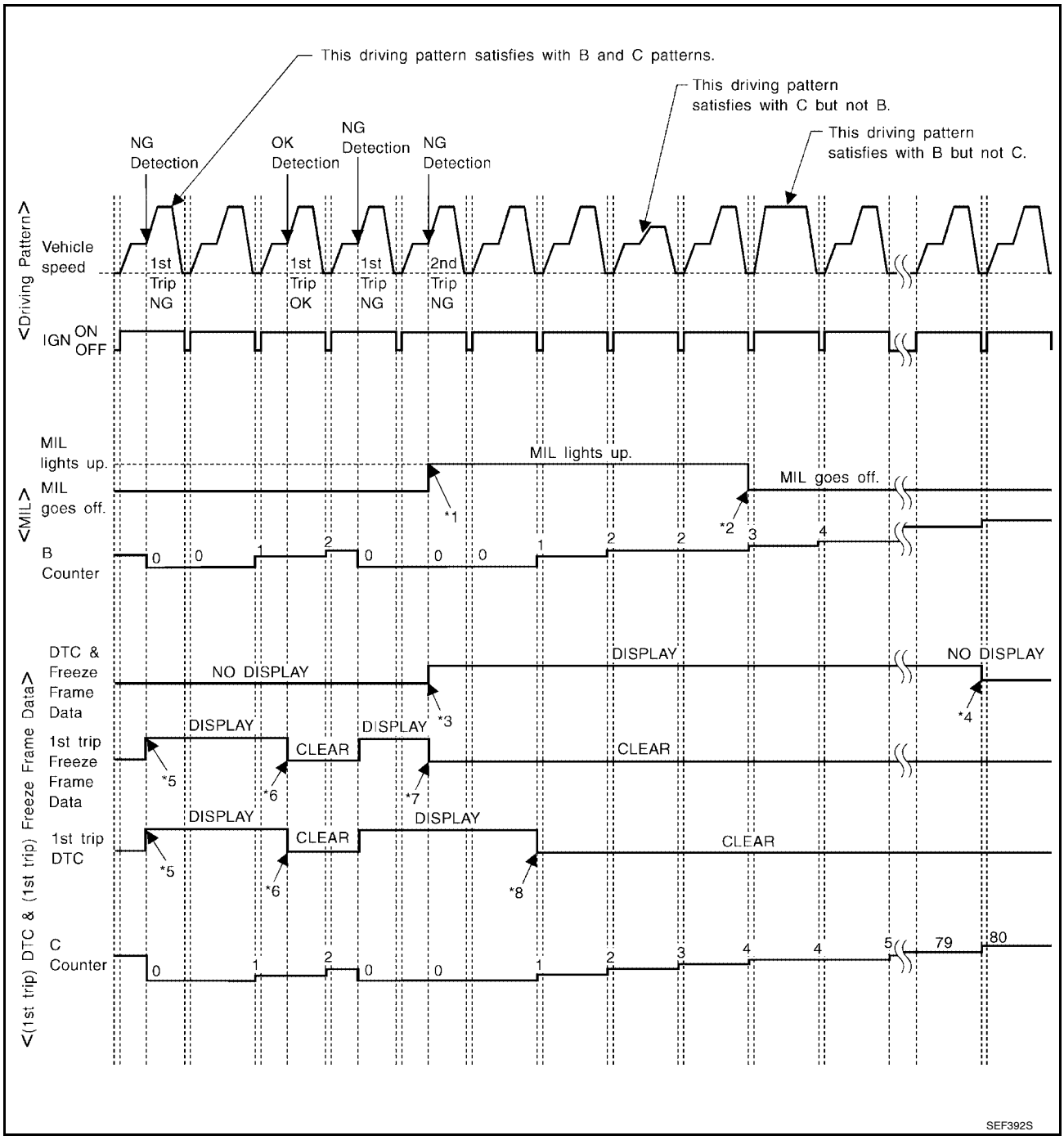
Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1 , *2	*1 , *2	1 (pattern B)

For details about patterns B and C under “Fuel Injection System” and “Misfire”, see EC-1246 .
For details about patterns A and B under “Other”, see EC-1248 .

*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>

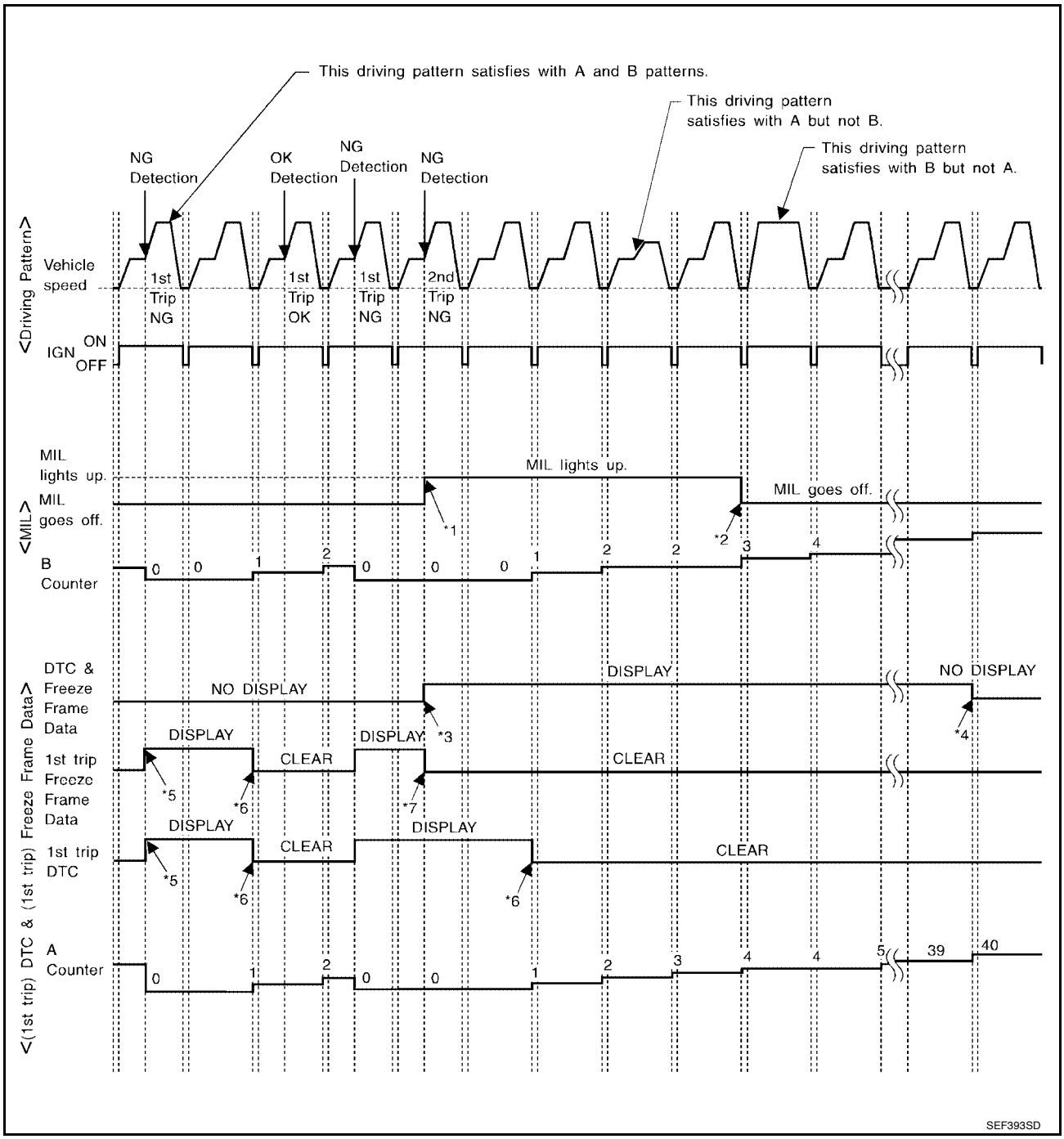
Driving pattern C means the vehicle operation as follows:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature (T) 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 the vehicle conditions described above.
- The C counter will be counted up when the vehicle conditions described above is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"



*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.)

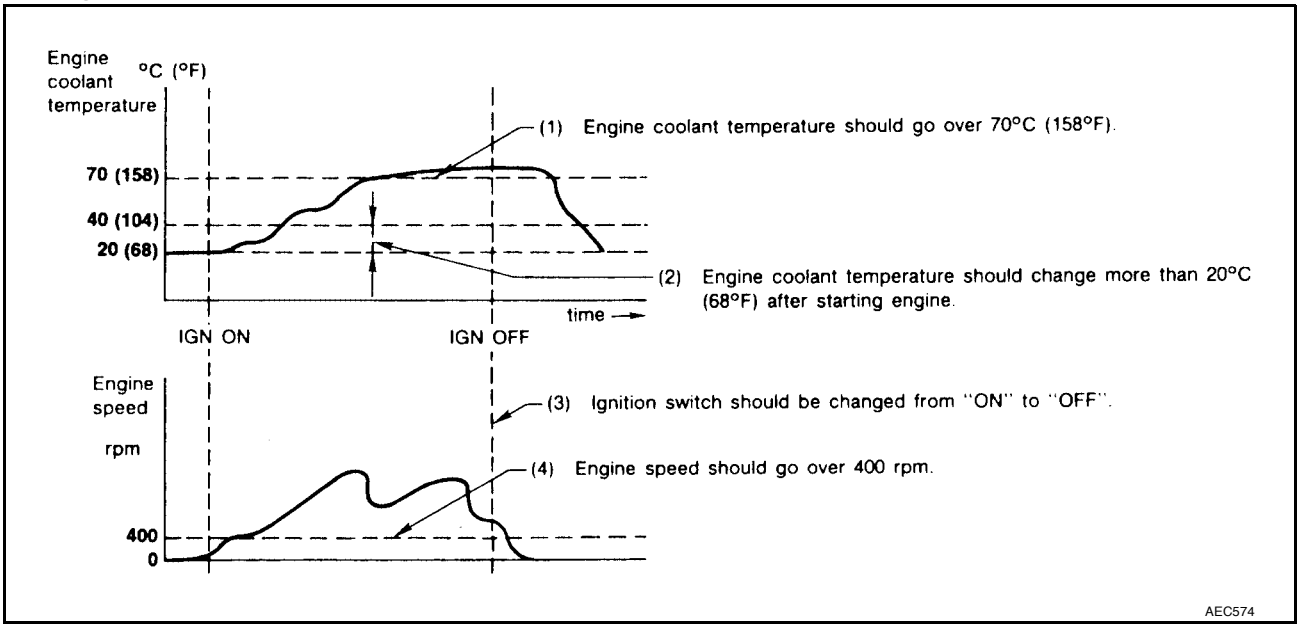
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*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

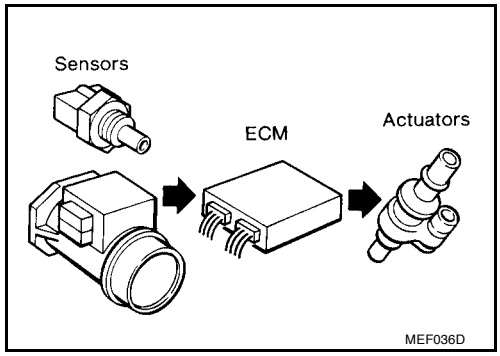
PFP:00004

Trouble Diagnosis Introduction

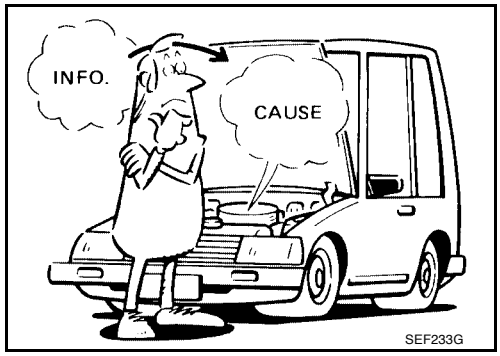
UBS00DS3

INTRODUCTION

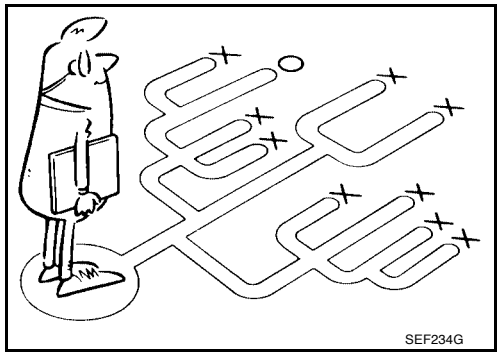
The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, fouled spark plugs, or other malfunctions with the engine.



It is much more difficult to diagnose a incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

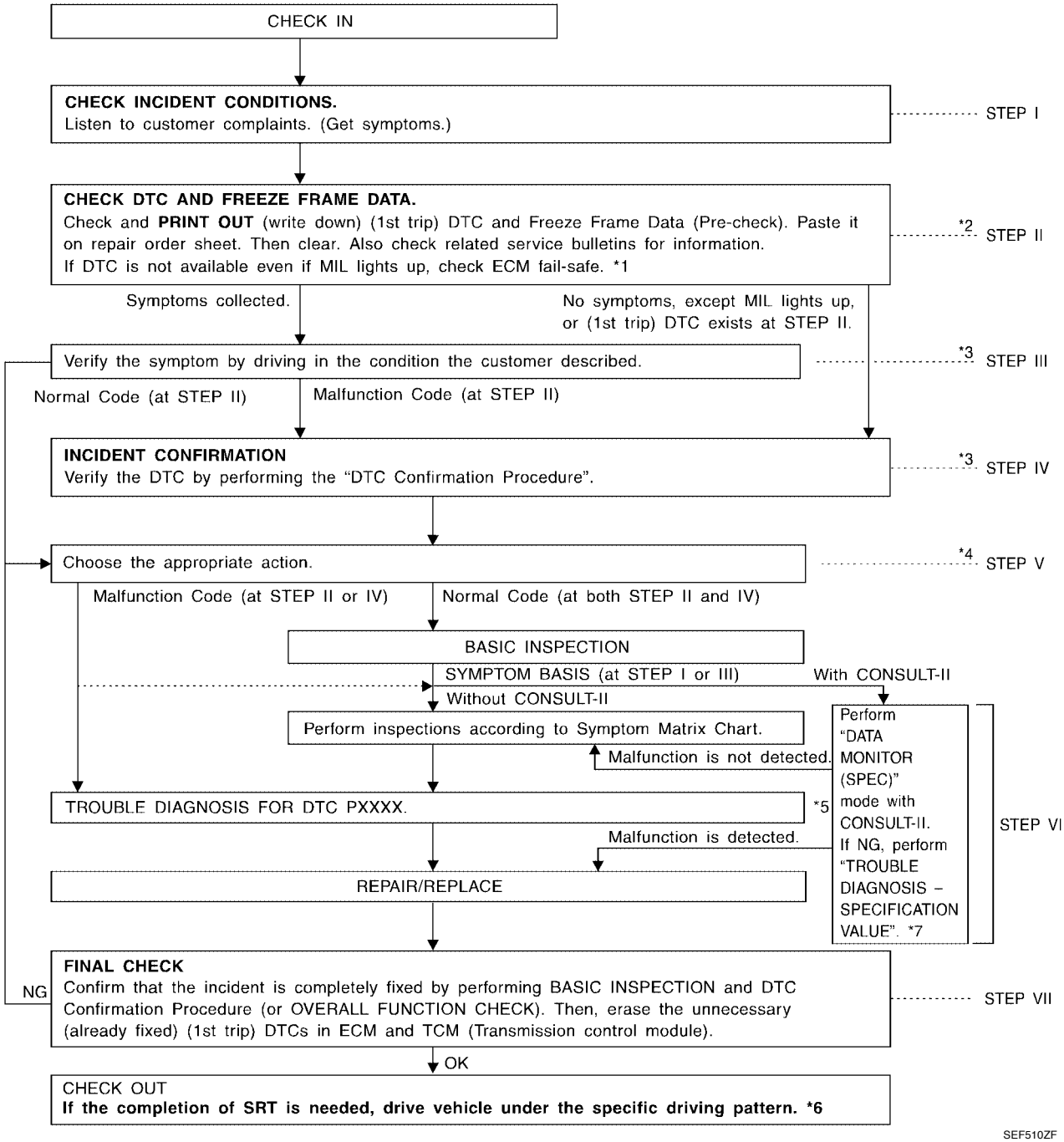


A visual check only may not find the cause of the incidents. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the Work Flow on EC-1250 .
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on next page should be used.
Start your diagnosis by looking for conventional malfunctions first. This will help troubleshoot driveability malfunctions on an electronically controlled engine vehicle.



WORK FLOW

Flow Chart



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*1 If time data of "SELF-DIAG RESULTS" is other than [0] or [1t], perform EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*2 If the incident cannot be verified, perform EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*3 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-1306, "POWER SUPPLY AND GROUND CIRCUIT" .

*4 If malfunctioning part cannot be detected, perform EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*5 EC-1238, "Driving Pattern".

*6 EC-1301, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE".

Description For Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the EC-1252, "DIAGNOSTIC WORKSHEET" .
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-1241 .) 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-1305, "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-1268 .) 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-1305, "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-1305, "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-1255 .) If CONSULT-II is available, perform “DATA MONITOR (SPEC)” mode with CONSULT-II and proceed to the EC-1301, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" . (If malfunction is detected, proceed to REPAIR/REPLACE.) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-1268 .)
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-1276 , EC-1296 . 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 GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident" . Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform EC-1305, "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 different method 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 toEC-1241 and AT-187)

DIAGNOSTIC WORKSHEET

Description

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make trouble-shooting faster and more accurate.
In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.
Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

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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	

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DTC Inspection Priority Chart

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If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	● P0101, P0102, P0103 Mass air flow sensor ● P0112, P0113, P0127 Intake air temperature sensor ● P0117, P0118, P0125 Engine coolant temperature sensor ● P0121, P0122, P0123 Throttle position sensor ● P0181, P0182, P0183 Fuel tank temperature sensor ● P0327, P0328 Knock sensor ● P0335 P1336 CKP sensor (OBD) ● P0340 CMP sensor ● P0460 P0461 P1464 Fuel level sensor ● P0500 VSS ● P0600 A/T control ● P0605 ECM ● P1605 A/T diagnosis communication line ● P1706 PNP switch
2	● P0132-P0134, P1143, P1144/P0152-P0154, P1163, P1164 HO2S1 ● P0031, P0032/P0051, P0052 HO2S1 heater ● P0138, P0139, P1146, P1147/P0158, P0159, P1166, P1167 HO2S2 ● P0037, P0038/P0057, P0058 HO2S2 heater ● P0217 Engine coolant overtemperature enrichment protection ● P0444, P0445, P1444 EVAP canister purge volume control solenoid valve ● P0447, P1446, P1448 EVAP canister vent control valve ● P0452, P0453 EVAP control system pressure sensor ● P0510 CTP switch ● P0705-P0755, P1705, P1760 A/T related sensors, solenoid valves and switches ● P0456, P1456 EVAP control system ● P0441 EVAP control system purge flow monitoring ● P1490 P1491 Vacuum cut valve bypass valve
3	● P0171, P0172, P0174, P0175 Fuel injection system function ● P0306 - P0300 Misfire ● P0420, P0430 Three way catalyst function ● P0442/P1442 EVAP control system ● P0455 EVAP control system ● P0505 ISC valve ● P0731-P0734 P0744 A/T function ● P1148, P1168 Closed loop control

Fail-safe Chart

UBS00DS5

When the DTC listed below is detected, the ECM enters the fail-sate mode and the MIL illuminates.

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-II display)
		Just as ignition switch is turned ON or START	40°C (104°F)
		More than approx. 4 minutes after ignition ON or START	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
P0122 P0123	Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
		Condition	Driving condition
		When engine is idling	Normal
		When accelerating	Poor acceleration
Unable to access ECM	ECM	**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 IACV-AAC valve operation are controlled under certain limitations.	
			ECM fail-safe operation
		Engine speed	**Engine speed will not rise more than 3,000 rpm**
		Fuel injection	Simultaneous multiport fuel injection system
		Ignition timing	Ignition timing is fixed at the preset value
		Fuel pump	Fuel pump relay is ON when engine is running and OFF when engine stalls
		IACV-AAC valve	Full open
		Replace ECM, if ECM fail-safe condition is confirmed.	

Basic Inspection

UBS00DS6

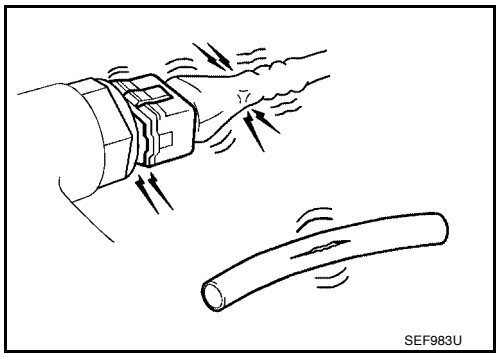
Precaution:
Perform Basic Inspection without electrical or mechanical loads applied;

- Headlamp switch is OFF,
- Air conditioner switch is OFF,
- Rear window defogger switch is OFF,
- Steering wheel is in the straight-ahead position, etc.

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related incident, or the current need for scheduled maintenance.
2. Open engine hood and check the following:

- Harness connectors for improper connections
- Vacuum hoses for splits, kinks, or improper connections
- Wiring for improper connections, pinches, or cuts


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With CONSULT-II>>GO TO 2.
With GST>>GO TO 2.
With No Tools>> GO TO 15.

2. CONNECT CONSULT-II OR GST TO THE VEHICLE

With CONSULT-II
Connect CONSULT-II to the data link connector for CONSULT-II and select “ENGINE” from the menu. Refer to EC-1286, "INSPECTION PROCEDURE" .

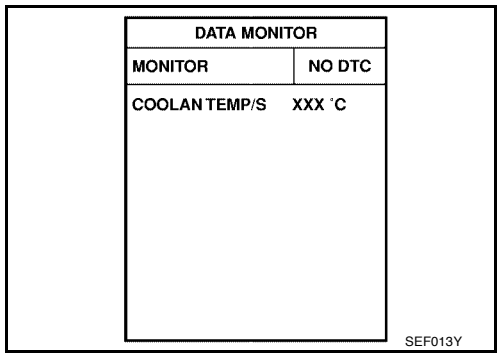
With GST
Connect GST to the data link connector for GST.
Refer to EC-1295, "INSPECTION PROCEDURE" .

With CONSULT-II>>GO TO 3.
With GST>>GO TO 14.

3. CHECK FI CAM FUNCTION

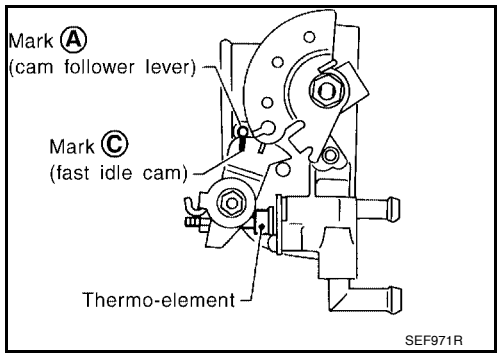
With CONSULT-II

1. Turn ignition switch ON.
2. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
3. Start engine and warm it up.



4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

- The center of mark **A** is aligned with mark **C** .
- The cam follower lever's roller is not touching the fast idle cam.



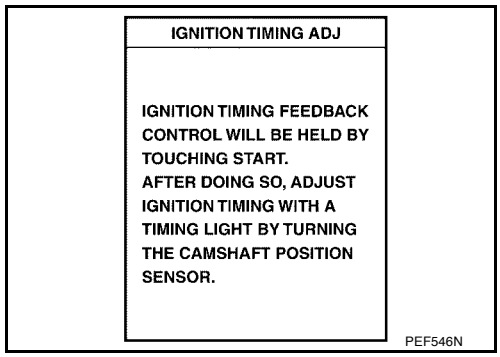
OK or NG

OK >> GO TO 4.
NG >> 1. Check FI cam. Refer to EC-1225, "Fast Idle Cam (FIC) Inspection and Adjustment" .
2. GO TO 4.

4. CHECK IGNITION TIMING

With CONSULT-II

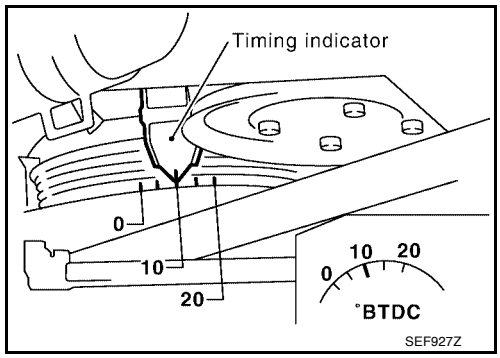
1. Warm up engine to normal operating temperature.
2. Select “IGNITION TIMING ADJ” in “WORK SUPPORT” mode and touch “START”.



3. Check ignition timing at idle using a timing light.

M/T: 10±5° BTDC (in Neutral position)

A/T: 10±5° BTDC (in P or N position)



OK or NG

OK >> GO TO 5.
NG >> 1. Adjust ignition timing by turning distributor. Refer to EC-1214, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" .
2. GO TO 5.

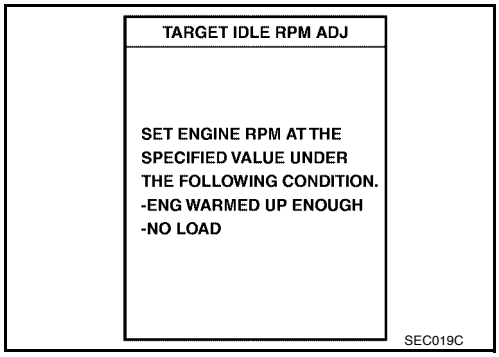
5. CHECK BASE IDLE SPEED

With CONSULT-II

1. Select “TARGET IDLE RPM ADJ” in “WORK SUPPORT” mode and touch “START”.
2. Check idle speed.

M/T: 700±50 rpm (in Neutral position)

A/T: 700±50 rpm (in P or N position)



OK or NG

OK >> GO TO 6.

NG >> 1. Adjust engine speed by turning idle speed adjusting screw. Refer to EC-1214, "Idle Speed/Ignition Timing/ Idle Mixture Ratio Adjustment" .

2. GO TO 6.

6. CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I

With CONSULT-II

NOTE:
Always check ignition timing and base idle speed before performing the following.

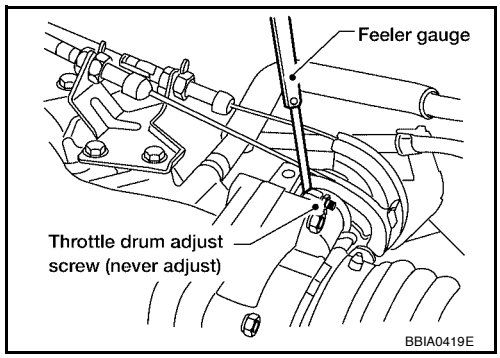
1. Warm up engine to normal operating temperature.
2. Check FI cam, refer to procedure 3.
3. Stop engine.

>> GO TO 7.

7. CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Turn ignition switch ON.
2. Select “TP SW/TP SEN IDLE POSI ADJ” in “WORK SUPPORT” mode.
3. Read “CLSD THL/P SW” signal under the following conditions.

- Insert a 0.3 mm (0.012 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure and check the signal.



TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91°C
CLSD THL POS	ON
CLSD THL/P SW	ON

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“CLSD THL/P SW” signal should remain “ON” while inserting 0.3 mm (0.012 in) feeler gauge.
“CLSD THL/P SW” signal should remain “OFF” while inserting 0.4 mm (0.016 in) feeler gauge.

OK or NG

OK >> GO TO 12.
NG >> GO TO 8.

8. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

With CONSULT-II

NOTE:

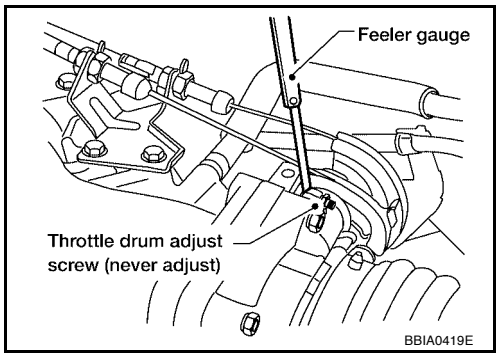
- **Never adjust throttle adjust screw (TAS).**
- **Do not touch throttle drum when checking “CLSD THL/P SW” signal, doing so may cause an incorrect adjustment.**

1. Warm up engine to normal operating temperature.
2. Check FI cam. Refer to procedure 3.
3. Stop engine.
4. Loosen throttle position sensor fixing bolts.

>> GO TO 9.

9. ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Turn ignition switch ON.
2. Select “TP SW/TP SEN IDLE POSI ADJ” in “WORK SUPPORT” mode.
3. Insert 0.35 mm (0.0138 in) feeler gauge between throttle adjust screw and throttle drum as shown in the figure.
4. Open throttle valve and then close.



5. Check “CLSD THL/P SW” signal.
   “CLSD THL/P SW” signal should remain “OFF” when the throttle valve is closed.

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91°C
CLSD THL POS	ON
CLSD THL/P SW	ON

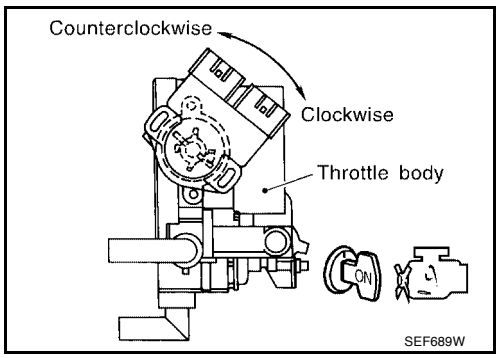
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10. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

With CONSULT-II

Turn throttle position sensor body counterclockwise until “CLSD THL/P SW” signal switches to “OFF”.

>> GO TO 11.



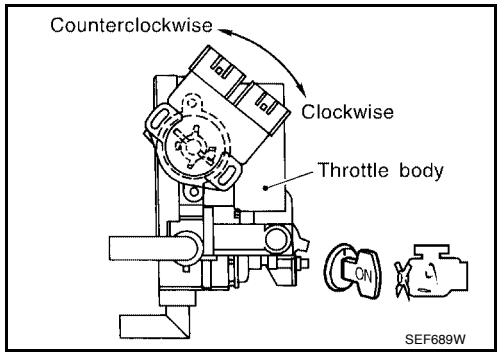
11. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV

With CONSULT-II

1. Remove 0.35 mm (0.0138 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
2. Temporarily tighten sensor body fixing bolts as follows.

– **Gradually move the sensor body clockwise and stop it when "CLSD THL/P SW" signal switches from "OFF" to "ON", then temporarily tighten sensor body fixing bolts.**

3. Make sure two or three times that the signal is "ON" when the throttle valve is closed and "OFF" when it is opened.
4. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge.
5. Make sure two or three times that the signal remains "OFF" when the throttle valve is closed.
6. Tighten throttle position sensor.
7. Check the "CLSD THL/P SW" signal again.
   The signal remains "OFF" while closing throttle valve.



OK or NG

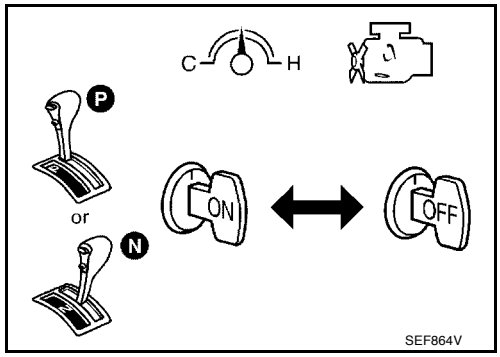
OK >> GO TO 12.
NG >> GO TO 8.

12. RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

With CONSULT-II

NOTE:
Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.

1. Remove feeler gauge.
2. Start engine.
3. Warm up engine to normal operating temperature.
4. Select "TP SW/TP SEN IDLE POSI ADJ" in "WORK SUPPORT" mode.
5. Stop engine. (Turn ignition switch OFF.)
6. Turn ignition switch ON and wait at least 5 seconds.
7. Turn ignition switch OFF and wait at least 5 seconds.



8. Repeat steps 5 and 6 until "CLSD THL POS" signal changes to "ON".

>> GO TO 13.

TP SW/TP SEN IDLE POSI ADJ	
MONITOR	
COOLAN TEMP/S	91°C
CLSD THL POS	ON
CLSD THL/P SW	ON

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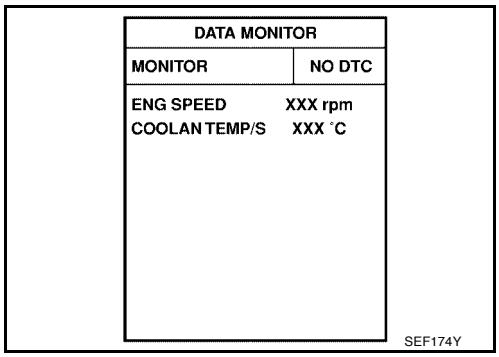
13. CHECK TARGET IDLE SPEED

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “ENG SPEED” in “DATA MONITOR” mode.
3. Check idle speed.

M/T: 750±50 rpm (in Neutral position)

A/T: 750±50 rpm (in P or N position)



OK or NG

OK >> **INSPECTION END**.

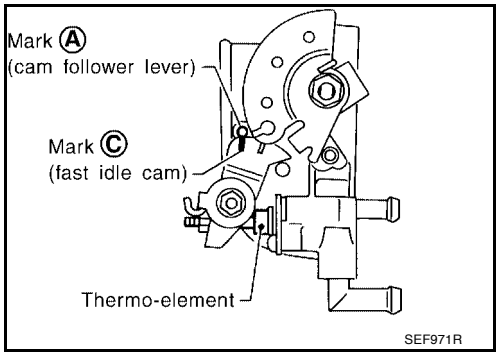
NG >> 1. Adjust idle speed. Refer to EC-1214, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" .
2. GO TO 27.

14. CHECK FI CAM FUNCTION

With GST

1. Turn ignition switch ON.
2. Select MODE 1 with GST.
3. Start engine and warm it up.
4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

- The center of mark **A** is aligned with mark **C** .
- The cam follower lever's roller is not touching the fast idle cam.



OK or NG

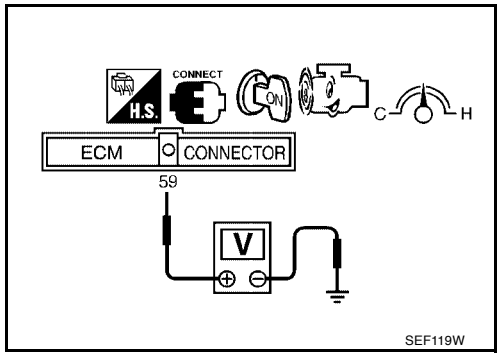
OK >> GO TO 16.

NG >> 1. Check FI cam. Refer to EC-1225, "Fast Idle Cam (FIC) Inspection and Adjustment" .
2. GO TO 16.

15. CHECK FI CAM FUNCTION

No Tools

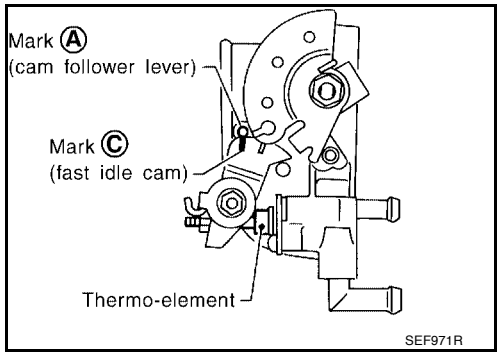
1. Set the voltmeter between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.
2. Start engine and warm it up.



3. When the voltage is between 1.10 to 1.36V, check the following.
- The center of mark **A** is aligned with mark **C** .
- The cam follower lever's roller is not touching the fast idle cam.

OK or NG

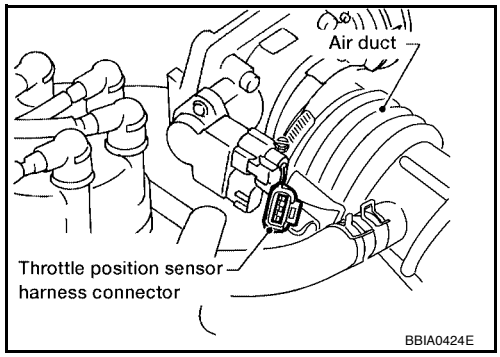
OK >> GO TO 16.
NG >> 1. Check FI cam. Refer to EC-1225, "Fast Idle Cam (FIC) Inspection and Adjustment" .
2. GO TO 16.



16. CHECK IGNITION TIMING

Without CONSULT-II

1. Warm up engine to normal operating temperature.
2. Stop engine and disconnect throttle position sensor harness connector.
3. Start engine.

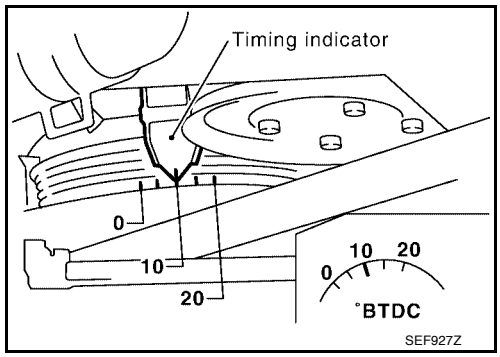


4. Check ignition timing at idle using a timing light.

M/T: 10±5° BTDC (in Neutral position)
A/T: 10±5° BTDC (in P or N position)

OK or NG

OK >> GO TO 17.
NG >> 1. Adjust ignition timing by turning distributor. Refer to EC-1214, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" .
2. GO TO 17.



17. CHECK BASE IDLE SPEED

Without CONSULT-II

1. Make sure that throttle position sensor harness connector remain disconnected.
2. Does engine speed fall to the following speed?

M/T: 700±50 rpm (in Neutral position)
A/T: 700±50 rpm (in P or N position)

OK or NG

OK >> GO TO 18.
NG >> 1. Adjust engine speed by turning idle speed adjusting screw. Refer to EC-1214, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment" .
2. GO TO 18.

18. CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION

Without CONSULT-II

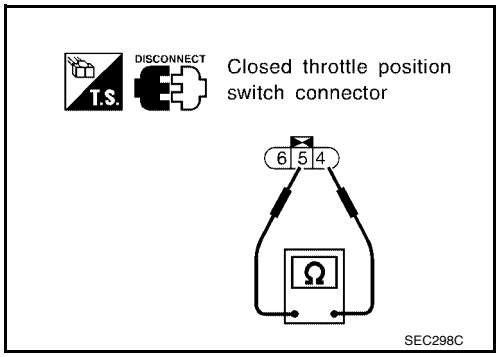
NOTE:
Always check ignition timing and base idle speed before performing the following.

1. Warm up engine to normal operating temperature.
2. Check FI cam, refer to procedure 14 or 15.
3. Stop engine.

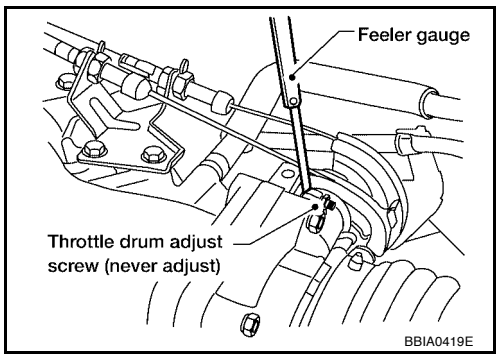
>> GO TO 19.

19. CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION-I

1. Disconnect closed throttle position switch harness connector.
2. Check continuity between closed throttle position switch terminals 4 and 5 under the following conditions.



- Insert the 0.3 mm (0.012 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure.
  Continuity should exist while inserting 0.3 mm (0.012 in) feeler gauge.
  Continuity should not exist while inserting 0.4 mm (0.016 in) feeler gauge.



OK or NG

OK >> GO TO 24.
NG >> GO TO 20.

20. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

Without CONSULT-II

NOTE:

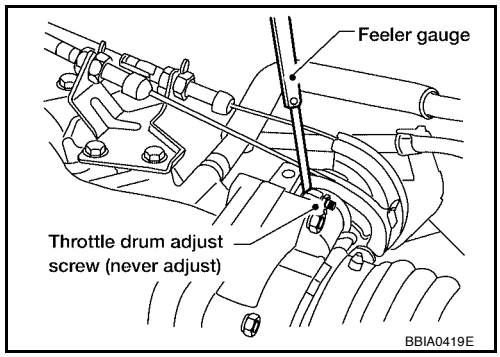
- **Never adjust throttle adjust screw (TAS).**
- **Do not touch throttle drum when checking continuity, doing so may cause an incorrect adjustment.**

1. Warm up engine to normal operating temperature.
2. Check FI cam. Refer to procedure 14 or 15.
3. Stop engine.
4. Loosen throttle position sensor fixing bolts.

>> GO TO 21.

21. ADJUSTMENT CLOSED THROTTLE POSITION SWITCH IDLE POSITION-II

1. Disconnect closed throttle position switch harness connector.
2. Insert 0.35 mm (0.0138 in) feeler gauge between the throttle adjust screw and throttle drum as shown in the figure.
3. Open throttle valve then close.

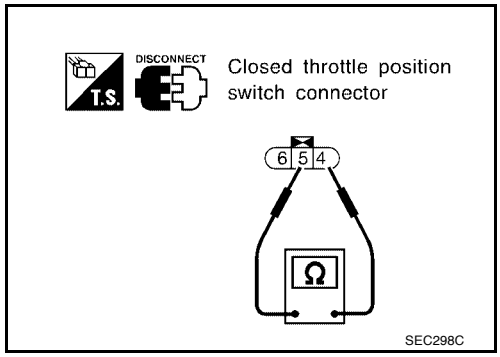


4. Check continuity between closed throttle position switch terminals 4 and 5.

Continuity should not exist while closing the throttle position sensor.

OK or NG

OK >> GO TO 23.
NG >> GO TO 22.

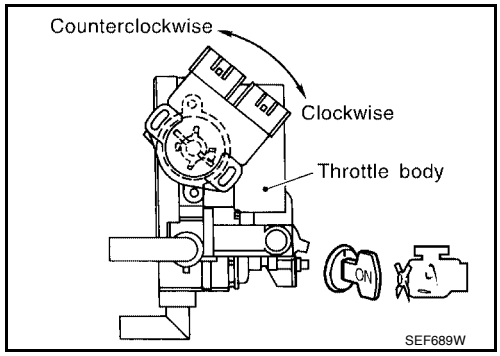


22. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

Without CONSULT-II

Turn throttle position sensor body counterclockwise until continuity does not exist.

>> GO TO 23.



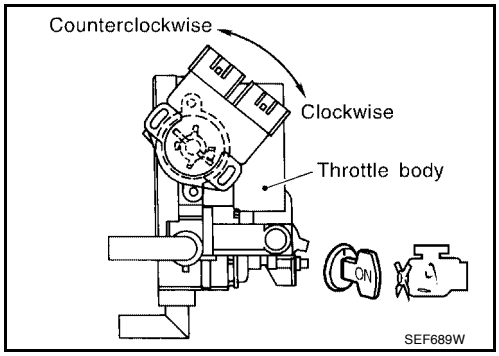
23. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV

Without CONSULT-II

1. Remove 0.35 mm (0.0138 in) feeler gauge then insert 0.3 mm (0.012 in) feeler gauge.
2. Temporarily tighten sensor body fixing bolts as follows.

– **Gradually move the sensor body clockwise and stop it when the continuity comes to exist, then temporarily tighten sensor body fixing bolts.**

3. Make sure two or three times that the continuity exists when the throttle valve is closed and continuity does not exist when it is opened.
4. Remove 0.3 mm (0.012 in) feeler gauge then insert 0.4 mm (0.016 in) feeler gauge.
5. Make sure two or three times that the continuity does not exist when the throttle valve is closed.
6. Tighten throttle position sensor.
7. Check the continuity again.



Continuity does not exist while closing the throttle valve.

OK or NG

OK >> GO TO 24.
NG >> GO TO 20.

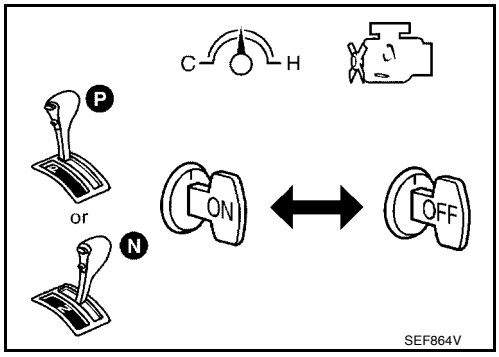
24. RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

Without CONSULT-II

NOTE:
Always warm up engine to normal operating temperature. If engine is cool, the throttle position sensor idle position memory will not be reset correctly.

1. Remove feeler gauge.
2. Start engine.
3. Warm up engine to normal operating temperature.
4. Stop engine. (Turn ignition switch OFF.)
5. Turn ignition switch ON and wait at least 5 seconds.
6. Turn ignition switch OFF and wait at least 5 seconds.
7. Repeat steps 4 and 5 for 20 times.

>> GO TO 25.



25. REINSTALLATION

Without CONSULT-II

1. Reconnect throttle position sensor harness connector and closed throttle position switch harness connector.
2. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no load and then run engine at idle speed.

>> GO TO 26.

26. CHECK TARGET IDLE SPEED

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

M/T: 750±50 rpm (in Neutral position)

A/T: 750±50 rpm (in P or N position)

OK or NG

OK >> GO TO 27.

NG >> 1. Adjust idle speed. Refer to EC-1214, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment".
2. GO TO 27.

27. ERASE UNNECESSARY DTC

After this inspection, unnecessary DTC No. might be displayed.
Erase the stored memory in ECM and TCM (Transmission control module).
Refer to EC-1241, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" and AT-187, "HOW TO ERASE DTC".

>> **INSPECTION END**.

Symptom Matrix Chart

UBS00DS7

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		3	2			3		1	EC-1735
	Injector circuit							2							EC-1725
	Fuel pressure regulator system	4	4	4	4	4	4	4	3	3		4			EC-1228
	Evaporative emission system														EC-1750
Air	Positive crankcase ventilation system												1		EC-1768
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-1214
	IACV-AAC valve circuit	2	1	3	3	3	2	2	2	2		3		1	EC-1582
	IACV-FICD solenoid valve circuit		2				3	3							EC-1744
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-1214
	Ignition circuit	1	1	2	2	2		2	2			2			EC-1719
Main power supply and ground circuit		1	2	3	3	3		3	2		1	3		1	EC-1306
Air conditioner circuit		2					3			2					MTC-22

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor circuit	1			2				2						EC-1487
Mass air flow sensor circuit														EC-1335, EC-1343
Heated oxygen sensor 1 circuit		1	2	3	2		2				2			EC-1387, EC-1396 , EC-1408 , EC-1604 , EC-1610
Engine coolant temperature sensor circuit	1	2	3		3	3			2		3			EC-1356, EC-1379
Throttle position sensor circuit		1	2		2	2					2			EC-1362, EC-1371
Incorrect throttle position sensor adjustment		3	1		1	1	1	1	1		1			EC-1255
Vehicle speed sensor circuit		2	3		3						3			EC-1577
Knock sensor circuit				3										EC-1477
ECM	2	2				3	3	2	2	1				EC-1602, EC-1255
Start signal circuit	1													EC-1731
Park/neutral position (PNP) switch circuit			3		3		3	2			3			EC-1712
Power steering oil pressure switch circuit		2												EC-1740

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													Reference section
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-3
	Fuel piping			5	5	5		5	4			5			—
	Vapor lock														
	Valve deposit	5		5	5	5		5	4			5			
	Poor fuel (Heavy weight gasoline, Low octane)														
Air	Air duct	5	5	5	5	5	5	5	4	4		5			
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — throttle body)														
	Throttle body, Throttle wire														EM-80
	Air leakage from intake manifold/Collector/Gasket														—
Cranking	Battery	1	1	1		1		1	1			1		1	SC-4
	Generator circuit														SC-26
	Starter circuit														SC-9
	Park/neutral position (PNP) switch														MT-46, AT-249
	Drive plate/Flywheel	6													EM-80

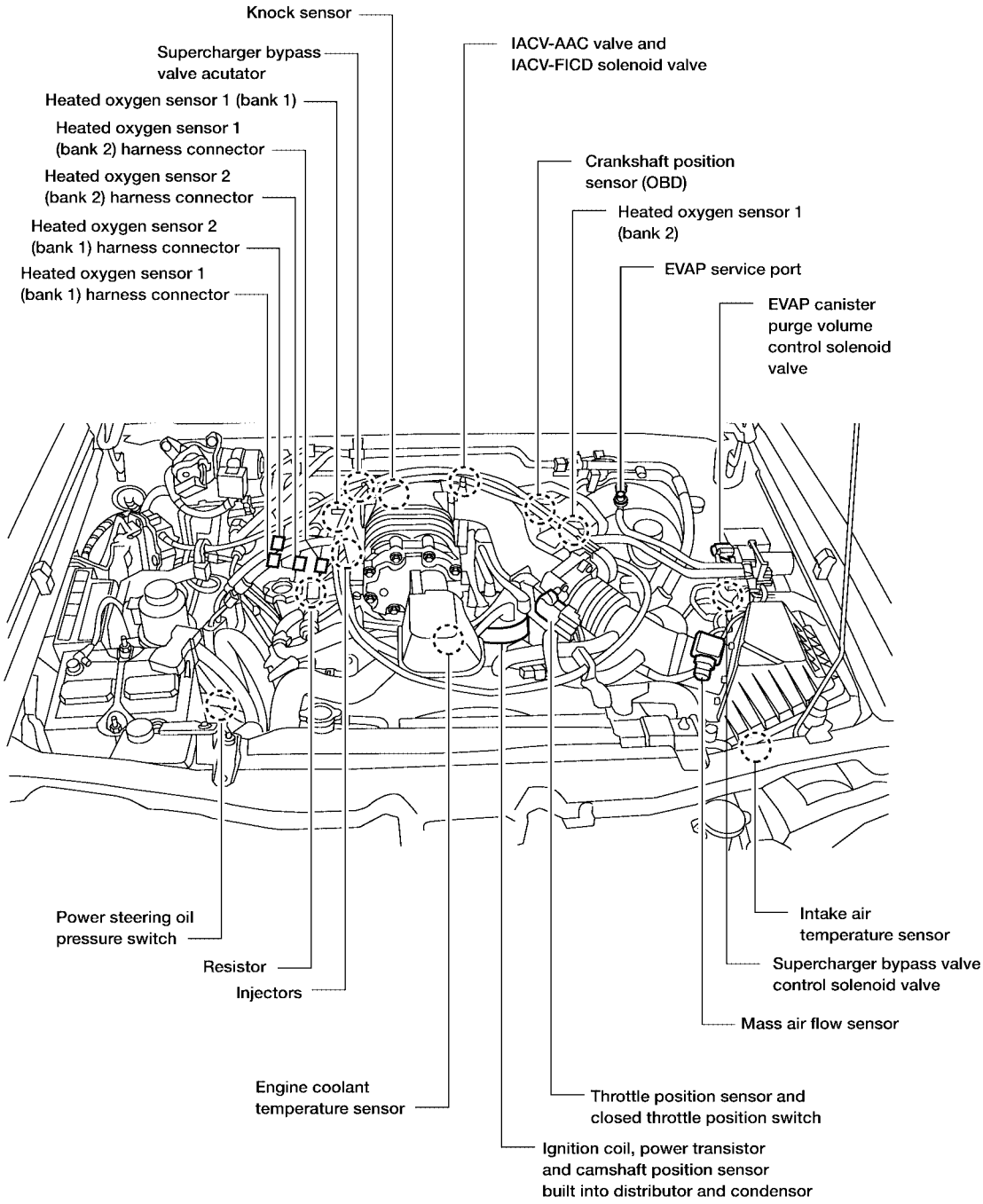
		SYMPTOM													Reference section
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-102
	Cylinder head gasket										2		2		
	Cylinder block	6	6	6	6	6		6	6			6	3		EM-131, EM-91
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing belt	6	6	6	6	6		6	6			6			
	Camshaft														
	Intake valve												2		
	Exhaust valve														
	Hydraulic lash adjuster														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	6	6	6	6	6		6	6			6			EX-3
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	6	6	6	6	6		6	6			6	2		LU-15, LU-16, LU-14, EM-88
	Oil level (Low/Filthy) oil														MA-30
Cooling	Radiator/Hose/Radiator filler cap	6	6	6	6	6		6	6		2	6			CO-25, CO-28, CO-32, CO-30
	Thermostat						5			5					
	Water pump														
	Water gallery														
	Cooling fan						5			5					
	Coolant level (low)/Contaminated coolant														MA-26

1 - 6: The numbers refer to the order of inspection.

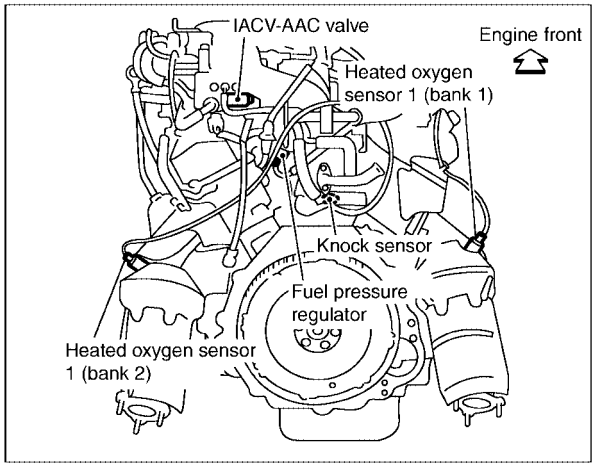
(continued on next page)

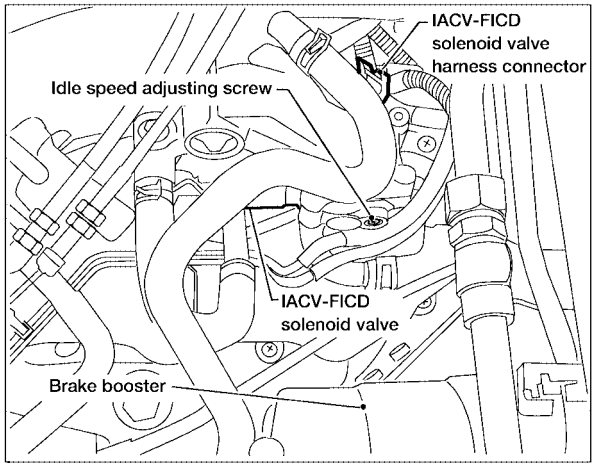
Engine Control Component Parts Location

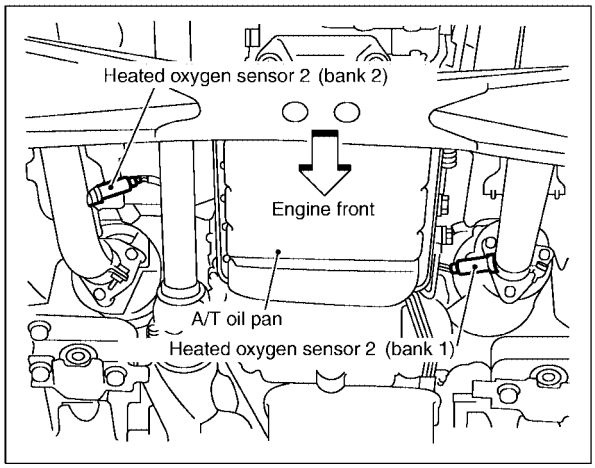
UBS00DS8

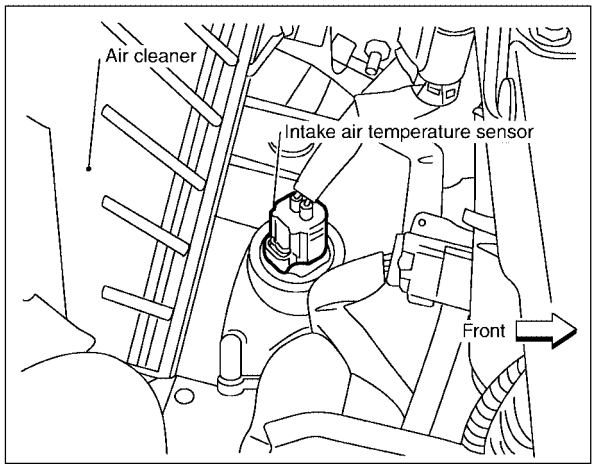


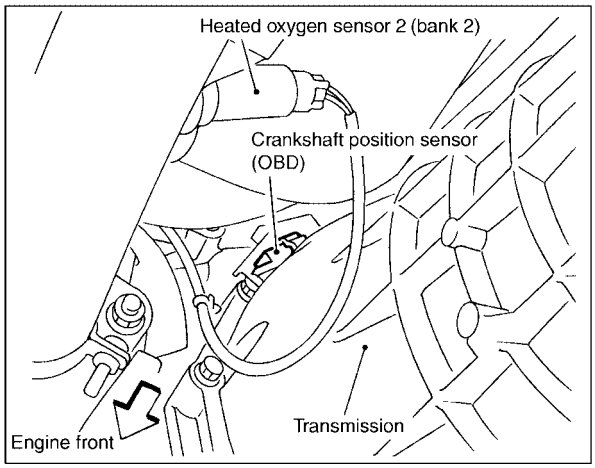
BBIA0420E


IACV-AAC valve
Engine front
Heated oxygen sensor 1 (bank 1)
Knock sensor
Fuel pressure regulator
Heated oxygen sensor 1 (bank 2)

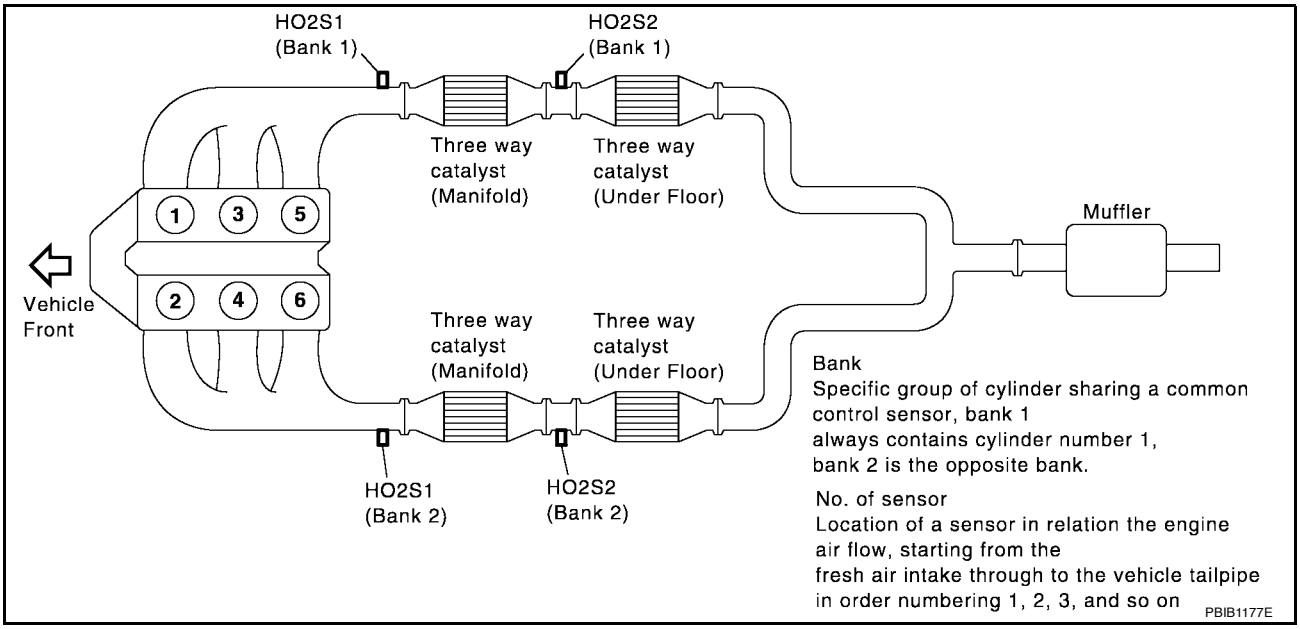

IACV-FICD solenoid valve harness connector
Idle speed adjusting screw
IACV-FICD solenoid valve
Brake booster

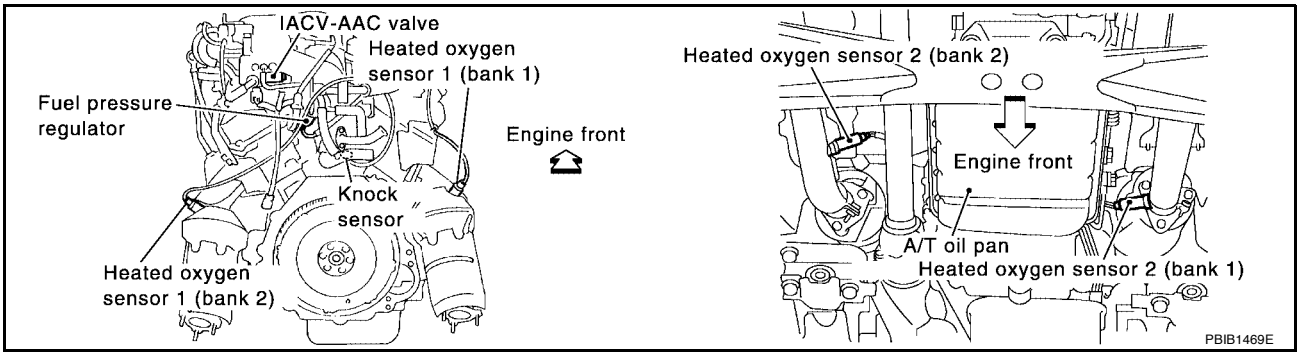

Heated oxygen sensor 2 (bank 2)
Engine front
A/T oil pan
Heated oxygen sensor 2 (bank 1)


Air cleaner
Intake air temperature sensor
Front


Heated oxygen sensor 2 (bank 2)
Crankshaft position sensor (OBD)
Transmission
Engine front

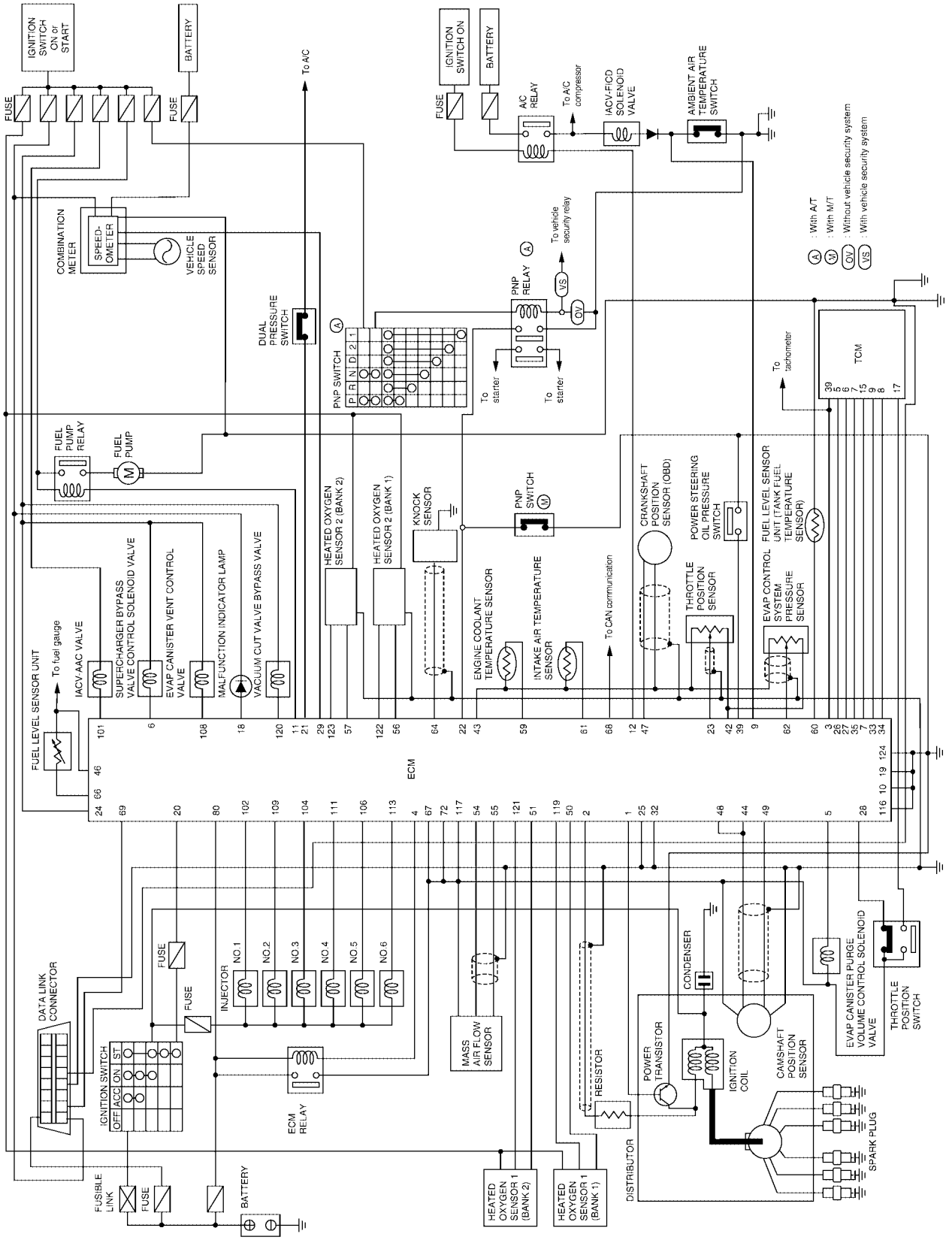
BBIA0186E


HO2S1
(Bank 1)
HO2S2
(Bank 1)
Three way
catalyst
(Manifold)
Three way
catalyst
(Under Floor)
Muffler
1
3
5
2
4
6
Vehicle
Front
Three way
catalyst
(Manifold)
Three way
catalyst
(Under Floor)
HO2S1
(Bank 2)
HO2S2
(Bank 2)
Bank
Specific group of cylinder sharing a common control sensor, bank 1
always contains cylinder number 1,
bank 2 is the opposite bank.
No. of sensor
Location of a sensor in relation the engine air flow, starting from the
fresh air intake through to the vehicle tailpipe
in order numbering 1, 2, 3, and so on
PBIB1177E


IACV-AAC valve
Heated oxygen
sensor 1 (bank 1)
Fuel pressure
regulator
Engine front
Knock
sensor
Heated oxygen
sensor 1 (bank 2)
Heated oxygen sensor 2 (bank 2)
Engine front
A/T oil pan
Heated oxygen sensor 2 (bank 1)
PBIB1469E

Circuit Diagram

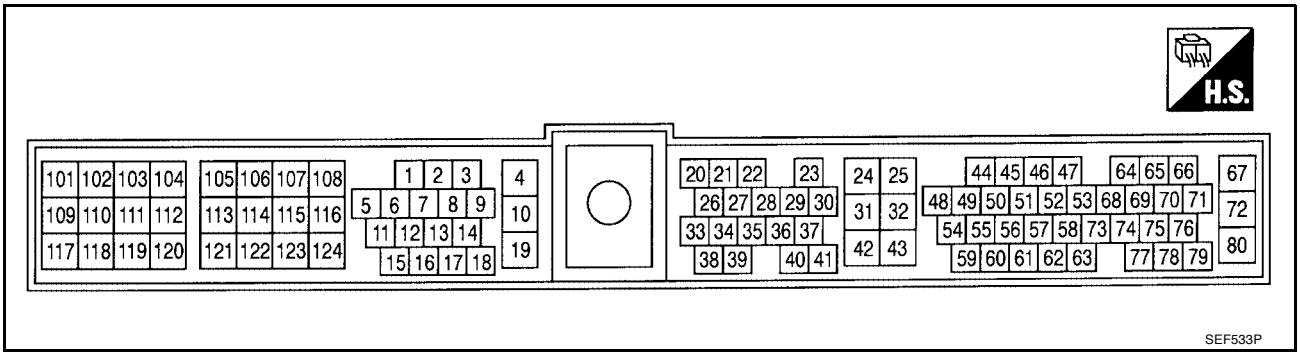
UBS00DS9



BBWA0507E

ECM Harness Connector Terminal Layout

UBS00DSA

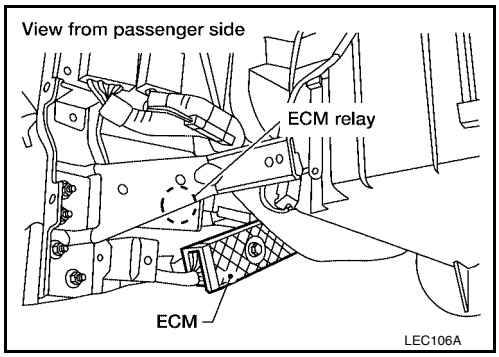


ECM Terminals and Reference Value

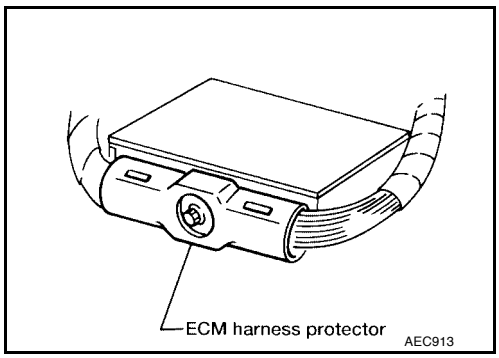
UBS00DSB

PREPARATION

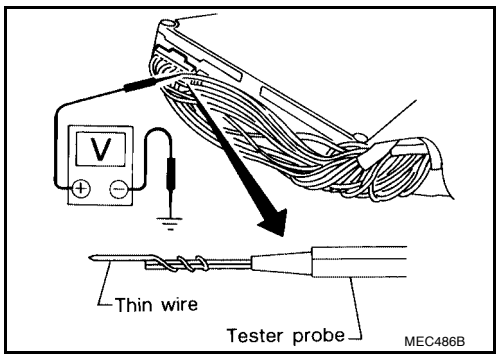
1. ECM is located behind the instrument lower cover. For this inspection:
   - Remove instrument lower cover.



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 1 time.
   - Data is for comparison and may not be exact.

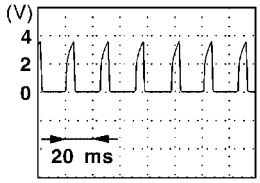
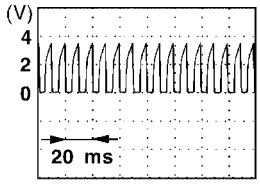
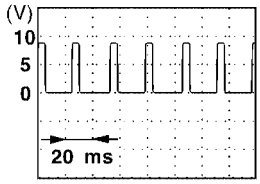
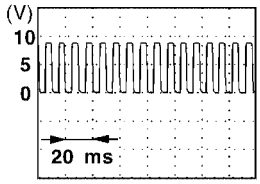


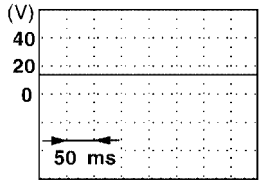
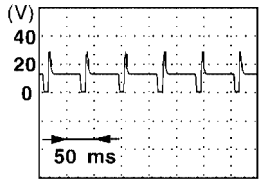
ECM INSPECTION TABLE

Specification data are reference values and are measured between each terminal and ground.

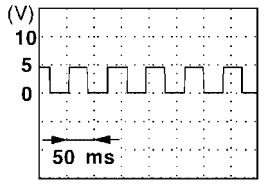
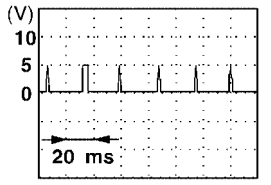
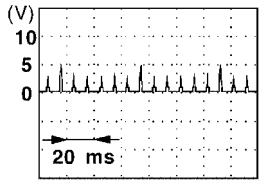
CAUTION:

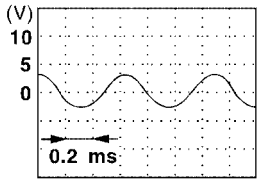
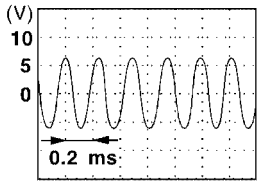
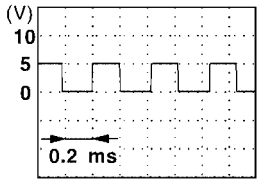
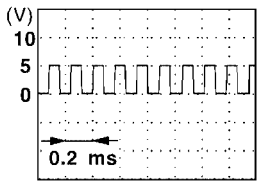
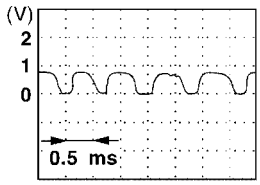
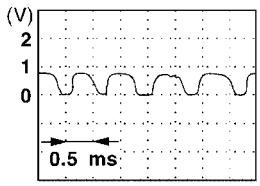
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	**[Engine is running]** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 0.7V★  SEF988U
			[Engine is running] ● Engine speed is 2,000 rpm	1.1 - 1.5V★  SEF989U
3	P/L	Tachometer	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1 - 2V★  SEF992U
			[Engine is running] ● Engine speed is 2,000 rpm	3 - 5V★  SEF993U
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)

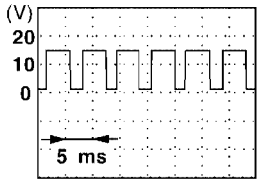
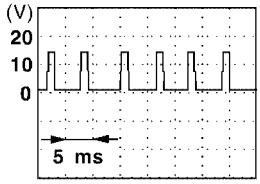
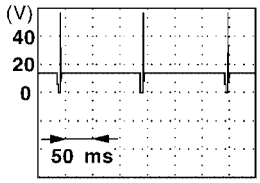
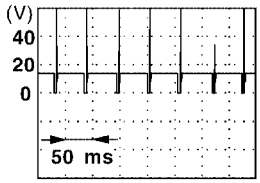
TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	R/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★  SEF995U
6	G/W	SCB valve control solenoid valve	**[Ignition switch: ON]** ● Engine stopped	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Idle speed	Approximately 0V
7	Y/G	A/T check signal	**[Ignition switch: ON]** **[Engine is running]**	0 - 3.0V
9	B/Y	Ambient air temperature switch	**[Engine is running]** ● Idle speed ● Ambient air temperature is above 25°C (77°F) ● Air conditioner is operating	0V
			[Engine is running] ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is not operating	Approximately 5V
10	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
11	W/R	Fuel pump relay	**[Ignition switch: ON]** ● For a few seconds after turning ignition switch ON **[Engine is running]**	0 - 1V
			[Ignition switch: ON] ● More than a few seconds after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
12	P	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are ON*	0 - 1V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
18	R/W	Malfunction indicator lamp	**[Ignition switch: ON]**	0 - 1V
			[Engine is running] ● Idle speed	BATTERY VOLTAGE (11 - 14V)
19	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
20	L/OR	Start signal	**[Ignition switch: ON]**	Approximately 0V
			[Ignition switch: START]	9 - 12V
21	G/R	Air conditioner switch	**[Engine is running]** ● Both A/C switch and blower switch are ON (Compressor operates)*	Approximately 0V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)
22	L/B	Park/neutral position (PNP) switch	**[Ignition switch: ON]** ● Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] ● Except above position	Approximately 5V
23	L	Throttle position sensor	**[Engine is running]** ● **Warm-up condition** ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump ● Accelerator pedal is fully released	0.15 - 0.85V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal is fully depressed	3.5 - 4.7V
24	W/L	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
26	PU/W	A/T signal No. 1	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
27	P/B	A/T signal No. 2	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
28	BR/W	Throttle position switch (Closed position)	**[Engine is running]** ● **Warm-up condition** ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump ● Accelerator pedal is fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal is depressed	Approximately 0V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	G/B	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle ● Shift lever: 2nd (M/T), D (A/T) ● Vehicle speed is 40 km/h (25 MPH)	2 - 3V★  SEF996U
32	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
35	G/R	A/T signal No. 3	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
39	GY/R	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being turned	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned	Approximately 5V
42	B/W	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
43	BR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
44 48	PU PU	Camshaft position sensor (Reference signal)	**[Engine is running]** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0.3 - 0.5V★  SEF997U
			[Engine is running] ● Engine speed is 2,000 rpm	0.3 - 0.5V★  SEF998U
46	OR/B	Fuel level sensor	**[Ignition switch: ON]**	Approximately 0 - 4.8V Output voltage varies with fuel level.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1 - 2V (AC range)★  SEF690W
			[Engine is running] ● Engine speed is 2,000 rpm	3 - 4V (AC range)★  SEF691W
49	LG	Camshaft position sensor (Position signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 2.5V★  SEF999U
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5V★  SEF001V
50	B	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V★  SEF002V
51	G	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V★  SEF002V

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.7 - 2.3V
55	G	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
56	OR	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● Warm-up condition ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
57	Y	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● Warm-up condition ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
59	LG/R	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature
60	Y/B	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel temperature
61	PU/R	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
62	Y	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V
64	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
66	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
69	LG/R	Data link connector	**[Engine is running]** ● CONSULT-II or GST is disconnected	6 - 10V
72	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
80	SB	Power supply (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	8 - 11V★  SEF005V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 3,000 rpm	7 - 10V★  SEF692W
102 104 106 109 111 113	W/B W/R W/G W/L W/PU W	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEF007V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEF008V
108	R/G	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
119	BR/Y	Heated oxygen sensor 1 heater (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 2,800 rpm	Approximately 0.4V
			[Engine is running] ● Engine speed is above 2,800 rpm	BATTERY VOLTAGE (11 - 14V)
120	P/B	Vacuum cut valve bypass valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
121	BR	Heated oxygen sensor 1 heater (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 2,800 rpm	Approximately 0.4V
			[Engine is running] ● Engine speed is above 2,800 rpm	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122	R/B	Heated oxygen sensor 2 heater (bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: After warning up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
123	R/Y	Heated oxygen sensor 2 heater (bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: After warning up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

*: Any mode except OFF, ambient air temperature is above 25°C (77°F).

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

CONSULT-II Function

UBS00DSC

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.*
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output specification of the basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECM part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values
- Others

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

		Item	DIAGNOSTIC TEST MODE							
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	DATA MONITOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUPPORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Camshaft position sensor		×	×	×	×			
		Mass air flow sensor		×		×	×			
		Engine coolant temperature sensor		×	×	×	×	×		
		Heated oxygen sensor 1		×		×	×		×	×
		Heated oxygen sensor 2		×		×	×		×	×
		Vehicle speed sensor		×	×	×	×			
		Throttle position sensor	×	×		×	×			
		Fuel tank temperature sensor		×		×	×	×		
		EVAP control system pressure sensor		×		×	×			
		Intake air temperature sensor		×	×	×	×			
		Crankshaft position sensor (OBD)		×						
		Knock sensor		×						
		Ignition switch (start signal)				×	×			
		Closed throttle position switch		×		×	×			
		Closed throttle position switch (throttle position sensor signal)				×	×			
		Air conditioner switch				×	×			
		Park/neutral position (PNP) switch		×		×	×			
		Power steering oil pressure switch				×	×			
		Battery voltage				×	×			
		Ambient air temperature switch				×	×			
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injectors				×	×	×		
		Power transistor (Ignition timing)	×			×	×	×		
		IACV-AAC valve	×	×		×	×	×		
		EVAP canister purge volume control solenoid valve		×		×	×	×		×
		Air conditioner relay				×	×			
		Fuel pump relay	×			×	×	×		
		Heated oxygen sensor 1 heater		×		×	×		×	
		Heated oxygen sensor 2 heater		×		×	×		×	
		EVAP canister vent control valve		×		×	×	×		
		Vacuum cut valve bypass valve		×		×	×	×		×
		SCB valve control solenoid valve		×		×	×	×		
		Calculated load value			×	×	×			

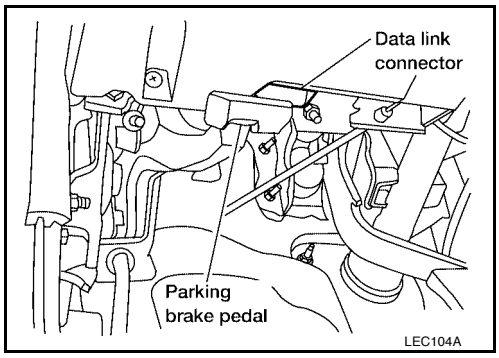
X: Applicable

*1: This item includes 1st trip DTCs.

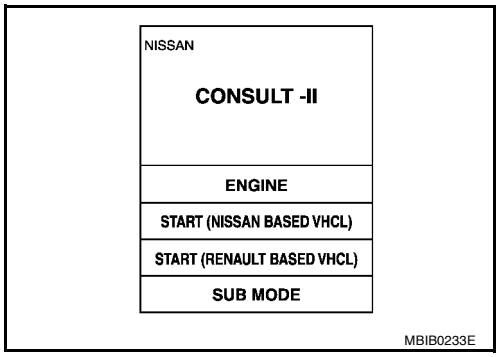
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-1287, "Freeze Frame Data and 1st Trip Freeze Frame Data" .

INSPECTION PROCEDURE

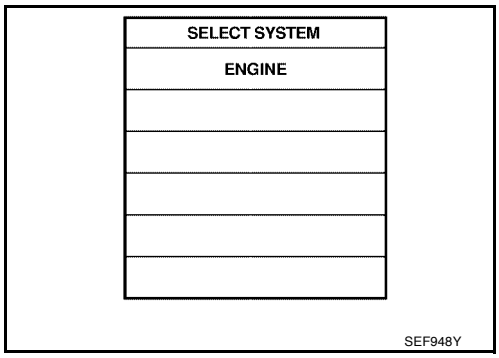
1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to data link connector which is located under LH dash panel near the fuse box cover.



3. Turn ignition switch ON.
4. Touch “START (NISSAN BASED VHCL)”.

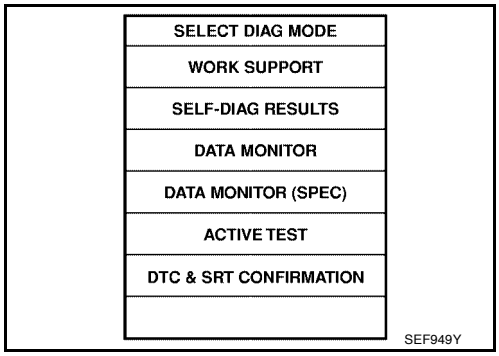


5. Touch “ENGINE”.
   If “ENGINE” is not indicated, go to GI-36, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.



WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
TP SW/TP SEN IDLE POSI ADJ	● FOLLOW THE BASIC INSPECTION INSTRUCTION IN THE SERVICE MANUAL.	When adjusting the idle throttle position
IGNITION TIMING ADJ	● IGNITION TIMING FEEDBACK CONTROL WILL BE HELD BY TOUCHING “START”. AFTER DOING SO, ADJUST IGNITION TIMING WITH A TIMING LIGHT BY TURNING THE CAMSHAFT POSITION SENSOR.	When adjusting target ignition timing After adjustment, confirm target ignition timing with a timing light by turning the distributor.
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
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clean the coefficient of self-learning control valve
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 ● FUEL TANK 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 adjusting idle speed

*: This function is not necessary in the usual service procedure.

SELF-DIAGNOSTIC MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-1194, "INDEX FOR DTC" .

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item *	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to EC-1194, "INDEX FOR DTC" .)
FUEL SYS-B1	● “Fuel injection system status” at the moment a malfunction is detected is displayed.
FUEL SYS-B2	● One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	● The calculated load value at the moment a malfunction is detected is displayed.

Freeze frame data item *	Description
COOLANT TEMP [°C] or [°F]	● The engine coolant temperature at the moment a malfunction is detected is displayed.
S-FUEL TRM-B1 [%]	● "Short-term fuel trim" at the moment a malfunction is detected is displayed. ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRM-B2 [%]	
L-FUEL TRM-B1 [%]	● "Long-term fuel trim" at the moment a malfunction is detected is displayed. ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRM-B2 [%]	
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	● The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	● The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	● The intake air temperature at the moment a malfunction is detected is displayed.

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE
Monitored Item

×: Applicable

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the REF signal (120° signal) of the camshaft position sensor.	
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor is displayed.	● When the engine is stopped, a certain value is indicated.
B/FUEL SCHDL [msec]		×	● "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When the engine is stopped, a certain value is indicated. ● This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]		×		
COOLAN TEMP/S [°C] or [°F]	×	×	● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	● When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
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]	×	×		

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
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 sensor signal is displayed.	
BATTERY VOLT [V]	×	×	● The power supply voltage of ECM is displayed.	
THRTL POS SEN [V]	×	×	● The throttle position sensor signal voltage is displayed.	
FUEL T/TMP SE [°C] or [°F]	×		● The fuel temperature judged from the fuel tank temperature sensor signal voltage 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 voltage 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 throttle position sensor signal.	
CLSD THL/P SW [ON/OFF]	×		● Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.	
AIR COND SIG [ON/OFF]	×	×	● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	×	×	● [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated.	

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
AMB TEMP SW [ON/OFF]	×		● Indicates [ON/OFF] condition from the ambient air temperature switch signal.	
IGNITION SW [ON/OFF]	×		● Indicates [ON/OFF] condition from ignition switch.	
INJ PULSE-B1 [msec]		×	● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	● When the engine is stopped, a certain computed value is indicated.
INJ PULSE-B2 [msec]				
IGN TIMING [BTDC]		×	● Indicates the ignition timing computed by ECM according to the input signals.	● When the engine is stopped, a certain value is indicated.
CAL/LD VALUE [%]			● “Calculated load value” indicates the value of the current airflow divided by peak airflow.	
ABSOL TH·P/S [%]			● Absolute throttle position sensor indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor.	
MASS AIRFLOW [g·m/s]			● Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	
IACV-AAC/V [%]		×	● Indicates the IACV-AAC valve control value computed by ECM according to the input signals.	
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.	
AIR COND RLY [ON/OFF]		×	● The air conditioner relay control condition (determined by ECM according to the input signal) is indicated.	
FUEL PUMP RLY [ON/OFF]		×	● Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
VENT CONT/V [ON/OFF]			● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated. ● ON: Closed OFF: Open	
VC/V BYPASS/V [ON/OFF]			● The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated. ● ON: Open OFF: Closed	
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 (B1) [ON/OFF]				

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	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]				
SCB/V CON S/V			● The control condition of the SCB valve control solenoid valve (determined by ECM according to the input signals) is indicated. ● ON: SCB valve is closed. OFF: SCB valve is opened.	
Voltage [V]			● Voltage measured by the voltage probe.	
Frequency [msec] or [Hz] or [%]			● Pulse width, frequency or duty cycle measured by the pulse 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.

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

DATA MONITOR (SPEC) MODE
Monitored Items

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor specification is displayed.	● When the engine is running, specification range is indicated.
B/FUEL SCHDL [msec]		×	● "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	● When the engine is running, specification range is indicated.
A/F ALPHA-B1 [%]		×	● Indicates the mean value of the air-fuel ratio feedback correction factor per cycle.	● When the engine is running, specification range is indicated. ● This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2 [%]		×		

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 connector ● Fuel injector ● 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.	● Adjust initial ignition timing
IACV-AAC/V OPENING	● Engine: After warming up, idle the engine. ● Change the IACV-AAC valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connector ● IACV-AAC valve

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
POWER BALANCE	● Engine: After warming up, idle the engine. ● A/C switch OFF ● Shift lever: N (A/T), Neutral (M/T) ● Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connector ● Compression ● Fuel injector ● Power transistor ● Spark plug ● Ignition coil
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 connector ● Engine coolant temperature sensor ● Fuel injector
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 connector ● Fuel pump relay
PURG VOL CONT/V	● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connector ● Solenoid valve
FUEL/T TEMP SEN	● Change the fuel tank temperature using CONSULT-II.		
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 connector ● Solenoid valve
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 connector ● Solenoid valve

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to EC-1234, "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
EVAPRATIVE SYSTEM	EVAP SML LEAK P0442/P1442	Refer to corresponding trouble diagnosis for DTC.	EC-1508, EC-1650
	EVAP V/S LEAK P0456/P1456		EC-1556, EC-1675
	PURG VOL CN/V P1444		EC-1652
	PURGE FLOW P0441		EC-1500
	VC CUT/V BP/V P1491		EC-1694
HO2S1	HO2S1 (B1) P0134		EC-1408
	HO2S1 (B1) P1143		EC-1604
	HO2S1 (B1) P1144		EC-1610
	HO2S1 (B1) P0133		EC-1396
	HO2S1 (B2) P0154		EC-1408
	HO2S1 (B2) P1163		EC-1604
	HO2S1 (B2) P1164		EC-1610
	HO2S1 (B2) P0153		EC-1396
HO2S2	HO2S2 (B1) P1146		EC-1617
	HO2S2 (B1) P1147		EC-1628
	HO2S2 (B1) P0139		EC-1427
	HO2S2 (B2) P1166		EC-1617
	HO2S2 (B2) P1167		EC-1628
	HO2S2 (B2) P0159		EC-1427

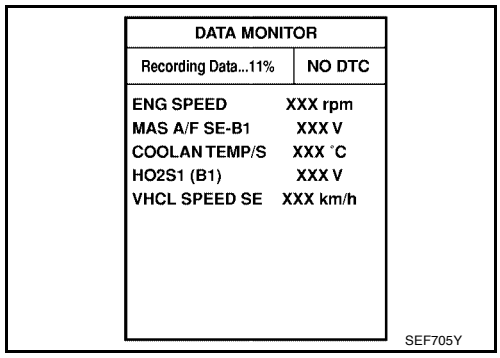
REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

Description

CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

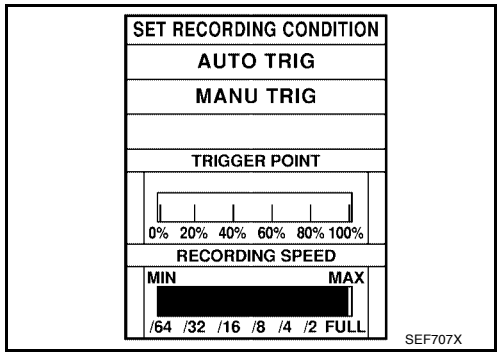
1. “AUTO TRIG” (Automatic trigger):

- 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 left, 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.



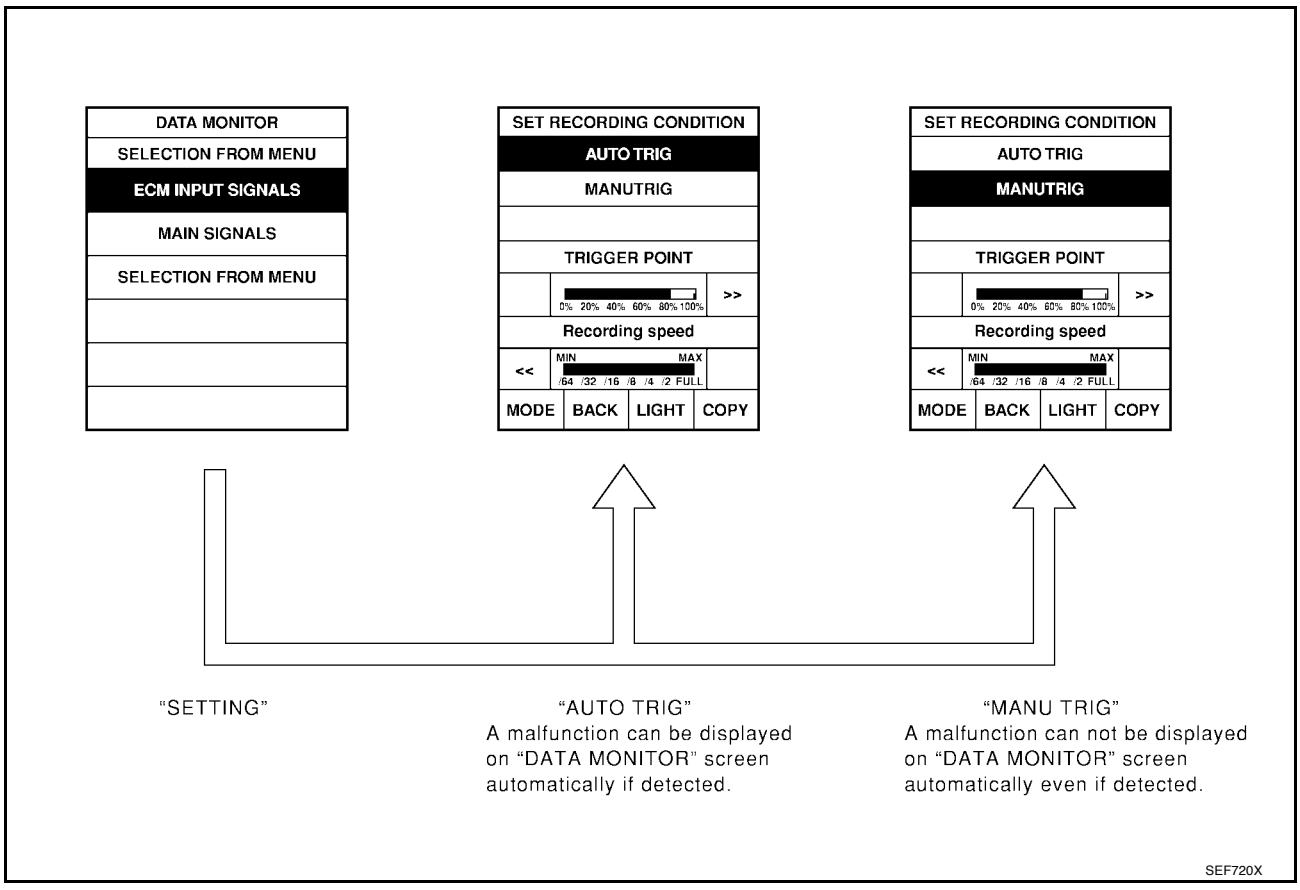
Operation

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 GI-25, "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.

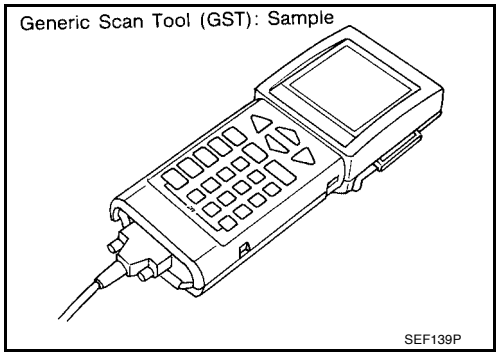


Generic Scan Tool (GST) Function

UBS00DSD

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained on the next page.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.

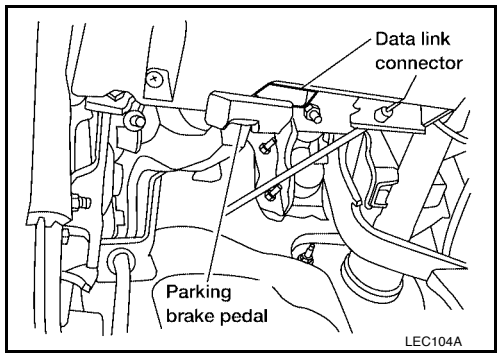


FUNCTION

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-1287, "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.
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: Closed ● Vacuum cut valve bypass valve: Open 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 is to enable the off-board to request vehicle specific vehicle information such as Vehicle Identification Number (VIN) and calibration IDs.

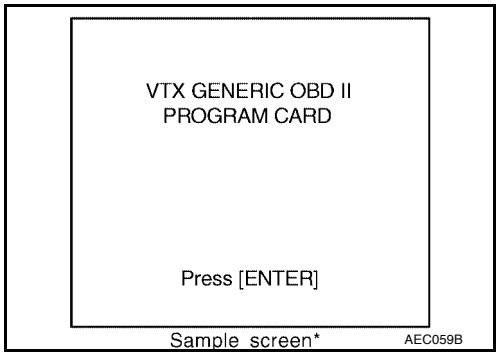
INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect “GST” to data link connector which is located under LH dash panel near the fuse box cover.



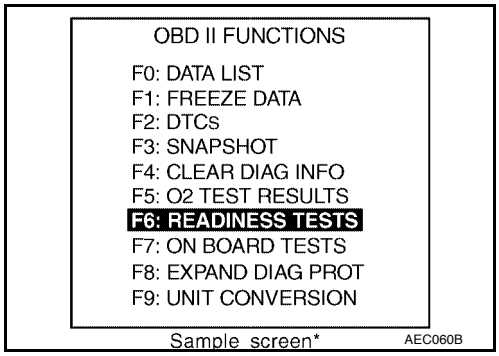
3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.

(*: 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

UBS00DSE

Remarks:
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
  * Specification data may not be directly related to their components signals/values/operations.
  i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	1.0 - 1.7V
		2,500 rpm	1.7 - 2.3V
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
HO2S1 MNTR (B1) HO2S1 MNTR (B2)			LEAN ←→ RICH Changes more than 5 times during 10 seconds.
HO2S2 (B1) HO2S2 (B2)	● Warm-up condition ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH
VHCL SPEED SE	● Turn drive wheels and compare CONSULT-II value speedometer indication with the speedometer indication.		Almost the same speed as the speedometer indication
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
THRTL POS SEN	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.15 - 0.85V
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	3.5 - 4.7V

MONITOR ITEM	CONDITION		SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS CLSD THL/P SW	● Engine: After warming up, idle the engine	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF
AIR COND SIG	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Except above	OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned	ON
AMB TEMP SW	● Ignition switch: ON ● Compare ambient air temperature with the following:	Below 19°C (66°F)	OFF
		Above 25°C (77°F)	ON
IGNITION SW	● Ignition switch: ON → OFF → ON		ON → OFF → ON
INJ PULSE-B1 INJ PULSE-B2	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	2.4 - 3.7 msec
		2,000 rpm	1.9 - 3.3 msec
B/FUEL SCHDL	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.4 msec
IGN TIMING	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	10±2° BTDC
		2,000 rpm	More than 25° BTDC
IACV-AAC/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	10 - 20%
		2,000 rpm	—
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	0%
		2,000 rpm	—
A/F ALPHA-B1 A/F ALPHA-B2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	54 - 155%
EVAP SYS PRES	● Ignition switch: ON		1.8 – 4.8V
AIR COND RLY	● Air conditioner switch: OFF → ON		OFF → ON
FUEL PUMP RLY	● Ignition switch is turned to ON (Operates for 5 seconds) ● Engine running or cranking		ON
	Except as shown above		OFF
VENT CONT/V	● Ignition switch: ON		OFF
HO2S1 HTR (B1) HO2S1 HTR (B2)	● Engine: After warming up ● Engine speed: Below 2,800 rpm		ON
	● Engine speed: Above 2,800 rpm		OFF

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	● Engine speed: Below 3,600 rpm after the following conditions are met. ● Engine: After warning up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.		ON
	● Engine speed: Above 3,600 rpm		OFF
SCB/V CON S/V	● More than 5 seconds after turning ignition switch ON (Engine stopped)		OFF
	● Engine speed: Idle		ON
VC/V BYPASS/V	Ignition switch: ON		OFF
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%
ABSOL TH·P/S	● Engine: After warming up ● Ignition switch: ON ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.	Throttle valve: fully closed	0.0%
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	3.3 - 4.8 g·m/s
		2,500 rpm	12.0 - 14.9 g·m/s

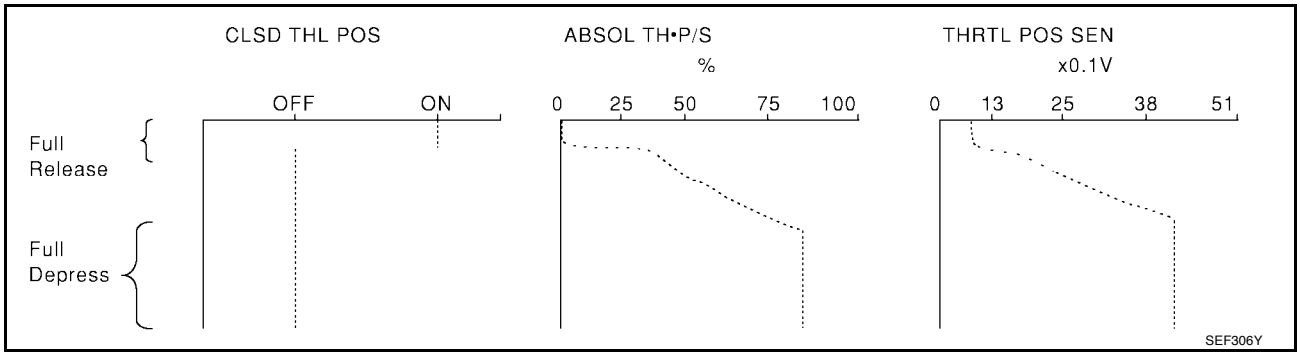
Major Sensor Reference Graph in Data Monitor Mode

UBS00DSF

The following are the major sensor reference graphs in “DATA MONITOR” mode.

THRTL POS SEN, ABSOL TH·P/S, CLSD THL POS

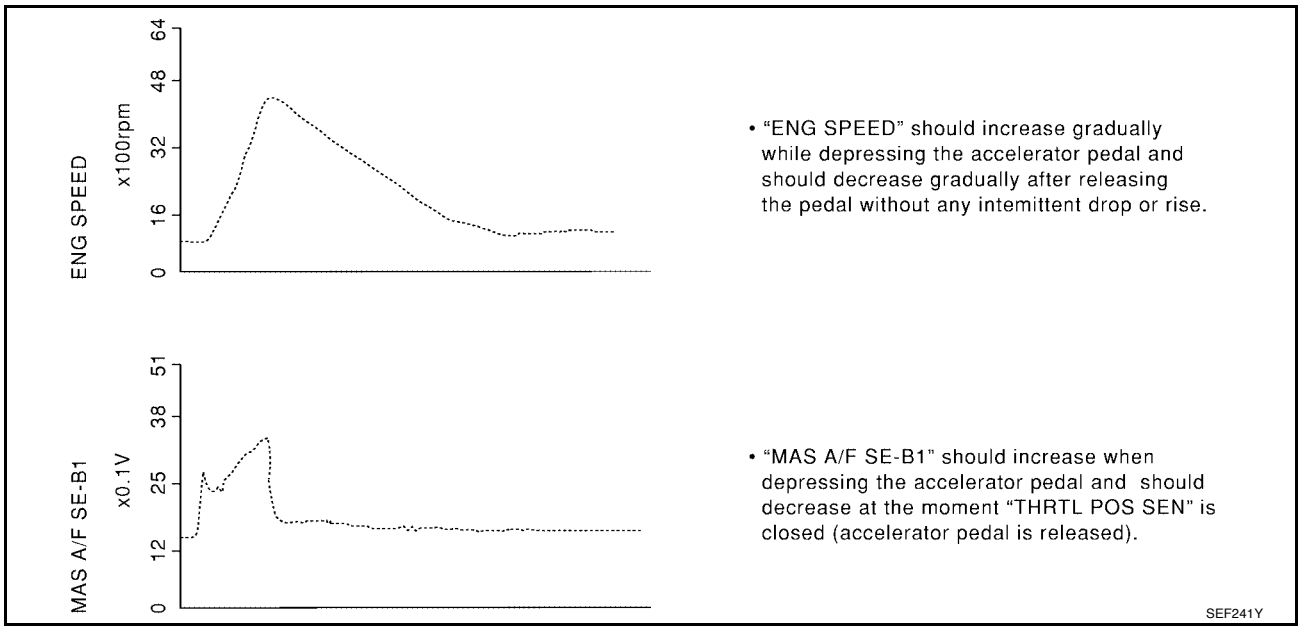
Below is the data for “THRTL POS SEN”, “ABSOL TH·P/S” and “CLSD THL POS” when depressing the accelerator pedal with the ignition switch ON.
The signal of “THRTL POS SEN” and “ABSOL TH·P/S” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from “ON” to “OFF”.

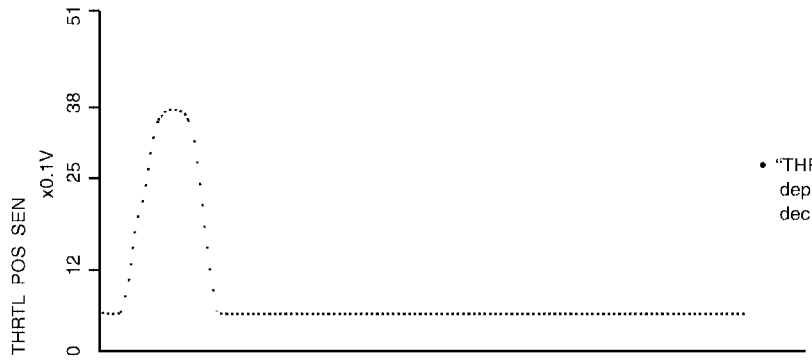


ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

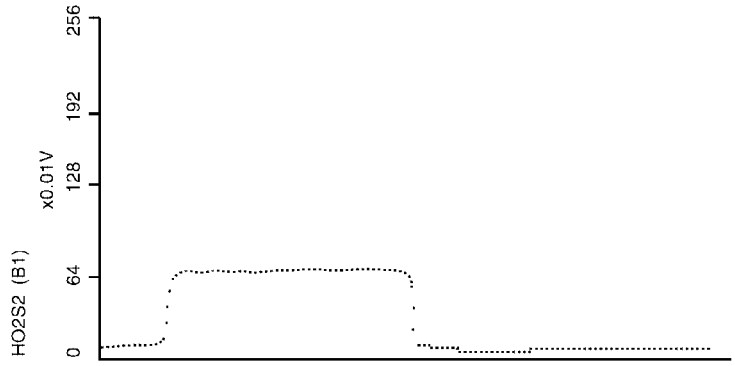
Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL POS SEN”, “HO2S2 (B1)”, “HO2S1 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.

Each value is for reference, the exact value may vary.

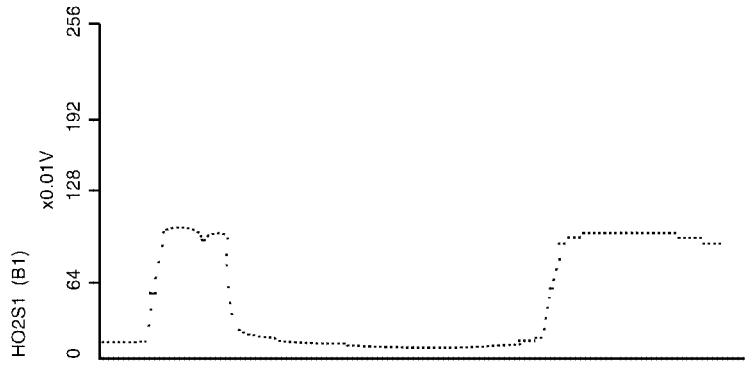




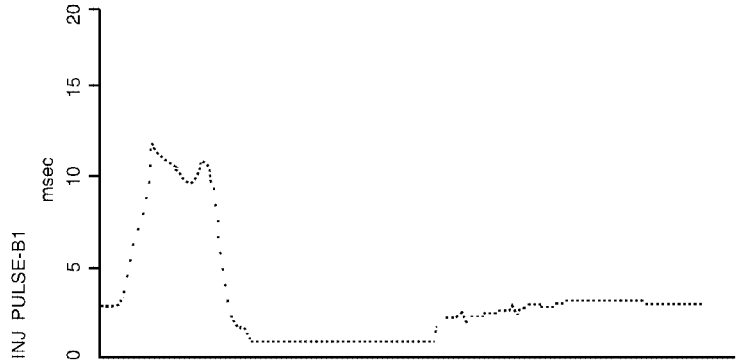
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "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.

SEF242YD

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

Description

UBS00DSG

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/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

UBS00DSH

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 101.3 kPa (760.0 mmHg, 29.92 inHg)±3 kPa (22.5 mmHg, 0.89 inHg)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up*1
- Electrical load: Not applied*2
- Engine speed: Idle

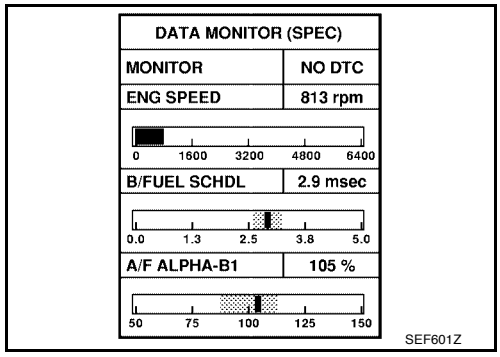
*1: For A/T models, after the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates less than 0.9V. For M/T models, drive vehicle for 5 minutes after the engine is warmed up to normal operating temperature.
*2: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

Inspection Procedure

UBS00DSI

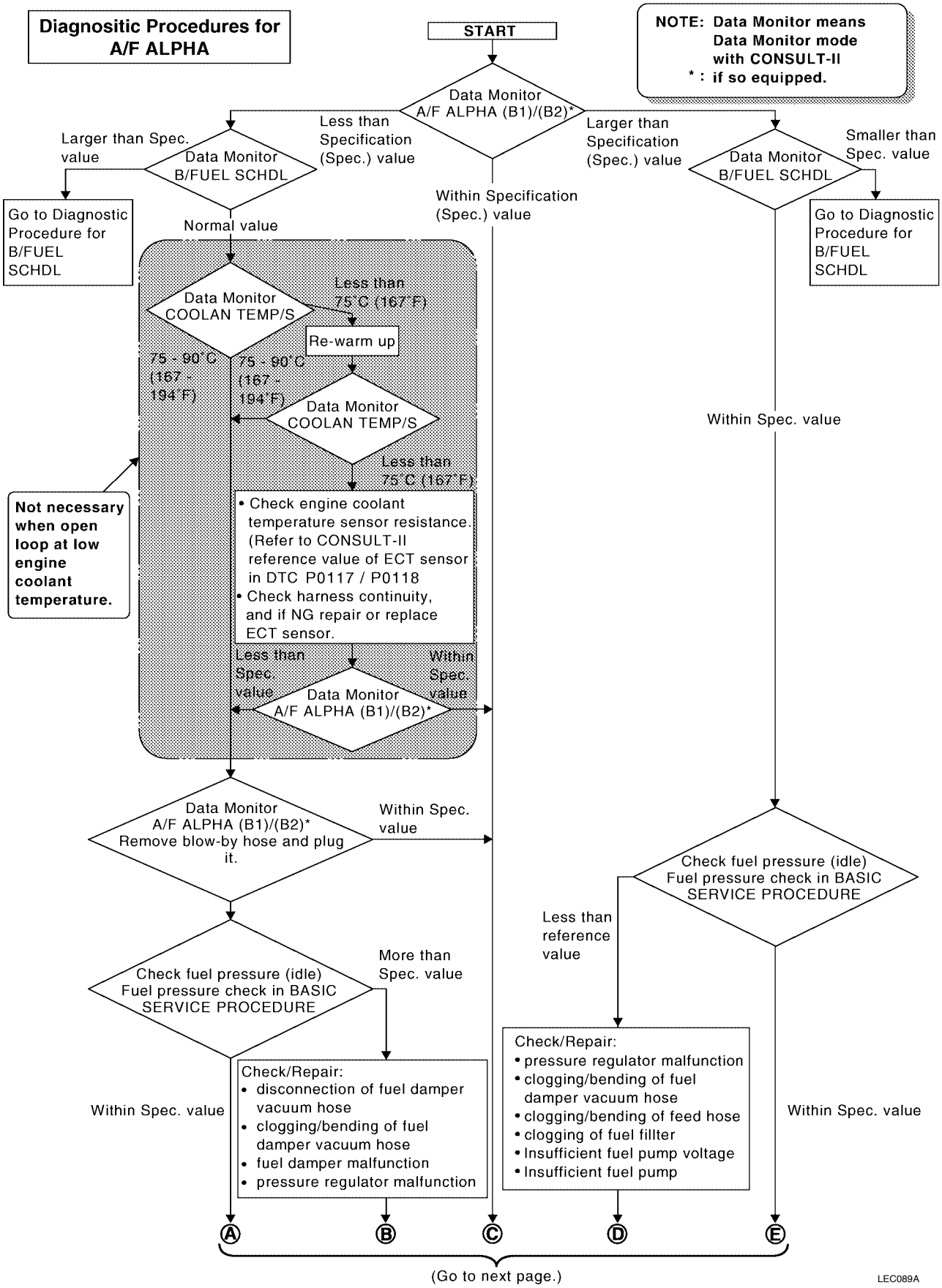
NOTE:
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

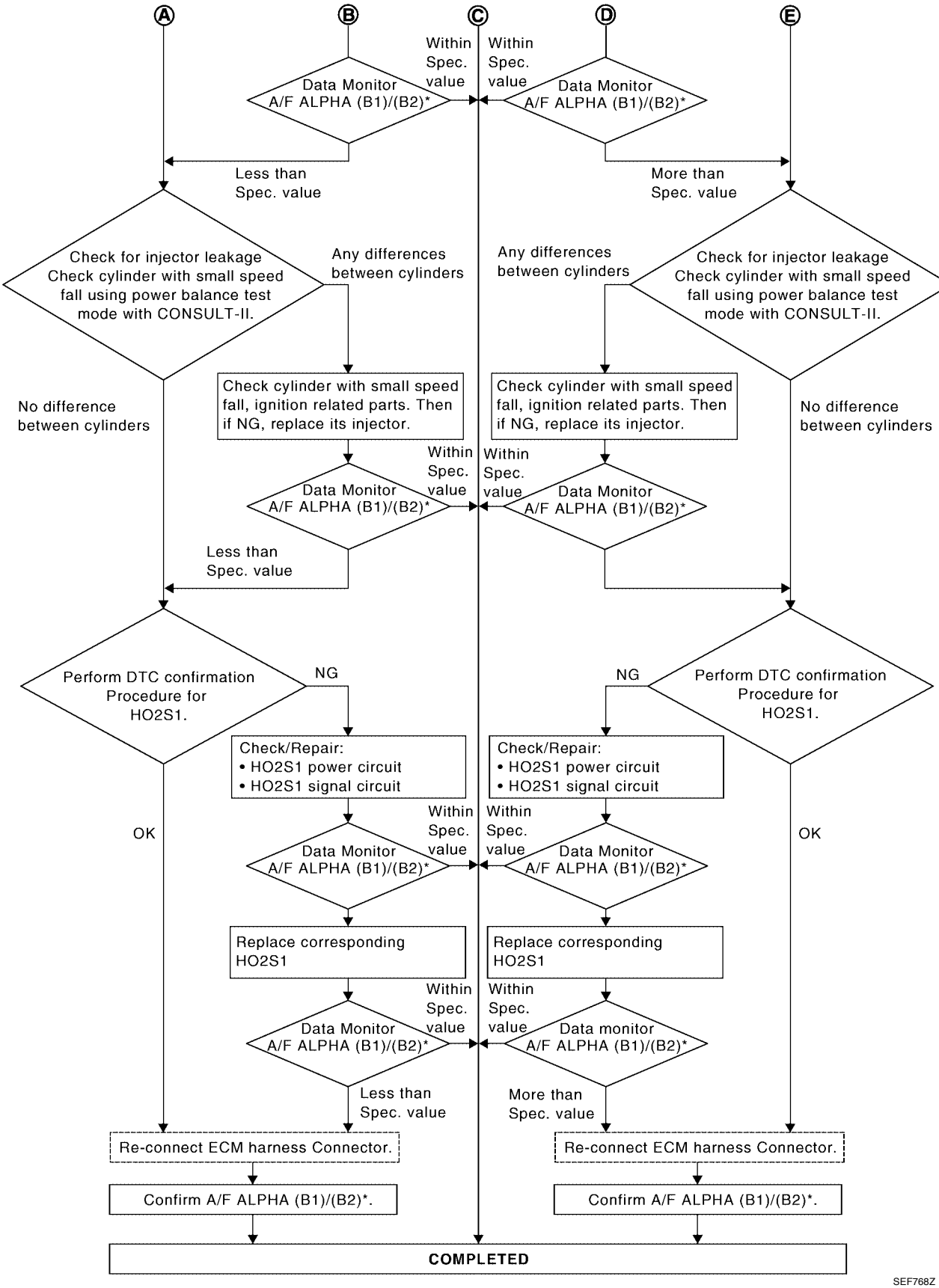
1. Perform EC-1255, "Basic Inspection" .
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-1302, "Diagnostic Procedure" .



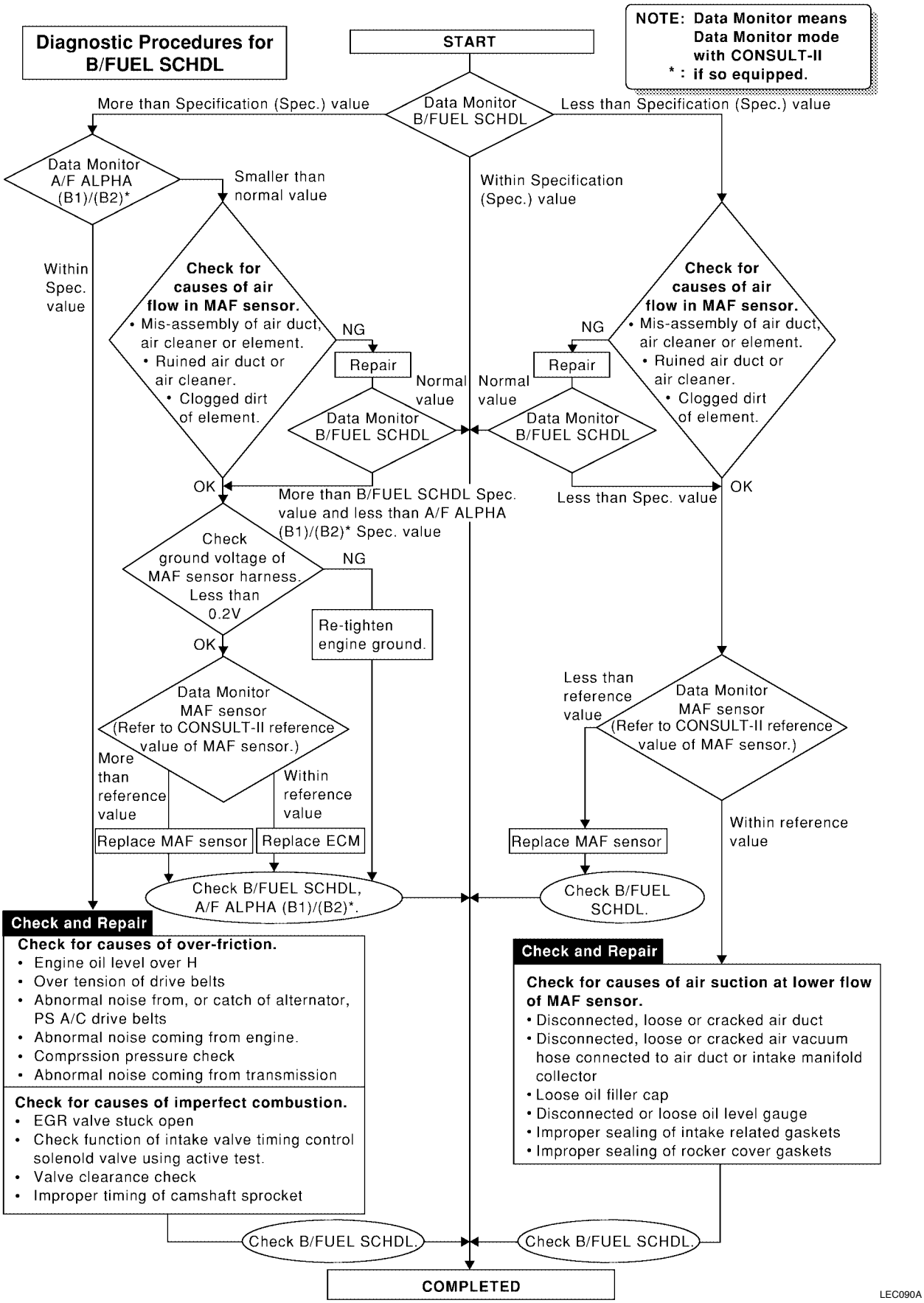
Diagnostic Procedure

UBS00DSJ




Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
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.)
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
LEC090A

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

UBS00DSK

Intermittent incidents (I/I) may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Common I/I Report Situations

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than [0] or [1t].
III	The symptom described by the customer does not recur.
IV	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.

Diagnostic Procedure

UBS00DSL

1. INSPECTION START

Erase (1st trip) DTCs. Refer to EC-1241, "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-25, "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-25, "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-22, "How to Check Terminal" , “HOW TO PROBE CONNECTORS”, “How to Check Enlarged Contact Spring of Terminal”.

OK or NG

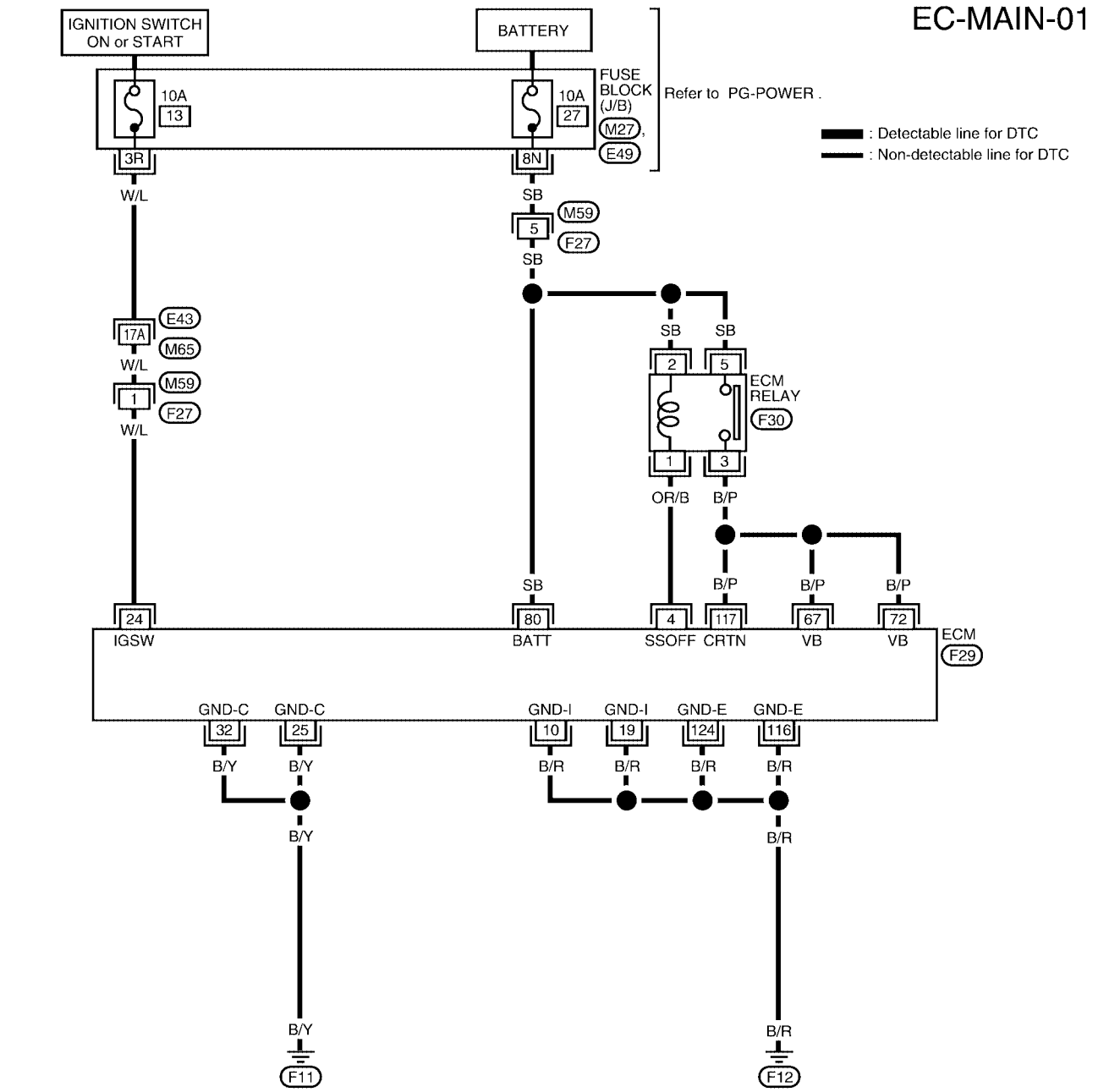
OK >> **INSPECTION END.**
NG >> Repair or replace connector.

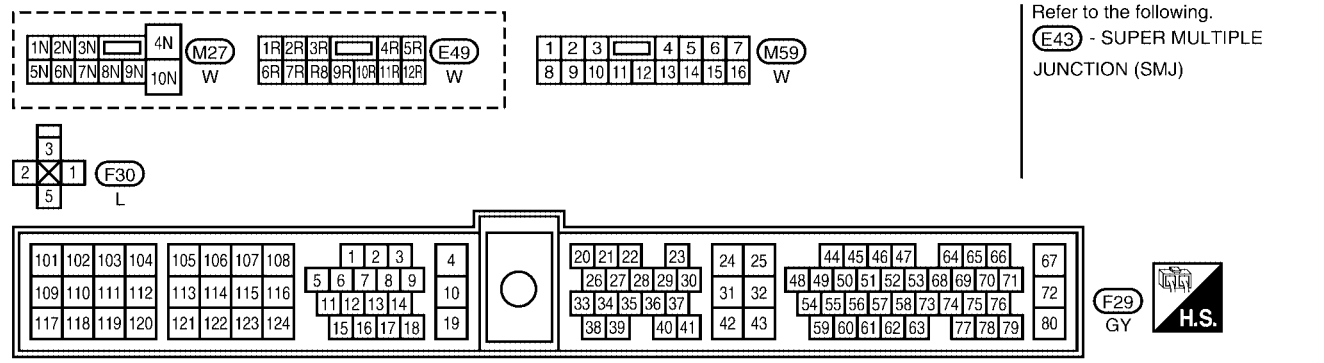
POWER SUPPLY AND GROUND CIRCUIT

PFP:24110

Wiring Diagram

UBS00DSM





BBWA0465E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self-shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
10	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
19	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
24	W/L	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
25	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
32	B/Y	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
80	SB	Power supply (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
116	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
124	B/R	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

Diagnostic Procedure

UBS00DSN

1. INSPECTION START

Start engine.

Is engine running?

Yes or No

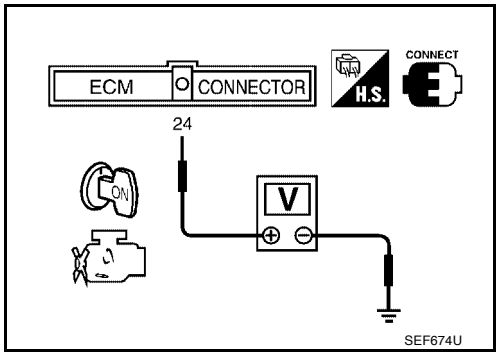
Yes >> GO TO 6.

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 24 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

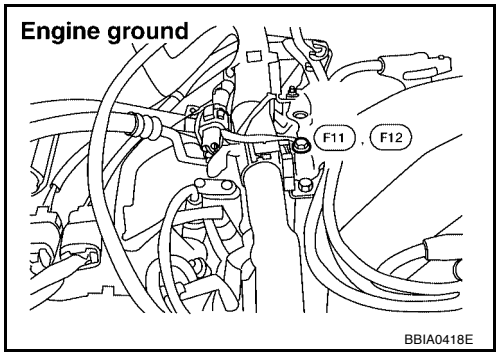
Check the following.

- Harness connectors E43, M65
- Harness connectors M59, F27
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair harness or connectors.

4. CHECK GROUND CONNECTORS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
Refer to EC-1311, "Ground Inspection" .



OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and ground.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

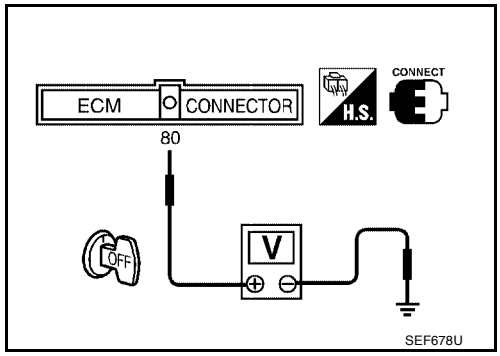
OK or NG

OK >> GO TO 16.
NG >> Repair open circuit or short to power in harness or connectors.

6. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Stop engine.
2. Check voltage between ECM terminal 80 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.

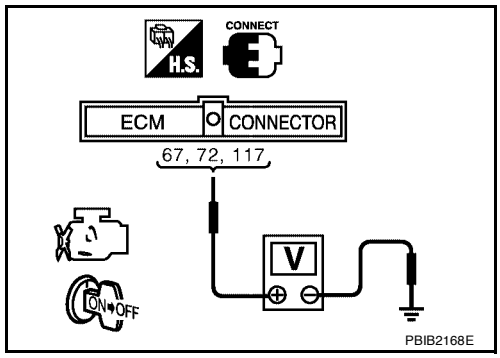
- Harness connectors M59, F27
- Fuse block (J/B) connector M27
- 10A fuse
- Harness for open or short between ECM and battery

>> Repair harness or connectors.

8. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch ON and then OFF.
2. Check voltage between ECM terminals 67, 72, 117 and ground with CONSULT-II or tester.

Voltage : After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.

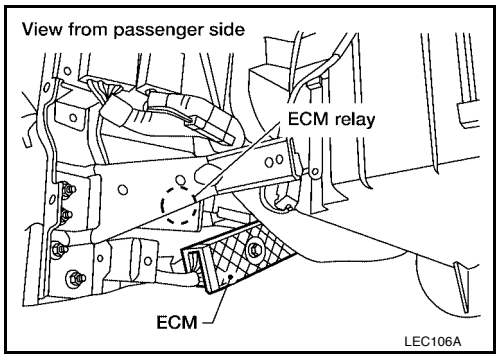


OK or NG

OK >> GO TO 14.
NG (Battery voltage does not exist.)>>GO TO 9.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 12.

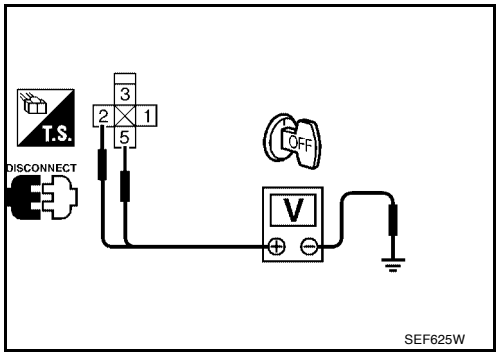
9. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM relay.



2. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM relay and harness connector F27

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 67, 72, 117 and ECM relay terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 4 and ECM relay terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

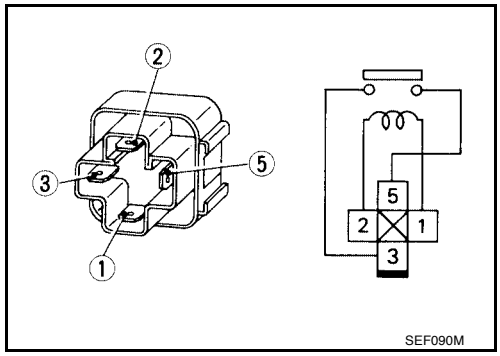
OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ECM RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

12V (1 - 2) applied : Continuity exists.
No voltage applied : No continuity



OK or NG

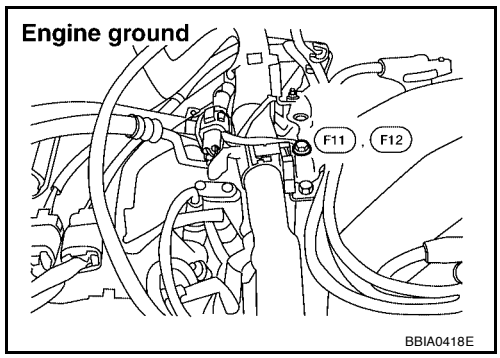
OK >> GO TO 14.
NG >> Replace ECM relay.

14. CHECK GROUND CONNECTORS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

OK or NG

OK >> GO TO 15.
NG >> Repair or replace ground connections.



15. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 10, 19, 25, 32, 116, 124 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 16.
NG >> Repair open circuit or short to power in harness or connectors.

16. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Ground Inspection

UBS00GZ2

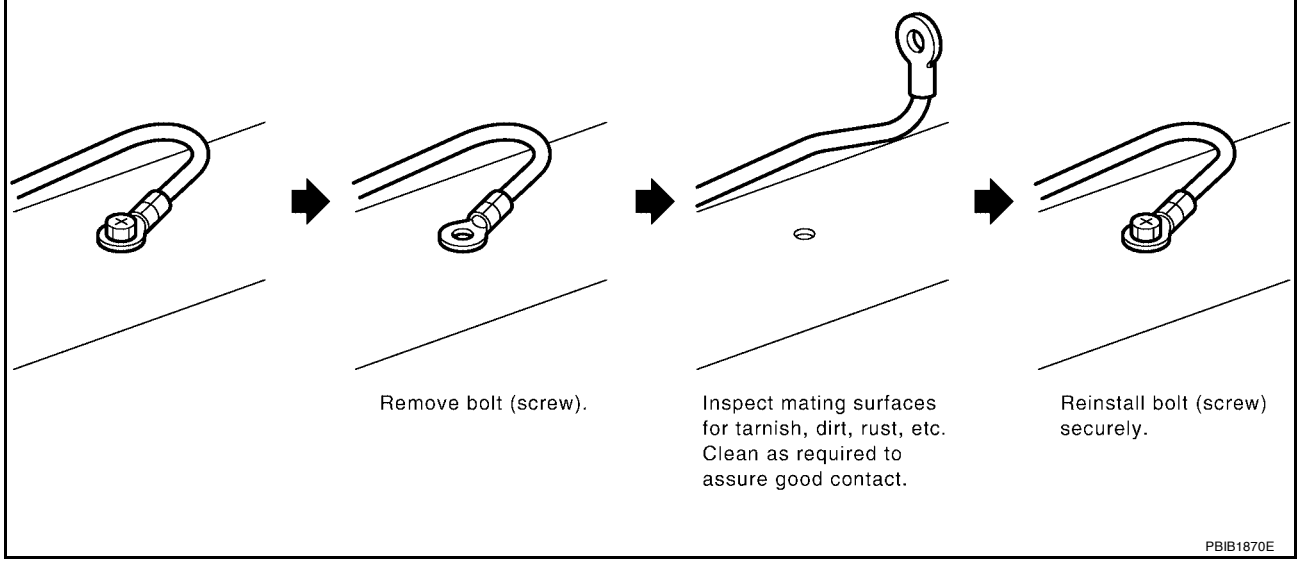
Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.

- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to PG-17, "Ground Distribution" .

Ground Inspection



DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

PFP:22690

Description

UBS00DSO

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Engine coolant temperature sensor	Engine coolant temperature		

The ECM performs ON/OFF control of the heated oxygen sensor 1 heaters corresponding to the engine speed.

OPERATION

Engine speed rpm	Heated oxygen sensor 1 heaters
Above 2,800	OFF
Below 2,800 after warming up	ON

CONSULT-II Reference Value in Data Monitor Mode

UBS00DSP

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1) HO2S1 HTR (B2)	● Engine: After warming up ● Engine speed: Below 2,800 rpm	ON
	● Engine speed: Above 2,800 rpm	OFF

On Board Diagnosis Logic

UBS00DSQ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031 (Bank 1) P0051 (Bank 2)	Heated oxygen sensor 1 heater control circuit low	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	● Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.) ● Heater oxygen sensor 1 heater
P0032 (Bank 1) P0052 (Bank 2)	Heated oxygen sensor 1 heater control circuit high	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	● Harness or connectors (The heated oxygen sensor 1 heater circuit is shorted.) ● Heater oxygen sensor 1 heater

DTC Confirmation Procedure

UBS00DSR

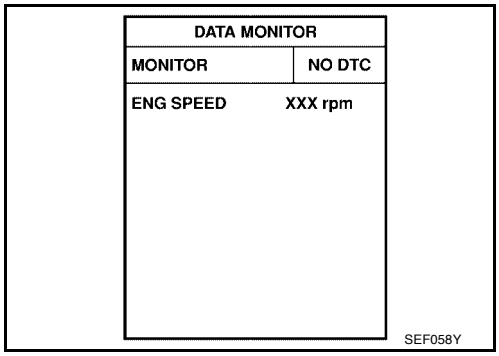
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT-II

1. Start engine and warm it up normal operating temperature.
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. Start engine and run it for at least 6 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-1318, "Diagnostic Procedure"



WITH GST

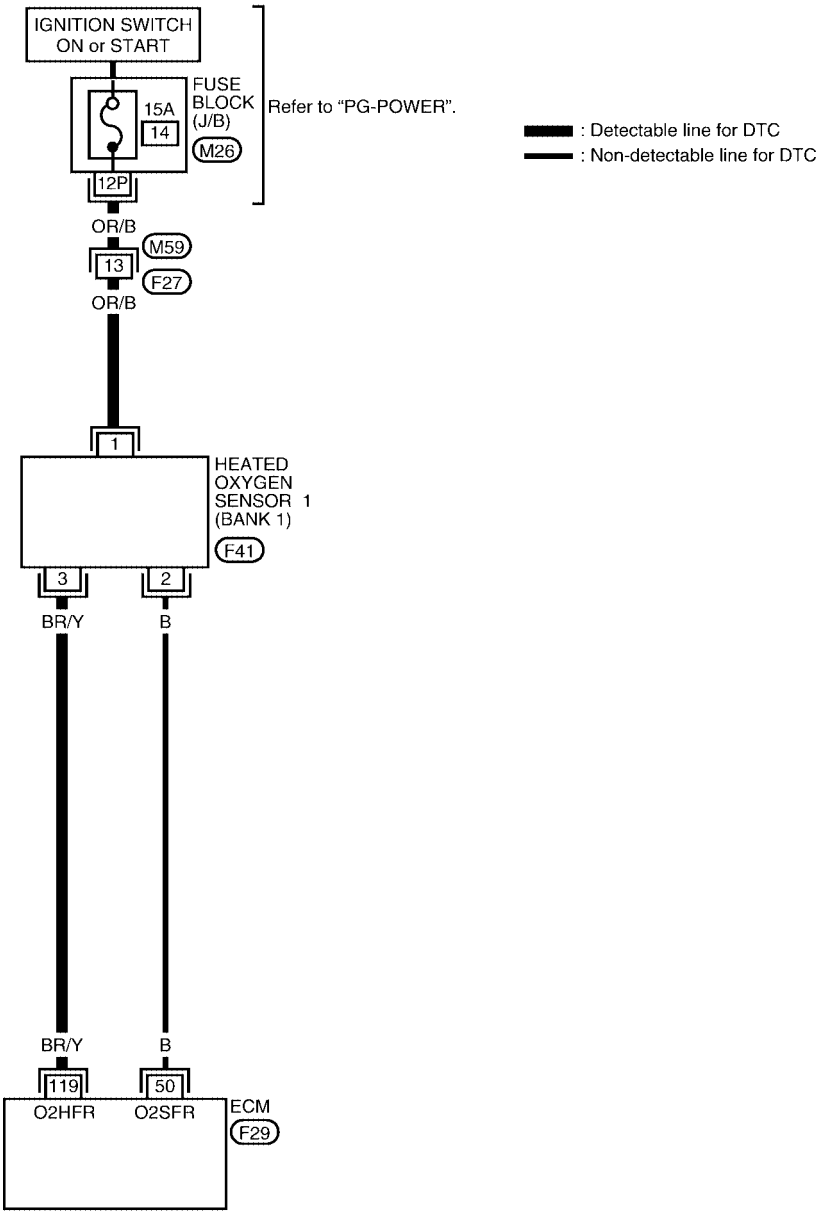
1. Start engine and warm it up normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and run it for at least 6 seconds at idle speed.
4. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
5. Start engine and run it for at 6 seconds at idle speed.
6. Select MODE 3 with GST.
7. If DTC is detected, go to EC-1318, "Diagnostic Procedure"

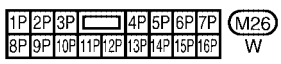
- **When using GST, DTC Confirmation Procedure should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

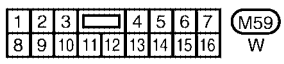
Wiring Diagram
BANK 1

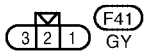
UBS00DSS

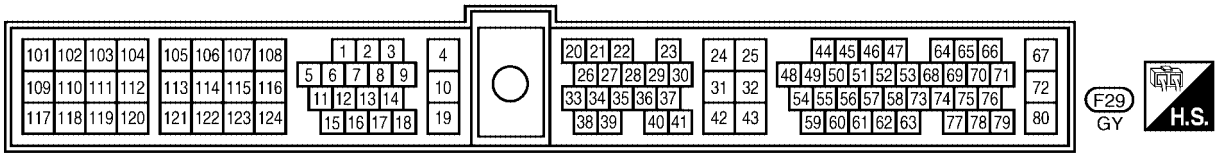
EC-O2H1B1-01











BBWA1077E

Specification data are reference values and are measured between each terminal and ground.

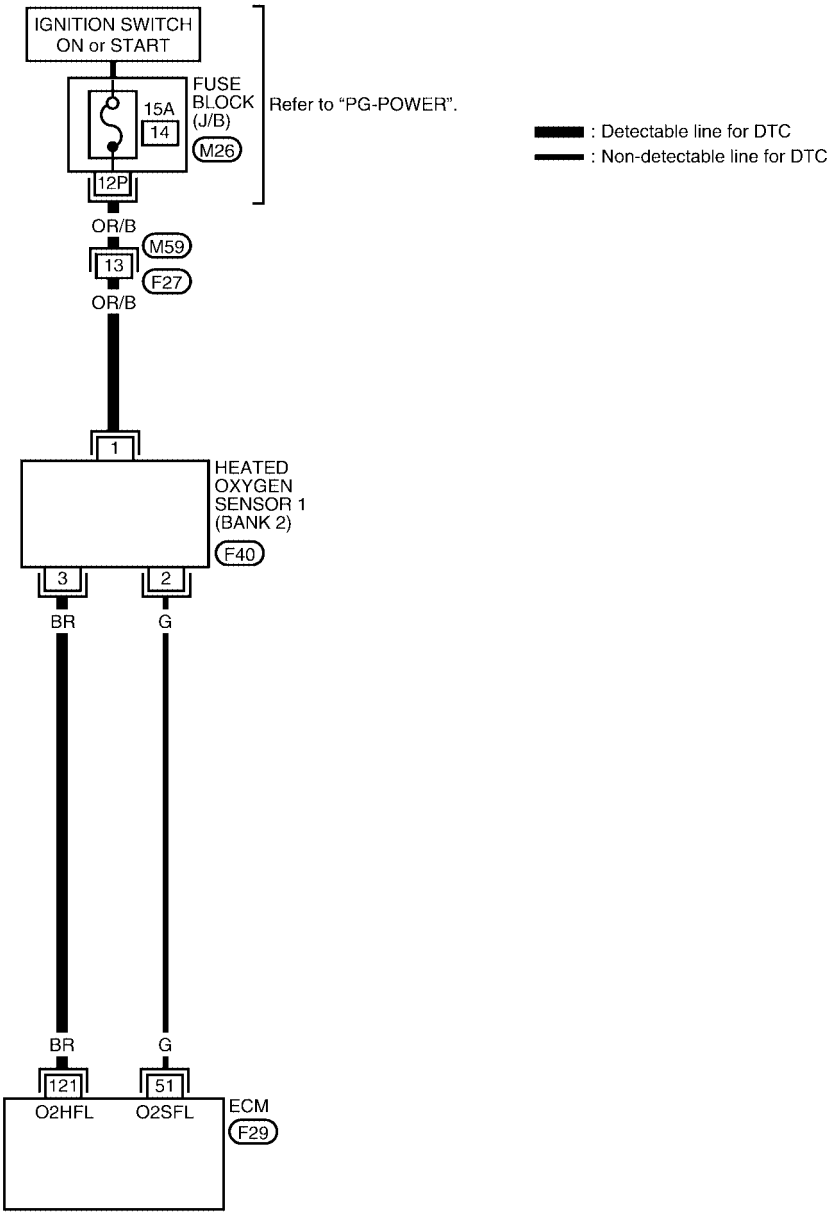
CAUTION:

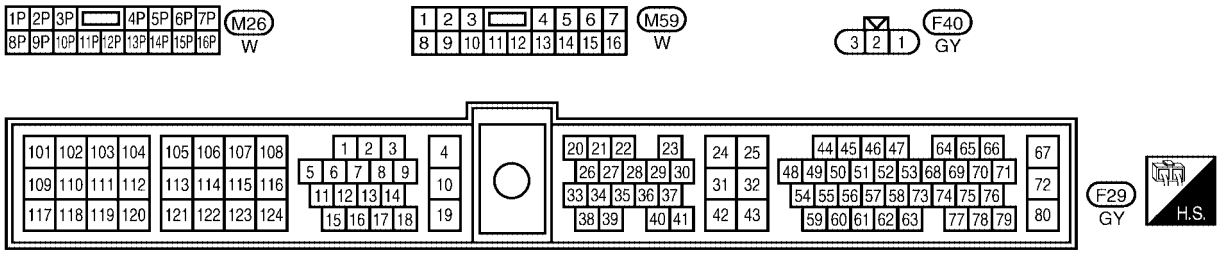
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
119	BR/Y	Heated oxygen sensor 1 heater (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 2,800 rpm	Approximately 0.4V
			[Engine is running] ● Engine speed is above 2,800 rpm	BATTERY VOLTAGE (11 - 14V)

BANK 2

EC-O2H1B2-01





BBWA1078E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	BR	Heated oxygen sensor 1 heater (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 2,800 rpm	Approximately 0.4V
			[Engine is running] ● Engine speed is above 2,800 rpm	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

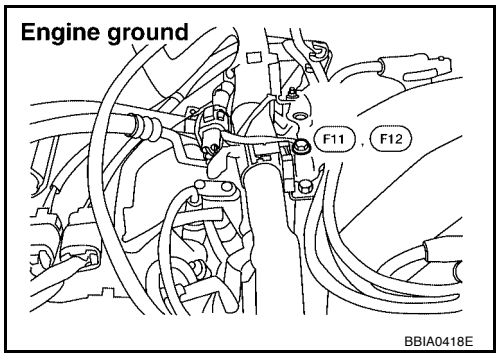
UBS00DST

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

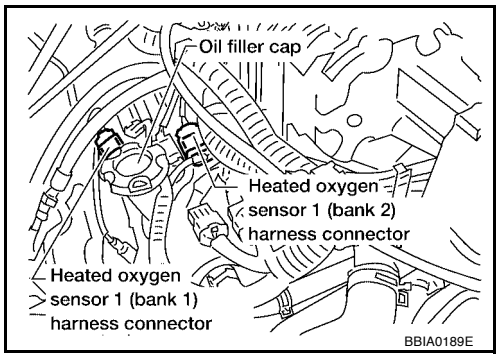
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



2. CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Turn ignition switch ON.

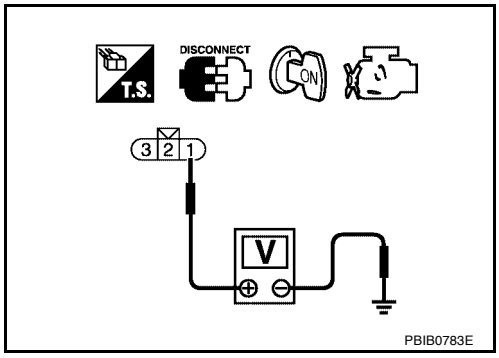


3. Check voltage between HO2S1 terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Fuse block (J/B) connector M26
- 15A fuse
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair harness or connectors.

4. CHECK HO2S1 HEATER OUTPUT 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	
P0031	119	3	Bank 1
P0051	121	3	Bank 2

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-1319, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace malfunctioning heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION EN**

Component Inspection

UBS00DSU

HEATED OXYGEN SENSOR 1 HEATER

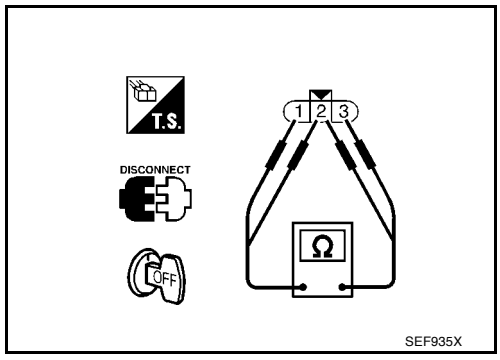
1. Check resistance between HO2S1 terminals 3 and 1.

Resistance: 3.3 - 4.0Ω [at 25°C (77°F)]

2. Check continuity between HO2S1 terminals 2 and 1, 3 and 2.

Continuity should not exist.

3. If NG, replace heated oxygen sensor 1.



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00DSV

HEATED OXYGEN SENSOR 1

Refer to EM-80, "OUTER COMPONENT PARTS" .

DTC P0034 SCB VALVE CONTROL SOLENOID VALVE

PFP:14110

Description

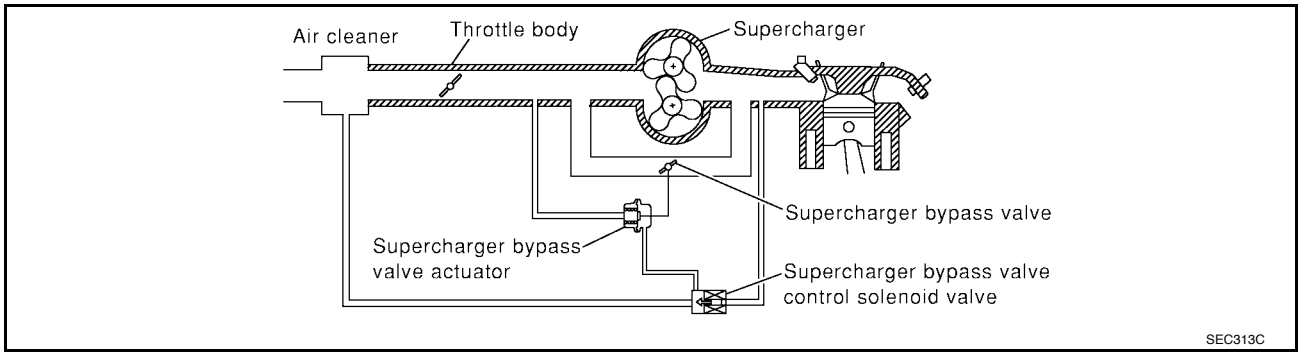
UBS00DSW

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Supercharged air control	SCB valve 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		

This system controls supercharged air according to the engine operating conditions.
This control operation is accomplished through the ECM and the SCB valve control solenoid valve.
When the solenoid valve is ON, the SCB valve shuts. Then intake air is lead to supercharger, and supercharged air is sent to the cylinder.
When the solenoid valve is OFF, the SCB valve opens. Then intake air is sent to the cylinder directly.
When the ECM detects any of the following conditions, current does not flow through the solenoid valve.

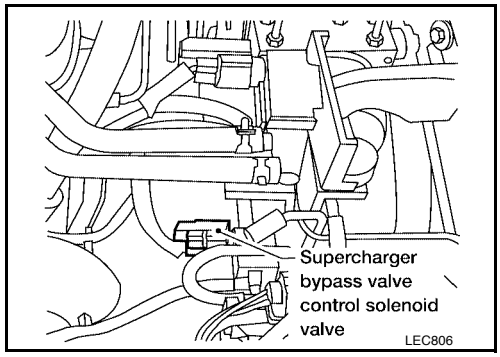
- Engine stopped
- Engine starting
- High-load, high-speed engine operation
- Excessively low engine coolant temperature
- Mass air flow sensor malfunction
- Engine coolant temperature sensor malfunction
- Throttle position sensor malfunction



COMPONENT DESCRIPTION

SCB Valve Control Solenoid Valve

The SCB valve control solenoid valve responds to signals from the ECM.
When the ECM sends an OFF signal, the solenoid valve is bypassed to apply intake manifold vacuum to the SCB valve actuator. This operation opens the SCB valve. When the ECM sends ON (ground) signal, the SCB valve opens or closes depend on the throttle valve position, regarding to the pressure difference between atmosphere and throttle body.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DSX

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
SCB/V CON S/V	● More than 5 seconds after turning ignition switch ON (Engine stopped)	OFF
	● Engine speed: Idle	ON

On Board Diagnosis Logic

UBS00DSY

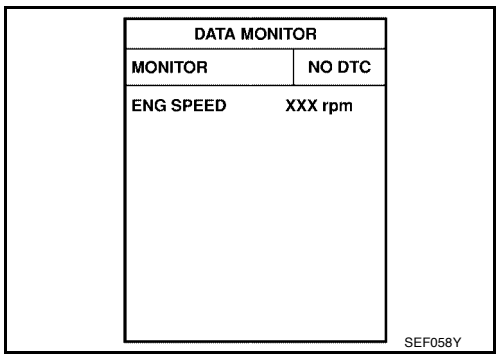
DTC No.	Trouble diagnosis name	DTC detection condition	Possible cause
P0034	SCB valve control solenoid valve circuit problem	Improper voltage signal from SCB valve control solenoid valve is sent to ECM.	● Harness or connectors (The SCB valve control solenoid valve circuit is open or shouted) ● SCB valve control solenoid valve.

DTC Confirmation Procedure

UBS00DSZ

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-1324, "Diagnostic Procedure" .



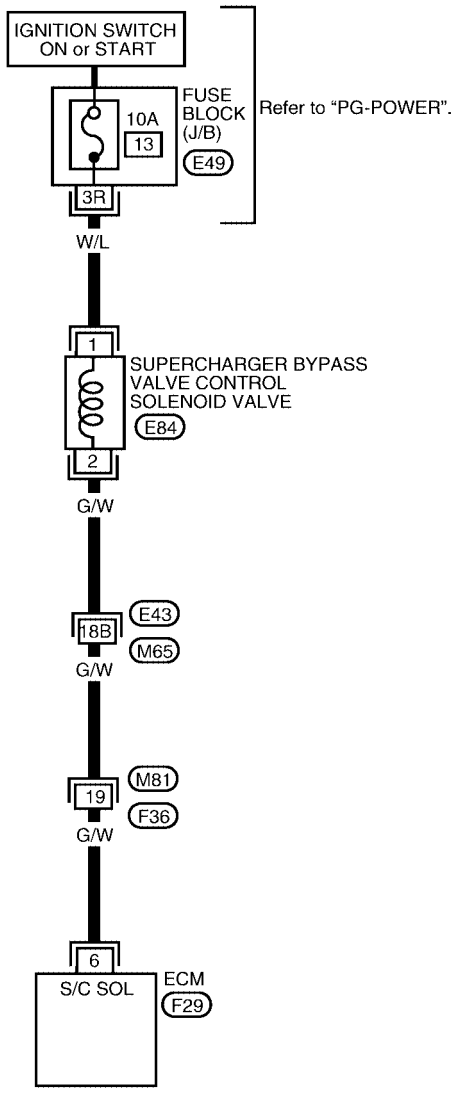
WITH GST

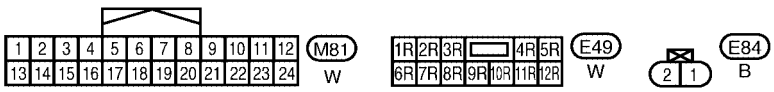
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

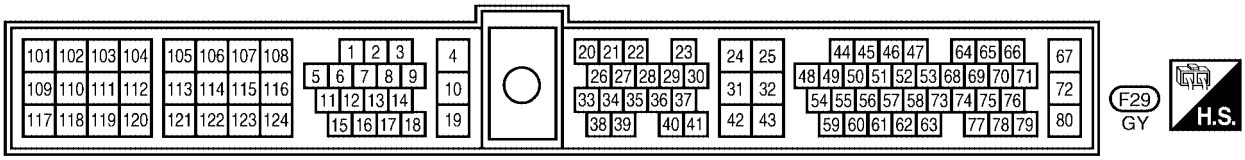
UBS00DT0

EC-S/CHGR-C





Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)



BBWA1105E

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

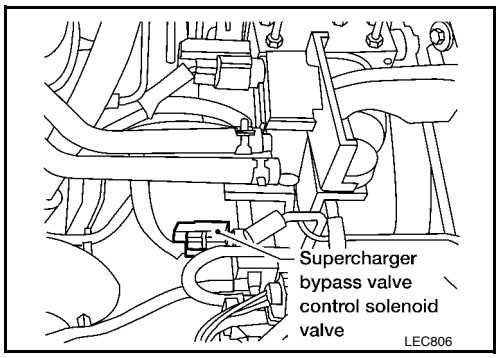
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	G/W	SCB valve control solenoid valve	**[Ignition switch: ON]** ● Engine stopped	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00DT1

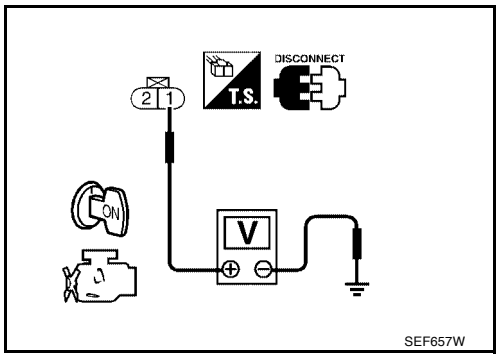
1. CHECK SCB VALVE CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect SCB valve control solenoid valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between SCB valve 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.

2. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between SCB valve control solenoid valve and fuse

>> Repair harness or connectors.

3. CHECK SCB VALVE 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 6 and SCB valve control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M81, F36
- Harness for open or short between SCB valve control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK SCB VALVE CONTROL SOLENOID VALVE

Refer to EC-1325, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace SCB valve control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Component Inspection

UBS00DT2

SCB VALVE CONTROL SOLENOID VALVE

With CONSULT-II

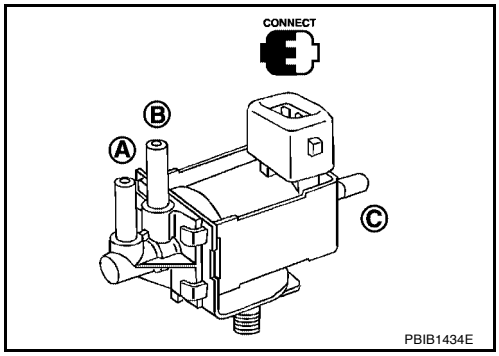
1. Perform “SCB/V CONT SOL/V” in “ACTIVE TEST” mode.

ACTIVE TEST	
SCB/V CONT SOL/V	ON
MONITOR	
ENG SPEED	XXXrpm
IACV-AAC/V	XXX%

PBIB1439E

2. Check air passage continuity and operation delay time under the following conditions.

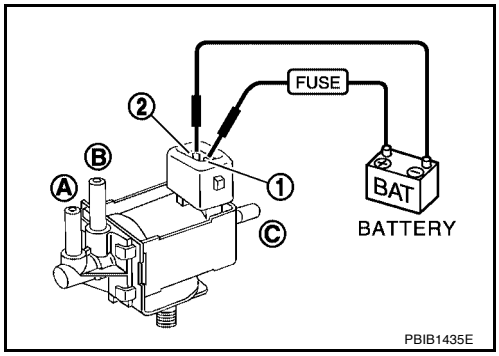
Conditions	Air passage between continuity between A and B	Air passage between continuity between A and C
ON	Yes	No
OFF	No	Yes



Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

Conditions	Air passage between continuity between A and B	Air passage between continuity between A and C
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes



DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

PFP:226A0

Description

UBS00DT3

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heaters corresponding to the engine speed.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. ● Engine: After warning up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	ON

CONSULT-II Reference Value in Data Monitor Mode

UBS00DT4

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1) HO2S2 HTR (B2)	● Engine speed: Below 3,600 rpm after the following conditions are met. – Engine: After warning up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	ON
	● Engine speed: Above 3,600 rpm	OFF

On Board Diagnosis Logic

UBS00DT5

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037 (Bank 1) P0057 (Bank 2)	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	● Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) ● Heater oxygen sensor 2 heater
P0038 (Bank 1) P0058 (Bank 2)	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	● Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) ● Heater oxygen sensor 2 heater

DTC Confirmation Procedure

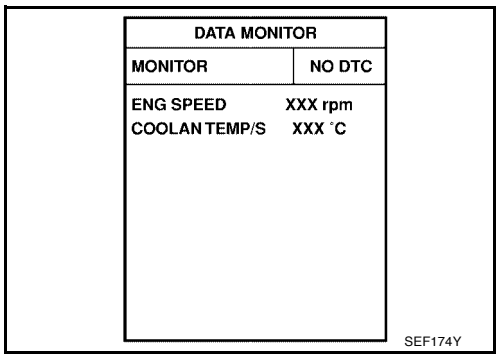
UBS00DT6

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed at between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. If 1st trip DTC is detected, go to EC-1332, "Diagnostic Procedure" .



WITH GST

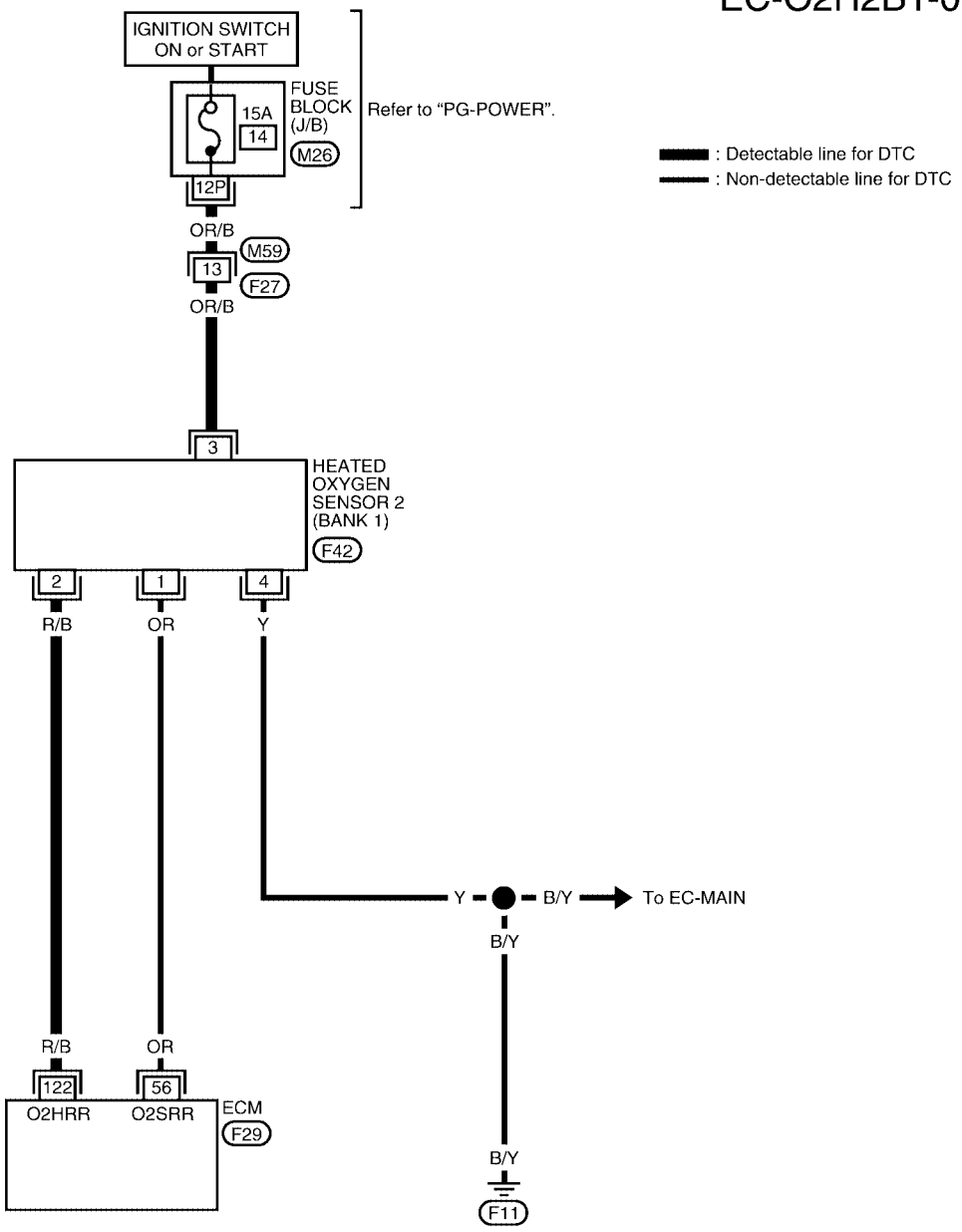
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
3. Let engine idle for 1 minute.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
6. Let engine idle for 1 minute.
7. Select MODE 3 with GST.
8. If DTC is detected, go to EC-1332, "Diagnostic Procedure" .

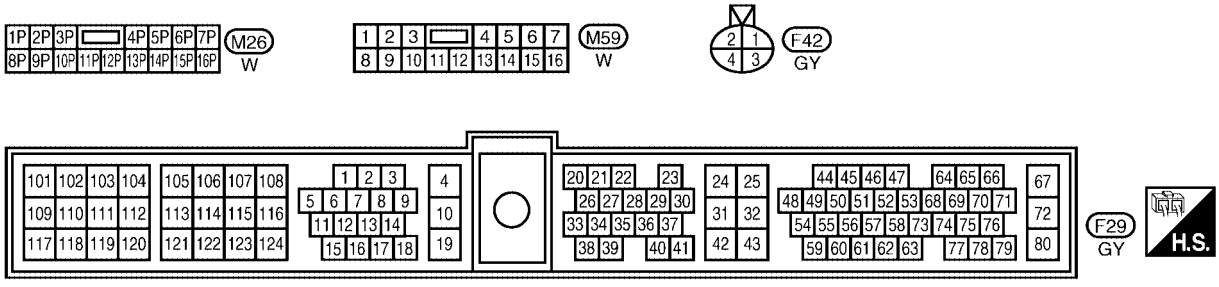
- **When using GST, DTC Confirmation Procedure should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram
BANK 1

UBS00DT7

EC-O2H2B1-01





BBWA1116E

Specification data are reference values and are measured between each terminal and ground.

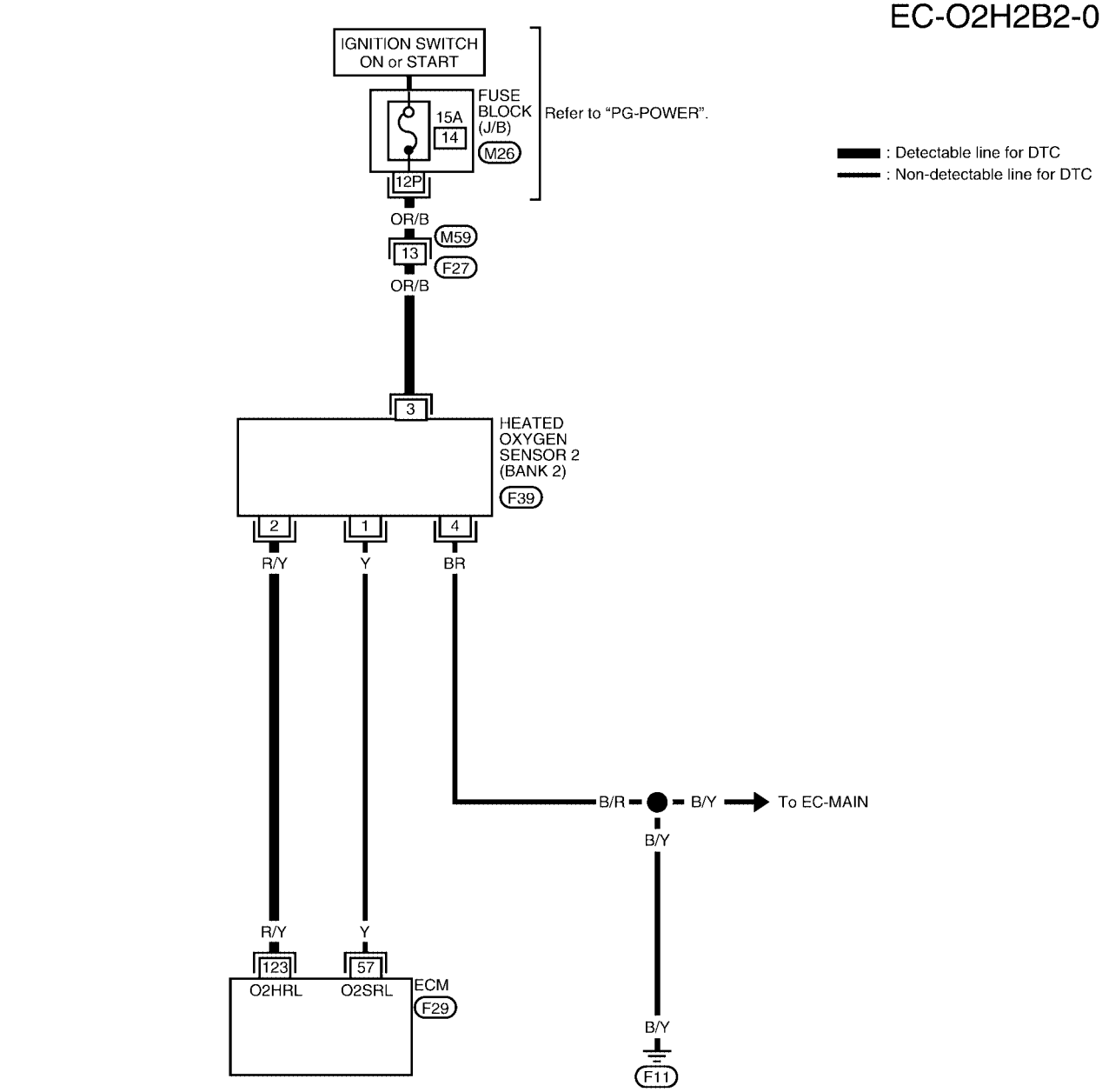
CAUTION:

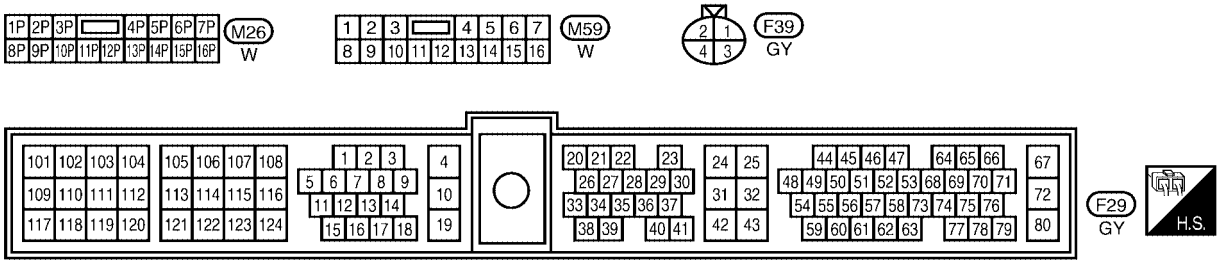
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
122	R/B	Heated oxygen sensor 2 heater (bank 1)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: After warning up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

BANK 2

EC-O2H2B2-01





BBWA1081E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
123	R/Y	Heated oxygen sensor 2 heater (bank 2)	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: After warning up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

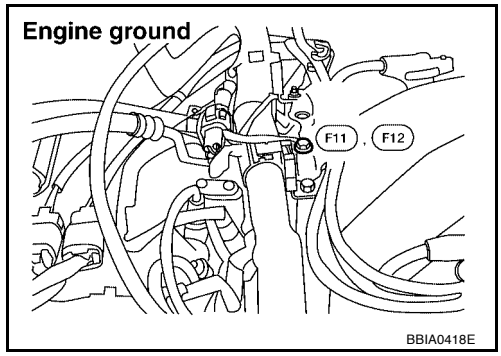
UBS00DT8

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

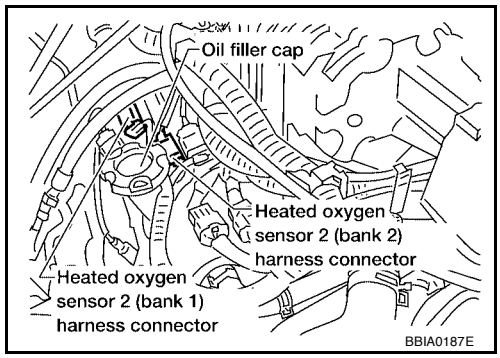
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



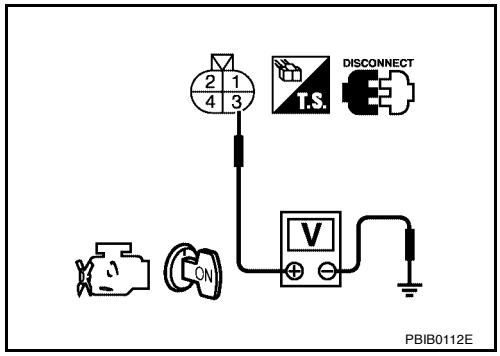
2. CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Turn ignition switch ON.



3. Check voltage between HO2S2 terminal 3 and ground.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Fuse block (J/B) connector M26
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair harness or connectors.

4. CHECK HO2S2 HEATER OUTPUT CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0037, P0038	122	2	Bank 1
P0057, P0058	123	2	Bank 2

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-1334, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END.**

Component Inspection

UBS00DT9

HEATED OXYGEN SENSOR 2 HEATER

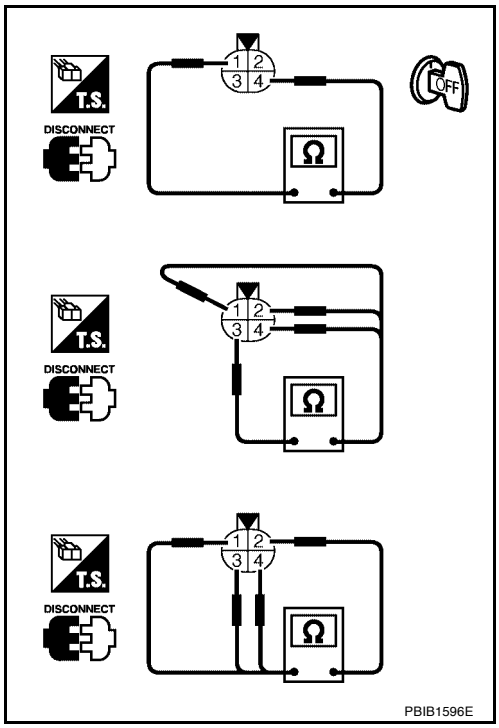
Check the following.

1. Check resistance between HO2S2 terminals 2 and 3.

Resistance: 3.3 - 4.0Ω [at 25°C (77°F)]

2. Check continuity.

Terminal No.	Continuity
1 and 2, 3, 4	No
4 and 1, 2, 3	



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00DTA

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

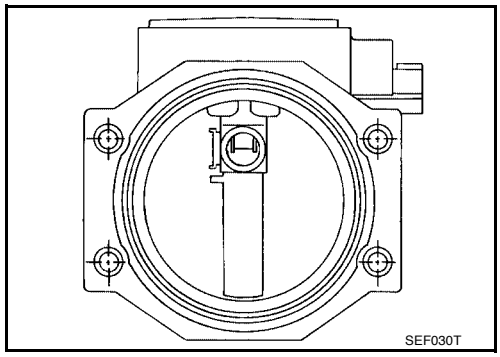
DTC P0101 MAF SENSOR

PFP:22680

Component Description

UBS00DTB

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.


SEF030T

CONSULT-II Reference Value in Data Monitor Mode

UBS00DTC

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 (A/T), Neutral (M/T) ● No load	Idle	1.0 - 1.7V
		2,500 rpm	1.7 - 2.3V
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	3.3 - 4.8 g·m/s
		2,500 rpm	12.0 - 14.9 g·m/s

On Board Diagnosis Logic

UBS00DTD

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0101	Mass air flow sensor circuit range/performance problem	A)	A high voltage from the sensor is sent to ECM under light load driving condition.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor
		B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor

DTC Confirmation Procedure

UBS00DTE

Perform PROCEDURE FOR MALFUNCTION A first.
If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.

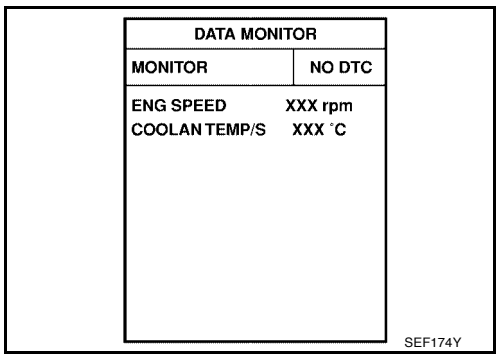
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

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-1339, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

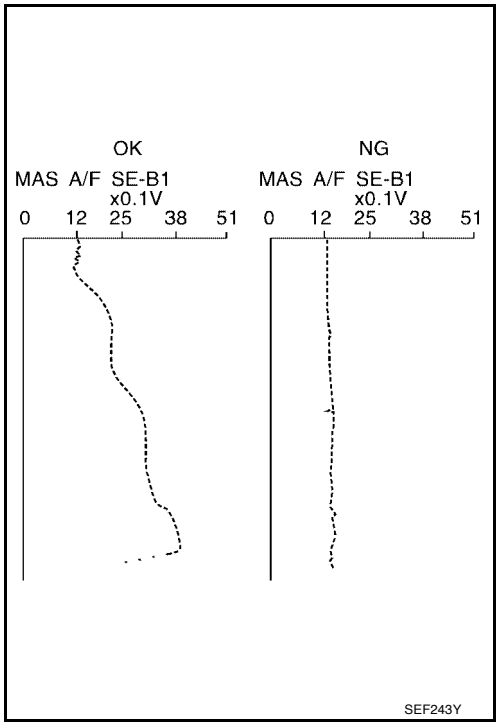
PROCEDURE FOR MALFUNCTION B

CAUTION:

Always drive vehicle at a safe speed.

With CONSULT-II

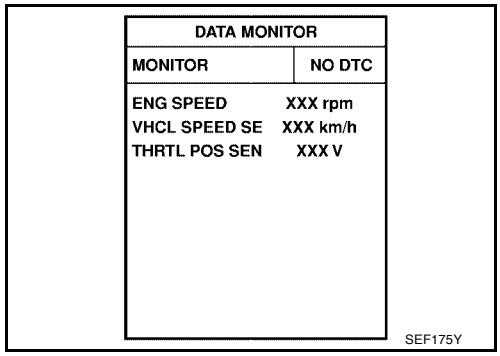
1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
   If engine cannot be started, go to EC-1339, "Diagnostic Procedure" .
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Check the voltage of MAS AIR/FL SE with “DATA MONITOR”.
5. Increases engine speed to about 4,000 rpm.
6. Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to EC-1339, "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 POS SEN	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-1339, "Diagnostic Procedure" .



Overall Function Check

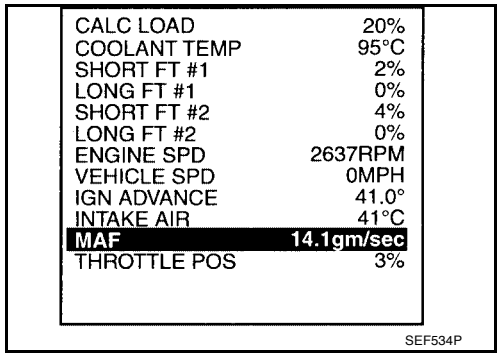
UBS00DTF

PROCEDURE FOR MALFUNCTION B

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

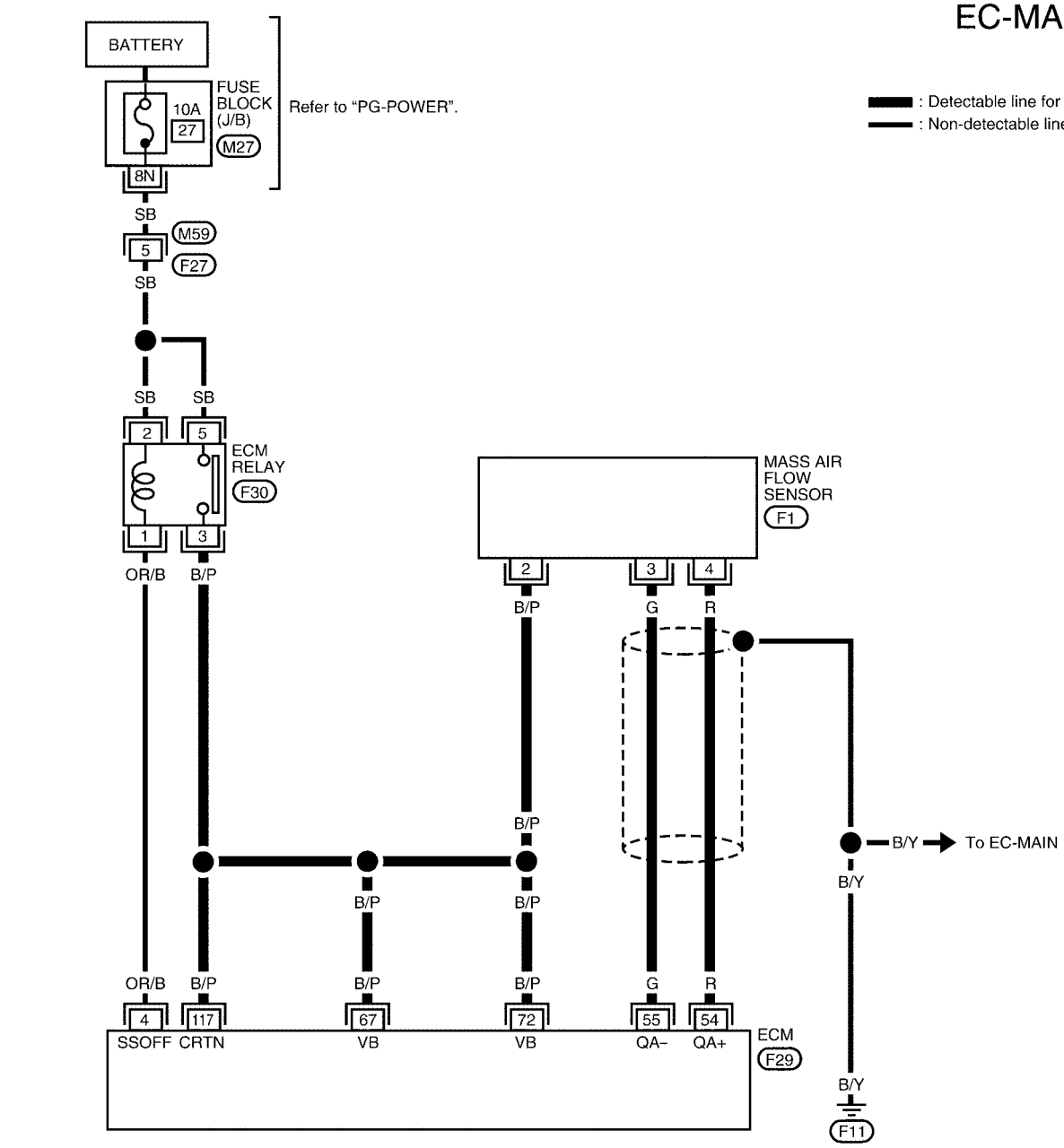
1. Start engine and warm it up to normal operating temperature.
2. Select MODE 1 with GST.
3. Check the mass air flow sensor signal with MODE 1.
4. Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
5. If NG, go to EC-1339, "Diagnostic Procedure" .

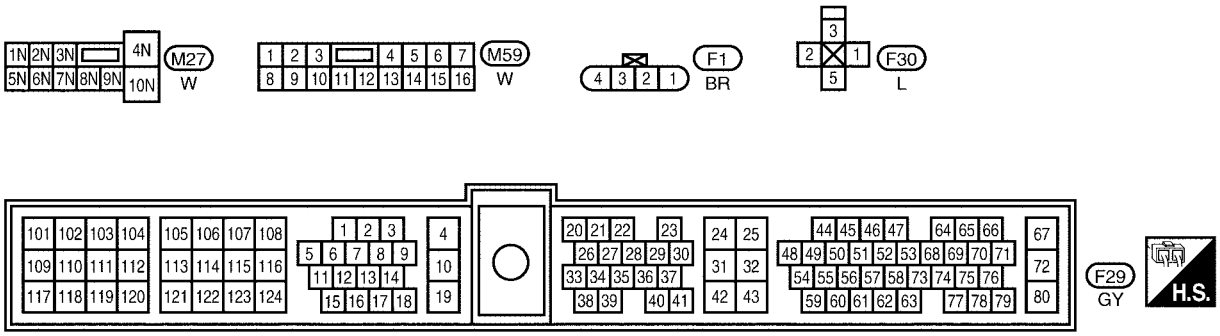


Wiring Diagram

UBS00DTG

EC-MAFS-01





BBWA0470E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
54	R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.7 - 2.3V
55	G	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00DTH

1. INSPECTION START

Which malfunction (A or B) is duplicated?

A or B

A >> GO TO 3.
B >> GO TO 2.

2. CHECK INTAKE SYSTEM

Check the following for connection.

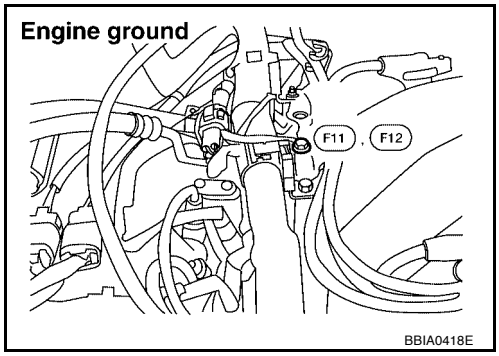
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

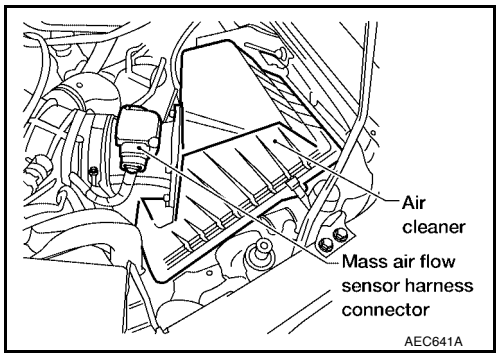


OK or NG

OK >> GO TO 4.
NG >> Repair or replace ground connections.

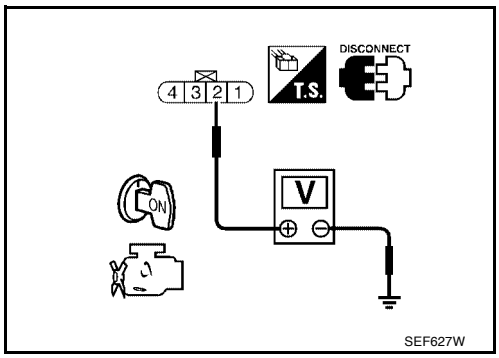
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness 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 55.
   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 4 and ECM terminal 54.
   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-1341, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Component Inspection

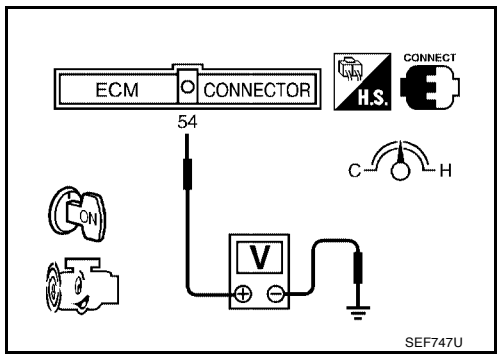
UBS00DTI

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 54 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

*: Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.



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 step 2 and 3 again.

5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.
6. If NG, clean or replace mass air flow sensor.

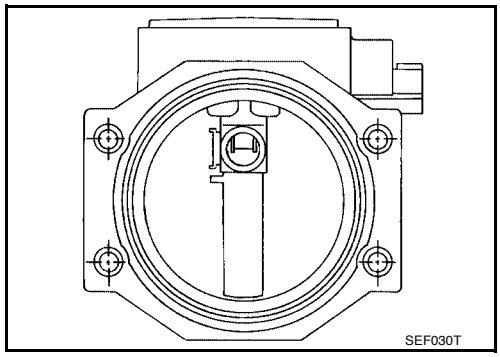
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

UBS00DTJ

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DTK

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 (A/T), Neutral (M/T) ● No load	Idle	1.0 - 1.7V
		2,500 rpm	1.7 - 2.3V
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	18.5 - 26.0%
		2,500 rpm	18.0 - 21.0%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	3.3 - 4.8 g·m/s
		2,500 rpm	12.0 - 14.9 g·m/s

On Board Diagnosis Logic

UBS00DTL

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM. **This self-diagnosis have the one trip detection logic.**	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor
P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

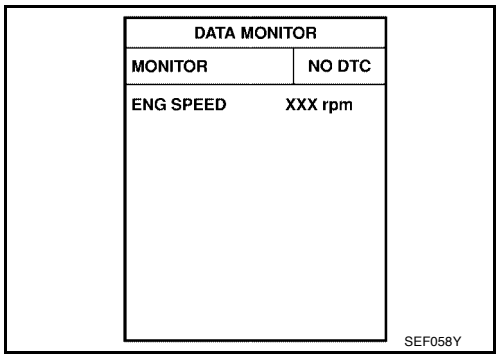
UBS00DTM

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

PROCEDURE FOR DTC P0102

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 at most.
4. If DTC is detected, go to EC-1346, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Start engine and let it idle for at least 6 seconds.
6. If DTC is detected, go to EC-1346, "Diagnostic Procedure" .



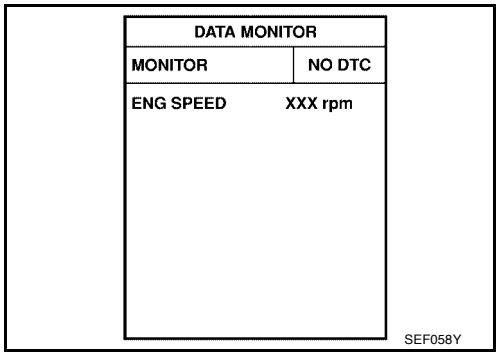
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR DTC P0103

With CONSULT-II

1. Turn ignition switch ON.
2. If 1st trip DTC is detected,
   Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 6 seconds.
4. If 1st trip DTC is detected, go to EC-1346, "Diagnostic Procedure" .
   If 1st trip DTC is not detected, go to next step.
5. Start engine and let it idle for at least 6 seconds.
6. If 1st trip DTC is detected, go to EC-1346, "Diagnostic Procedure" .



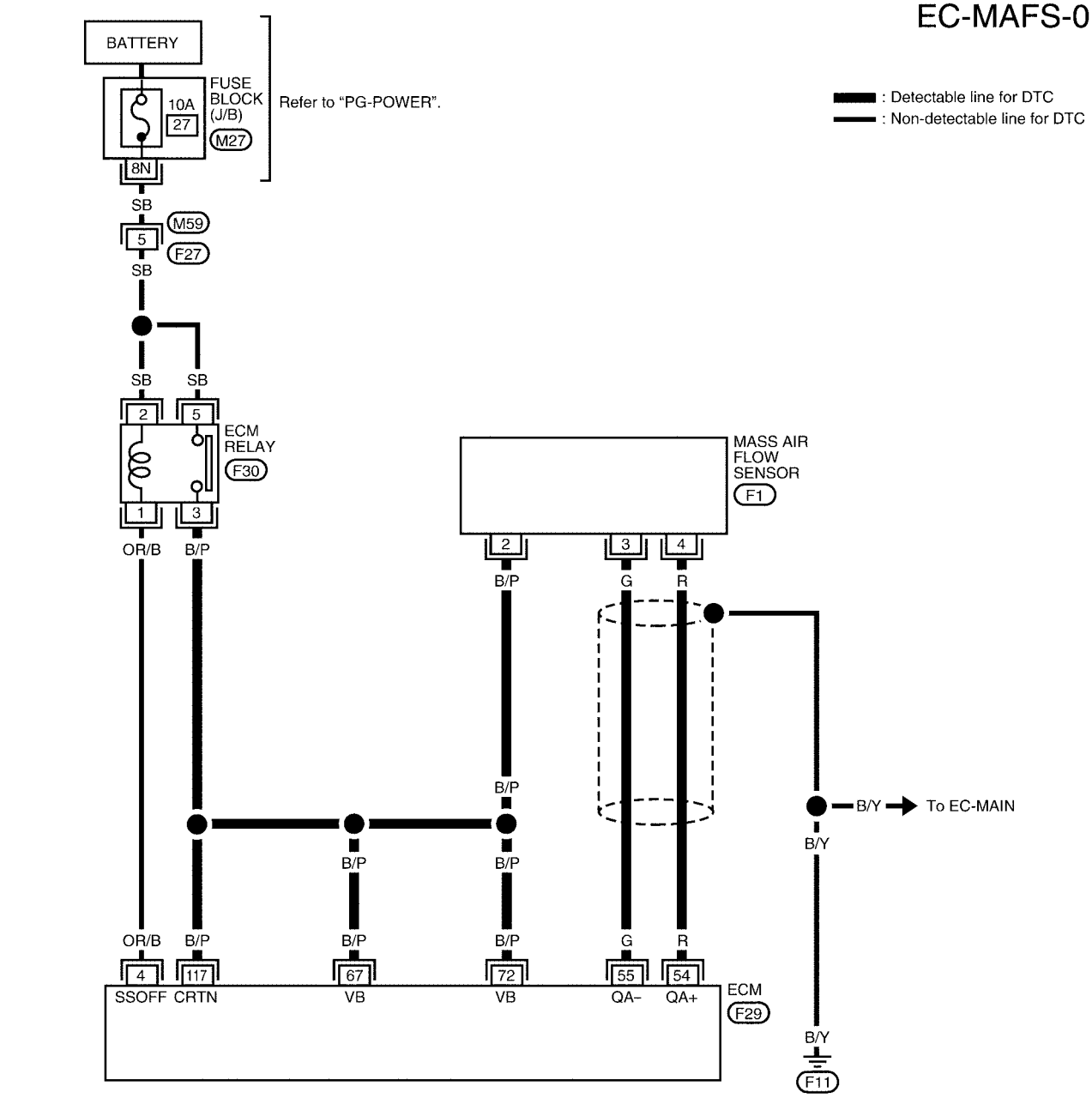
With GST

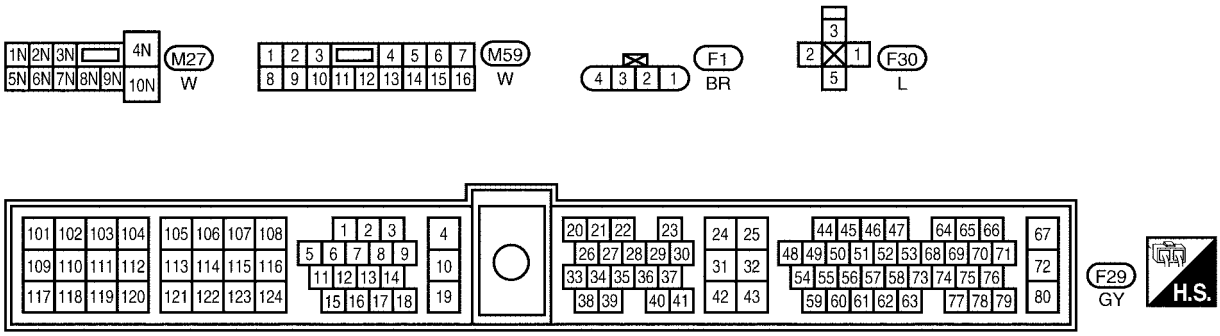
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00DTN

EC-MAFS-01





BBWA0470E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
54	R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 1.7V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm	1.7 - 2.3V
55	G	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00DTO

1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2. CHECK INTAKE SYSTEM

Check the following for connection.

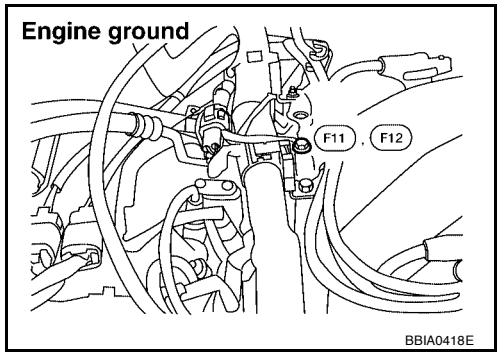
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

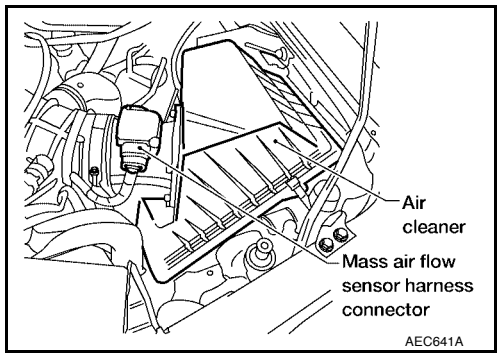


OK or NG

OK >> GO TO 4.
NG >> Repair or replace ground connections.

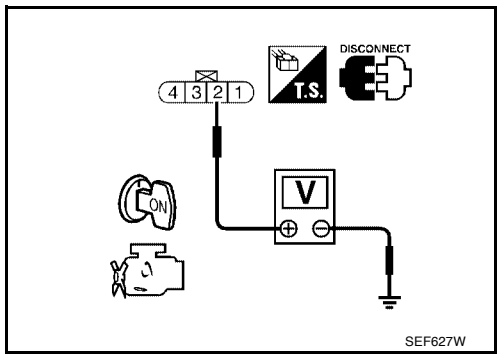
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness 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 55.
   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 4 and ECM terminal 54.
   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-1348, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Component Inspection

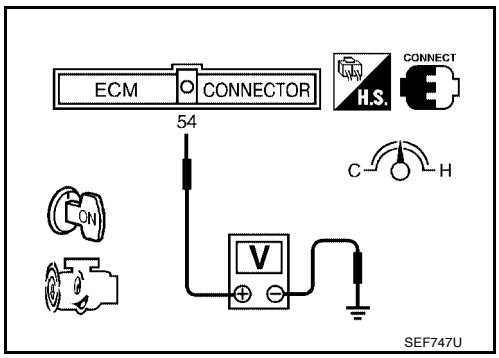
UBS00DTP

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 54 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Less than 1.0
Idle (Engine is warmed-up to normal operating temperature.)	1.0 - 1.7
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.7 - 2.3
Idle to about 4,000 rpm*	1.0 - 1.7 to Approx. 4.0

*: Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.



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 step 2 and 3 again.

5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.
6. If NG, clean or replace mass air flow sensor.

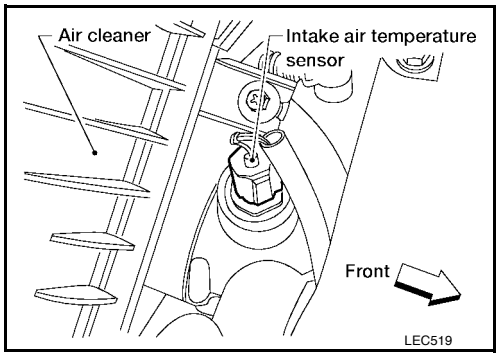
DTC P0112, P0113 IAT SENSOR

PFP:22630

Component Description

UBS00DTQ

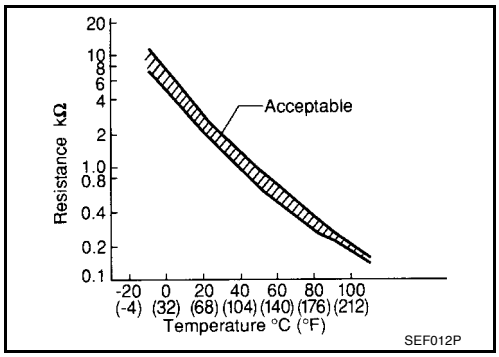
The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* (V)	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
80 (176)	1.23	0.27 - 0.38

*: These data are reference values and are measured between ECM terminal 61 (Intake air temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

On Board Diagnosis Logic

UBS00DTR

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor
P0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

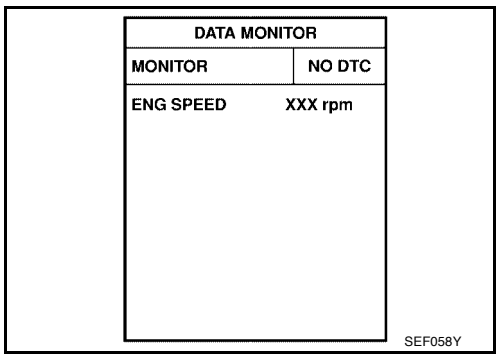
DTC Confirmation Procedure

UBS00DTS

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-1353, "Diagnostic Procedure" .



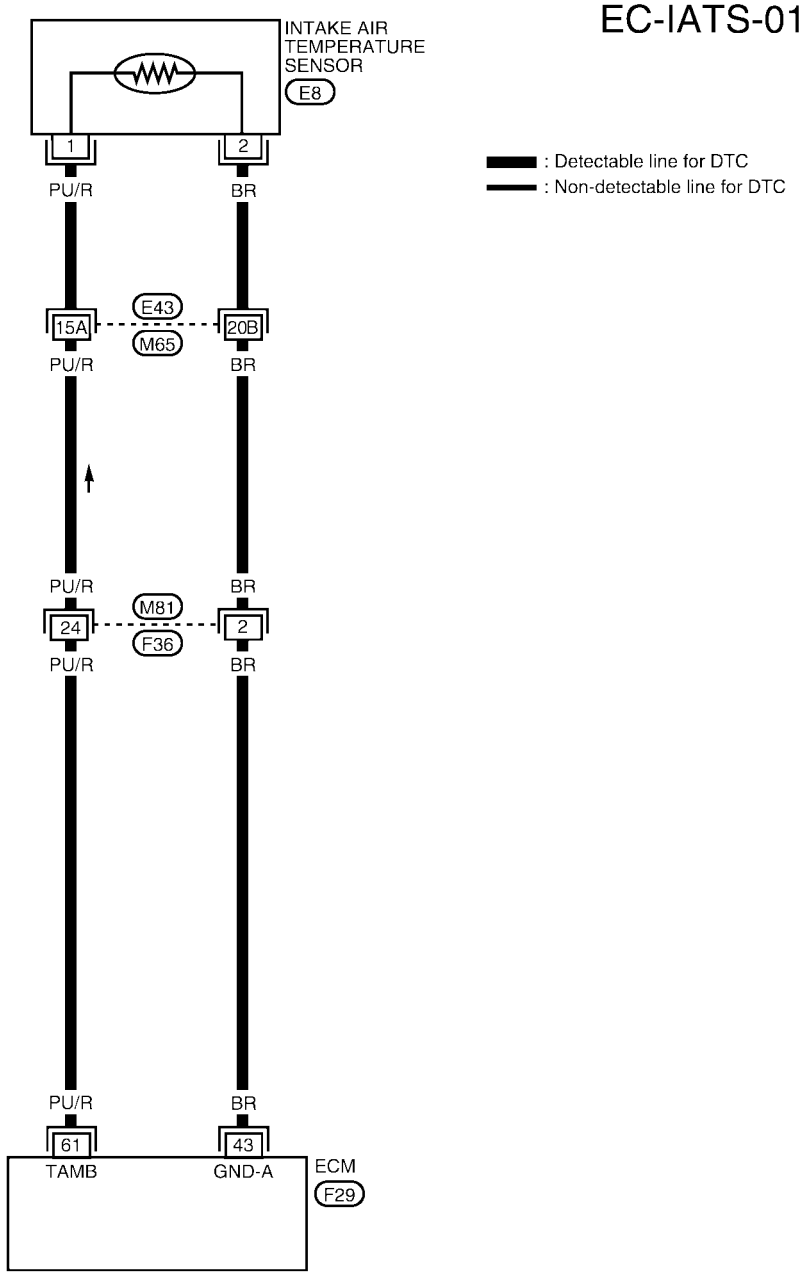
WITH GST

Follow the procedure “WITH CONSULT-II” above.

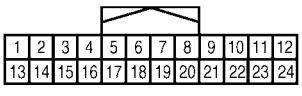
Wiring Diagram

UBS00DTT

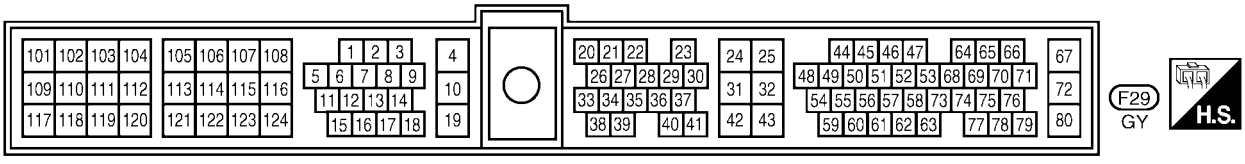
EC-IATS-01



Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)







BBWA1074E

Diagnostic Procedure

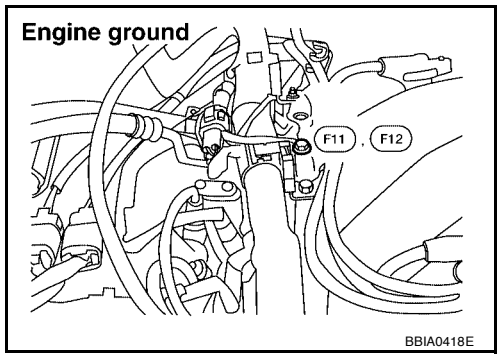
UBS00DTU

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

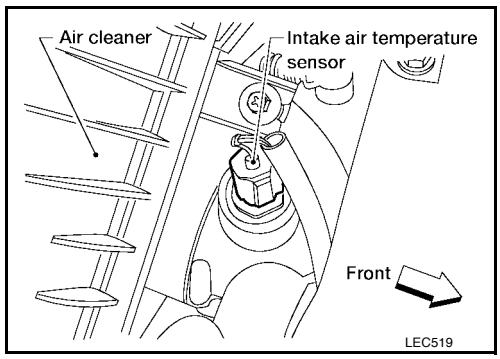
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect intake air temperature sensor harness connector.
2. Turn ignition switch ON.

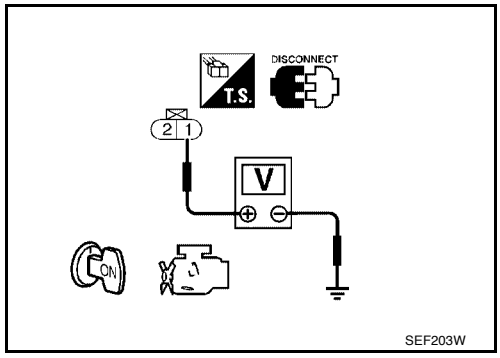


3. Check voltage between intake air temperature sensor terminal 1 and ground.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M81, F36
- Harness for open or short between ECM and intake air temperature sensor

>> Repair harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between intake air temperature sensor terminal 2 and ECM terminal 43. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M81, F36
- Harness for open or short between ECM and intake air temperature sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1354, "Component Inspection"

OK or NG

OK >> GO TO 7.
NG >> Replace intake air temperature sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

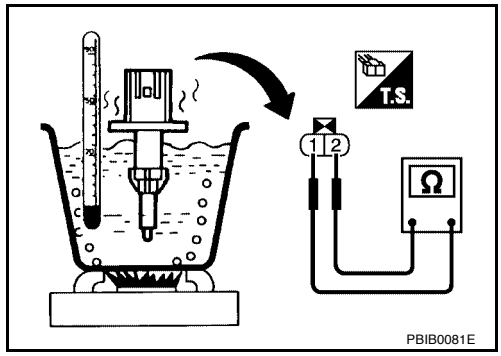
>> **INSPECTION END**.

Component Inspection

UBS00DTV

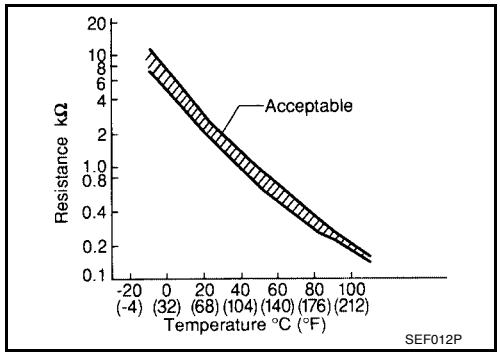
INTAKE AIR TEMPERATURE SENSOR

Check resistance between intake air temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Intake air temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 038



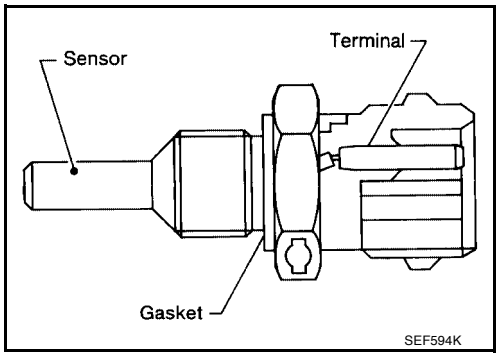
DTC P0117, P0118 ECT SENSOR

PFP:22630

Component Description

UBS00DTW

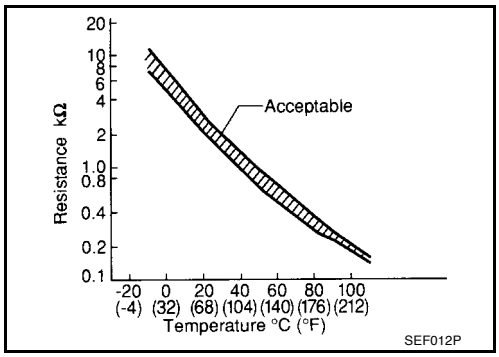
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The 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 59 (Engine coolant temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

On Board Diagnosis Logic

UBS00DTX

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Engine coolant temperature sensor
P0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters in 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)
	When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	

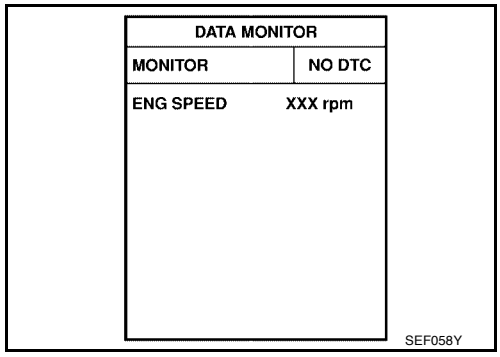
DTC Confirmation Procedure

UBS00DTY

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1359, "Diagnostic Procedure" .



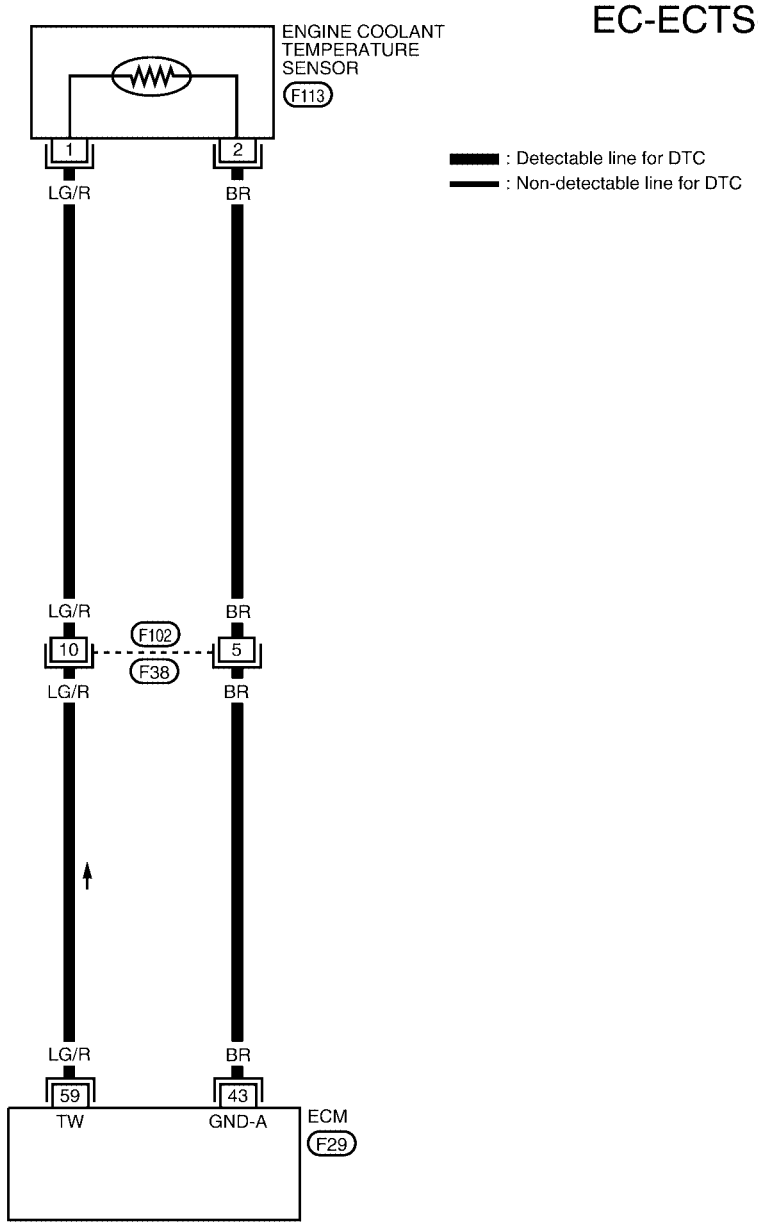
WITH GST

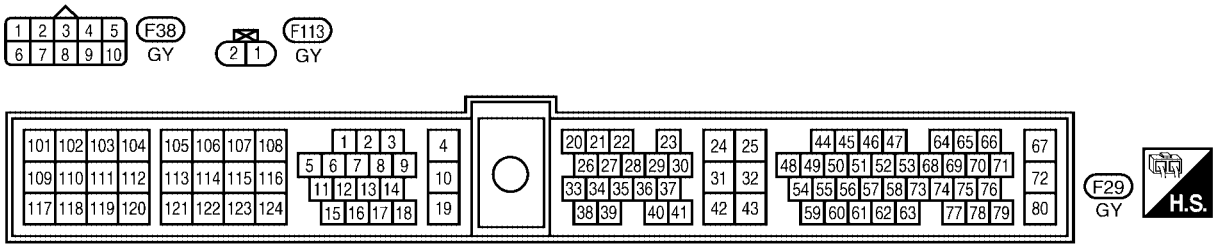
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DTZ

EC-ECTS-01





BBWA0508E

Diagnostic Procedure

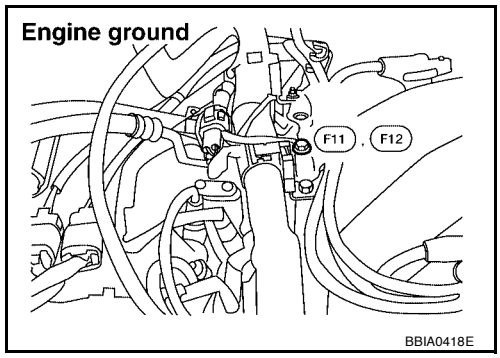
UBS00DU0

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

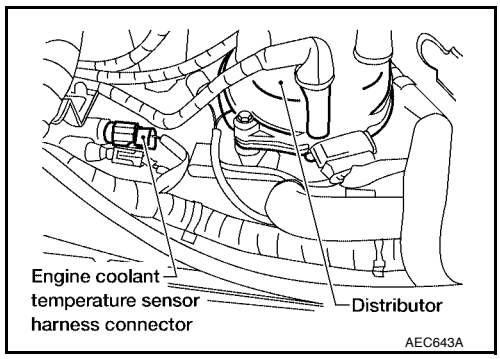
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor harness connector.
2. Turn ignition switch ON.

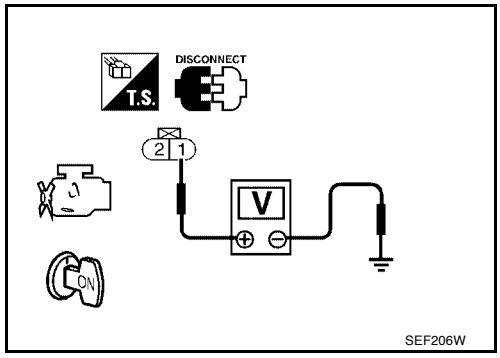


3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F38, F102
- 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.

4. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECT sensor terminal 2 and ECM terminal 43. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F38, F102
- 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.

6. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1360, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace engine coolant temperature sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

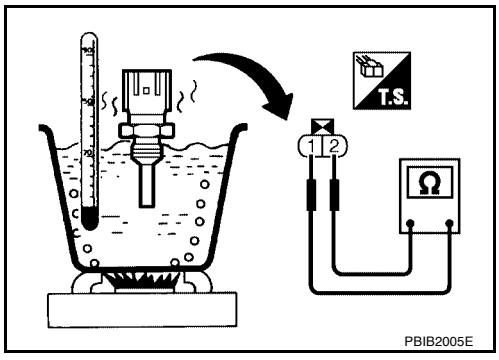
>> **INSPECTION END**.

Component Inspection

UBS00DU1

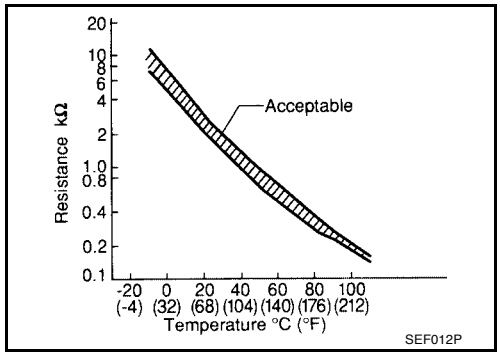
ENGINE COOLANT TEMPERATURE SENSOR

Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



UBS00DU2

Removal and Installation

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-80, "OUTER COMPONENT PARTS" .

DTC P0121 TP SENSOR

PFP:16119

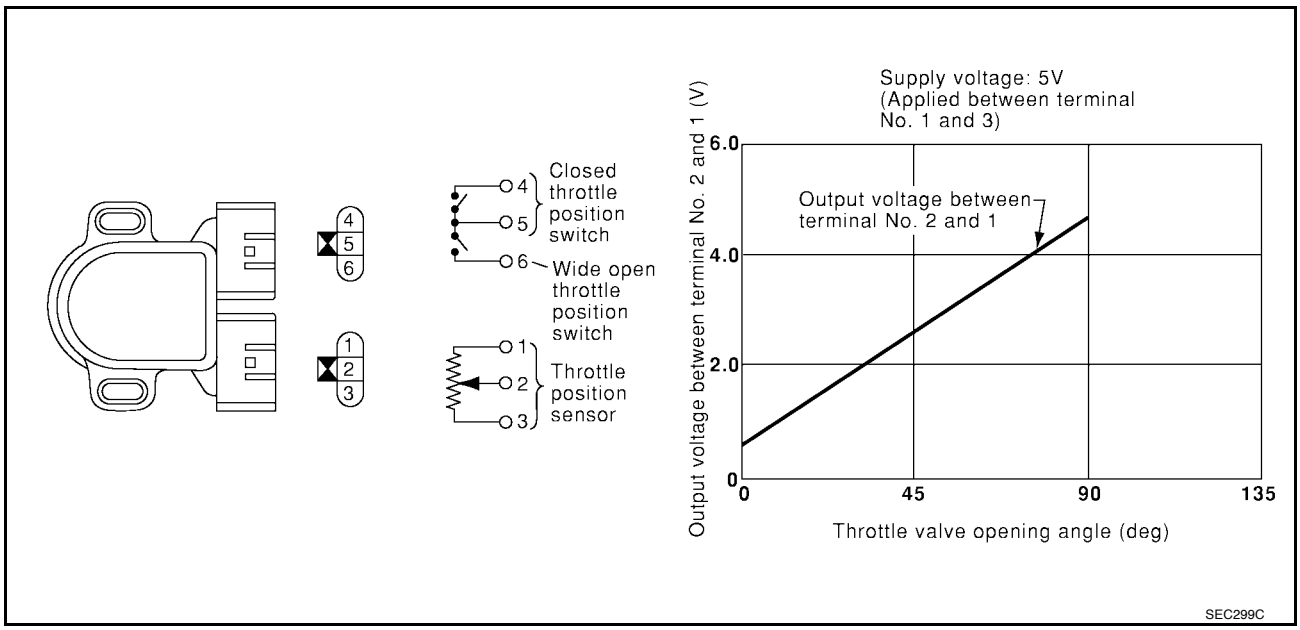
Component Description

UBS00DU3

NOTE:
If DTC P0121 is displayed with DTC P0510, first perform the trouble diagnosis for DTC P0510. Refer to EC-1589 .

The throttle position sensor responds to the accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the ECM.

Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This sensor controls engine operation such as fuel cut. On the other hand, the “Wide open and closed throttle position switch”, which is built into the throttle position sensor unit, is not used for engine control.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DU4

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.15 - 0.85V
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	3.5 - 4.7V
ABSOL TH·P/S	● Engine: After warming up ● Ignition switch: ON ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.	Throttle valve: fully closed	0.0%
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80%

On Board Diagnosis Logic

UBS00DU5

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0121	Throttle position sensor circuit range/performance problem	A)	A high voltage from the sensor is sent to ECM under light load driving condition.	● Harness or connectors (The TP sensor circuit is open or shorted.) ● TP sensor ● Fuel injector ● Camshaft position sensor ● Mass air flow sensor
		B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	● Harness or connectors (The TP sensor circuit is open or shorted.) ● Intake air leaks ● TP sensor

DTC Confirmation Procedure

UBS00DU6

NOTE:

- **Perform PROCEDURE FOR MALFUNCTION A first. If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

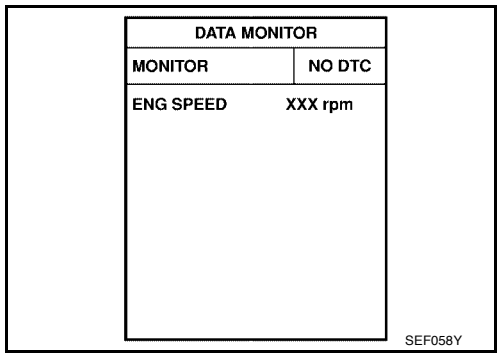
PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 10 seconds.
   If idle speed is over 1,000 rpm, maintain the following conditions for at least 10 seconds to keep engine speed below 1,000 rpm.

Selector lever	Suitable position except P or N
Brake pedal	Depressed
Vehicle speed	0 km/h (0 MPH)

4. If 1st trip DTC is detected, go to EC-1366, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

CAUTION:

Always drive vehicle at a safe speed.

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Turn ignition switch ON.

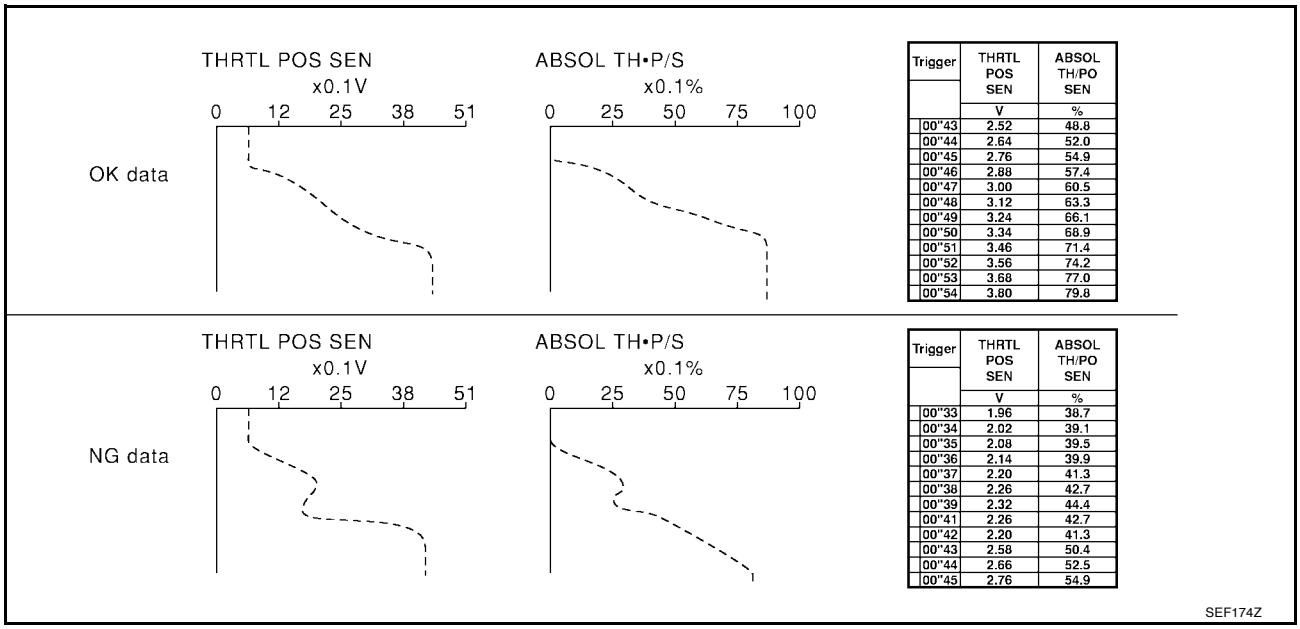
4. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II.
5. Select “THRTL POS SEN” and “ABSOL TH·P/S” in “DATA MONITOR” mode with CONSULT-II.
6. Press RECORD on CONSULT-II screen at the same time accelerator pedal is depressed.
7. Print out the recorded graph and check the following:

- The voltage rise is linear in response to accelerator pedal depression.
- The voltage when accelerator pedal is fully depressed is approximately 4V.

If NG, go to EC-1366, "Diagnostic Procedure" .
If OK, go to following step.

DATA MONITOR	
MONITOR	NO DTC
THRTL POS SEN	XXX V
ABSOL TH-P/S	XXX %

SEF177Y



Trigger	THRTL POS SEN	ABSOL TH/PO SEN
	V	%
00"43	2.52	48.8
00"44	2.64	52.0
00"45	2.76	54.9
00"46	2.88	57.4
00"47	3.00	60.5
00"48	3.12	63.3
00"49	3.24	66.1
00"50	3.34	68.9
00"51	3.46	71.4
00"52	3.56	74.2
00"53	3.68	77.0
00"54	3.80	79.8

Trigger	THRTL POS SEN	ABSOL TH/PO SEN
	V	%
00"33	1.96	38.7
00"34	2.02	39.1
00"35	2.08	39.5
00"36	2.14	39.9
00"37	2.20	41.3
00"38	2.26	42.7
00"39	2.32	44.4
00"41	2.26	42.7
00"42	2.20	41.3
00"43	2.58	50.4
00"44	2.66	52.5
00"45	2.76	54.9

SEF174Z

8. Select “AUTO TRIG” in “DATA MONITOR” mode with CONSULT-II.
9. Maintain the following conditions for at least 10 consecutive seconds.

DATA MONITOR	
MONITORING	NO DTC
ENG SPEED	XXX rpm
MAS AIR/FL SE	XXX V
COOLAN TEMP/S	XXX °C
IACV-AAC/V	XXX %

SEF805Z

CMPS·RPM (REF)	More than 2,000 rpm
MAS AIR/FL SE	More than 3V
COOLAN TEMP/S	More than 70°C (158°F)
IACV-AAC/V	Less than 80%
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

10. If 1st trip DTC is detected, go to EC-1366, "Diagnostic Procedure" .

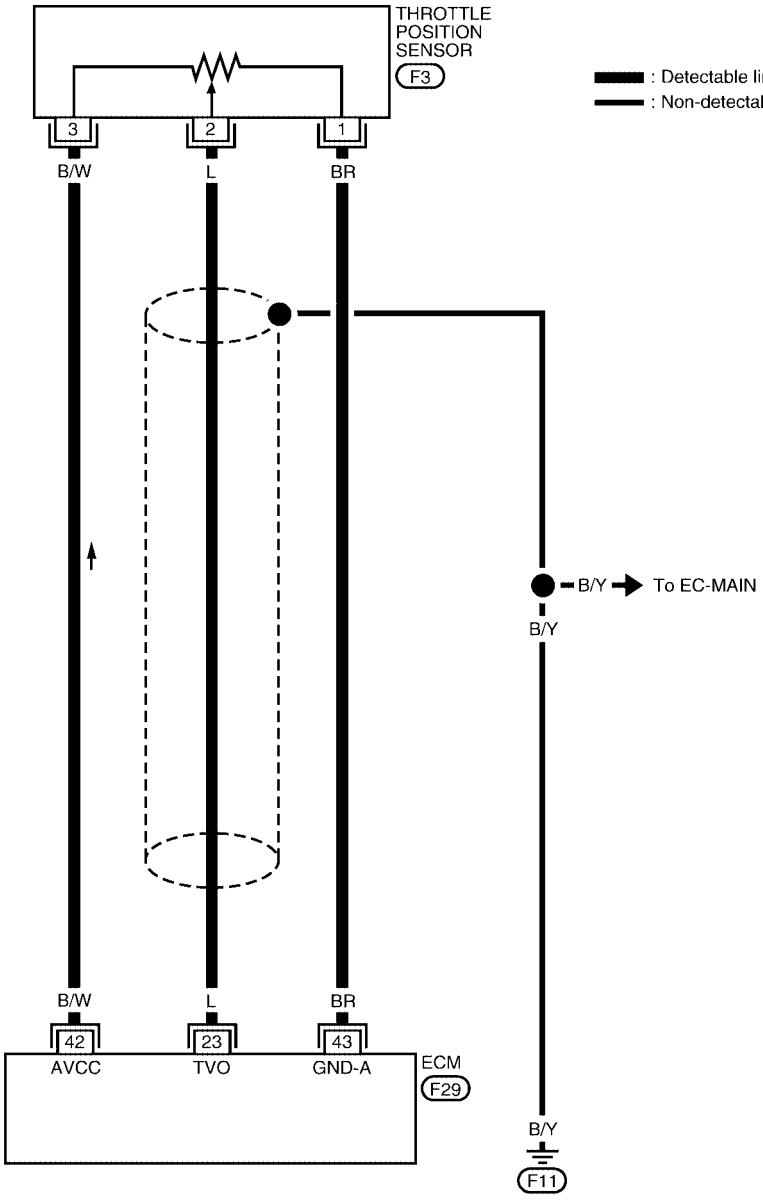
With GST

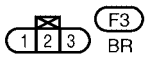
Follow the procedure “With CONSULT-II” above.

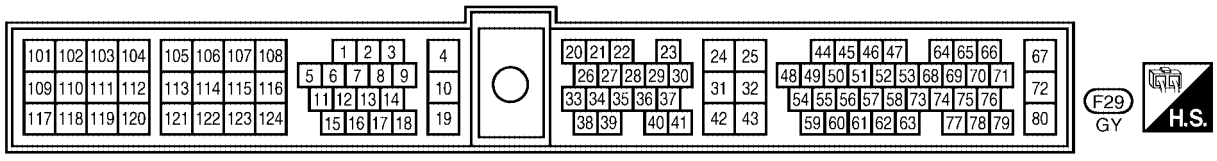
Wiring Diagram

UBS00DU7

EC-TPS-01







BBWA0473E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	L	Throttle position sensor	**[Engine is running]** ● **Warm-up condition** ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump ● Accelerator pedal is fully released	0.15 - 0.85V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal is fully depressed	3.5 - 4.7V
42	B/W	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
43	BR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00DU8

1. INSPECTION START

Which malfunction (A or B) is duplicated?

A or B

A >> GO TO 4.
B >> GO TO 2.

2. ADJUST THROTTLE POSITION SENSOR

Check the following items. Refer to EC-1255, "Basic Inspection"

Items	Specifications
Ignitions timing	M/T: 10 ± 5° BTDC (in Neutral position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

>> GO TO 3.

3. CHECK INTAKE SYSTEM.

1. Turn ignition switch OFF.
2. Check the following for connection.

- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold collector

OK or NG

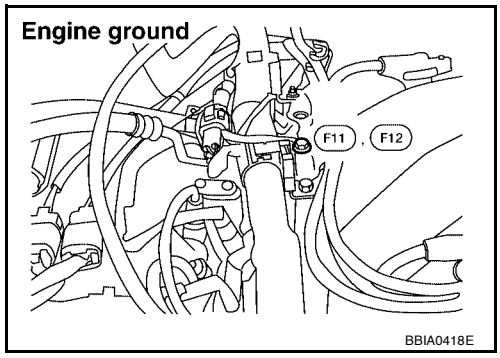
OK >> GO TO 4.
NG >> Reconnect the parts.

4. CHECK GROUND CONNECTIONS

Loosen and retighten ground screw.
Refer to EC-1311, "Ground Inspection" .

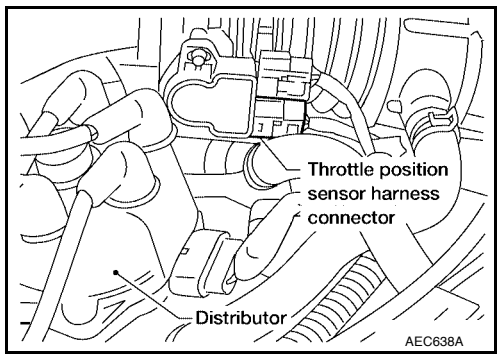
OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.



5. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect throttle position sensor harness connector.
2. Turn ignition switch ON.

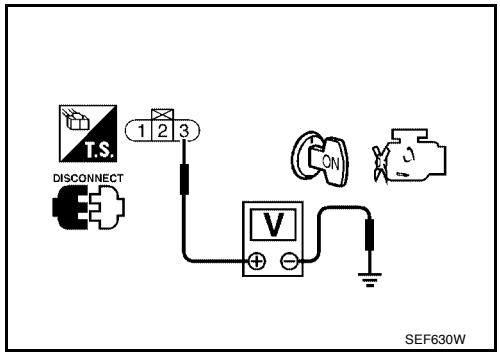


3. Check voltage between throttle position sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



6. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between throttle position sensor terminal 1 and ECM terminal 43. 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 THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 23 and throttle position sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR

Refer to EC-1370, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. ADJUST CLOSED THROTTLE POSITION SWITCH

Adjust closed throttle position switch. Refer to EC-1255, "Basic Inspection" .

Items	Specifications
Ignitions timing	M/T: 10 ± 5° BTDC (in Neutral position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T:750 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.
NG >> Replace throttle position sensor. To adjust it, perform EC-1255, "Basic Inspection" .

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-1341, "Component Inspection" .

OK or NG

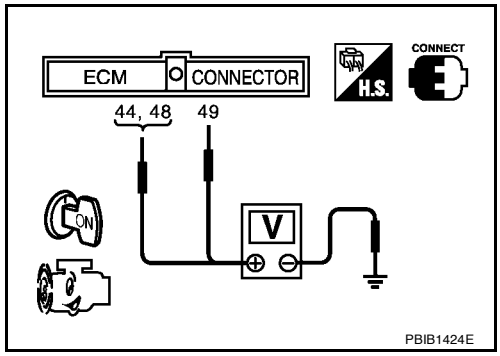
OK >> GO TO 11.
NG >> Replace mass air flow sensor.

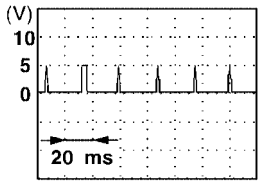
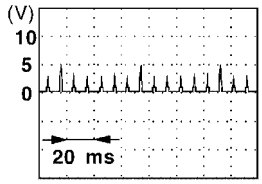
11. CHECK CAMSHAFT POSITION SENSOR

1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.

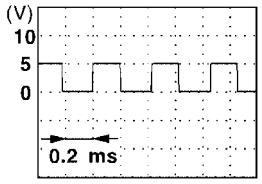
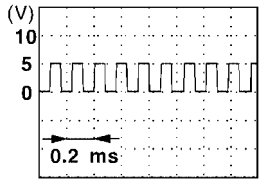
NOTE:
The pulse cycle changes depending on rpm at idle.

<Terminal 44 or 48 and ground>



Condition	Idle	2,000 rpm
Voltage	0.3 - 0.5V	0.3 - 0.5V
Pulse signal	 SEF997U	 SEF998U

<Terminal 49 and ground>

Condition	Idle	2,000 rpm
Voltage	Approximately 2.5V	Approximately 2.5V
Pulse signal	 SEF999U	 SEF001V

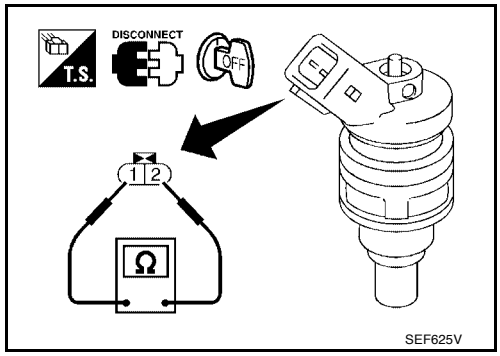
OK or NG

OK >> GO TO 12.
NG >> Replace distributor assembly with camshaft position sensor.

12. CHECK FUEL INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between injector terminals as shown in the figure.

Resistance: 10.4 - 15.3Ω [at 10 - 60°C (50 - 140°F)]



OK or NG

OK >> GO TO 13.
NG >> Replace fuel injector.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

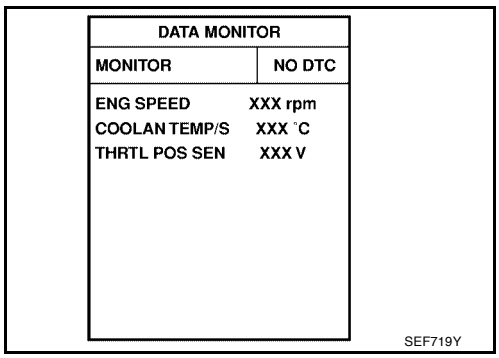
Component Inspection

UBS00DU9

THROTTLE POSITION SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Check voltage of “THRTL POS SEN” under the following conditions.
   Voltage measurement must be made with throttle position sensor installed in vehicle.



Throttle valve conditions	THRTL POS SEN
Completely closed	0.15 - 0.85V
Completely open	3.5 - 4.7V

With GST

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Turn ignition switch ON.
4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	Voltage [V]
Completely closed	0.15 - 0.85
Completely open	3.5 - 4.7

DTC P0122, P0123 TP SENSOR

PFP:16119

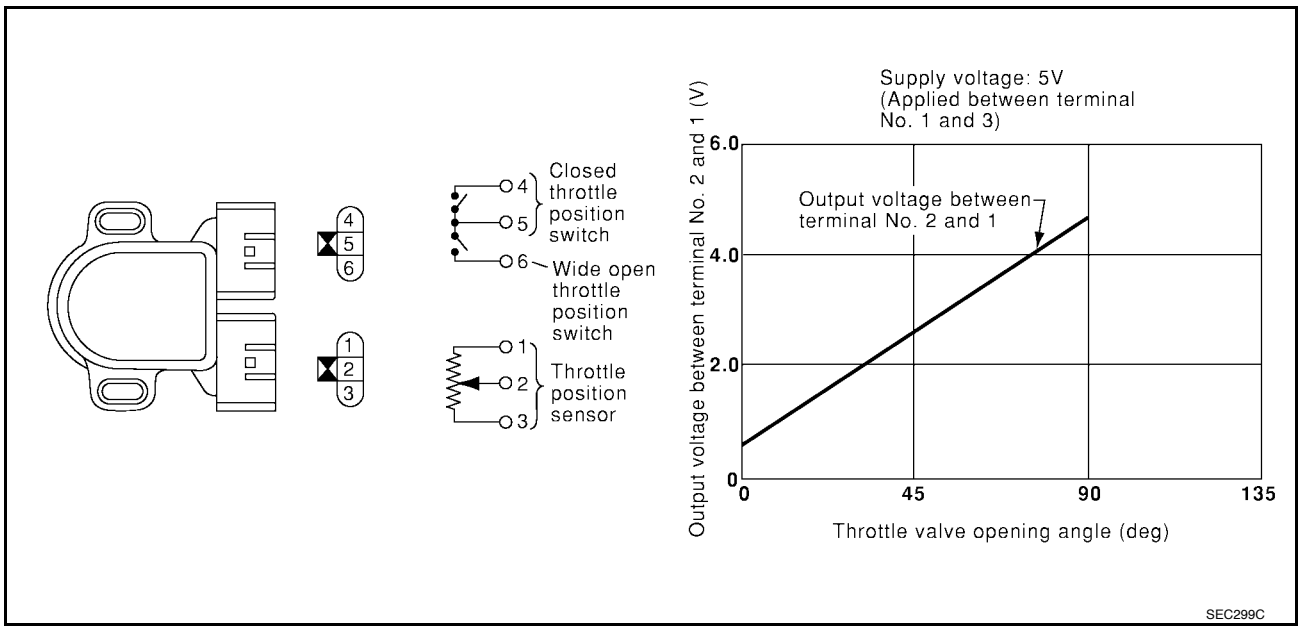
Component Description

UBS00DUA

NOTE:
If DTC P0122, P0123 is displayed with DTC P0510, first perform the trouble diagnosis for DTC P0510. Refer to EC-1589 .

The throttle position sensor responds to the accelerator pedal movement. This sensor is a kind of potentiometer which transforms the throttle position into output voltage, and emits the voltage signal to the ECM. In addition, the sensor detects the opening and closing speed of the throttle valve and feeds the voltage signal to the ECM.

Idle position of the throttle valve is determined by the ECM receiving the signal from the throttle position sensor. This sensor controls engine operation such as fuel cut. On the other hand, the “Wide open and closed throttle position switch”, which is built into the throttle position sensor unit, is not used for engine control.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DUB

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL POS SEN	● Engine: After warming up, idle the engine	Throttle valve: fully closed	0.15 - 0.85V
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	3.5 - 4.7V
ABSOL TH·P/S	● Engine: After warming up ● Ignition switch: ON ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.	Throttle valve: fully closed	0.0%
	● Engine: After warming up ● Ignition switch: ON (Engine stopped)	Throttle valve: fully opened	Approx. 80%

On Board Diagnosis Logic

UBS00DUC

These self-diagnosis have one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122	Throttle position sensor circuit low input	An excessively low voltage from the sensor is sent to ECM	● Harness or connectors (The TP sensor circuit is open or shorted.) ● TP sensor
P0123	Throttle position sensor circuit high input	An excessively high voltage from the sensor is sent to ECM	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode	
Throttle position sensor circuit	Throttle position will be determined based on the injected fuel amount and the engine speed. Therefore, acceleration will be poor.	
	Condition	Driving condition
	When engine is idling	Normal
	When accelerating	Poor acceleration

DTC Confirmation Procedure

UBS00DUD

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

CAUTION:
Always drive vehicle at a safe speed.

TESTING CONDITION:

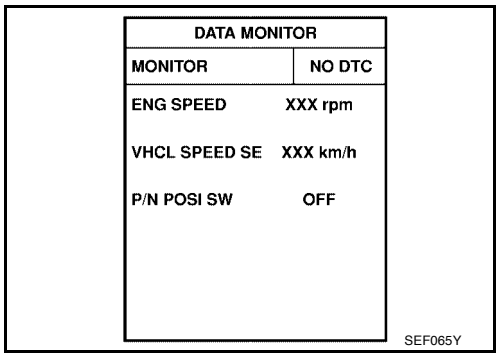
- **Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**
- **This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.**

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and maintain the following conditions for at least 5 consecutive seconds.

Vehicle speed	More than 5 km/h (3 MPH)
Selector lever	Suitable position except P or N position

3. If DTC is detected, go to EC-1374, "Diagnostic Procedure" .



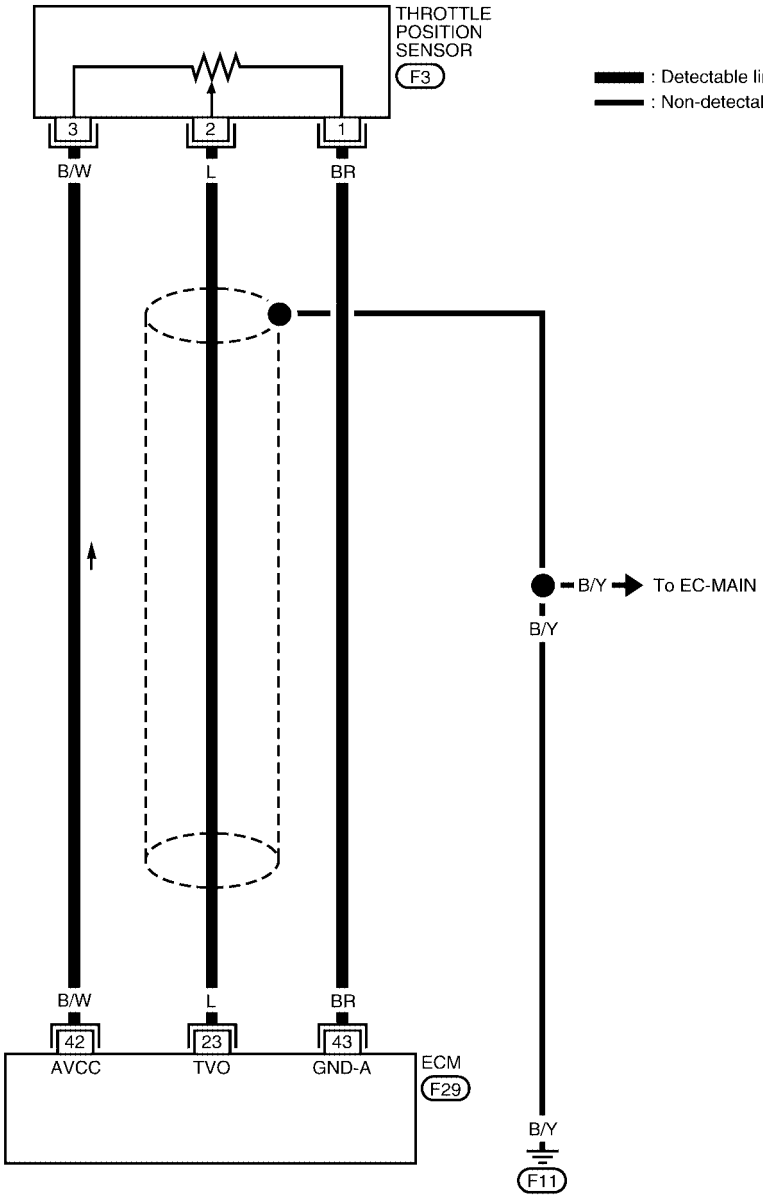
WITH GST

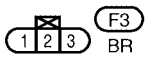
Follow the procedure “WITH CONSULT-II” above.

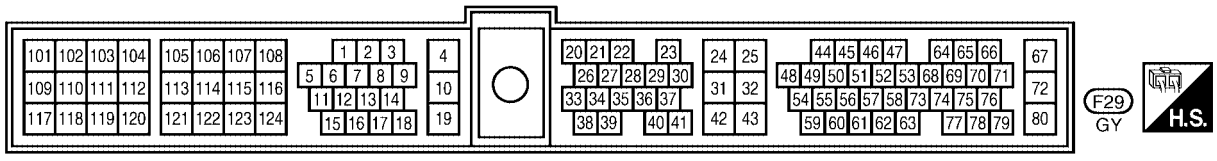
Wiring Diagram

UBS00DUE

EC-TPS-01







BBWA0473E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	L	Throttle position sensor	**[Engine is running]** ● **Warm-up condition** ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump ● Accelerator pedal is fully released	0.15 - 0.85V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal is fully depressed	3.5 - 4.7V
42	B/W	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
43	BR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

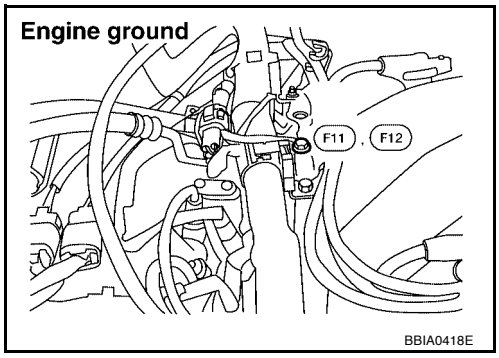
UBS00DUF

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

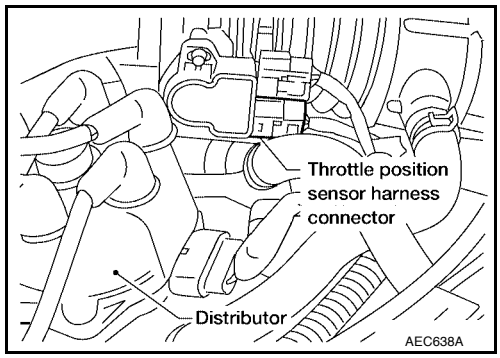
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



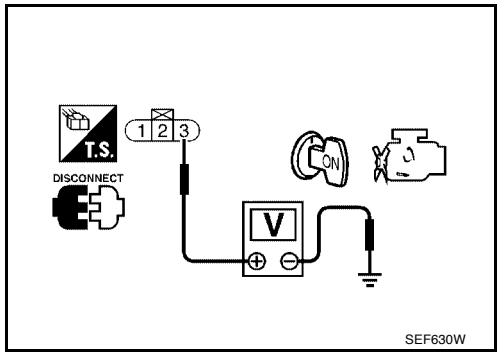
2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect throttle position sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between throttle position sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between throttle position sensor terminal 1 and ECM terminal 43. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 23 and throttle position sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-1378, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. ADJUST CLOSED THROTTLE POSITION SWITCH

Adjust closed throttle position switch. Refer to EC-1255, "Basic Inspection" .

Items	Specifications
Ignitions timing	M/T: 10 ± 5° BTDC (in Neutral position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 7.
NG >> Replace throttle position sensor. To adjust it, perform EC-1255, "Basic Inspection" .

7. CHECK MASS AIR FLOW SENSOR

Refer to EC-1341, "Component Inspection" .

OK or NG

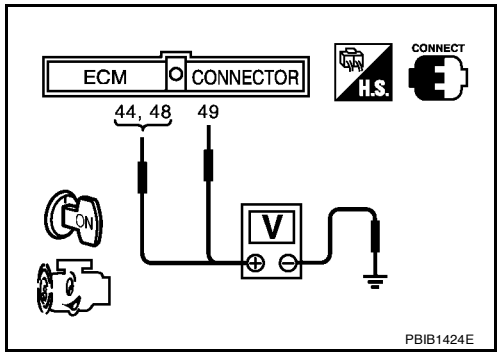
OK >> GO TO 8.
NG >> Replace mass air flow sensor.

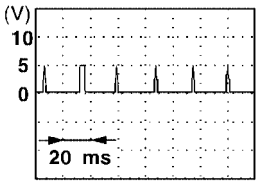
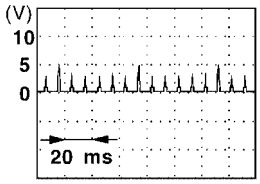
8. CHECK CAMSHAFT POSITION SENSOR

1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.

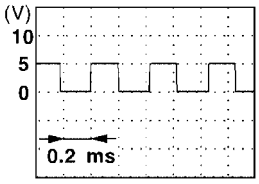
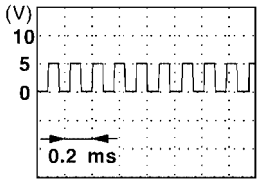
NOTE:
The pulse cycle changes depending on rpm at idle.

<Terminal 44 or 48 and ground>



Condition	Idle	2,000 rpm
Voltage	0.3 - 0.5V	0.3 - 0.5V
Pulse signal	 SEF997U	 SEF998U

<Terminal 49 and ground>

Condition	Idle	2,000 rpm
Voltage	Approximately 2.5V	Approximately 2.5V
Pulse signal	 SEF999U	 SEF001V

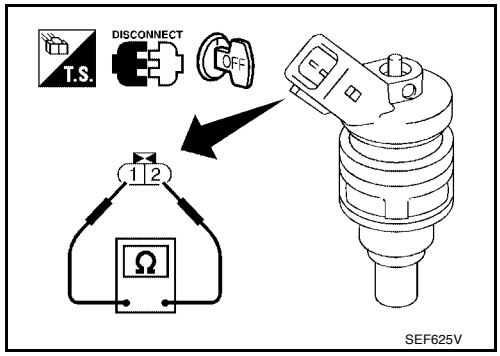
OK or NG

OK >> GO TO 9.
NG >> Replace distributor assembly with camshaft position sensor.

9. CHECK FUEL INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 10.4 - 15.3Ω [at 10 - 60°C (50 - 140°F)]



OK or NG

OK >> GO TO 10.
NG >> Replace fuel injector.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

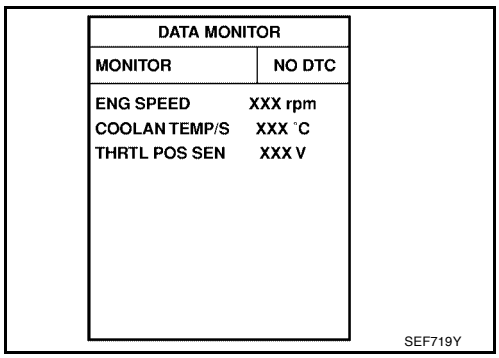
Component Inspection

UBS00DUG

THROTTLE POSITION SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Check voltage of “THRTL POS SEN” under the following conditions.
   Voltage measurement must be made with throttle position sensor installed in vehicle.



Throttle valve conditions	THRTL POS SEN
Completely closed	0.15 - 0.85V
Completely open	3.5 - 4.7V

With GST

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Turn ignition switch ON.
4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground.
   Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	Voltage [V]
Completely closed	0.15 - 0.85
Completely open	3.5 - 4.7

DTC P0125 ECT SENSOR

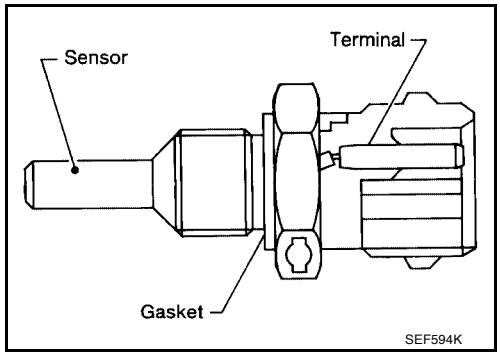
PFP:22630

Component Description

UBS00DUH

NOTE:
If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to EC-1356 .

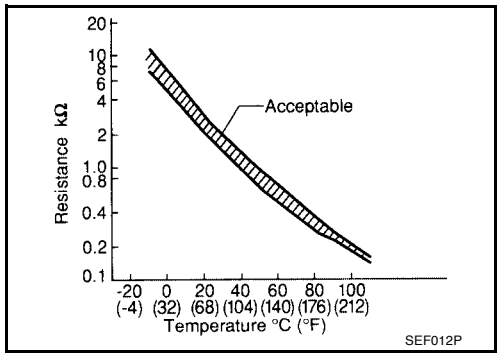
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
−10 (14)	4.4	9.2
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 59 (Engine coolant temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

On Board Diagnosis Logic

UBS00DUI

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125	Insufficient engine coolant temperature for closed loop fuel control	● Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. ● Engine coolant temperature is insufficient for closed loop fuel control.	● Harness or connectors (High resistance in the circuit) ● Engine coolant temperature sensor ● Thermostat

DTC Confirmation Procedure

UBS00DUJ

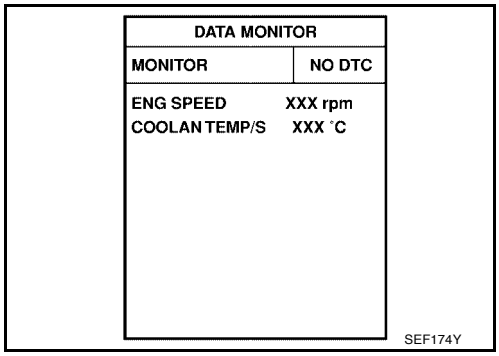
CAUTION:
Be careful not to overheat engine.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-1380, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

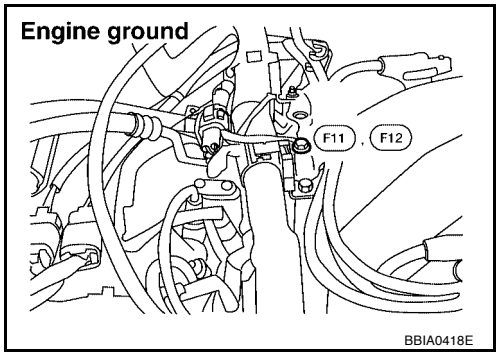
UBS00DUK

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



2. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1381, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace engine coolant temperature sensor.

3. 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 4.
NG >> Replace thermostat. Refer to CO-28, "THERMOSTAT" .

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

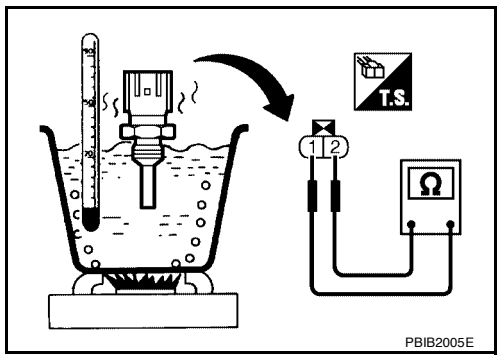
>> **INSPECTION END**.

Component Inspection

UBS00DUL

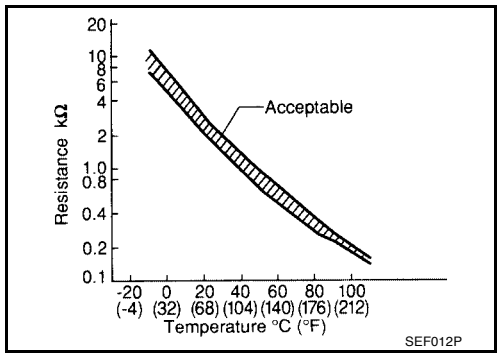
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

UBS00DUM

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-80, "OUTER COMPONENT PARTS" .

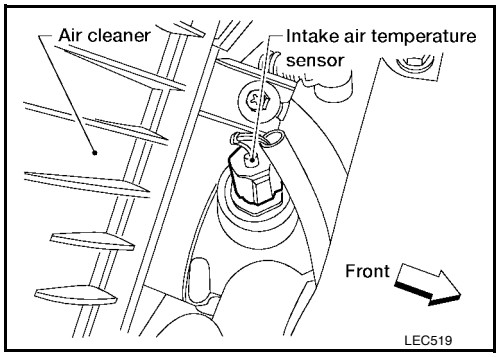
DTC P0127 IAT SENSOR

PFP:22630

Component Description

UBS00DUN

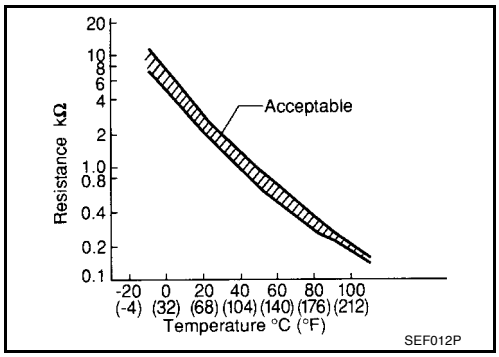
The intake air temperature sensor is mounted to the air duct housing. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* (V)	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
80 (176)	1.23	0.27 - 0.38

*: These data are reference values and are measured between ECM terminal 61 (Intake air temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

On Board Diagnosis Logic

UBS00DUO

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	● Harness or connectors (The sensor circuit is open or shorted) ● Intake air temperature sensor

DTC Confirmation Procedure

UBS00DUP

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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

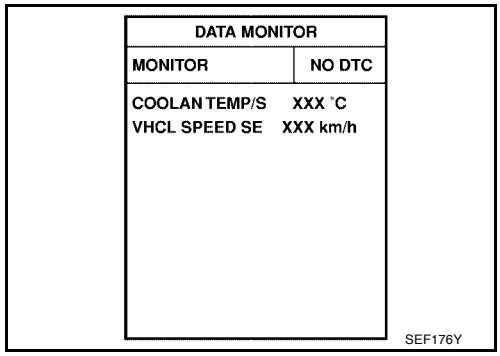
1. Wait until engine coolant temperature is less than 90°C (194°F).

a. Turn ignition switch ON.

b. Select “DATA MONITOR” mode with CONSULT-II.
c. Check the engine coolant temperature.
d. 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-1383, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

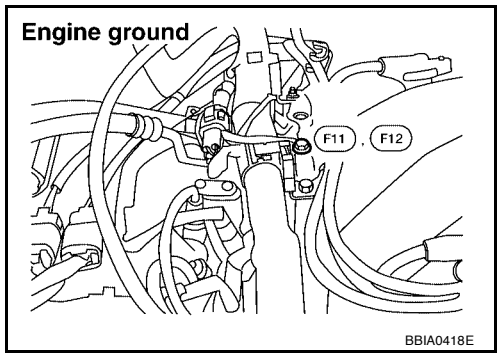
UBS00DUQ

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



2. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1384, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace intake air temperature sensor.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For Wiring Diagram, refer to EC-1352, "Wiring Diagram" .

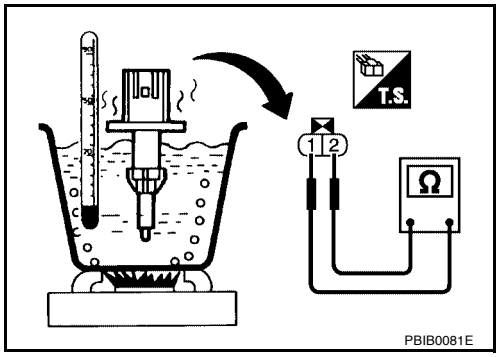
>> **INSPECTION END**.

Component Inspection

UBS00DUR

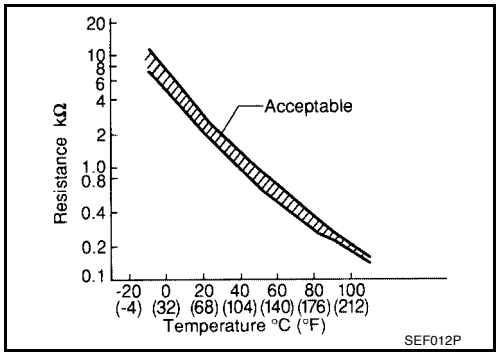
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between intake air temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Intake air temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 038



2. If NG, replace in take air temperature sensor.

DTC P0128 THERMOSTAT FUNCTION

PFP:21200

On Board Diagnosis Logic

UBS00DUS

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.
This is due to a leak in the seal or the thermostat stuck open.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	• Thermostat • Leakage from sealing portion of thermostat • Engine coolant temperature sensor

DTC Confirmation Procedure

UBS00DUT

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
TESTING CONDITION:

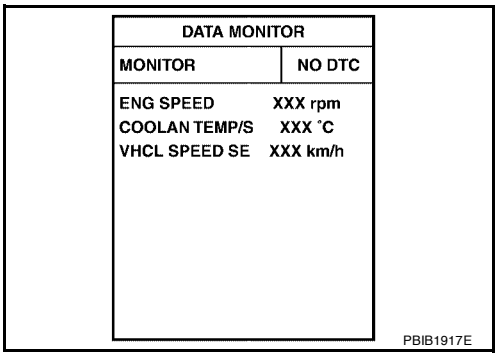
- **For best results, perform at ambient temperature of –10°C (14°F) or higher.**
- **For best results, perform at engine coolant temperature of –10°C (14°F) to 70°C (158°F).**

WITH CONSULT-II

1. Replace thermostat with new one. Refer to CO-28, "THERMOSTAT" . Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on.
2. Turn ignition switch ON.
3. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
4. Check that the “COOLAN TEMP/S” is above 70°C (158°F).
   If it is below 70°C (158°F), go to following step.
   If it is above 70°C (158°F), cool down the engine to less than 70°C (158°F), then retry from step 1.
5. Drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE	80 - 120 km/h (50 - 75 MPH)

If 1st trip DTC is detected, go to EC-1385, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00DUU

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1386, "Component Inspection" .

OK or NG

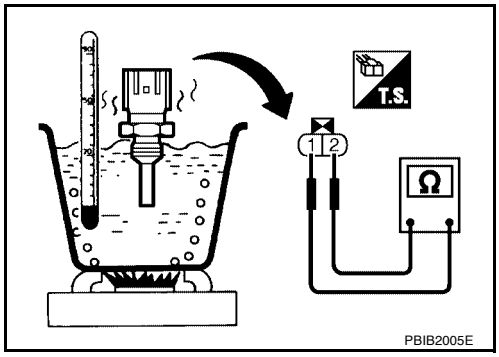
OK >> **INSPECTION END**.
NG >> Replace engine coolant temperature sensor.

Component Inspection

UBS00DUV

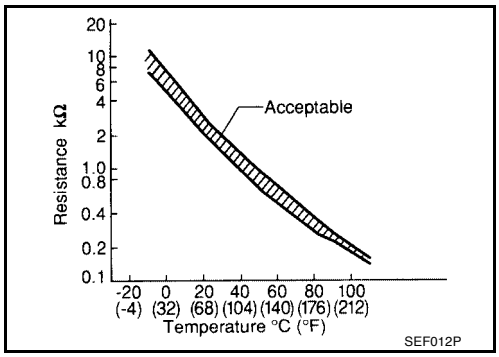
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

UBS00DUW

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-80, "OUTER COMPONENT PARTS" .

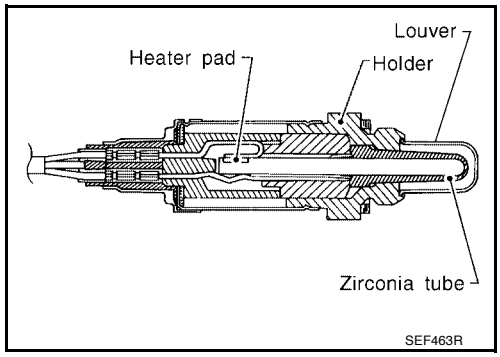
DTC P0132, P0152 HO2S1

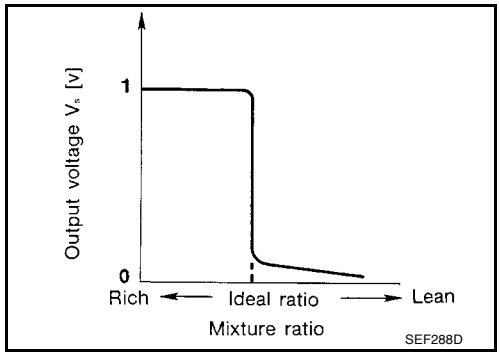
PFP:22690

Component Description

UBS00DUX

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

UBS00DUY

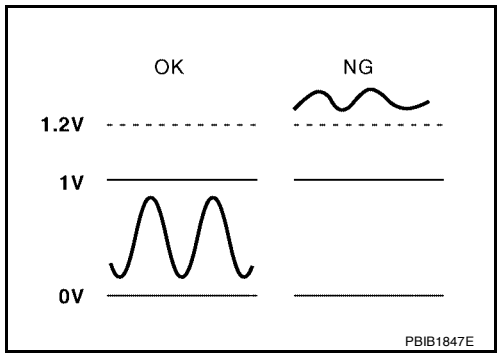
Specification data are reference values.

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

UBS00DUZ

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0132 (Bank 1) P0152 (Bank 2)	Heated oxygen sensor 1 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 1

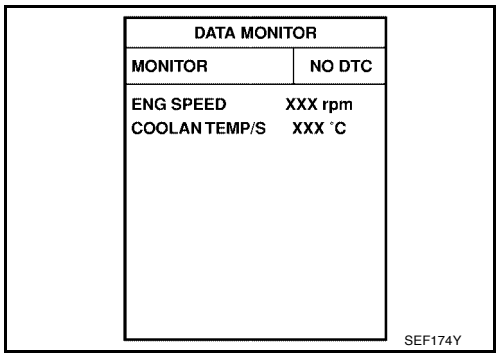
DTC Confirmation Procedure

UBS00DV0

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Restart engine and let it idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-1392, "Diagnostic Procedure" .



WITH GST

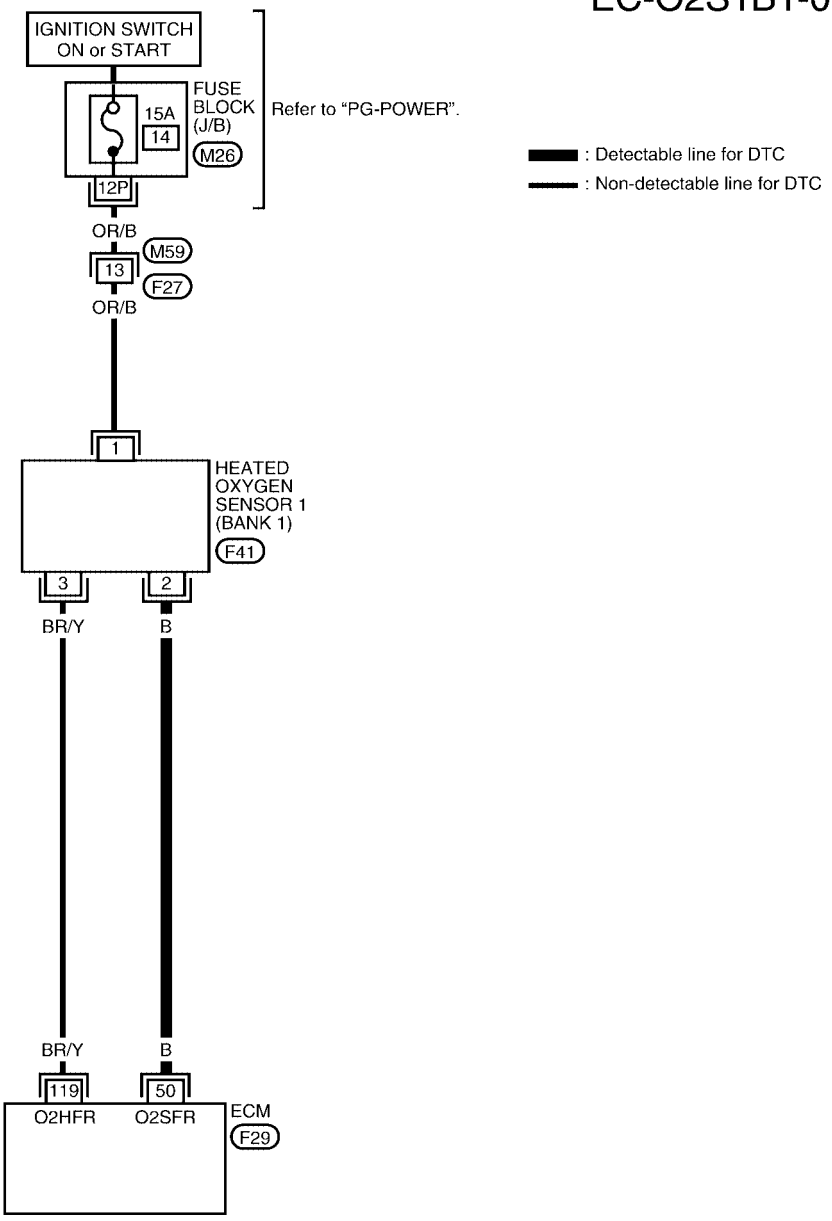
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for 2 minutes.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Restart engine and let it idle for 2 minutes.
6. Select MODE 3 with GST.
7. If DTC is detected, go to EC-1392, "Diagnostic Procedure" .

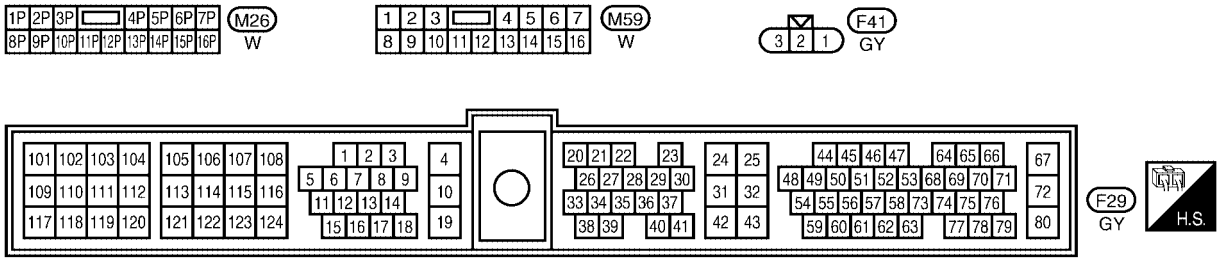
- **When using GST, DTC Confirmation Procedure should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

Wiring Diagram
BANK 1

UBS00DV1

EC-O2S1B1-01



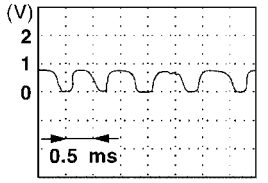


BBWA1075E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

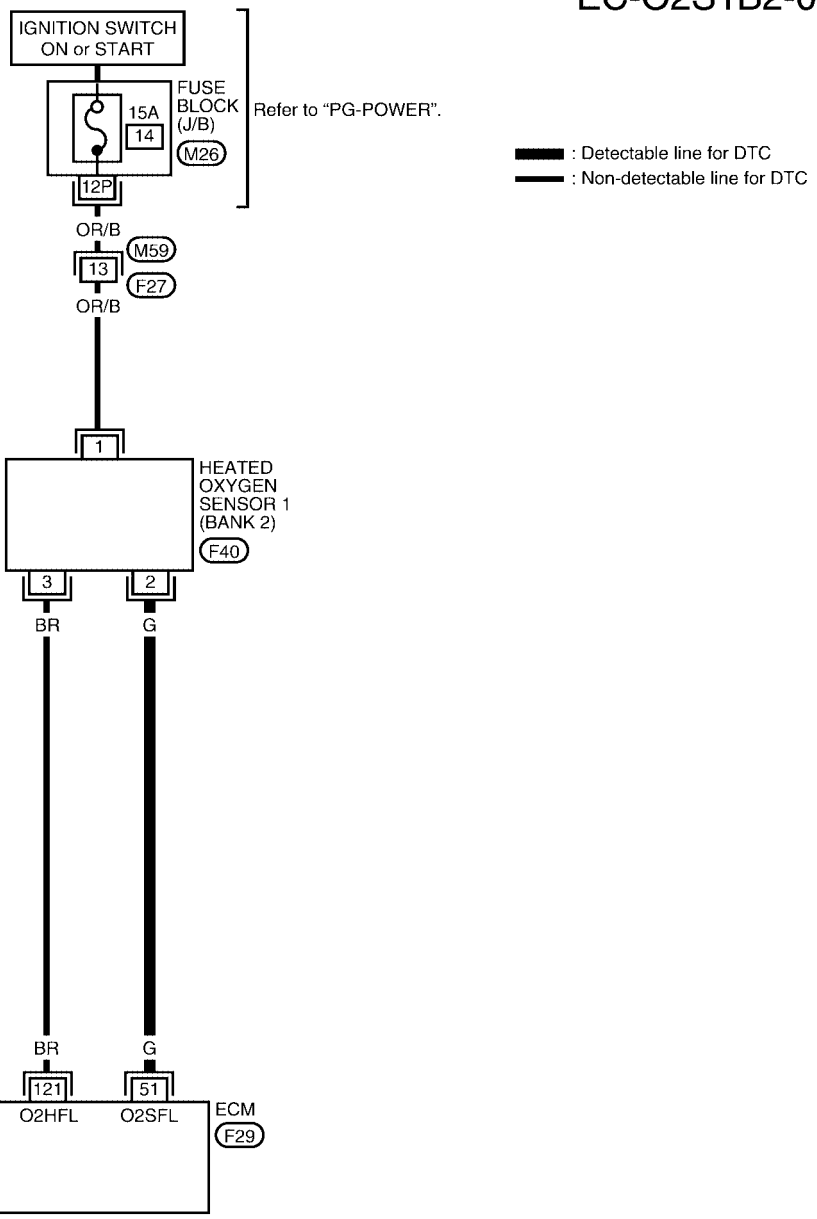
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V★  SEF002V

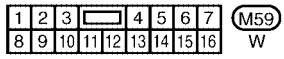
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.

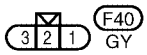
BANK 2

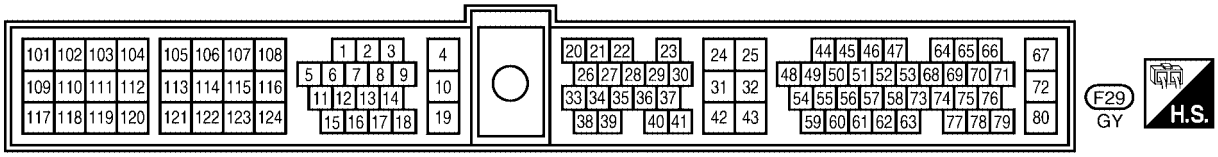
EC-O2S1B2-01









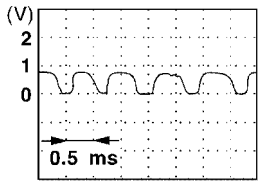


BBWA1076E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	G	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V★  SEF002V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.

Diagnostic Procedure

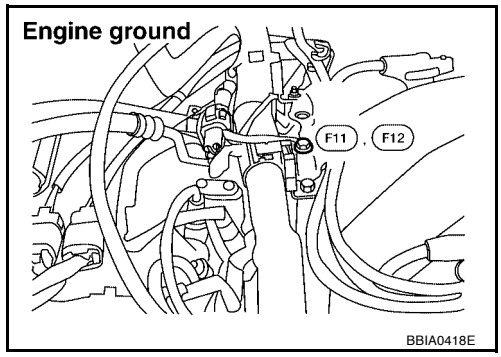
UBS00DV2

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



BBIA0418E

2. RETIGHTEN HEATED OXYGEN SENSOR 1

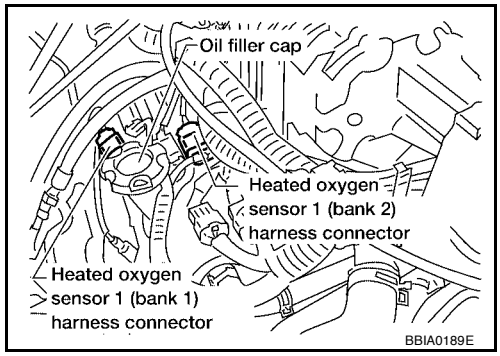
1. Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 3.

3. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check harness continuity between ECM terminal and HO2S1 terminal as follows.
   Refer to Wiring Diagram.



DTC	Terminals		Bank
	ECM	Sensor	
P0132	50	2	Bank 1
P0152	51	2	Bank 2

Continuity should exist.

4. Check harness continuity between the following terminals and ground.

DTC	Terminals		Bank
	ECM	Sensor	
P0132	50	2	Bank 1
P0152	51	2	Bank 2

Refer to Wiring Diagram.

Continuity should not exist.

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FRONT HO2S1 CONNECTOR FOR WATER

1. Disconnect heated oxygen sensor 1 harness connector.
2. Check connectors for water.

Water should not exist.

OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. 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 (B2)	XXX V
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

PBIB2025E

5. Check the following.

- “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown 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

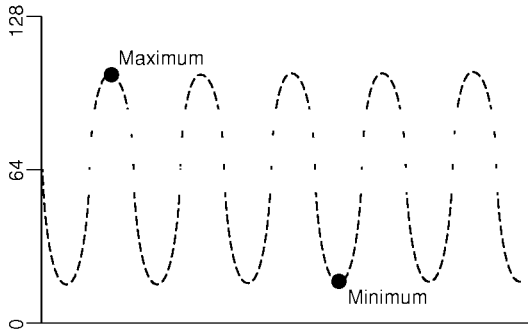
cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L	R-L	R-L	R-L	R-L

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
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 oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

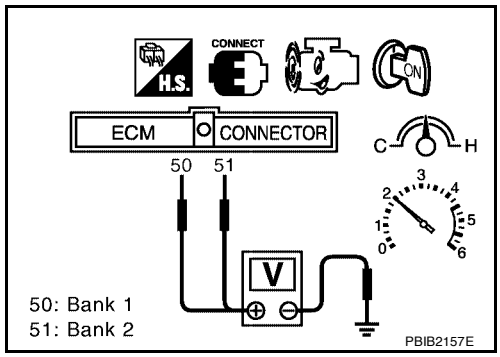
OK >> GO TO 7
NG >> Replace malfunctioning heated oxygen sensor 1.

6. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and 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 1 time.
- The minimum voltage is below 0.3V at least 1 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 → 0 - 0.3V

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DV3

HEATED OXYGEN SENSOR 1

Refer to EM-80, "OUTER COMPONENT PARTS" .

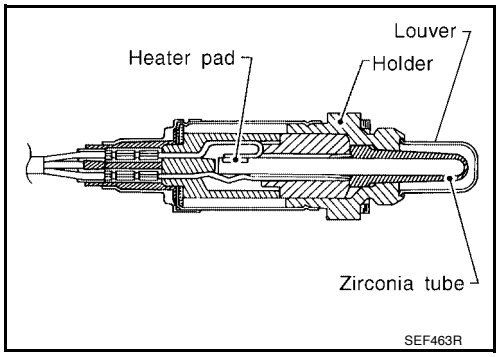
DTC P0133, P0153 HO2S1

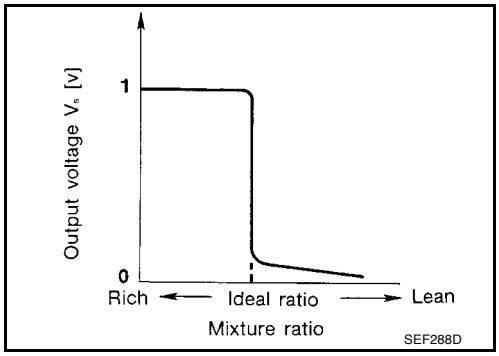
PFP:22690

Component Description

UBS00DV4

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

UBS00DV5

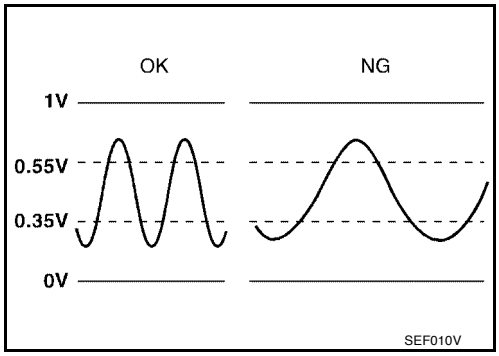
Specification data are reference values.

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

UBS00DV6

To judge the malfunction of heated oxygen sensor 1, this diagnosis measures response time of heated oxygen sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 temperature index. Judgment is based on whether the compensated time (heated oxygen sensor 1 cycling time index) is inordinately long or not.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0133 (Bank 1)	Heated oxygen sensor 1 circuit slow response	The response of the voltage signal from the sensor takes more than the specified time.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 1 ● Fuel pressure ● Fuel injector ● Intake air leaks ● Exhaust gas leaks ● PCV valve ● Mass air flow sensor
P0153 (Bank 2)			

DTC Confirmation Procedure

UBS00DV7

CAUTION:
Always drive vehicle at a safe speed.

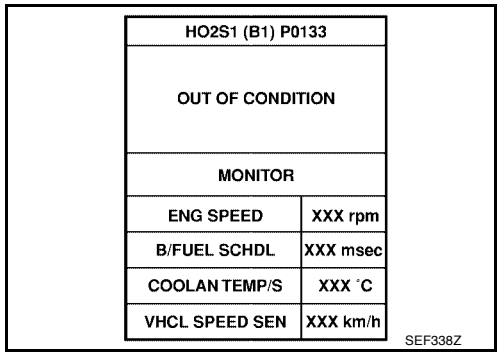
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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

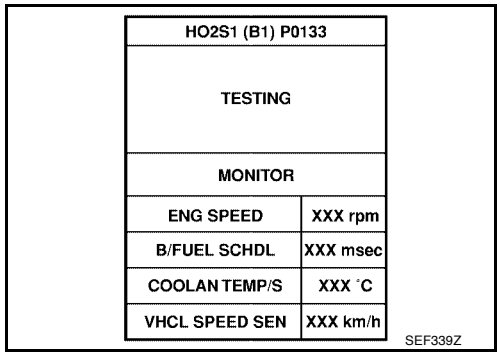
1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 5 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1)/(B2) P0133/ P0153” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.
   NOTE:
   Never raise engine speed above 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 5.



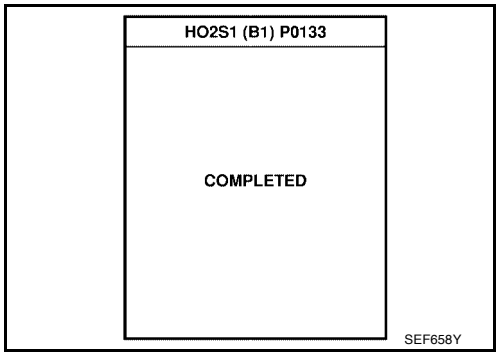
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 40 to 50 seconds.)

ENG SPEED	1,700 - 3,300 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	2.0 - 14.0 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-1402, "Diagnostic Procedure" .



Overall Function Check

UBS00DV8

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

WITH GST

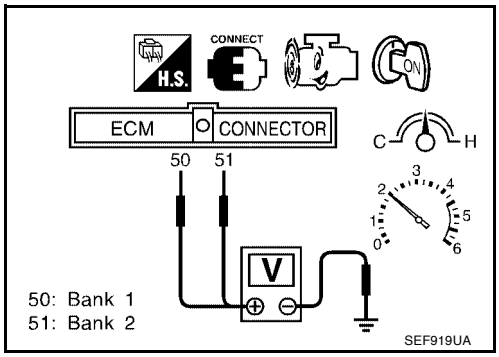
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HOS1 (B1) signal] or 51 [HOS1 (B2) signal] and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- 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

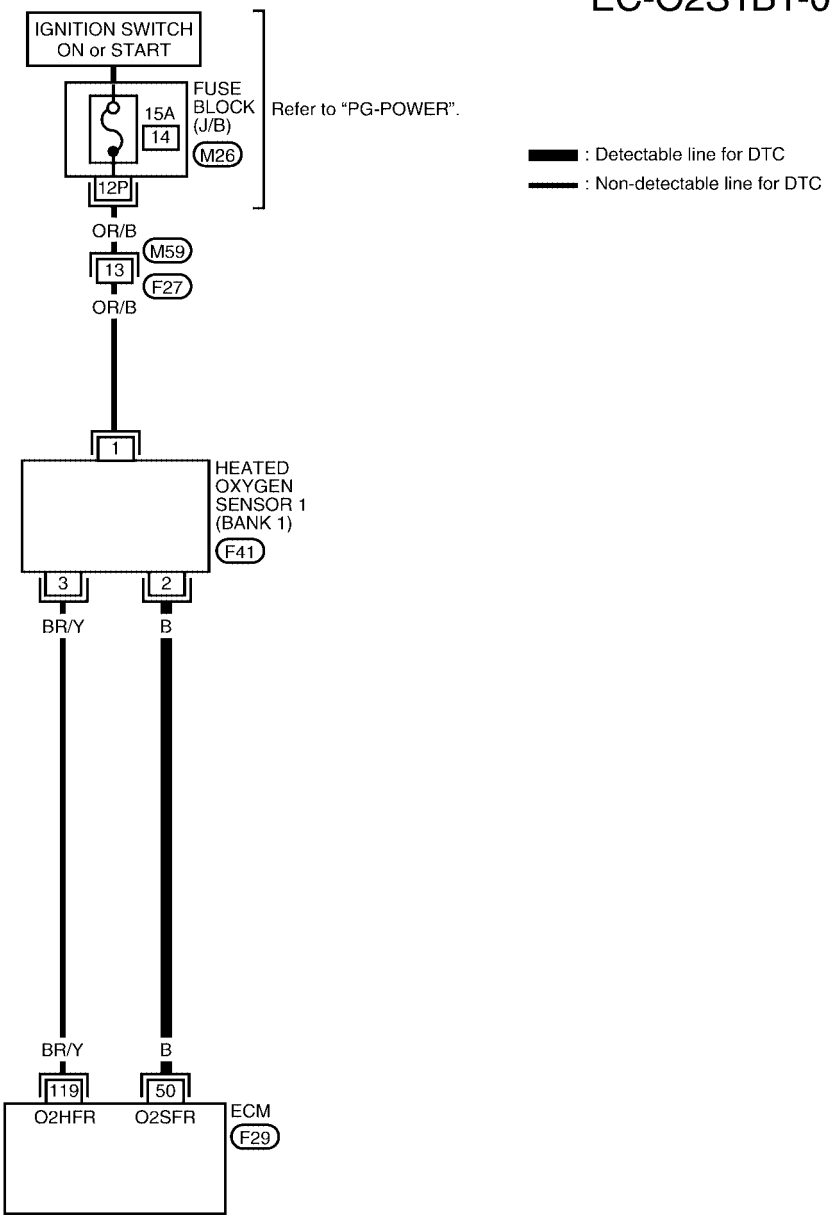
4. If NG, go to EC-1402, "Diagnostic Procedure" .

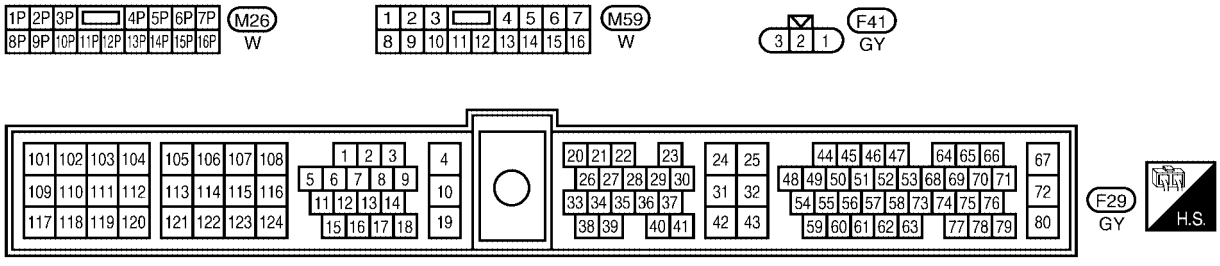


Wiring Diagram
BANK 1

UBS00DV9

EC-O2S1B1-01



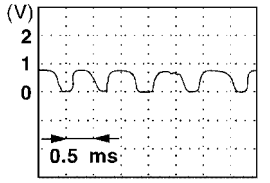


BBWA1075E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

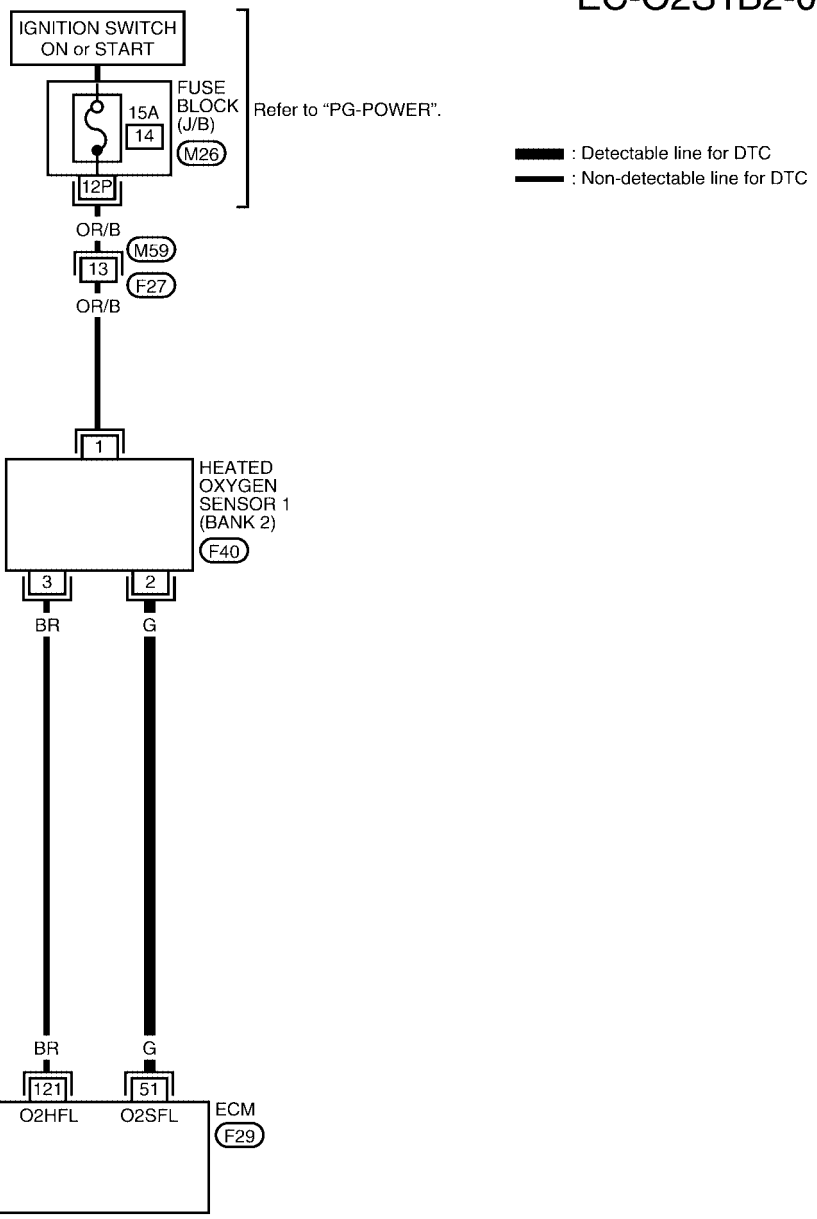
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V★  SEF002V

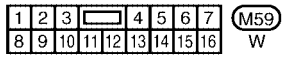
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.

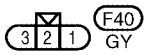
BANK 2

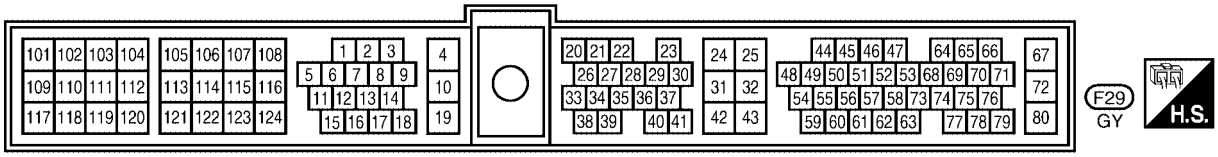
EC-O2S1B2-01









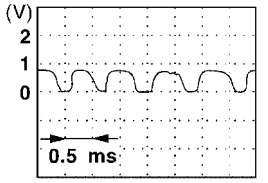


BBWA1076E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	G	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V★  SEF002V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.

Diagnostic Procedure

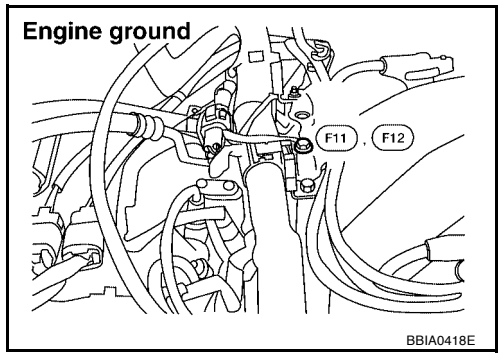
UBS00DVA

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



BBIA0418E

2. RETIGHTEN HEATED OXYGEN SENSOR 1

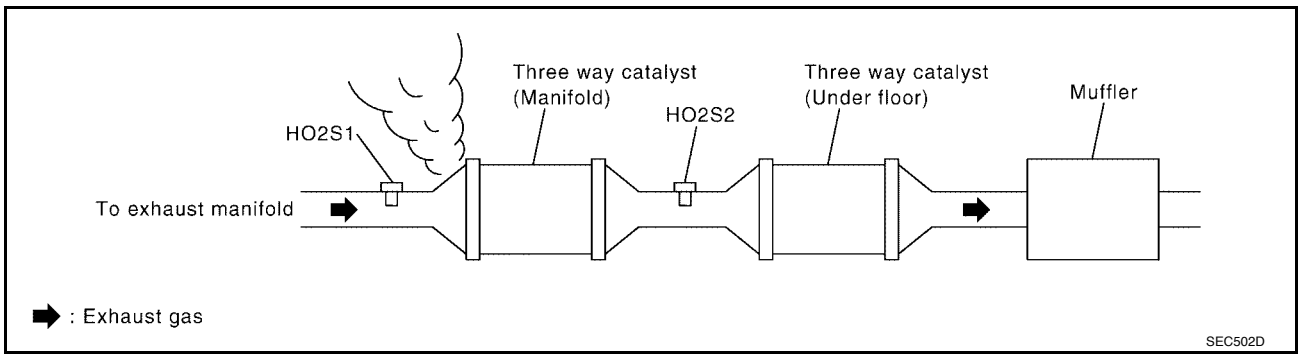
Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 3.

3. CHECK FOR EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

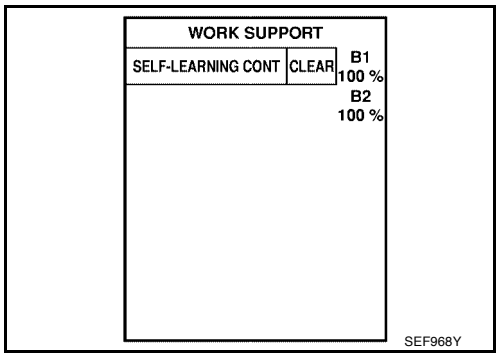
OK or NG

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, P0174 or P0172, 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 DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-1241, "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, P0174 or P0172, P0175 detected?
   Is it difficult to start engine?

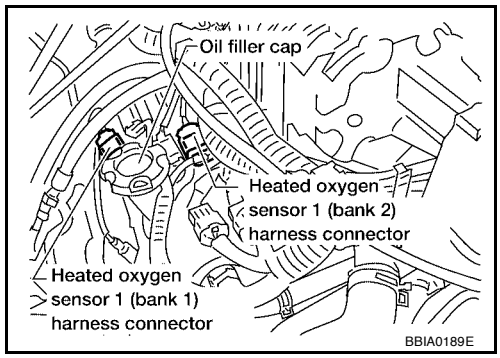
Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-1437 or EC-1445 .

No >> GO TO 6.

6. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal and HO2S1 terminal as follows.
   Refer to Wiring Diagram.



DTC	Terminals		Bank
	ECM	Sensor	
P0133	50	2	Bank 1
P0153	51	2	Bank 2

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0133	50	2	Bank 1
P0153	51	2	Bank 2

Continuity should not exist.

5. Also check harness for 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 MASS AIR FLOW SENSOR

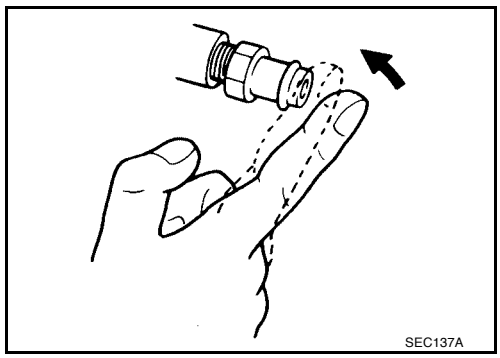
Refer to EC-1341, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace mass air flow sensor.

8. CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover; make sure that 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.



OK or NG

OK (With CONSULT-II)>> GO TO 9.
OK (Without CONSULT-II)>>GO TO 10.
NG >> Replace PCV valve.

9. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. 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 (B2)	XXX V
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

PBIB2025E

5. Check the following.

- “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown below.
- “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.

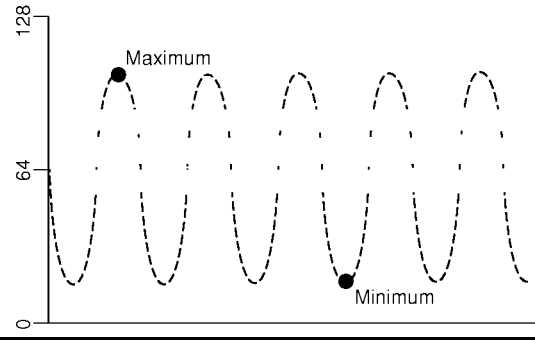
Bank 1						
	cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R					
Bank 2						
	cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R					

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 oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 11.
NG >> Replace malfunctioning heated oxygen sensor 1.

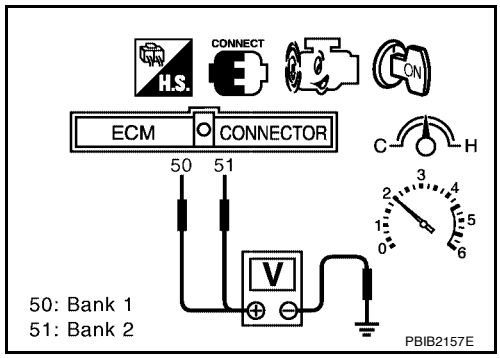
10. CHECK FRONT HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and 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 1 time.
- The minimum voltage is below 0.3V at least 1 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 → 0 - 0.3V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 11.
NG >> Replace malfunctioning heated oxygen sensor 1.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DVB

HEATED OXYGEN SENSOR 1

Refer to EM-80, "OUTER COMPONENT PARTS" .

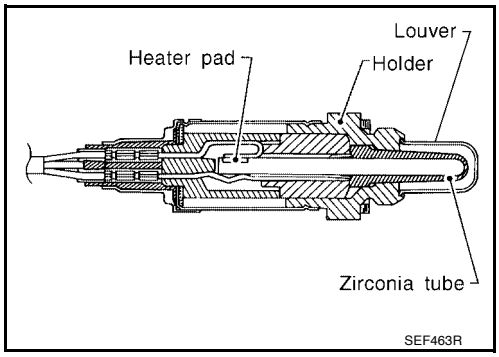
DTC P0134, P0154 HO2S1

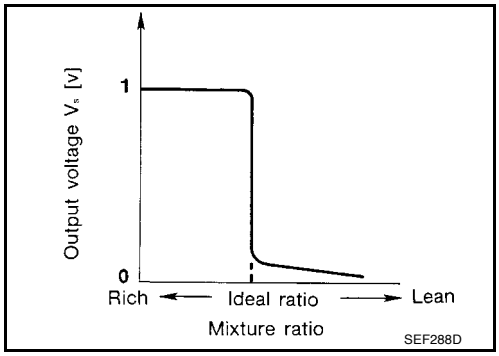
PFP:22690

Component Description

UBS00DVC

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

UBS00DVD

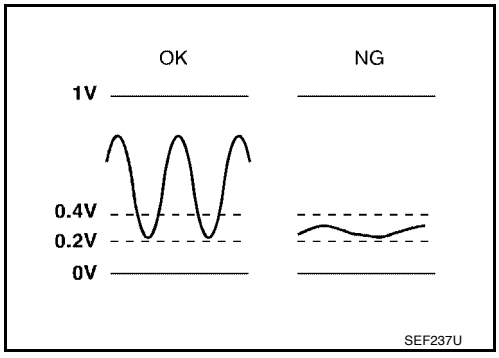
Specification data are reference values.

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

UBS00DVE

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0134 (Bank 1) P0154 (Bank 2)	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 1

DTC Confirmation Procedure

UBS00DVF

CAUTION:
Always drive vehicle at a safe speed.

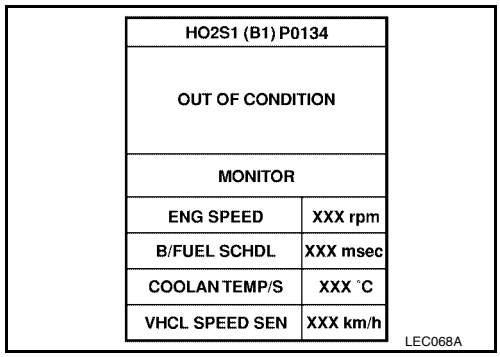
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

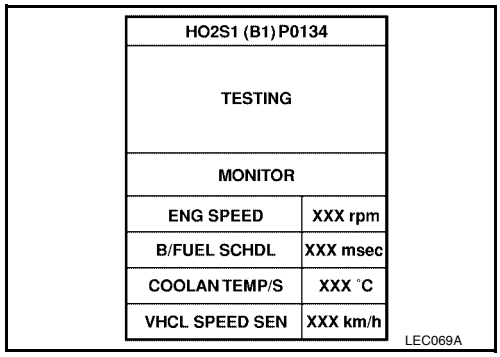
1. Start engine and warm it up to normal operating temperature.
2. Select “HO2S1 (B1)/(B2) P0134/P0154” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
3. Touch “START”.
4. Let it idle for at least 3 minutes.

   NOTE:
   Never raise engine speed above 2,800 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.)

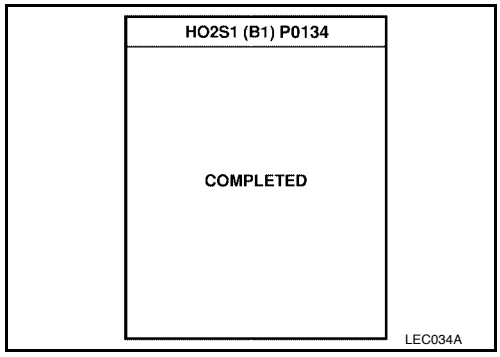
ENG SPEED	1,400 - 2,700 rpm
Vehicle speed	More than 64 km/h (40 MPH)
B/FUEL SCHDL	2.0 - 14.0 msec
Selector lever	Suitable position



   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-1414, "Diagnostic Procedure" .

   During this test, P1148 and P1168 may be stored in ECM.



Overall Function Check

UBS00DVG

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

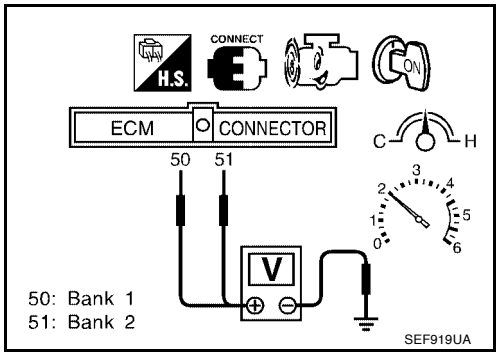
WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and ground.

3. Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage does not remain in the range of 0.2 to 0.4V.

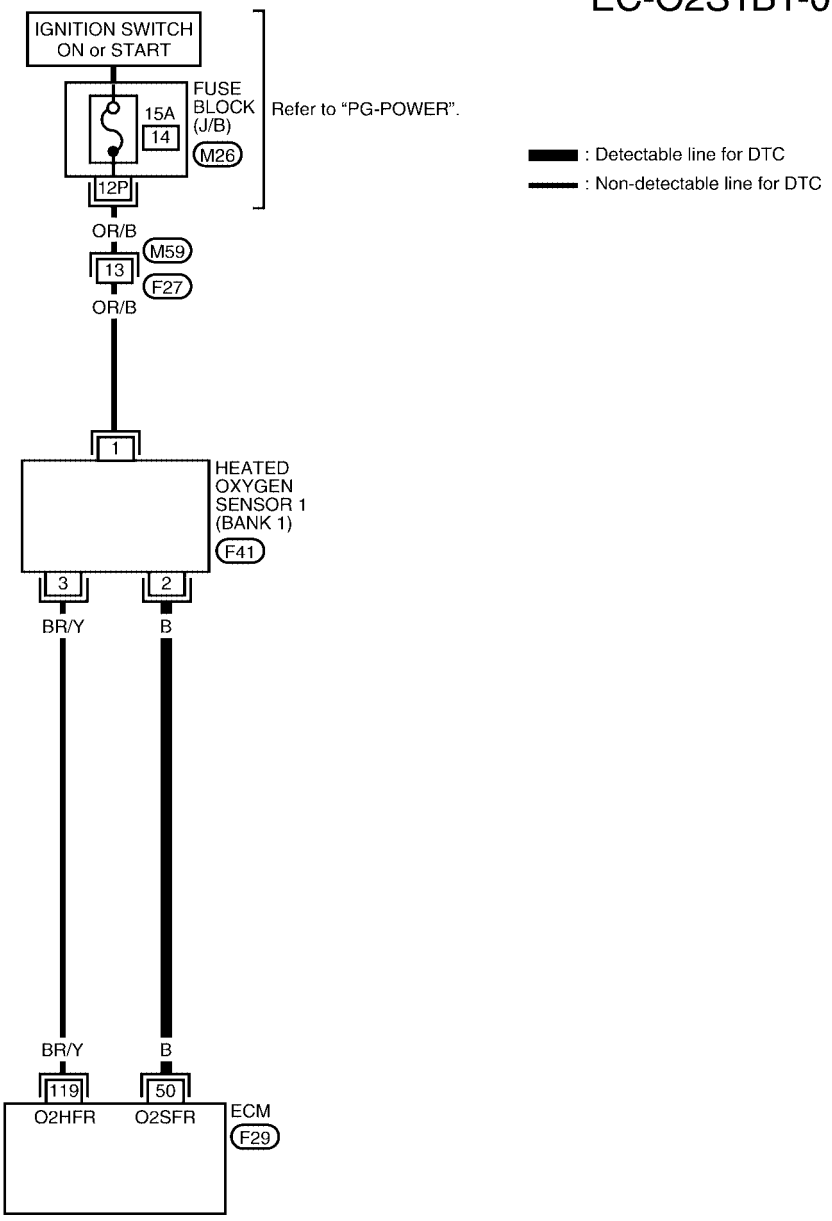
4. If NG, go to EC-1414, "Diagnostic Procedure" .

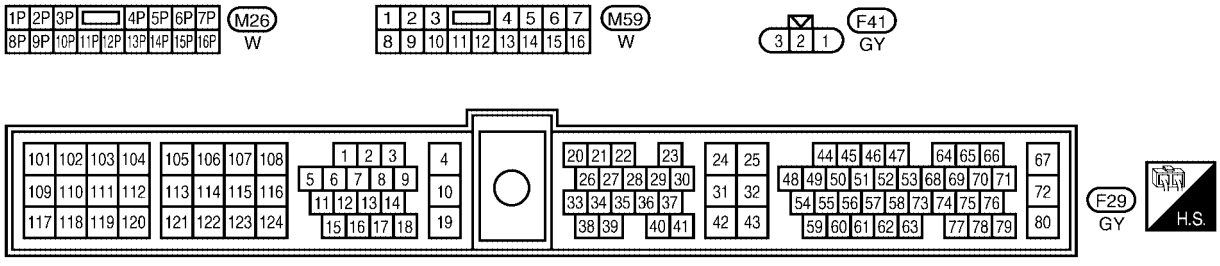


Wiring Diagram
BANK 1

UBS00DVH

EC-O2S1B1-01



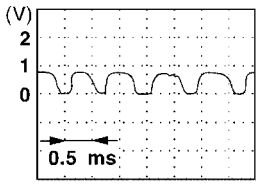


BBWA1075E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

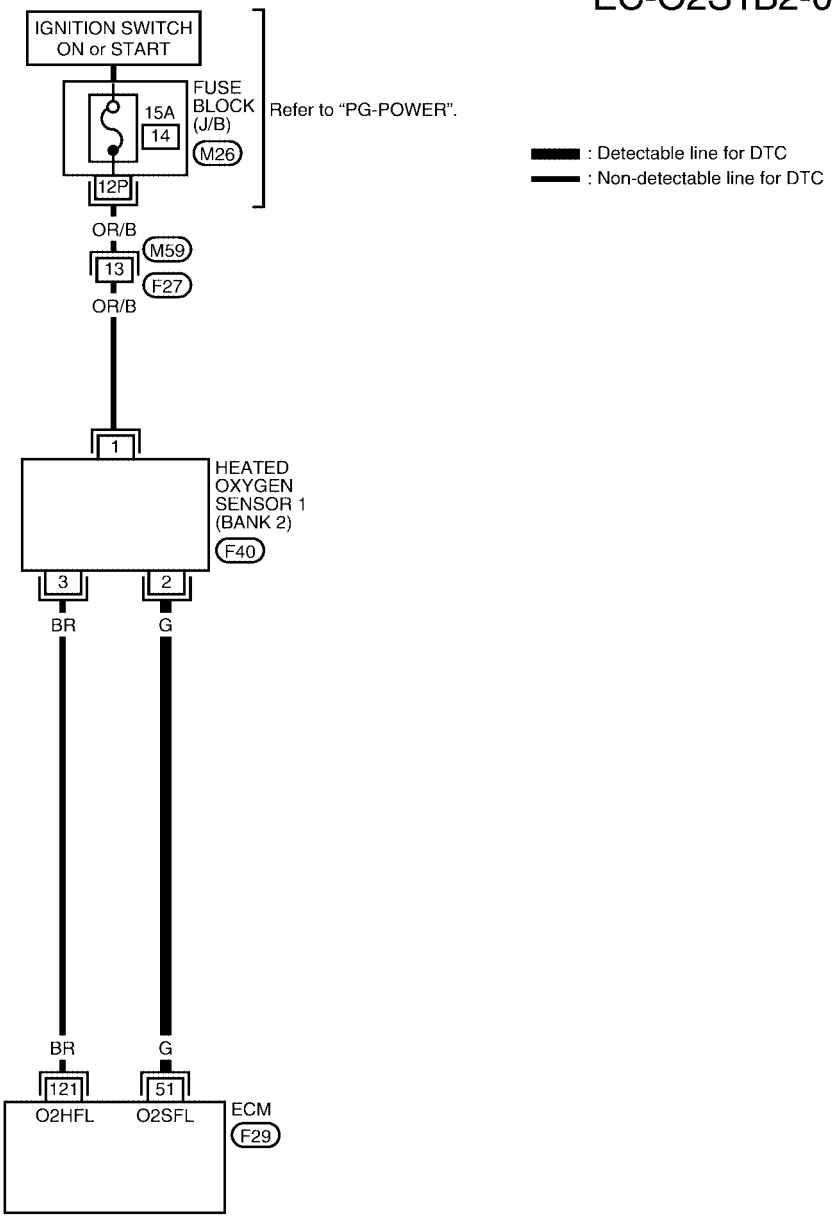
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	B	Heated oxygen sensor 1 (front) (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V★  SEF002V

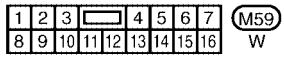
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.

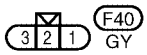
BANK 2

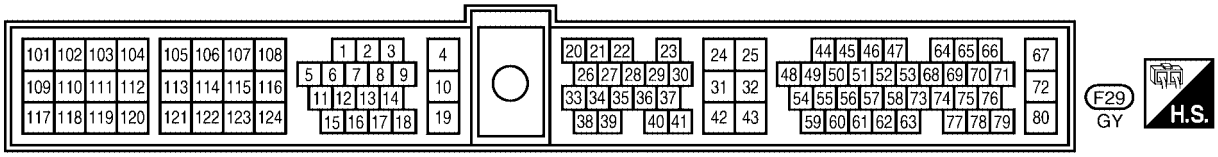
EC-O2S1B2-01









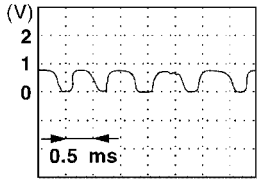


BBWA1076E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	G	Heated oxygen sensor 1 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V★  SEF002V

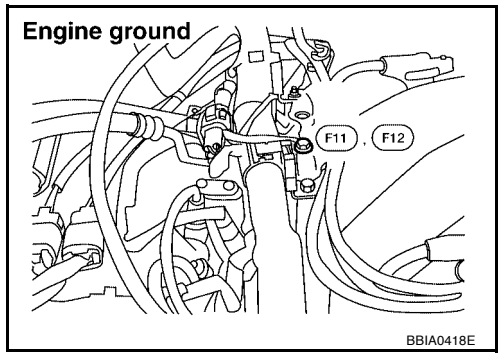
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.

Diagnostic Procedure

UBS00DVI

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .



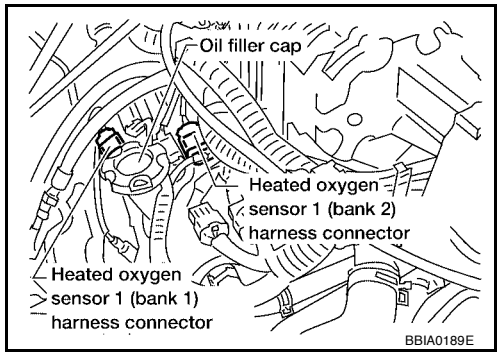
BBIA0418E

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK HO2S 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check harness continuity between ECM terminal and HO2S1 terminal as follows.
   Refer to Wiring Diagram.



DTC	Terminals		Bank
	ECM	Sensor	
P0134	50	2	Bank 1
P0154	51	2	Bank 2

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0134	50	2	Bank 1
P0154	51	2	Bank 2

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 3.
OK (Without CONSULT-II)>> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. 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 (B2)	XXX V
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

PBIB2025E

5. Check the following.

- “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown below.
- “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

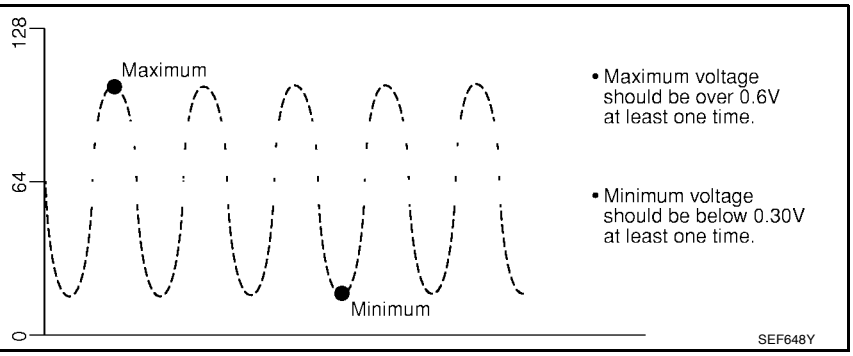
cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L	R-L	R-L	R-L	R-L

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



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

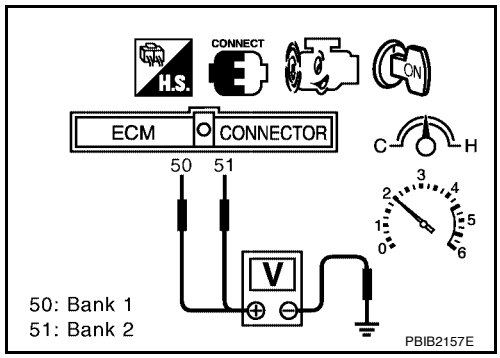
OK >> GO TO 5.
NG >> Replace malfunctioning heated oxygen sensor 1.

4. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B1) signal] and 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 1 time.
- The minimum voltage is below 0.3V at least 1 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 → 0 - 0.3V

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DVJ

HEATED OXYGEN SENSOR 1

Refer to EM-80, "OUTER COMPONENT PARTS" .

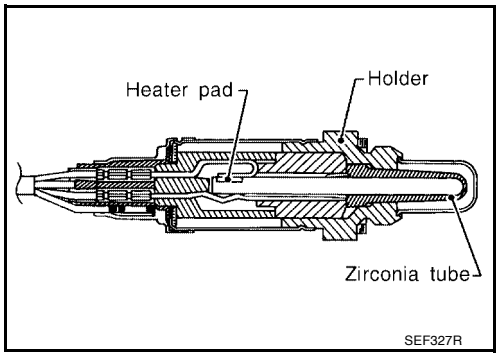
DTC P0138, P0158 HO2S2

PFP:226A0

Component Description

UBS00DVK

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DVL

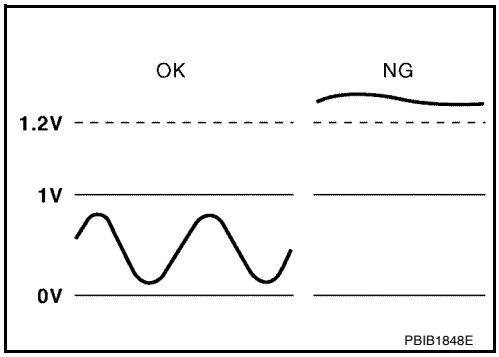
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Warm-up condition ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS00DVM

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0138 (Bank 1) P0158 (Bank 2)	Heated oxygen sensor 2 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2

DTC Confirmation Procedure

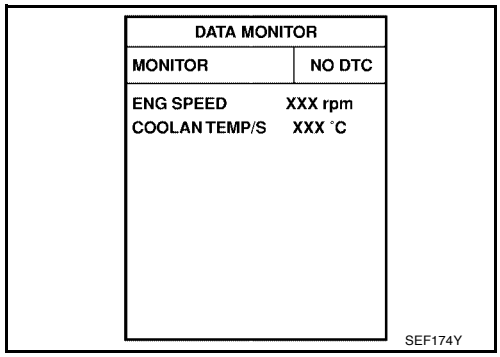
UBS00DVN

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 5 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-1423, "Diagnostic Procedure" .

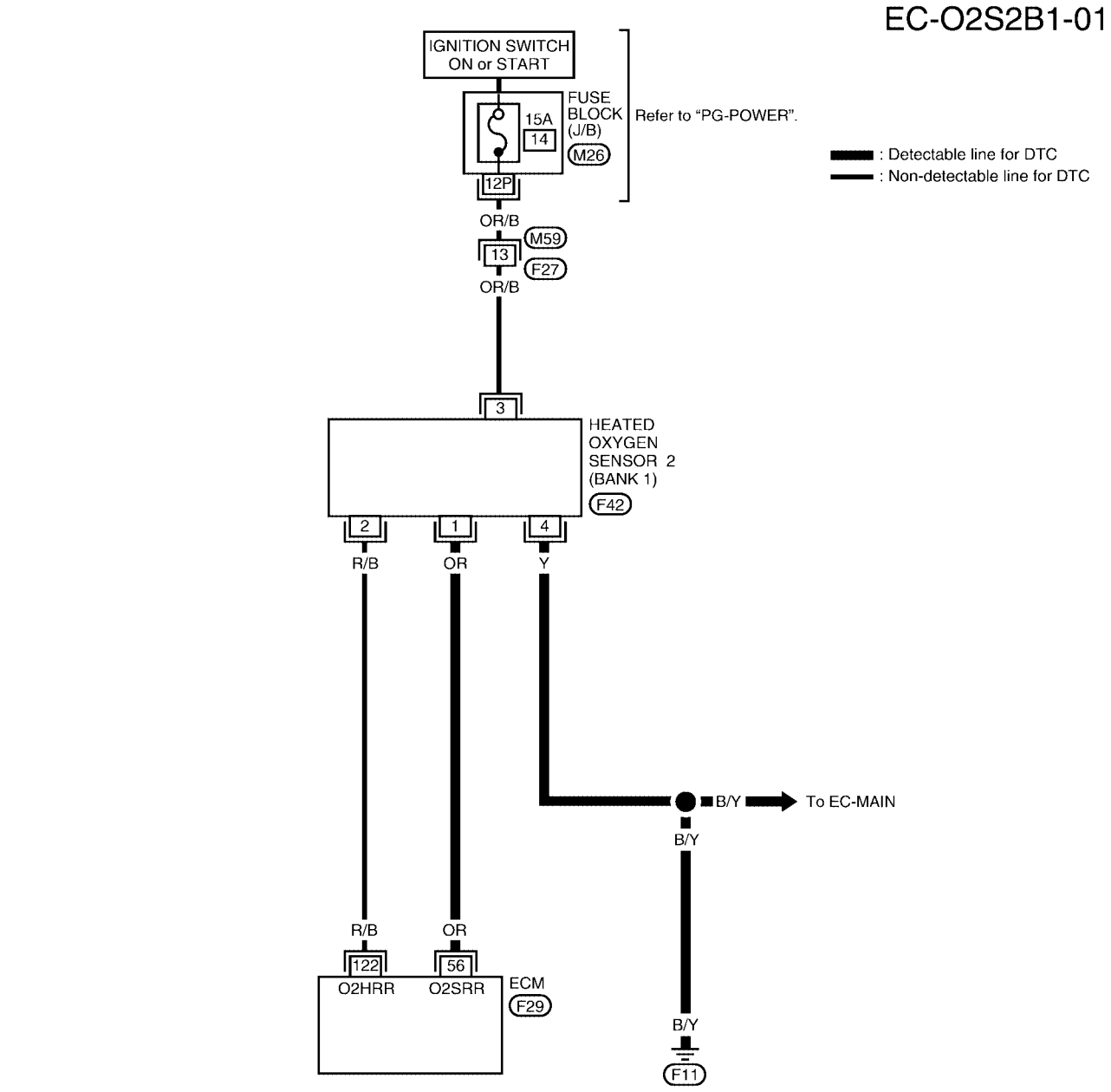


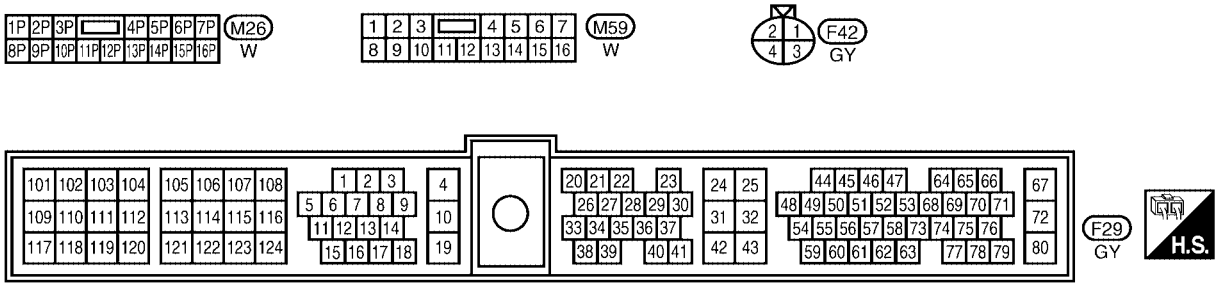
WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 2 minutes.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
7. Let engine idle for 2 minutes.
8. Select MODE 3 with GST.
9. If DTC is detected, go to EC-1423, "Diagnostic Procedure" .

Wiring Diagram
BANK 1

UBS00DVO





BBWA1079E

Specification data are reference values and are measured between each terminal and ground.

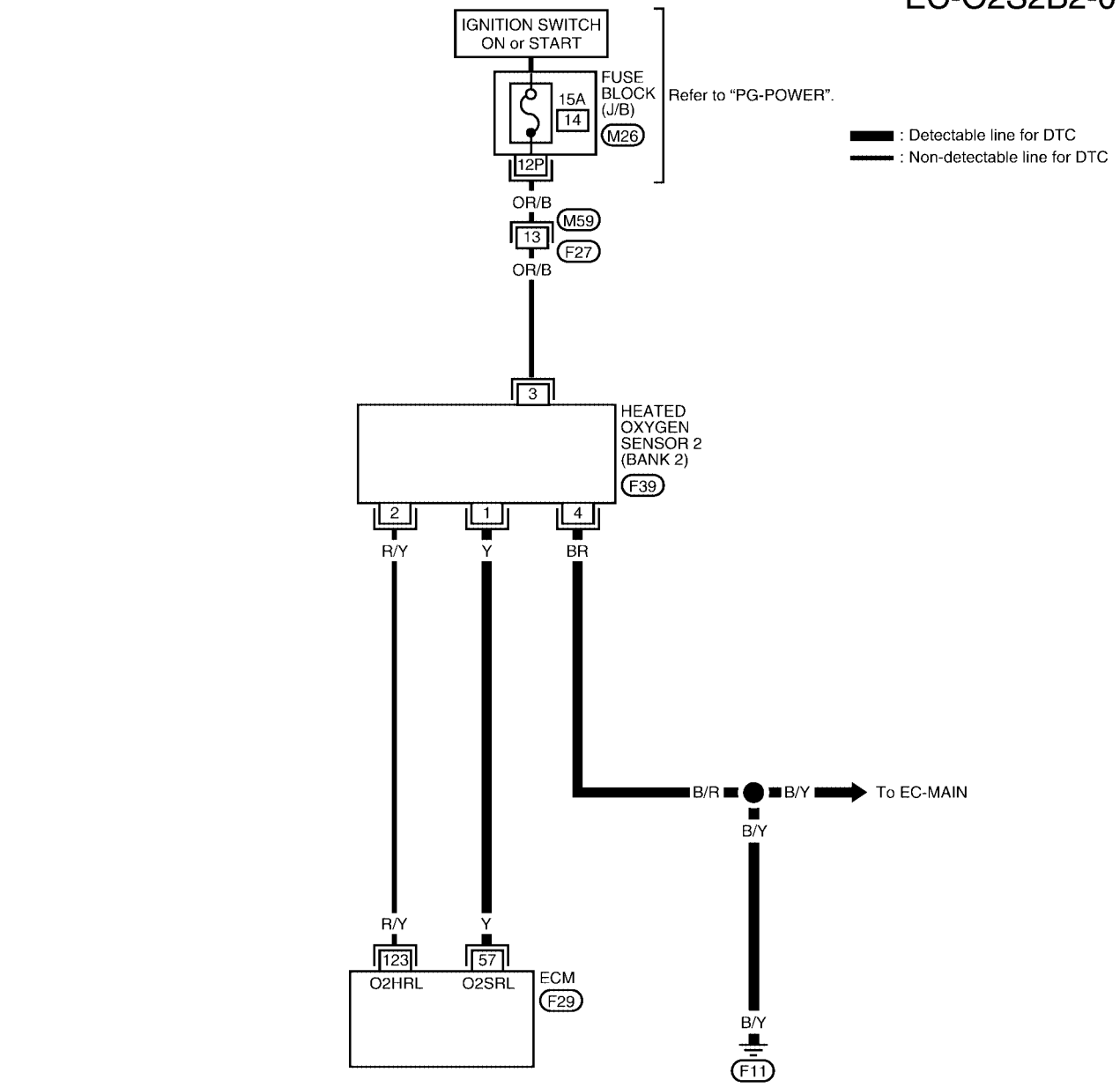
CAUTION:

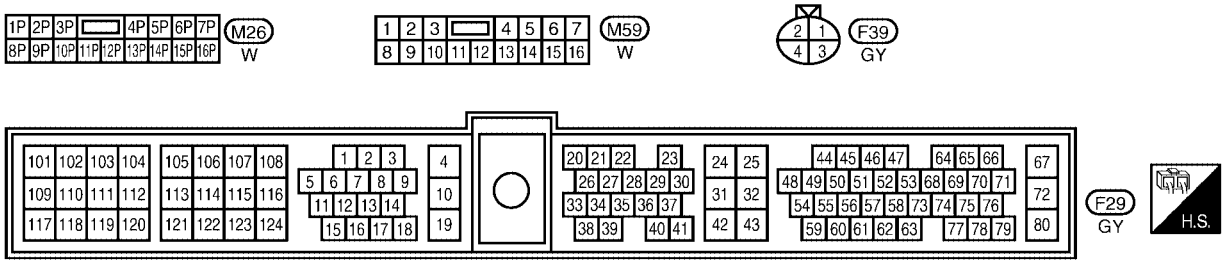
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

BANK 2

EC-O2S2B2-01





BBWA1080E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	Y	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

Diagnostic Procedure

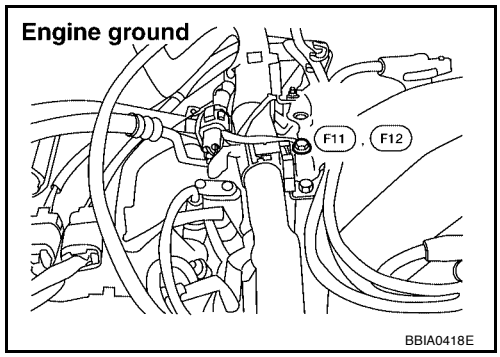
UBS00DVP

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

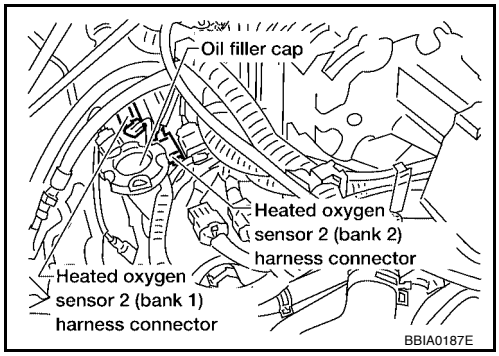
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



2. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Check harness continuity between ECM terminal and HO2S2 terminal as follows.
   Refer to Wiring Diagram.



DTC	Terminals		Bank
	ECM	Sensor	
P0138	56	1	Bank 1
P0158	57	1	Bank 2

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0138	56	1	Bank 1
P0158	57	1	Bank 2

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit to ground or short to power in harness or connectors.

4. CHECK HO2S2 CONNECTORS FOR WATER

Check heated oxygen sensor 2 connector and harness connector for water.
Water should not exist.

OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

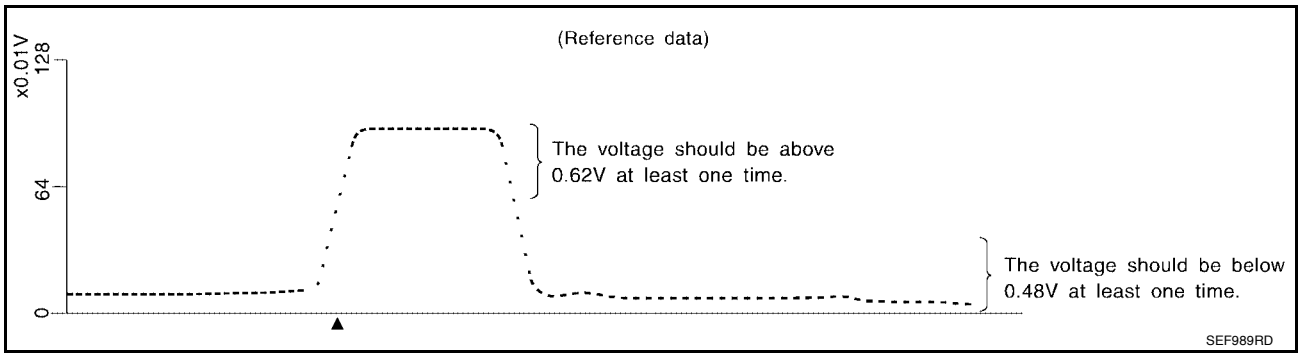
With CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperate.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

7. Check “HO2S2 (B1)/(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 oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

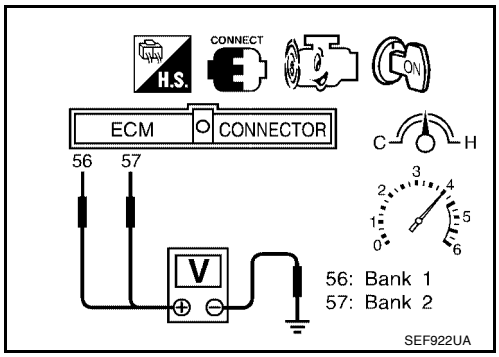
OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK HEATED OXYGEN SENSOR 2

Without CONSULT-II

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Stop vehicle with engine running.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.62V at least once during this procedure.
   If the voltage is above 0.62V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.48V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DVQ

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

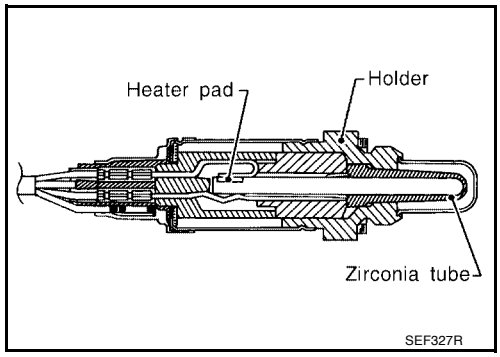
DTC P0139, P0159 HO2S2

PFP:226A0

Component Description

UBS00DVR

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DVS

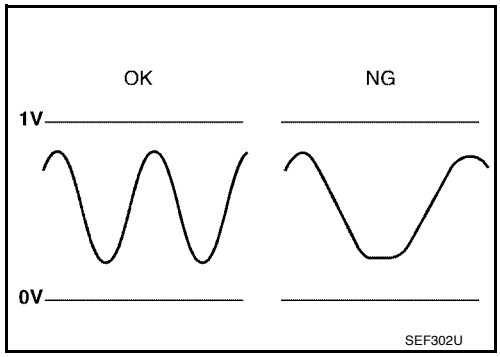
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Warm-up condition ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS00DVT

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139 (Bank 1) P0159 (Bank 2)	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector ● Intake air leaks

DTC Confirmation Procedure

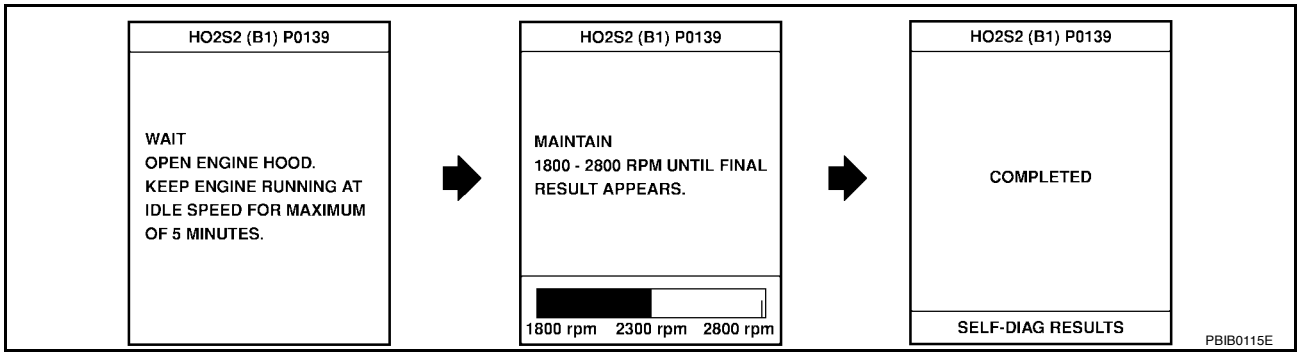
UBS00DVU

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
TESTING CONDITION:
Open engine hood before conducting following procedure

WITH CONSULT-II

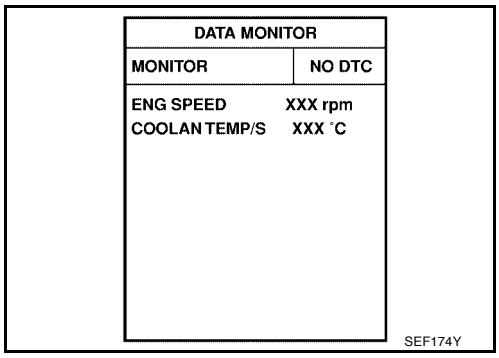
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “HO2S2 (B1) P0139” or “HO2S2 (B2) P0159” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II and follow the instruction of CONSULT-II.
6. Start engine and following the instruction of CONSULT-II.



7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-1432, "Diagnostic Procedure"
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
c. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-II.
d. When “COOLAN TEMP/S” indication reaches to 70°C (158°F), go to step 3.



Overall Function Check

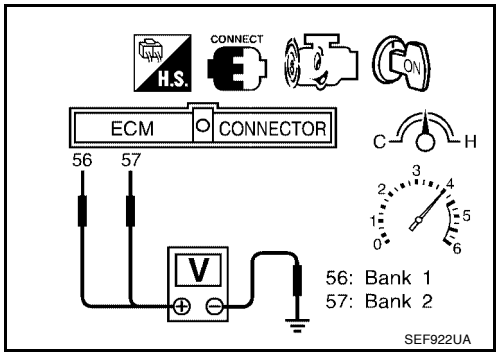
UBS00DVV

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 56 [HO2S2(B1) signal] or 57 [HO2S2(B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   A change of voltage should be more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.

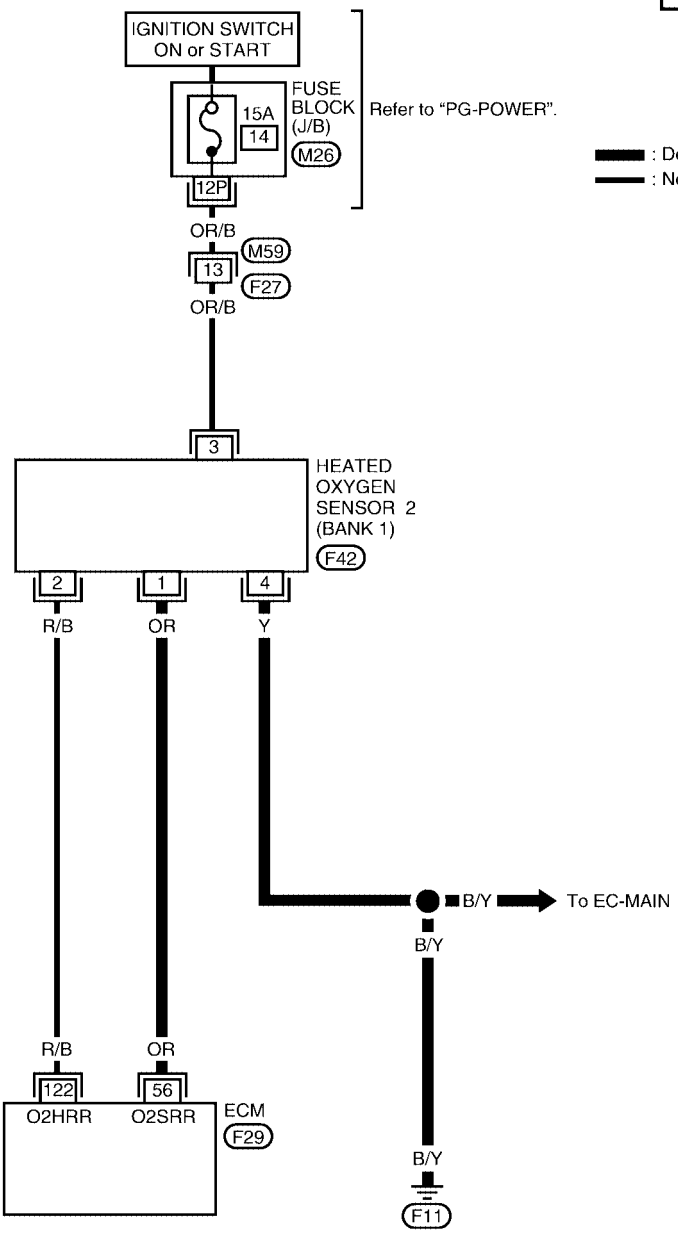


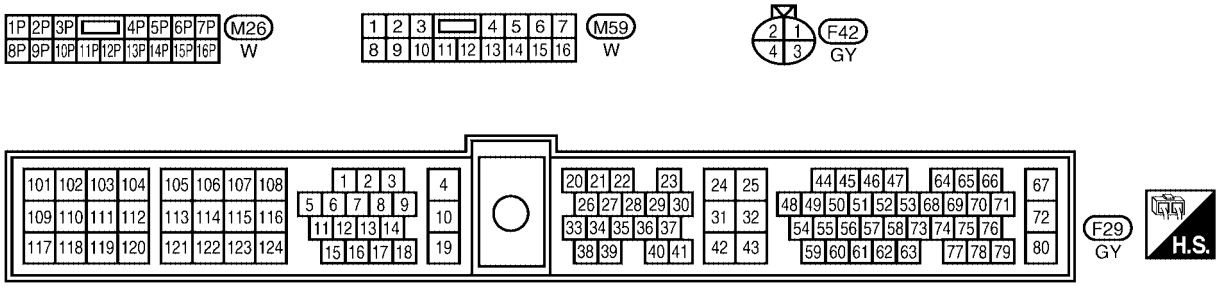
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   A change of voltage should be more than 0.06V for 1 second during this procedure.
8. If NG, go to EC-1432, "Diagnostic Procedure"

Wiring Diagram
BANK 1

UBS00DVW

EC-O2S2B1-01





BBWA1079E

Specification data are reference values and are measured between each terminal and ground.

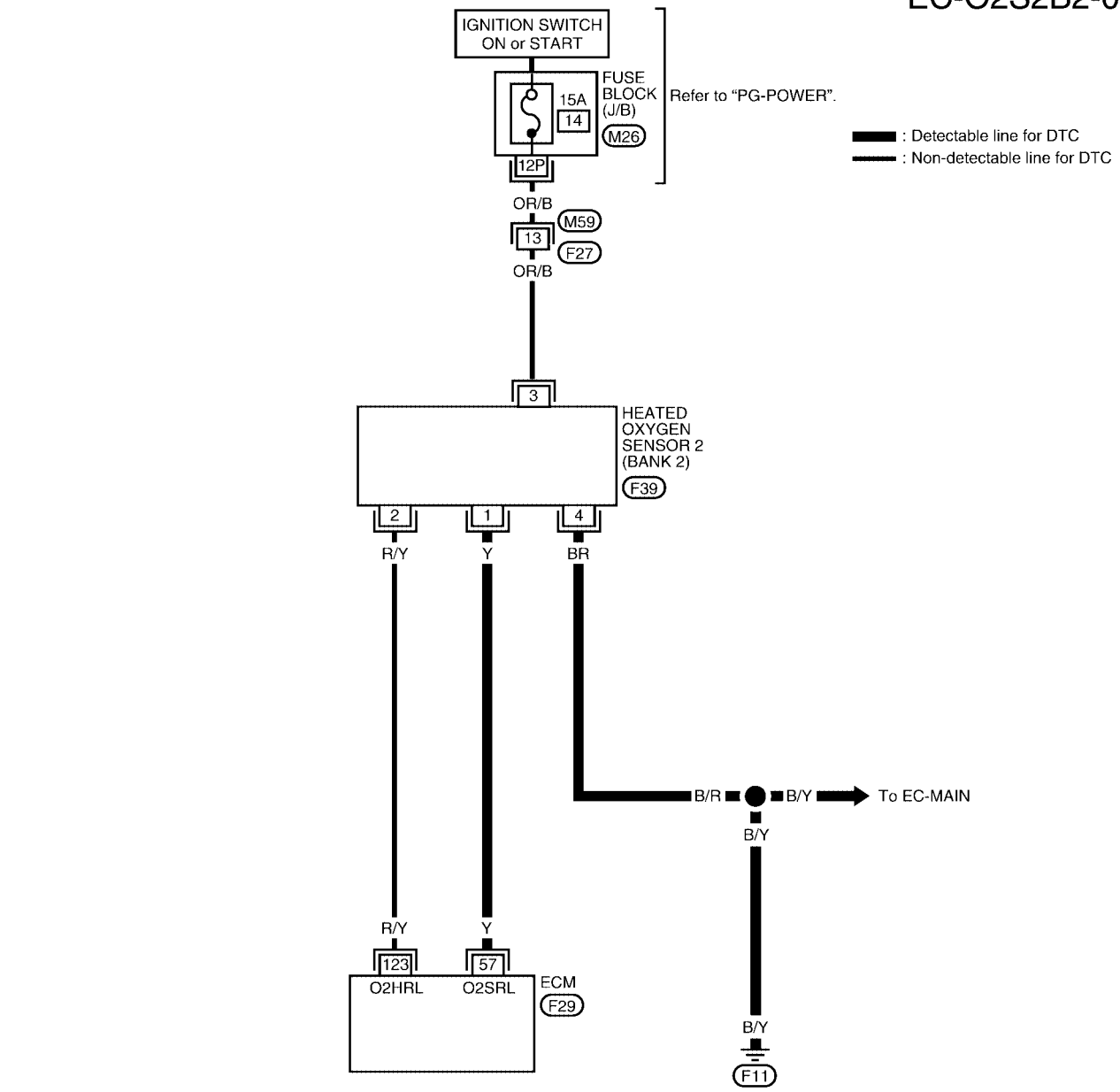
CAUTION:

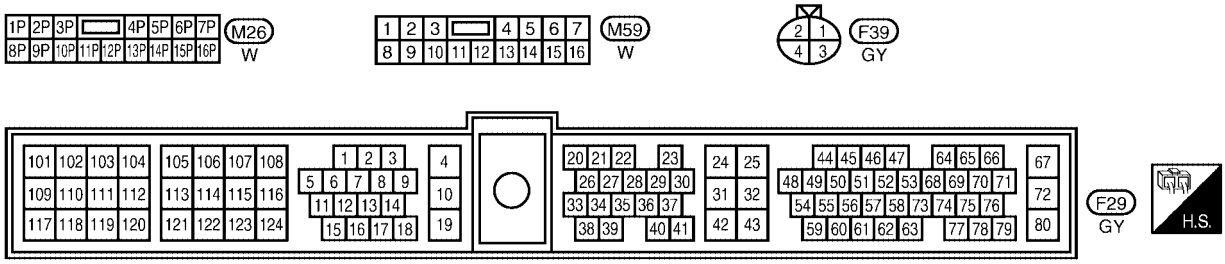
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

BANK 2

EC-O2S2B2-01





BBWA1080E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	Y	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

Diagnostic Procedure

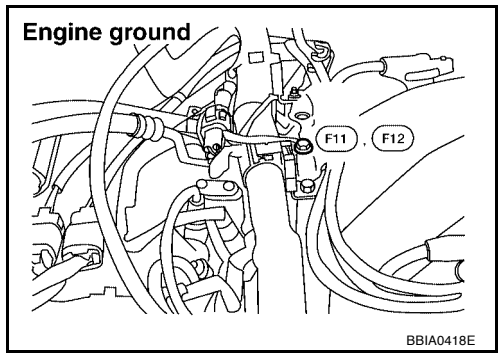
UBS00DVX

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

OK or NG

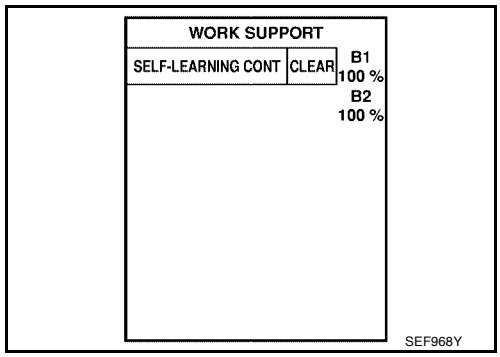
OK >> GO TO 2.
NG >> Repair or replace ground connections.



2. CLEAR THE SELF-LEARNING DATA

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171, P0174 or P0172, 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 DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-1241, "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, P0174 or P0172, P0175 detected?
   Is it difficult to start engine?

Yes or No

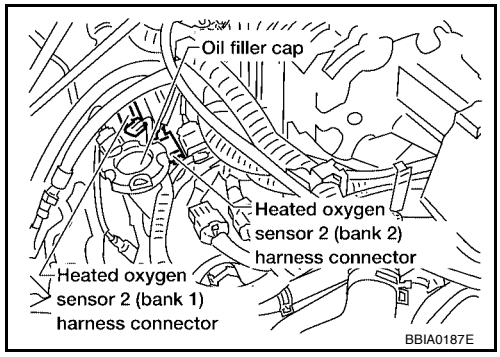
Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-1437 or EC-1445 .

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 ground.
   Refer to Wiring Diagram.

Continuity should exist.



OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to power in harness or connectors.

4. 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	
P0139	56	1	Bank 1
P0159	57	1	Bank 2

Continuity should exist.

3. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0139	56	1	Bank 1
P0159	57	1	Bank 2

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

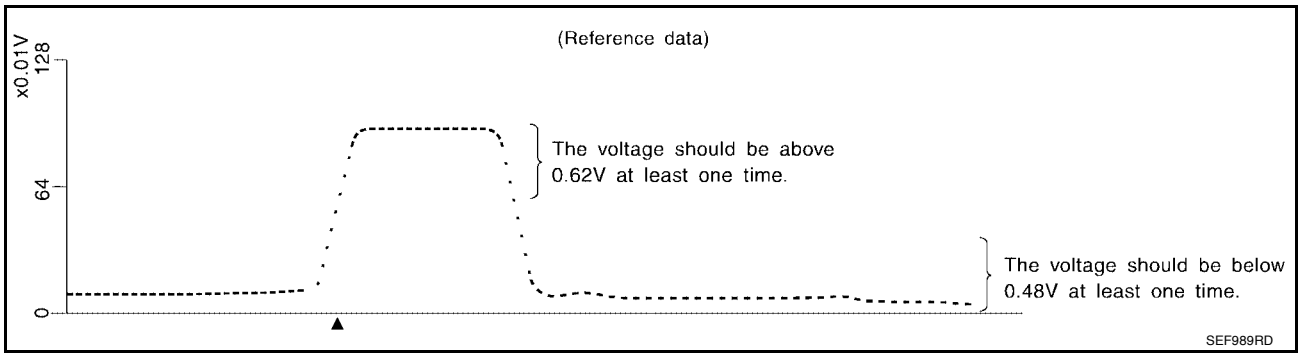
With CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperate.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

7. Check “HO2S2 (B1)/(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 oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

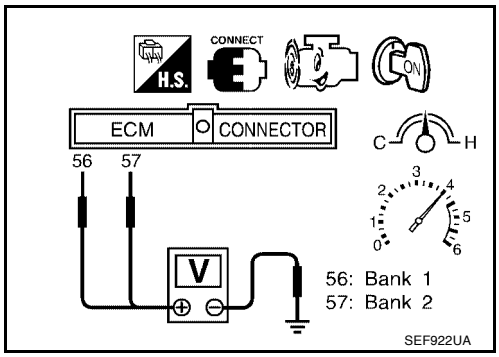
OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK HEATED OXYGEN SENSOR 2

Without CONSULT-II

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Stop vehicle with engine running.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.62V at least once during this procedure.
   If the voltage is above 0.62V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.48V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DVY

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

UBS00DVZ

With the Air-Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171 (Bank 1) P0174 (Bank 2)	Fuel injection system too lean	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	● Intake air leaks ● Heated oxygen sensor 1 ● Fuel injector ● Exhaust gas leaks ● Incorrect fuel pressure ● Lack of fuel ● Mass air flow sensor ● Incorrect PCV hose connection

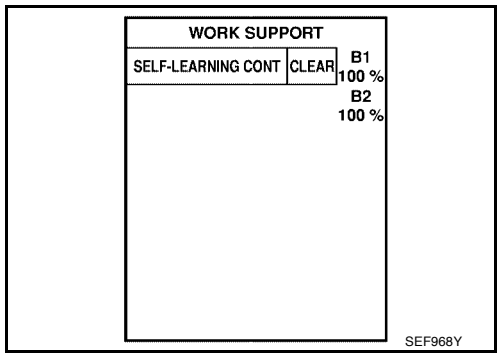
DTC Confirmation Procedure

UBS00DW0

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 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 EC-1441, "Diagnostic Procedure" .
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 EC-1441, "Diagnostic Procedure" . If engine does not start, check exhaust and intake air leak visually.



WITH GST

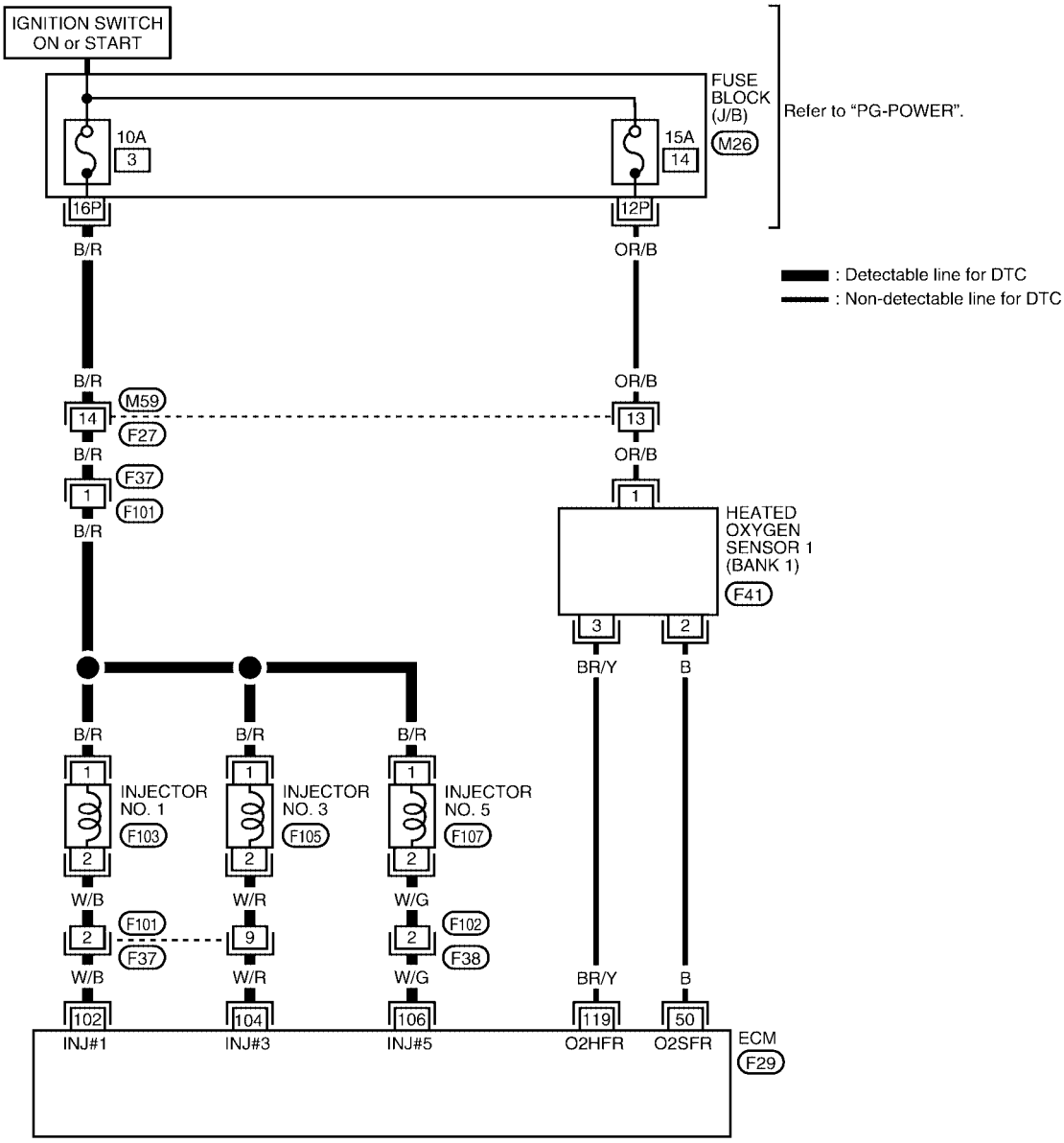
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select MODE 3 with GST. Make sure DTC P0102 is detected.
6. Select MODE 4 with GST and erase the DTC P0102.
7. Start engine again and let it idle for at least 10 minutes.

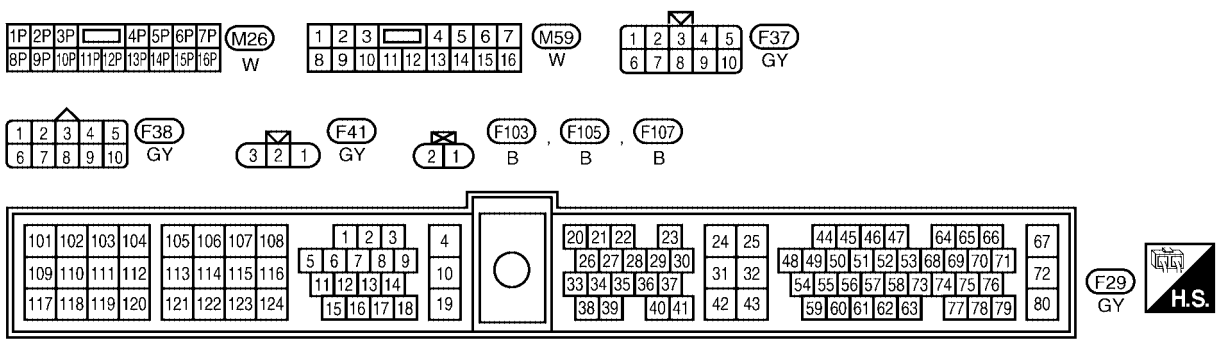
8. Select MODE 7 with GST. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to EC-1441, "Diagnostic Procedure" .
9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal. If engine starts, go to EC-1441, "Diagnostic Procedure" . If engine does not start, check exhaust and intake air leak visually.

Wiring Diagram
BANK 1

UBS00DW1

EC-FUELB1-01

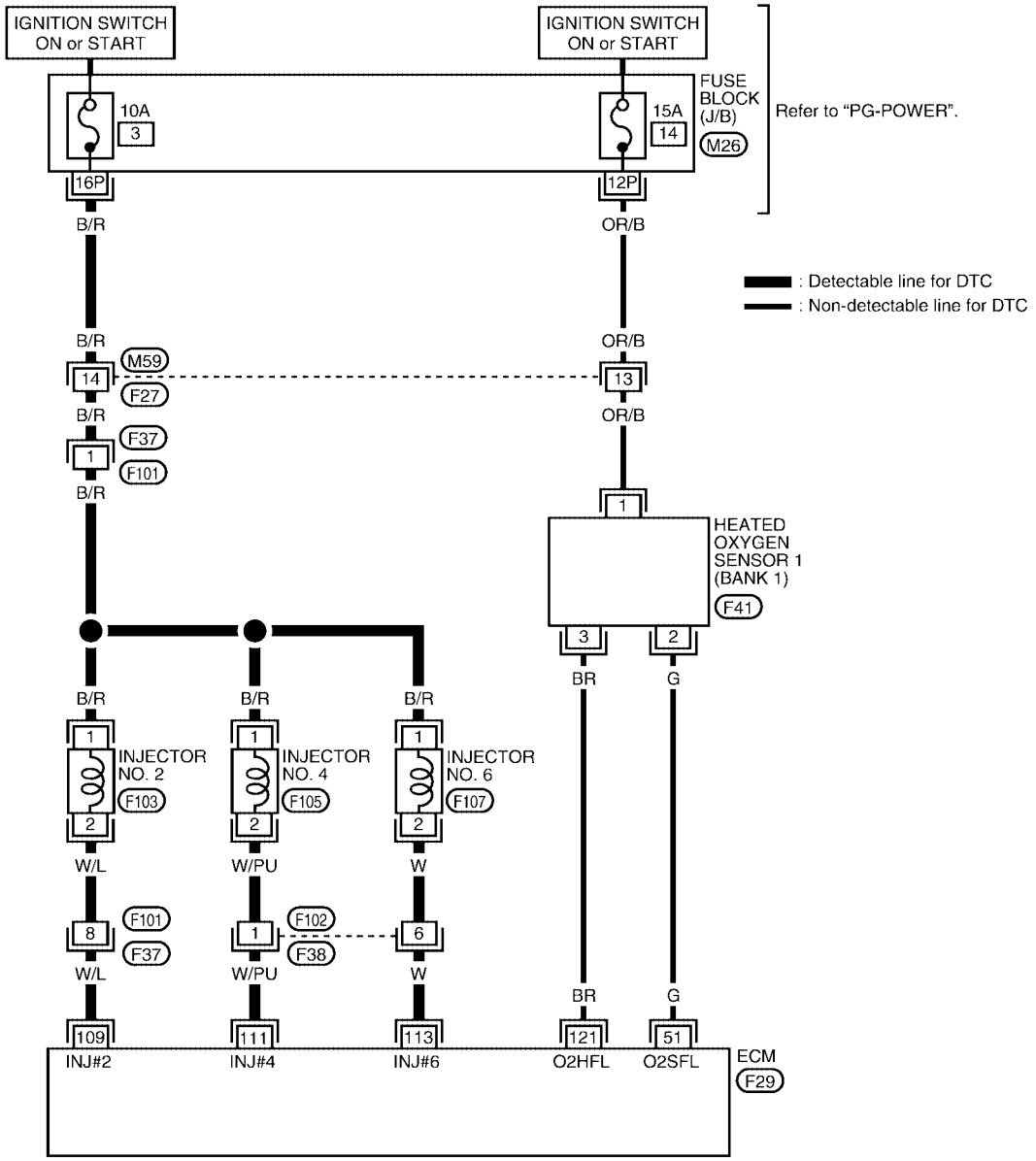


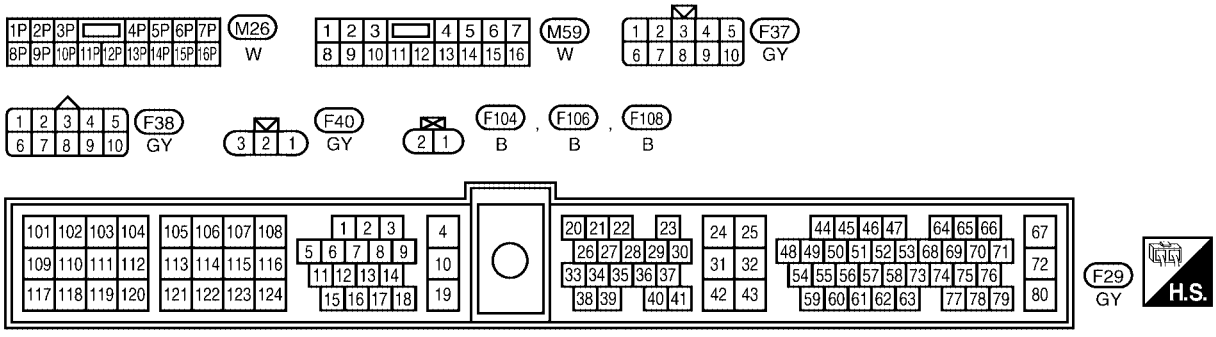


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BANK 2

EC-FUELB2-01





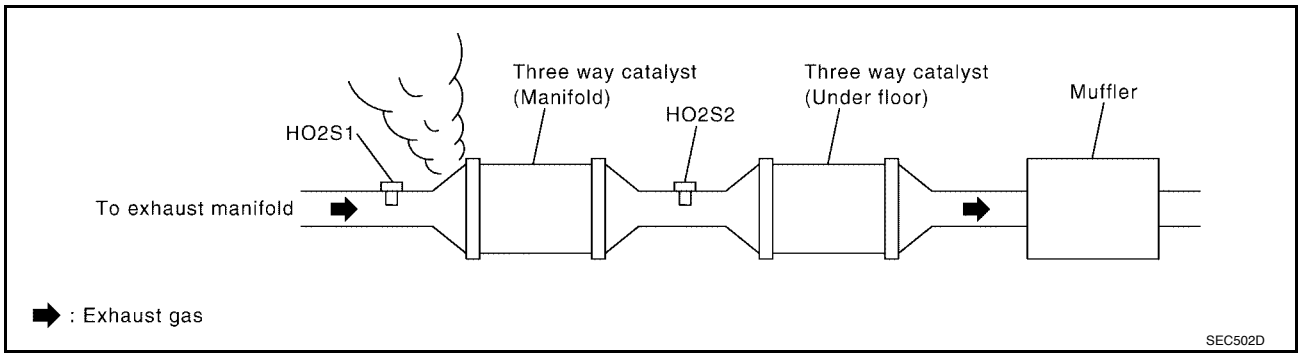
BBWA1103E

Diagnostic Procedure

UBS00DW2

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK FOR PCV HOSE

Check PCV hose for loose connection or disconnection.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal and HO2S1 terminal as follows.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0171	50	2	Bank 1
P0174	51	2	Bank 2

Continuity should exist.

5. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0171	50	2	Bank 1
P0174	51	2	Bank 2

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-1227, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-1227, "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 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-1735 .)
- Fuel pressure regulator (Refer to EC-1228 .)
- Fuel lines (Refer to MA-28 .)
- Fuel filter for clogging

>> Repair or replace.

7. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all parts removed.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

3.3 - 4.8 g·m/sec : at idling
12.0 - 14.9 g·m/sec : at 2,500 rpm

With GST

1. Install all parts removed.
2. Check mass air flow sensor signal in MODE 1 with GST.

3.3 - 4.8 g·m/sec : at idling
12.0 - 14.9 g·m/sec : at 2,500 rpm

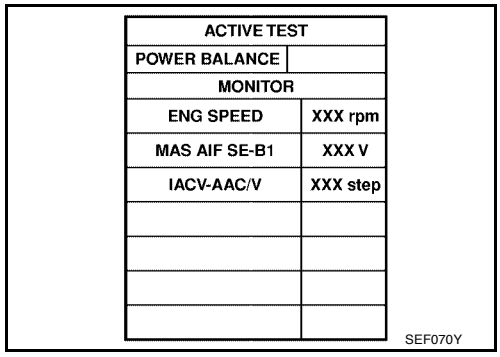
OK or NG

OK >> GO TO 8.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-1335 .

8. CHECK FUNCTION OF INJECTORS

With CONSULT-II

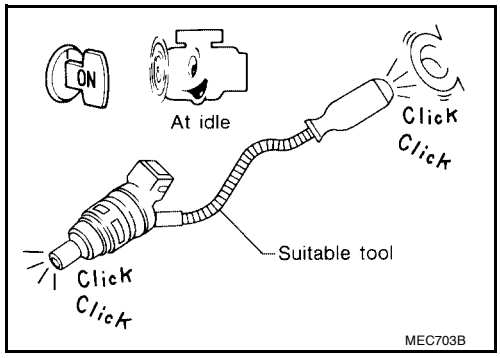
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.



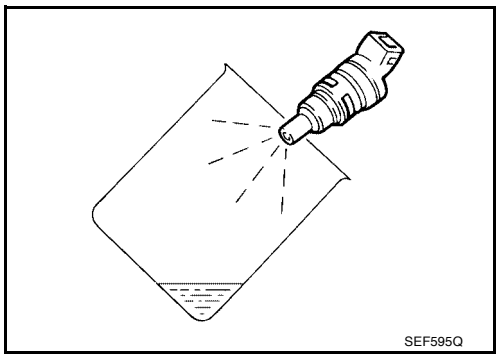
OK or NG

OK >> GO TO 9.
NG >> Perform trouble diagnosis for EC-1725, "INJECTOR CIRCUIT" .

9. 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 all injector harness connectors.
4. Remove injector gallery assembly. Refer to EM-80, "OUTER COMPONENT PARTS" .
   Keep fuel hose and all injectors connected to injector gallery.
5. For DTC P0171, reconnect injector harness connectors on bank 1.
   For DTC P0174, reconnect injector harness connectors on bank 2.
6. Disconnect all ignition coil harness connectors.
7. Prepare pans or saucers under each injector.
8. Crank engine for about 3 seconds.
   For DTC P0171, make sure than fuel sprays out from injectors on bank 1.
   For DTC P0174, make sure than fuel sprays out from injectors on bank 2.

   Fuel should be sprayed evenly for each injector.



OK or NG

OK >> GO TO 10.
NG >> Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

UBS00DW3

With the Air-Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172 (Bank 1) P0175 (Bank 2)	Fuel injection system too rich	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	● Heated oxygen sensor 1 ● Fuel injector ● Exhaust gas leaks ● Incorrect fuel pressure ● Mass air flow sensor

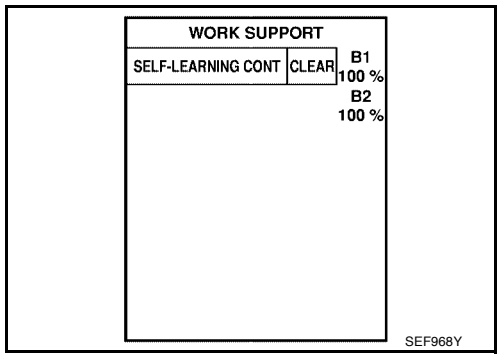
DTC Confirmation Procedure

UBS00DW4

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 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 EC-1449, "Diagnostic Procedure" .
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 EC-1449, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.



WITH GST

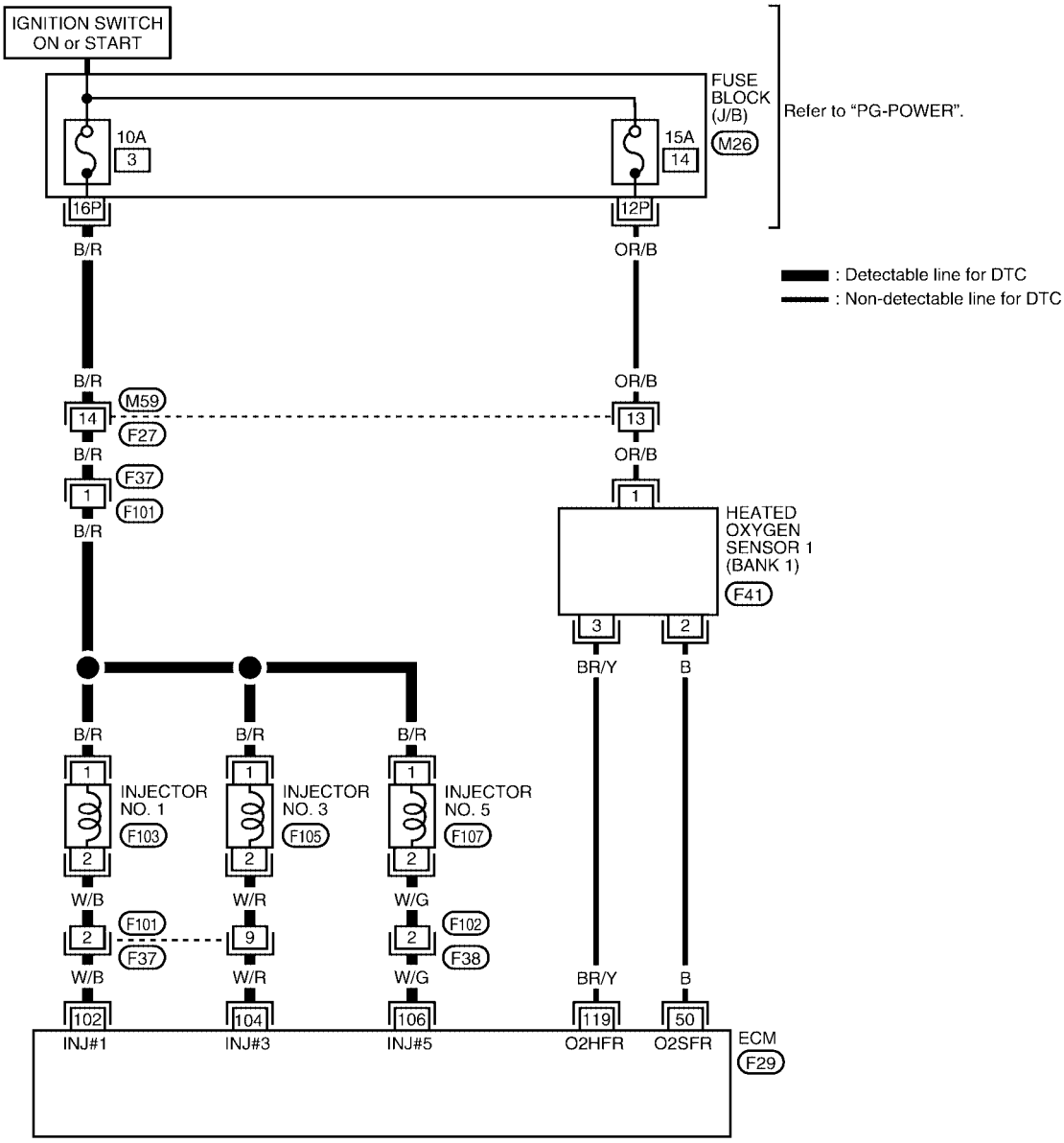
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select MODE 3 with GST. Make sure DTC P0102 is detected.
6. Select MODE 4 with GST and erase the DTC P0102.
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 EC-1449, "Diagnostic Procedure" .

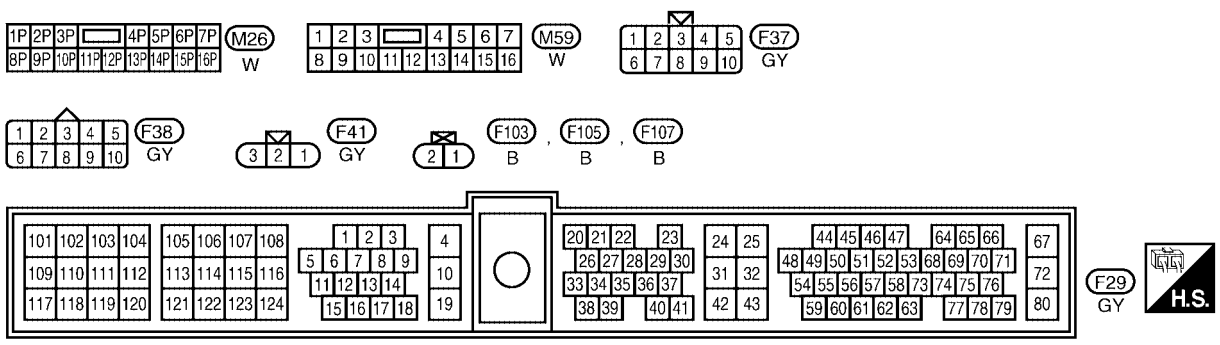
9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal.
    If engine starts, go to EC-1449, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.

Wiring Diagram
BANK 1

UBS00DW5

EC-FUELB1-01

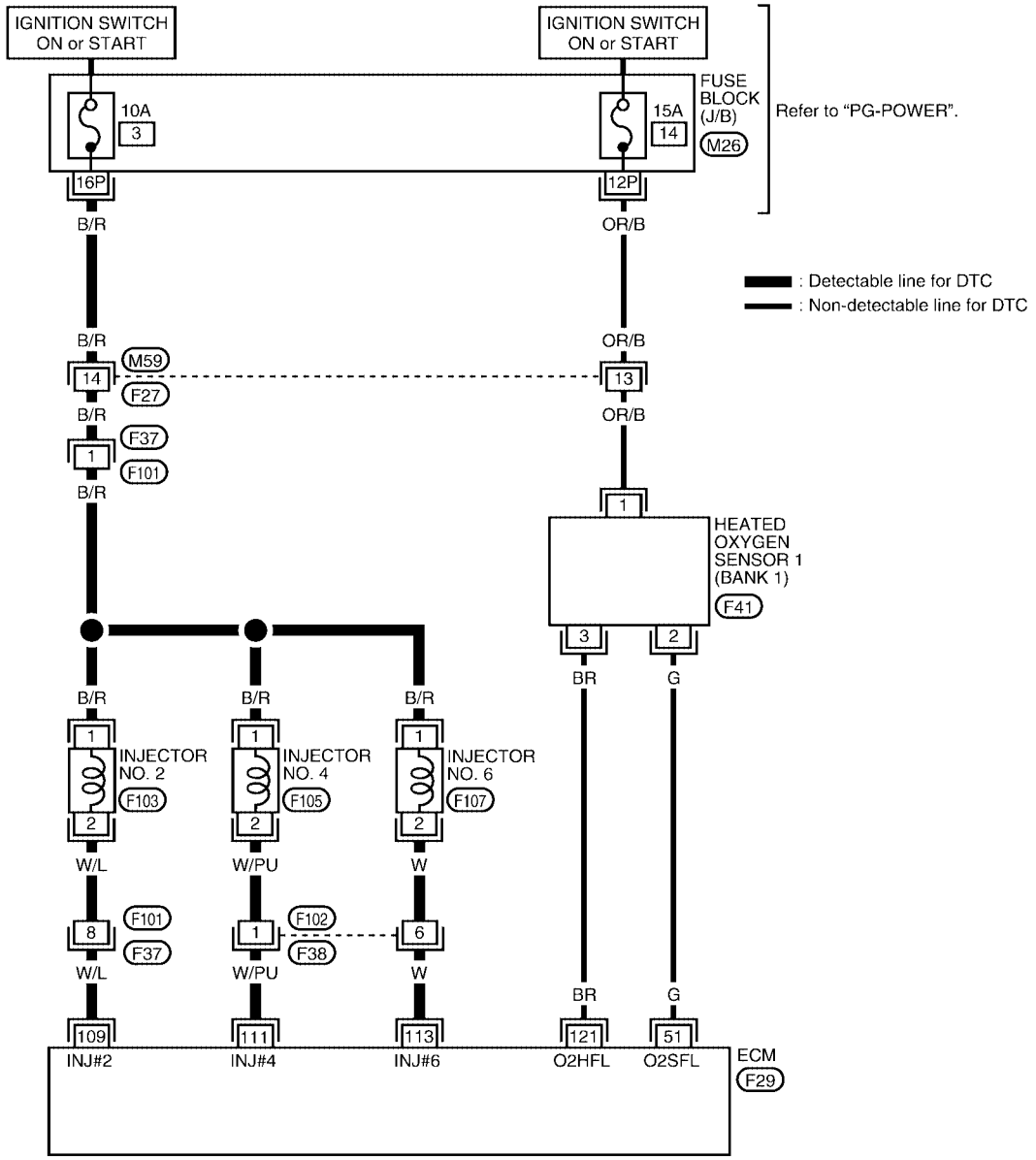


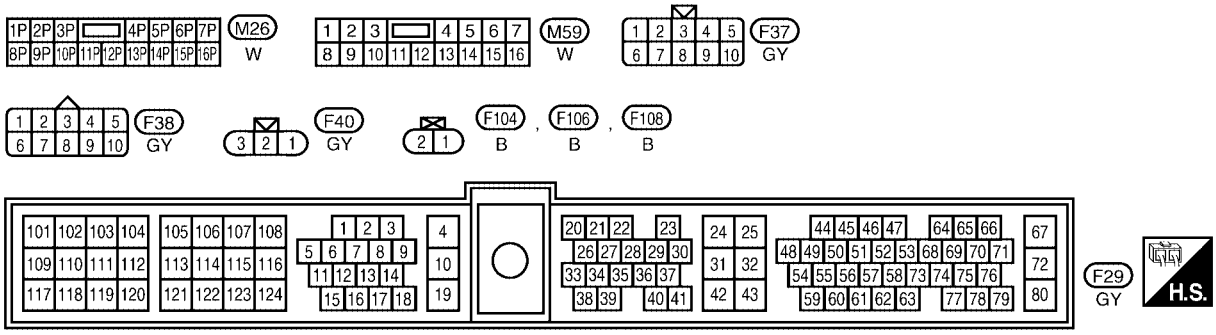


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BANK 2

EC-FUELB2-01





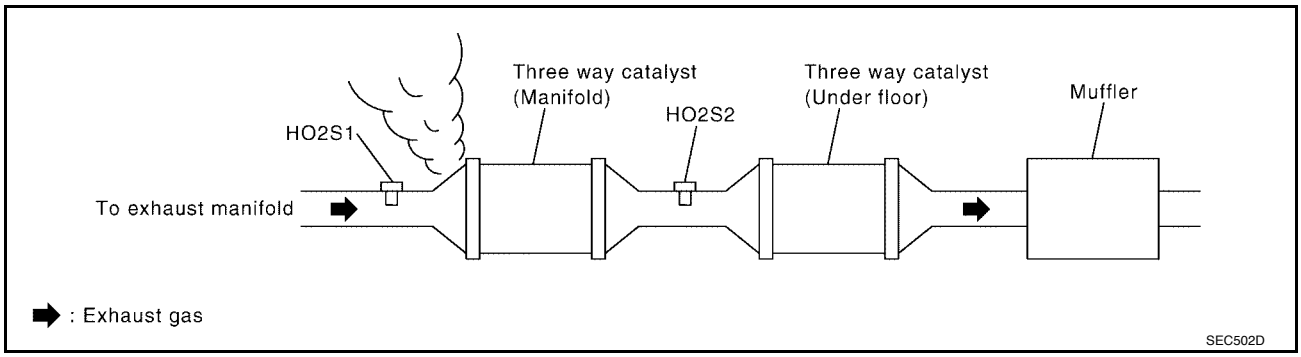
BBWA1103E

Diagnostic Procedure

UBS00DW6

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the 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 heated oxygen sensor 1 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	50	2	Bank 1
P0175	51	2	Bank 2

Continuity should exist.

5. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P0172	50	2	Bank 1
P0175	51	2	Bank 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-1227, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-1227, "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-1735 .)
- Fuel pressure regulator (Refer to EC-1228 .)

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all parts removed.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

3.3 - 4.8 g·m/sec : at idling
12.0 - 14.9 g·m/sec : at 2,500 rpm

With GST

1. Install all parts removed.
2. Check mass air flow sensor signal in MODE 1 with GST.

3.3 - 4.8 g·m/sec : at idling
12.0 - 14.9 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 ground. Refer to EC-1335 .

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 AIF SE-B1	XXX V
IACV-AAC/V	XXX step

SEF070Y

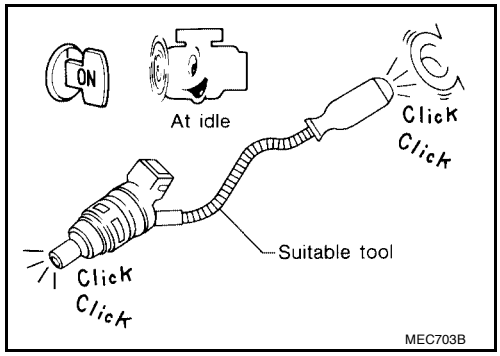
Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.

OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for EC-1725, "INJECTOR CIRCUIT" .



MEC703B

8. CHECK INJECTOR

1. Remove injector assembly. Refer to EM-80, "OUTER COMPONENT PARTS" .
   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 all injector harness connectors
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 EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

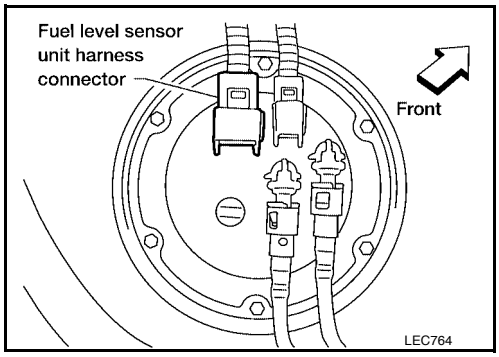
DTC P0181 FTT SENSOR

PFP:22630

Component Description

UBS00DW7

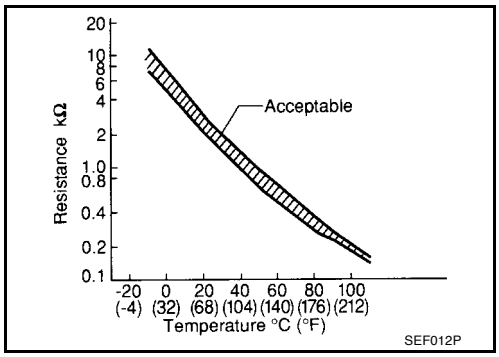
The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Fluid 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 60 (Fuel tank temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

On Board Diagnosis Logic

UBS00DW8

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0181	Fuel tank temperature sensor circuit range/ performance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	● Harness or connectors (The sensor circuit is open or shorted) ● Fuel tank temperature sensor

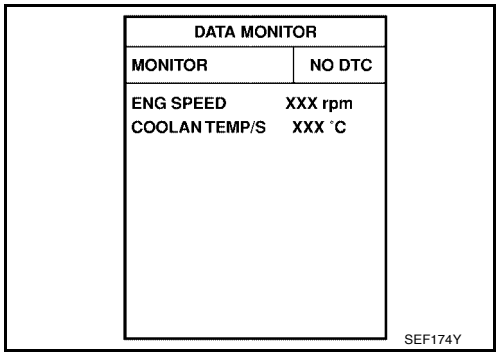
DTC Confirmation Procedure

UBS00DW9

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 the result is NG, go to EC-1455, "Diagnostic Procedure" .
   If the result is OK, 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 EC-1455, "Diagnostic Procedure" .



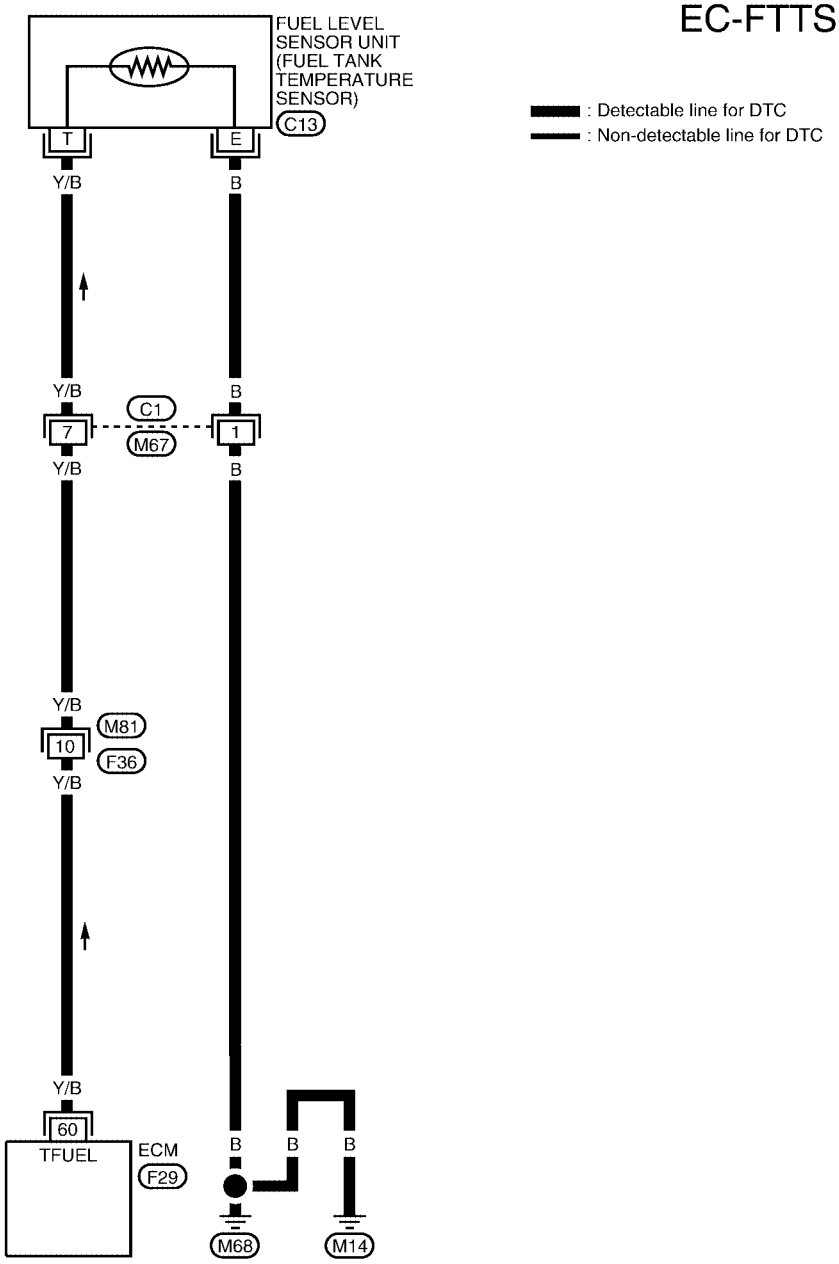
WITH GST

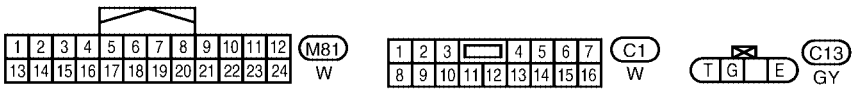
Follow the procedure “WITH CONSULT-II” above.

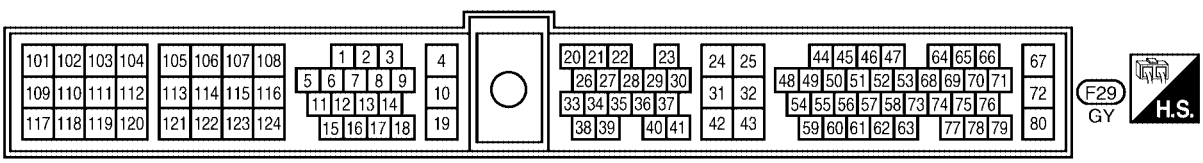
Wiring Diagram

UBS00DWA

EC-FTTS-01







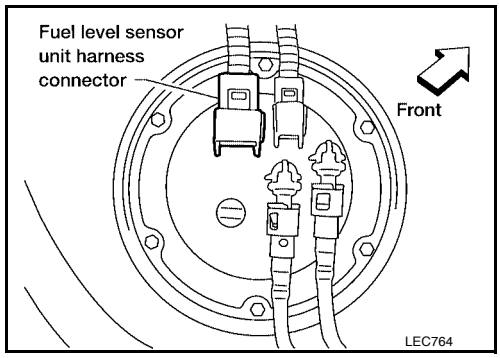
BBWA1084E

Diagnostic Procedure

UBS00DWB

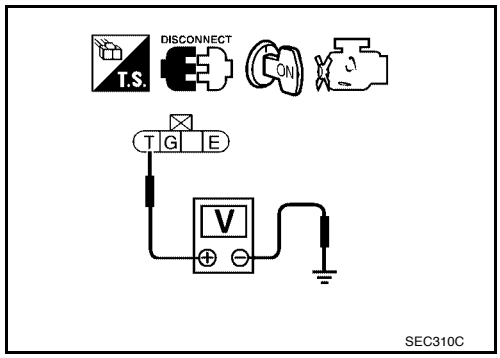
1. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit harness connector.
3. Turn ignition switch ON.



4. Check voltage between fuel level sensor unit terminal T 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 C1, M67
- Harness connectors M81, F36
- Harness for open or short between ECM and fuel tank temperature sensor

>> 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 terminal E and 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

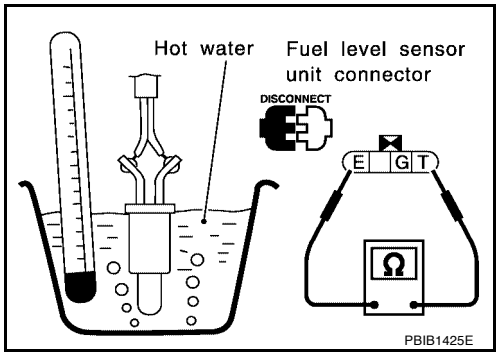
Check the following.

- Harness connectors C1, M67.
- Harness for open between fuel tank temperature sensor and ground.

>> Repair open circuit or short to power in harness or connectors.

5. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance fuel level sensor unit terminals T and E 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

OK or NG

OK >> GO TO 6.
NG >> Replace fuel tank temperature sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DWC

FUEL TANK TEMPERATURE SENSOR

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

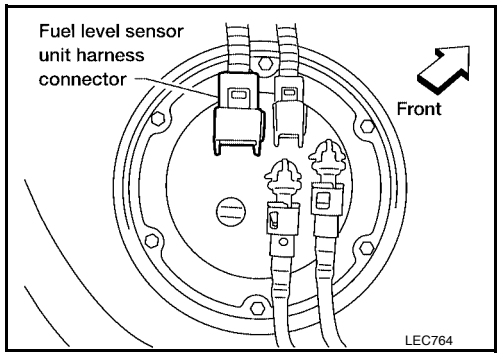
DTC P0182, P0183 FTT SENSOR

PFP:22630

Component Description

UBS00DWD

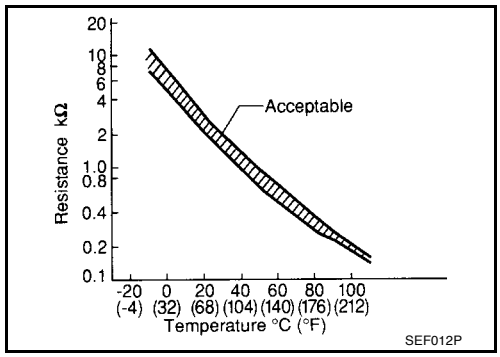
The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Fluid 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 60 (Fuel tank temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

On Board Diagnosis Logic

UBS00DWE

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Fuel tank temperature sensor
P0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

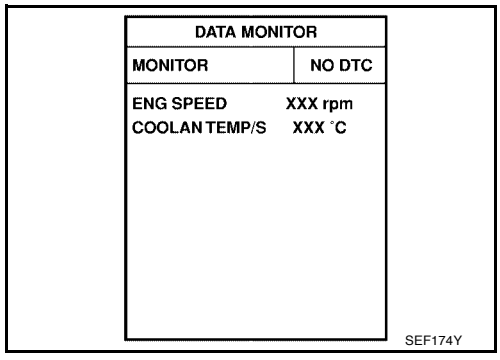
DTC Confirmation Procedure

UBS00DWF

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-1459, "Diagnostic Procedure" .



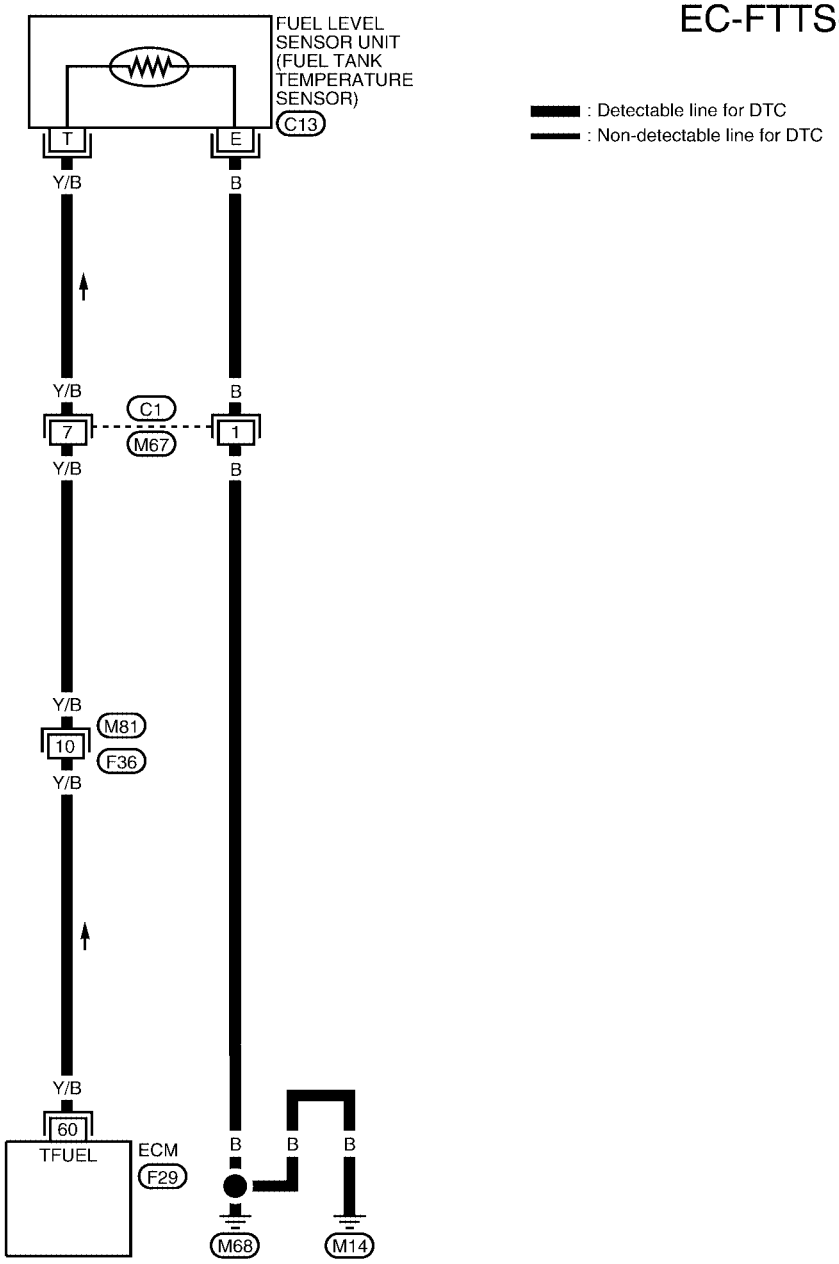
WITH GST

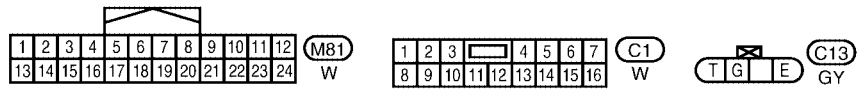
Follow the procedure “WITH CONSULT-II” above.

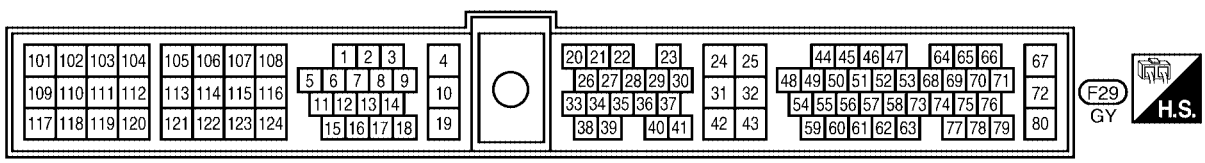
Wiring Diagram

UBS00DWG

EC-FTTS-01







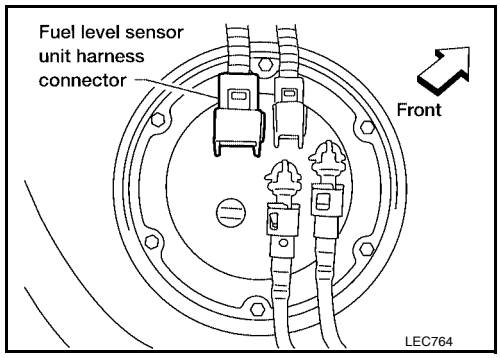
BBWA1084E

Diagnostic Procedure

UBS00DWH

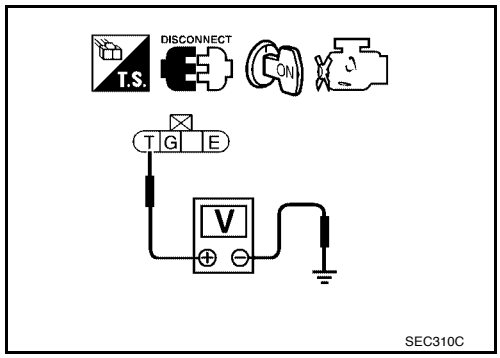
1. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit harness connector.
3. Turn ignition switch ON.



4. Check voltage between fuel level sensor unit terminal T 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 C1, M67
- Harness connectors M81, F36
- Harness for open or short between ECM and fuel tank temperature sensor

>> 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 terminal E and 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

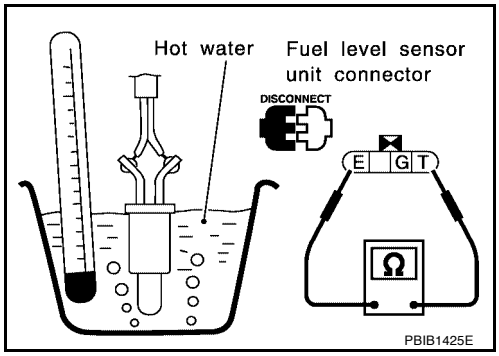
Check the following.

- Harness connectors C1, M67.
- Harness for open between fuel tank temperature sensor and ground.

>> Repair open circuit or short to power in harness or connectors.

5. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance fuel level sensor unit terminals T and E 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

OK or NG

OK >> GO TO 6.
NG >> Replace fuel tank temperature sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DWI

FUEL TANK TEMPERATURE SENSOR

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

PFP:00019

On Board Diagnosis Logic

UBS00DWJ

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy.

This self-diagnosis has one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0217	Engine coolant over temperature condition	Engine coolant temperature is excessively high under normal engine speed.	● Cooling fan (crankshaft driven) ● Thermostat ● Improper ignition timing ● Engine coolant temperature sensor ● Blocked radiator ● Blocked front end (Improper fitting of nose mask) ● Crushed vehicle frontal area (Vehicle frontal is collided but not repaired) ● Blocked air passage by improper installation of front fog lamp or fog lamps ● Improper mixture ratio of coolant ● Damaged bumper For more information, refer to EC-1465, "Main 12 Causes of Overheating" .

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to MA-26, "Changing Engine Coolant" . Also, replace the engine oil. Refer to MA-30, "Changing Engine Oil" .

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "ANTI-FREEZE COOLANT MIXTURE RATIO" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

UBS00DWK

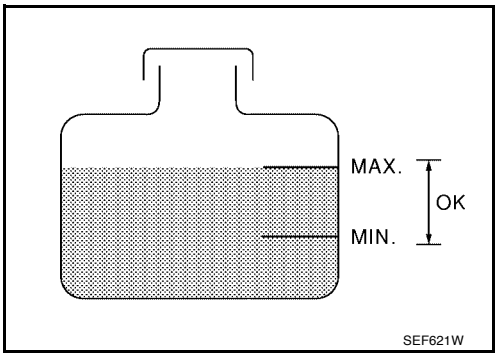
Use this procedure to check the overall function of the engine coolant over temperature enrichment protection check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high-pressure fluid escaping from the radiator.
Wrap a thick cloth around the 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.

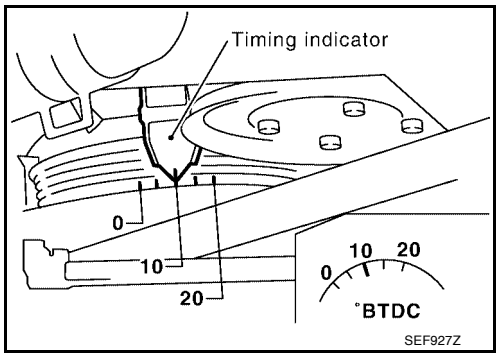
WITH CONSULT-II

1. Check the coolant level and mixture ratio (Using coolant tester) in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level and mixture ratio.
   - If the coolant level in the reservoir and/or the radiator is below the proper range, skip following steps and go to EC-1463, "Diagnostic Procedure" .
   - If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to MA-26, "Changing Engine Coolant" .
   - Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "ANTI-FREEZE COOLANT MIXTURE RATIO" .
   - After refilling coolant, run engine to ensure that no water-flow noise is emitted.



– After checking or replacing coolant, go to step 3) below.

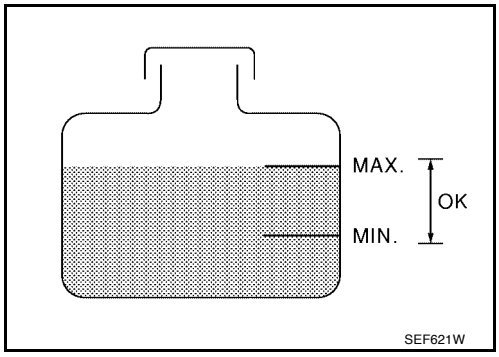
2. Confirm whether customer filled the engine coolant or not. If customer filled the engine coolant, skip following steps and go to EC-1463, "Diagnostic Procedure" .
3. Start engine and make sure that cooling fan (crankshaft driven) operates. If NG, go to After repair, go to next step.
4. Check for blocked coolant passage.
   Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.
   If NG, go to step 4 of EC-1463, "Diagnostic Procedure" . After repair, go to next step.
   Be extremely careful not to touch any moving or adjacent parts.
5. Check radiator for blocked air passage
   Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps ...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.
   Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.
   If NG, take appropriate action and then go to next step.
6. Check ECT sensor for proper operation. Refer to step 5 of EC-1463, "Diagnostic Procedure" . If NG, replace ECT sensor and go to next step.
7. Check ignition timing. Refer to EC-1255, "Basic Inspection" .
   Make sure that ignition timing is 10 ± 5° at 700 ± 50 rpm.
   If NG, adjust ignition timing and then recheck.



WITHOUT CONSULT-II

1. Check the coolant level and mixture ratio (Using coolant tester) in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level and mixture ratio.
   - If the coolant level in the reservoir and/or radiator is below the proper range, skip the following steps and go to EC-1463, "Diagnostic Procedure" .
   - If the coolant mixture ratio is out of range between 45 to 55%, replace the coolant. Refer to MA-26, "Changing Engine Coolant" .

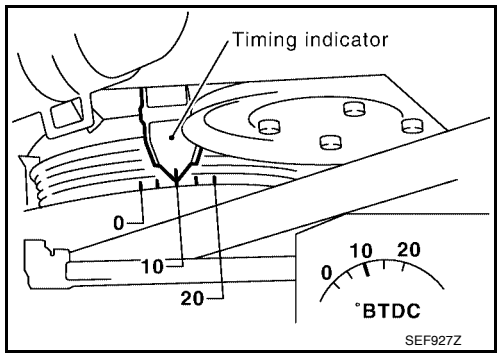
   – Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "ANTI-FREEZE COOLANT MIXTURE RATIO" .



   – After refilling coolant, run engine to ensure that no water-flow noise is emitted.
   – After checking or replacing coolant, go to step 3) below.
2. Confirm whether customer filled the engine coolant or not. If customer filled engine coolant, skip following steps and go to EC-1463, "Diagnostic Procedure" .
3. Start engine and make sure that cooling fan (crankshaft driven) operates.
   Be careful not to overheat engine.
   If NG, go to step 1 of EC-1463, "Diagnostic Procedure" . After repair, go to next step.
4. Check for blocked coolant passage.
   Warm up engine to normal operating temperature, then grasp upper and lower radiator hoses and make sure that coolant flows.
   If NG, go to step 4 of EC-1463, "Diagnostic Procedure" . After repair, go to next step.

Be extremely careful not to touch any moving or adjacent parts.

5. Check radiator for blocked air passage
   Check for blocked condenser or radiator (condenser or radiator fins damaged, condenser or radiator clogged), after market fog lamps ...etc. Check for condenser or radiator fin damage, shroud damage, vehicle front end for clogging of debris or insects ...etc.
   Check for improper fitting of front end cover, damaged radiator grille or bumper, vehicle frontal area damaged by collision but not repaired.
   If NG, take appropriate action and then go to next step.
6. Check ECT sensor for proper operation. Refer to step 5 of step. If NG, replace ECT sensor and go to next step.
7. Check ignition timing. Refer to EC-1255, "Basic Inspection" .
   Make sure that ignition timing is 10 ± 5° at 700 ± 50 rpm.
   If NG, adjust ignition timing and then recheck.



Diagnostic Procedure

UBS00DWL

1. CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION

Start engine and make sure that cooling fan (crankshaft driven) operates.

OK or NG

OK >> GO TO 2.
NG >> Check cooling fan (crankshaft driven). Refer to CO-32, "COOLING FAN (CRANKSHAFT DRIVEN)" .

2. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

CAUTION:
Higher than the specified pressure may cause radiator damage.

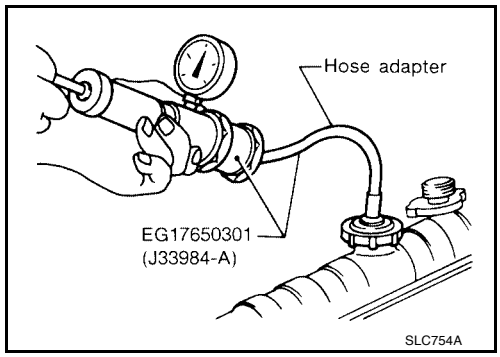
Testing pressure: 157 kPa (1.6 kg/cm^2 , 23 psi)

Pressure should not drop.

OK or NG

OK >> GO TO 3.
NG >> Check the following for leak:

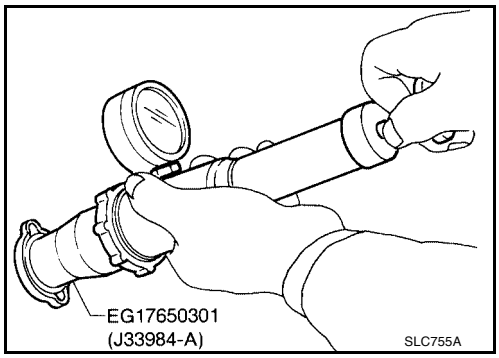
- Hose
- Radiator
- Water pump
  Refer CO-25, "WATER PUMP" .



3. 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 4.
NG >> Replace radiator cap.

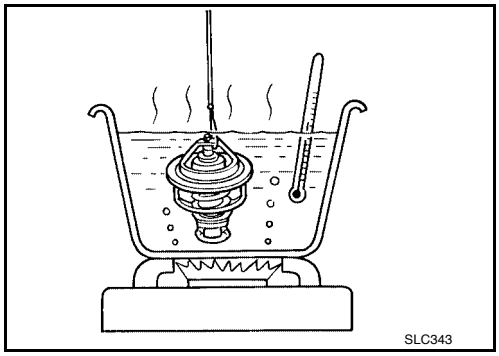
4. CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
It should seat tightly.
2. Check valve opening temperature and valve lift.

Valve opening temperature : 76.5°C (170°F) [standard]
Valve lift : More than 10 mm/90°C (0.31 in/194°F)

3. Check if valve is closed at 5°C (41°F) below valve opening temperature.

For details, refer to CO-28, "THERMOSTAT" .



OK or NG

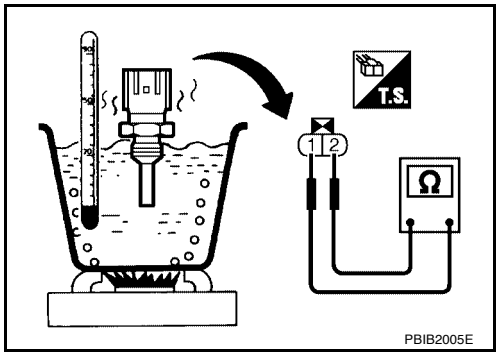
OK >> GO TO 5.
NG >> Replace thermostat.

5. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.

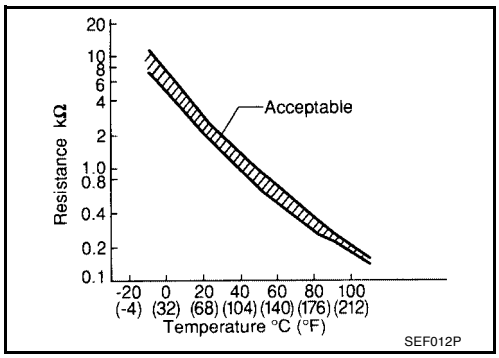
<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



OK or NG

OK >> GO TO 6.
NG >> Replace engine coolant temperature sensor.



6. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to EC-1465, "Main 12 Causes of Overheating" .

>> **INSPECTION END**.

Main 12 Causes of Overheating

UBS00DWM

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-14 .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-26 .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See CO-23 .
ON*1	5	● Coolant leaks	● Visual	No leaks	See CO-23 .
ON*1	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-28 .
ON*1	7	● Cooling fan (Crankshaft driven)	● Visual	Operating	See CO-32 .
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—
ON*2	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 MA-26 .
OFF*3	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See MA-14 .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-102 .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-131 .

*1: Engine running at 3,000 rpm for 10 minutes.
*2: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*3: After 60 minutes of cool down time.
For more information, refer to CO-21, "OVERHEATING CAUSE ANALYSIS" .

DTC P0299 SUPERCHARGER FUNCTION

PFP:14110

On Board Diagnosis Logic

UBS00DWN

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0299	Supercharger function	ECM detects that amount of fuel injected is smaller than the specified value when supercharger is operating.	● Supercharger ● Supercharger driving belt ● Stuck open of supercharger bypass valve ● Clogging, cracks or improper connection of vacuum hose

DTC Confirmation Procedure

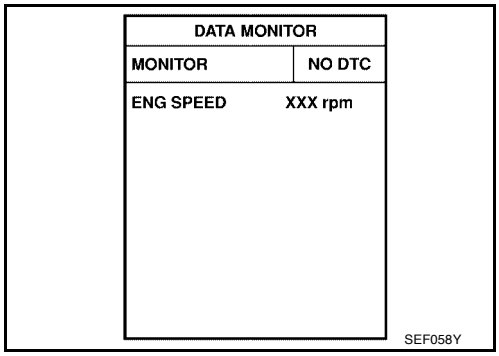
UBS00DWO

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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.
3. Maintain the following conditions for at least 5 seconds.

ENG SPEED	Model with A/T: 3,200 - 4,400 rpm (A constant rotation is maintained.) Model with M/T: 3,600 - 4,400 rpm (A constant rotation is maintained.)
VHCL SPEED SE	More than 64 km/h (40 MPH)
THRTL POS SEN	Model with A/T: More than 2.53V Model with M/T: More than 2.30V



4. If 1st trip DTC is detected, go to EC-1467, "Diagnostic Procedure" .

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00DWP

1. CHECK SUPERCHARGER BYPASS VALVE CONTROL SOLENOID VALVE

With CONSULT-II

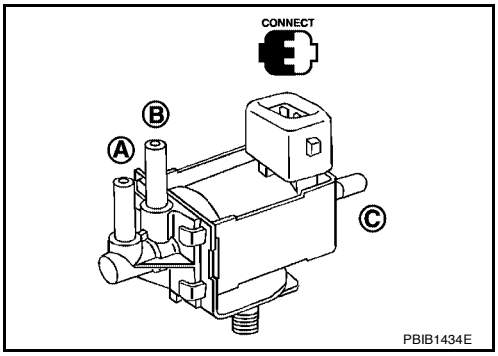
1. Stop the engine and turn ignition switch ON.
2. Perform “SCB/V CONT SOL/V” in “ACTIVE TEST” mode.

ACTIVE TEST	
SCB/V CONT SOL/V	ON
MONITOR	
ENG SPEED	XXXrpm
IACV-AAC/V	XXX%

PBIB1439E

3. Check air passage continuity and operation delay time under the following conditions.

Conditions	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

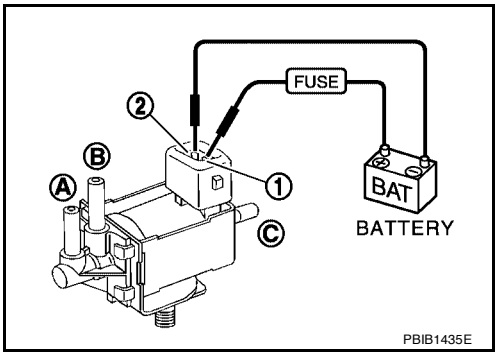


PBIB1434E

With GST

Check air passage continuity and operation delay time under the following conditions

Conditions	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



PBIB1435E

OK or NG

OK >> GO TO 2.
NG >> Replace the supercharger bypass valve control solenoid valve.

2. CHECK SUPERCHARGER BYPASS VALVE ACTUATOR FOR PROPER OPERATION

1. Stop the engine
2. Start the engine and keep it at idle speed.
3. Stop the engine again.
4. Check the supercharger bypass valve actuator operation when the engine starts and stops.

Does supercharge bypass valve actuator operate properly?

Yes or No

Yes >> GO TO 3.
No >> Replace supercharger bypass valve actuator.

3. CHECK SUPERCHARGER DRIVING BELT

1. Visually check the supercharger driving belt for damage or worn.
2. Start engine and keep it at idle speed.
3. Check the supercharger driving belt for skipping.

Is driving belt skipping, damaged or worn?

Yes or No

Yes >> Replace the supercharger drive belt.
No >> GO TO 4.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DWQ

SUPERCHARGER

Refer to EM-80, "OUTER COMPONENT PARTS" .

DTC P0300 - P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

PFP:00000

On Board Diagnosis Logic

UBS00DWR

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the CKP sensor signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (OBD)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	● Improper spark plug ● Insufficient compression ● Incorrect fuel pressure ● The injector circuit is open or shorted ● Fuel injector ● Intake air leak ● The ignition secondary signal circuit is open or shorted ● Lack of fuel ● Signal plate or flywheel ● Heated oxygen sensor 1 ● Incorrect PCV hose connection
P0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	
P0305	No. 5 cylinder misfire detected	No. 5 cylinder misfires.	
P0306	No. 6 cylinder misfire detected	No. 6 cylinder misfires.	

DTC Confirmation Procedure

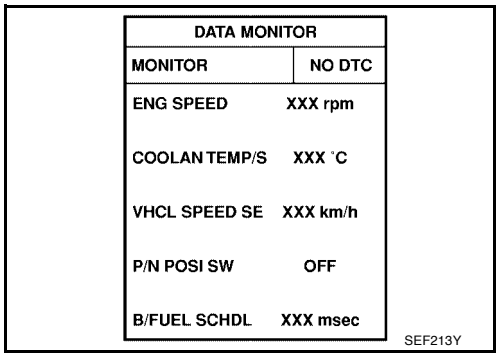
UBS00DWS

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 5 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 5 seconds.
4. Restart engine and let it idle for about 15 minutes.
5. If 1st trip DTC is detected, go to EC-1470, "Diagnostic Procedure" .



NOTE:
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
   Hold the accelerator pedal as steady as possible.

   The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00DWT

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 AIF SE-B1	XXX V
IACV-AAC/V	XXX step

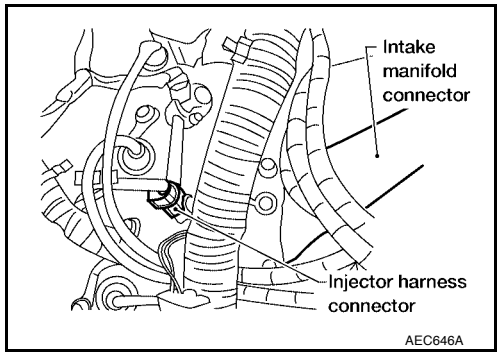
SEF070Y

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.

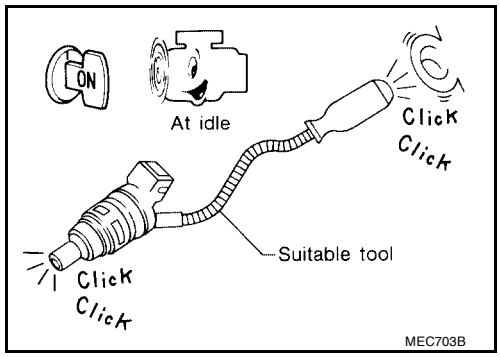


4. CHECK INJECTOR

Does each injector make an operating sound at idle?

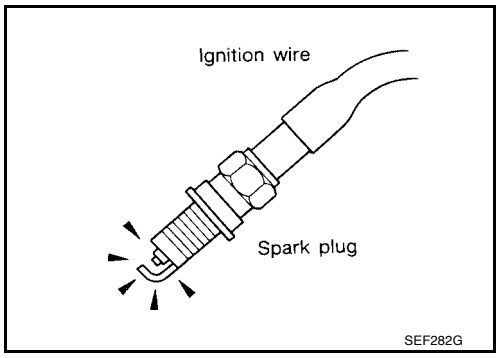
Yes or No

Yes >> GO TO 5.
No >> Check injector(s) and circuit(s). Refer to EC-1725, "INJECTOR CIRCUIT" .



5. CHECK IGNITION SPARK

1. Stop engine and turn ignition switch OFF.
2. Disconnect all injector harness connectors.
3. Disconnect ignition wire from spark plug.
4. Connect a known-good spark plug to the ignition wire.
5. Place end of spark plug against a suitable ground and crank engine.
6. Check for spark.

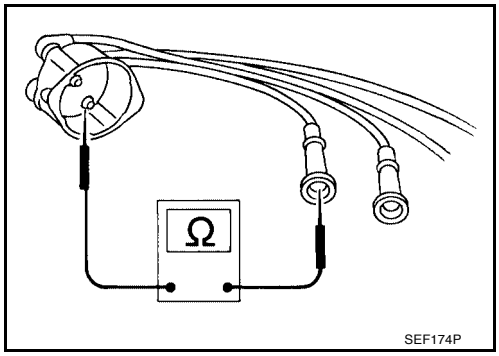


OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. CHECK IGNITION WIRES

1. Inspect wires for cracks, damage, burned terminals and for improper fit.
2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.
   Resistance:



Cylinder No.	Resistance kΩ [at 25°C (77°F)]
1	Approx. 6.5
2	Approx. 10.0
3	Approx. 8.5
4	Approx. 12.5
5	Approx. 8.5
6	Approx. 11.0

If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.

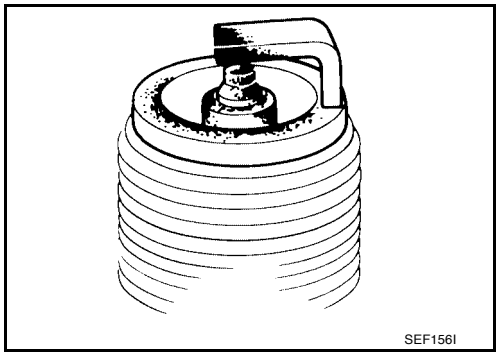
OK or NG

OK >> Check the following:
- Distributor rotor head for incorrect parts
- Ignition coil, power transistor and their circuits
  Refer to EC-1719, "IGNITION SIGNAL" .

NG >> Replace.

7. CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.



OK or NG

OK >> GO TO 8.
NG >> Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-32, "Changing Spark Plugs" .

8. CHECK COMPRESSION PRESSURE

Refer to EM-102, "Measurement of Compression" .

- Check compression pressure.

Standard	**: 1,196 kPa (12.2 kg/cm^2 , 173 psi)/300 rpm**
Minimum	**: 883 kPa (9.0 kg/cm^2 , 128 psi)/300 rpm**
Difference between each cylinder	**: 98 kPa (1.0 kg/cm^2 , 14 psi)/300 rpm**

OK or NG

OK >> GO TO 9.
NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

9. CHECK FUEL PRESSURE

1. Install any parts removed.
2. Release fuel pressure to zero.
   Refer to EC-1227, "FUEL PRESSURE RELEASE" .
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-1227, "FUEL PRESSURE CHECK" .

At idle: Approx. 235 kPa (2.4 kg/cm^2 , 34 psi)

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-1735 .)
- Fuel pressure regulator (Refer to EC-1228 .)
- Fuel lines (Refer to MA-28 .)
- Fuel filter for clogging

>> Repair or replace.

11. CHECK IGNITION TIMING

Check the following items. Refer to EC-1255, "Basic Inspection" .

Items	Specifications
Ignition timing	M/T:10 ± 5° BTDC (in Neutral position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

OK or NG

OK (With CONSULT-II)>>GO TO 12.
OK (Without CONSULT-II)>>GO TO 13.
NG >> Adjust ignition timing.

12. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and “HI SPEED” in “DATA MONITOR” mode with CONSULT-II, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. 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 (B2)	XXX V
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

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5. Check the following.

- “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown left:
- “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.

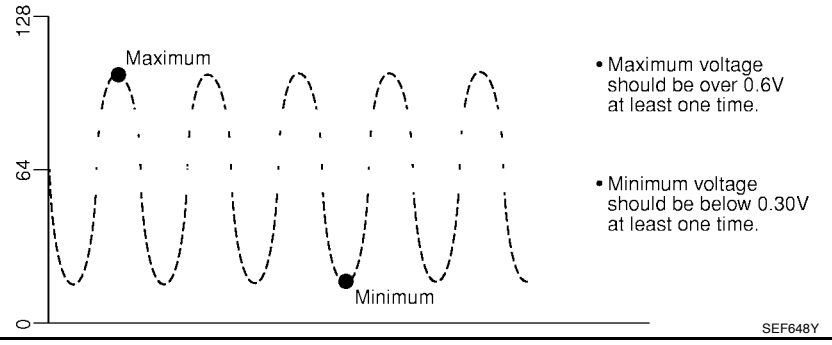
Bank 1						
	cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R					
Bank 2						
	cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R					

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 oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

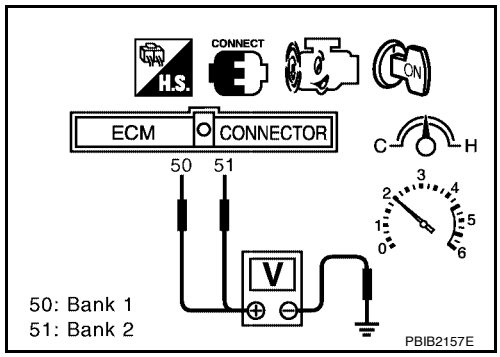
OK >> GO TO 14.
NG >> Replace malfunctioning heated oxygen sensor 1.

13. CHECK HEATED OXYGEN SENSOR 1 (BANK1)(BANK2)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and 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 1 time.
- The minimum voltage is below 0.3V at least 1 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 → 0 - 0.3V

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 14.
NG >> Replace malfunctioning heated oxygen sensor 1.

14. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

Check mass air flow sensor signal in “DATA MONITOR” mode with CONSULT-II.

3.3 - 4.8 g·m/sec : at idling
12.0 - 14.9 g·m/sec : at 2,500 rpm

With GST

Check mass air flow sensor signal in MODE 1 with GST.

3.3 - 4.8 g·m/sec : at idling
12.0 - 14.9 g·m/sec : at 2,500 rpm

OK or NG

OK >> GO TO 15.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-1335 .

15. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-1268, "Symptom Matrix Chart" .

OK or NG

OK >> GO TO 16.
NG >> Repair or replace.

16. 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-1241, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 17.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

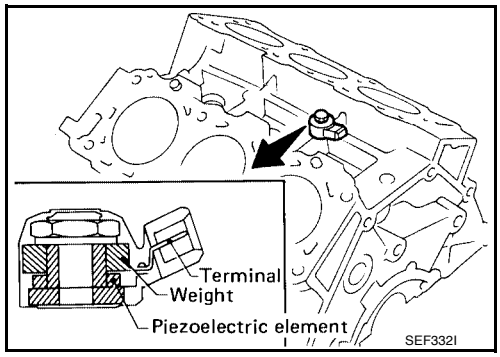
DTC P0327, P0328 KS

PFP:22060

Component Description

UBS00DWU

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.



On Board Diagnosis Logic

UBS00DWV

The MIL will not light up for these diagnoses.

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause
P0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Knock sensor
P0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

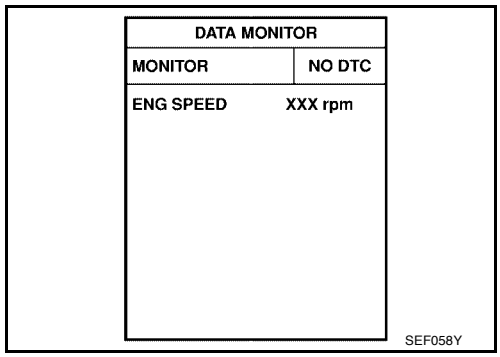
UBS00DWW

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-1479, "Diagnostic Procedure" .



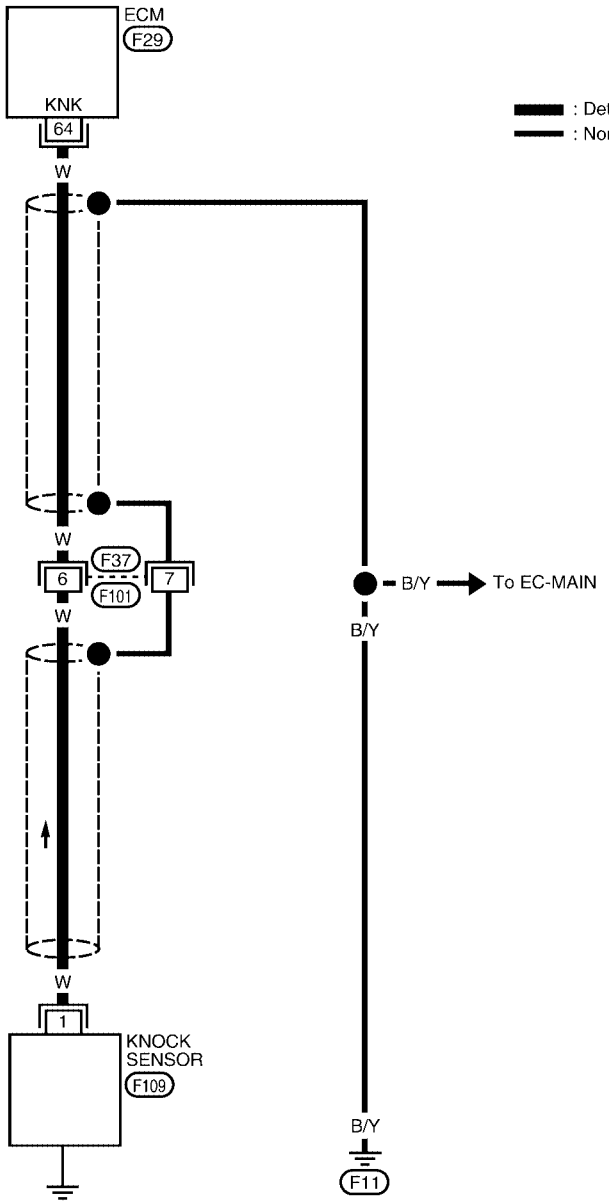
WITH GST

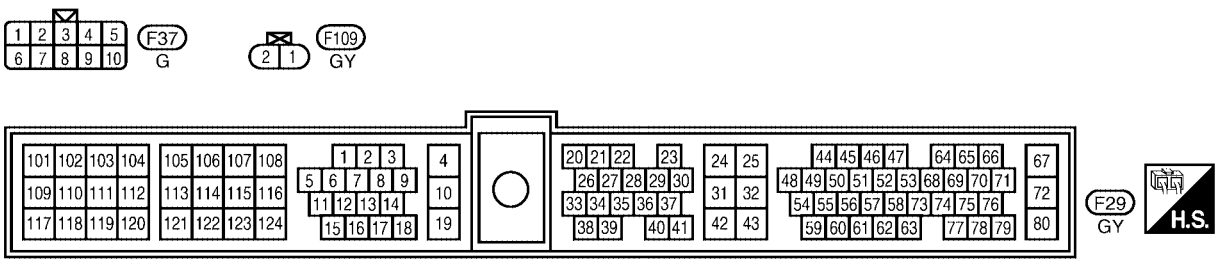
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DWX

EC-KS-01





BBWA0512E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
64	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V

Diagnostic Procedure

UBS00DWY

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 terminal 64 and ground.

   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

   Resistance: Approximately 500-620 kΩ [at 25°C (77°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 64 and knock sensor terminal 1. Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F37, F101
- Harness for open or short between ECM and knock sensor

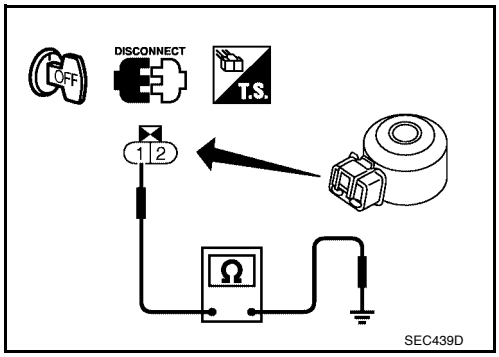
>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK KNOCK SENSOR

NOTE:
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

1. Disconnect knock sensor harness connector.
2. Check resistance between terminal 1 and ground.

Resistance: 500 - 620 kΩ [at 25°C (77°F)]



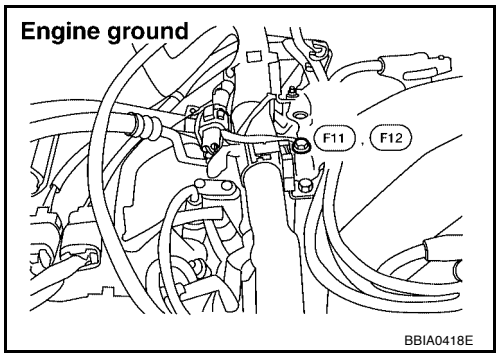
CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

OK or NG

OK >> GO TO 5.
NG >> Replace knock sensor.

5. CHECK GROUND CONNECTIONS

Loosen and retighten ground screws on the engine.
Refer to EC-1311, "Ground Inspection" .



OK or NG

OK >> GO TO 6.
NG >> Repair or replace ground connections.

6. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors F37, F101.
2. Check harness continuity between harness connector F37 terminal 7 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F37
- Harness for open or short between harness connector F37 and ground

>> Repair open circuit or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

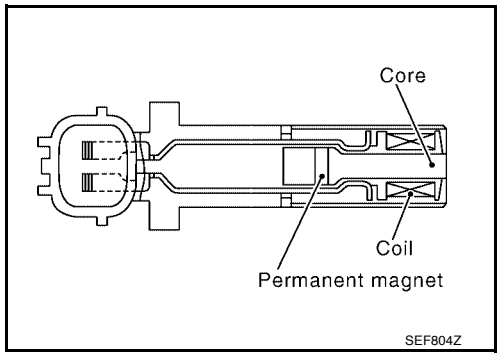
DTC P0335 CKP SENSOR (OBD)

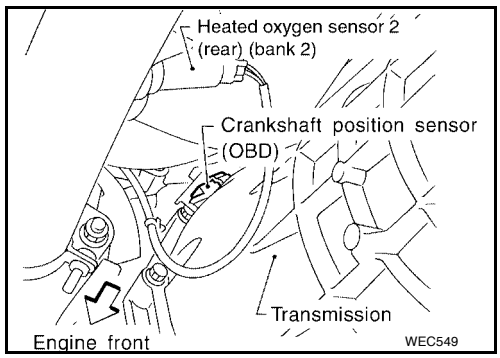
PFP:23731

Component Description

UBS00DWZ

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
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.
This sensor is not used to control the engine system. It is used only for the on board diagnosis.





CONSULT-II Reference Value in Data Monitor Mode

UBS00DX0

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED·	● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

UBS00DX1

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (OBD) circuit	● The proper pulse signal from the crankshaft position sensor (OBD) is not sent to ECM while the engine is running at the specified engine speed.	● Harness or connectors (The sensor circuit is open or shorted) ● Crankshaft position sensor (OBD)

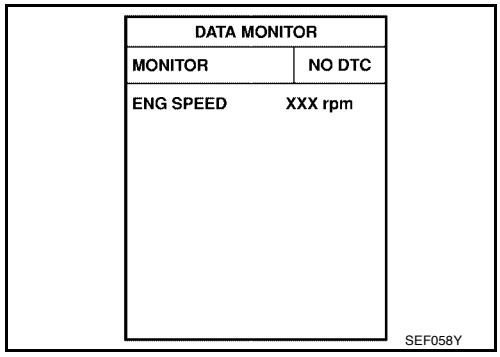
DTC Confirmation Procedure

UBS00DX2

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 run it for at least 15 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-1484, "Diagnostic Procedure" .

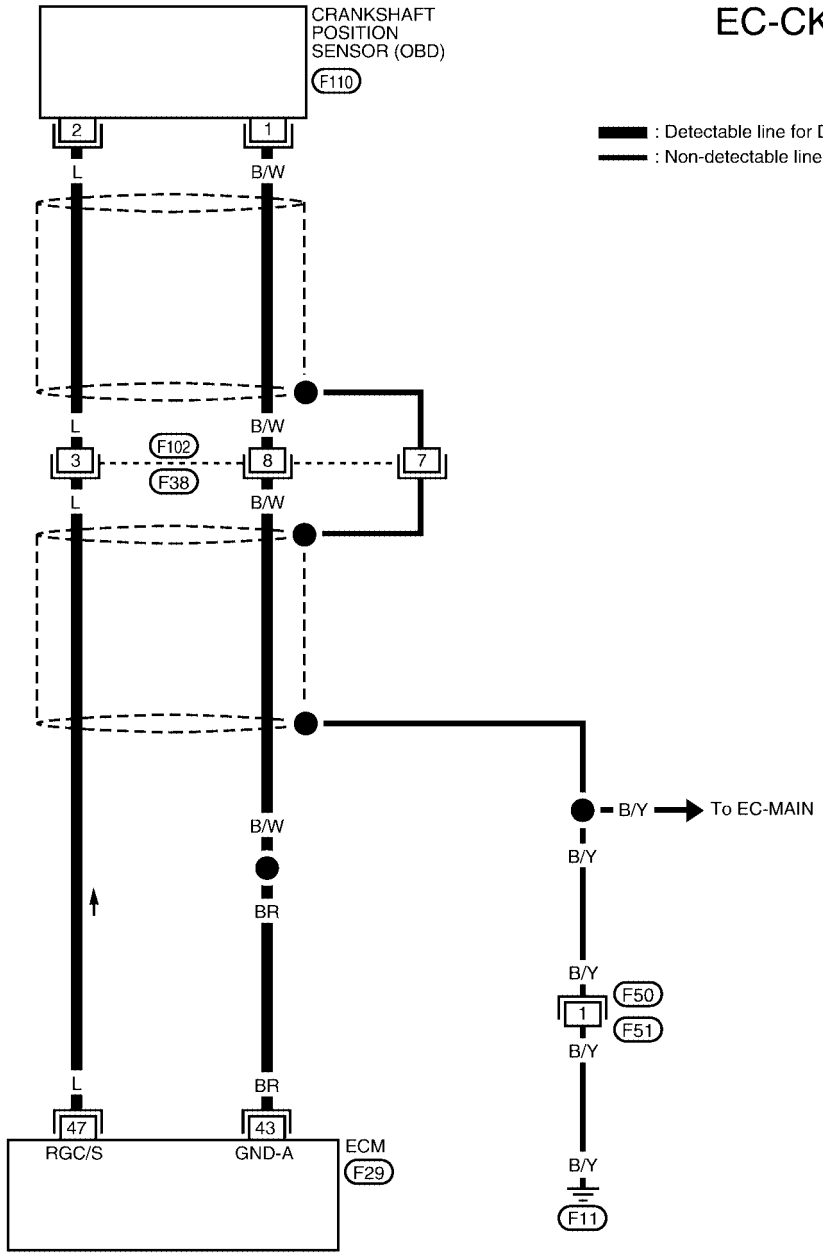


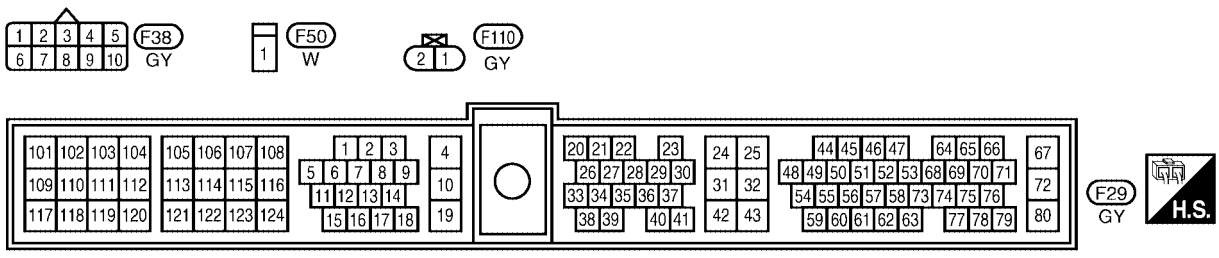
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DX3



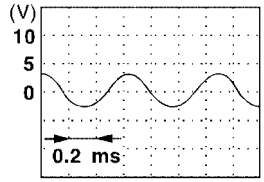
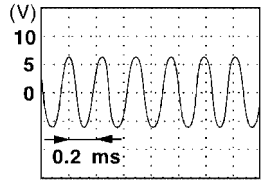


BBWA0513E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
43	BR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1 - 2V★ (AC range)  SEF690W
			[Engine is running] ● Engine speed is 2,000 rpm	3 - 4V★ (AC range)  SEF691W

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

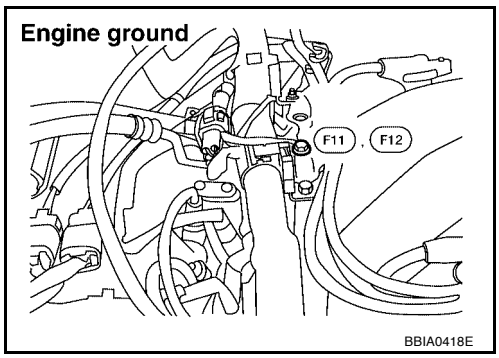
UBS00DX4

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



BBIA0418E

2. CHECK CKP SENSOR (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

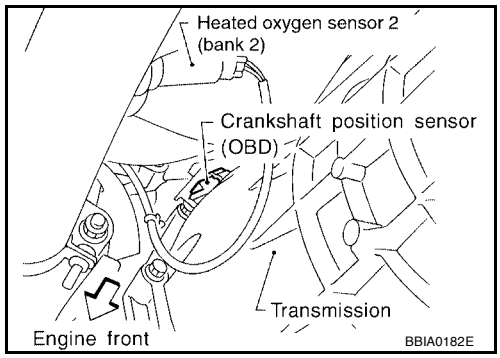
1. Disconnect crankshaft position (CKP) sensor (OBD) and ECM harness connectors.
2. Check continuity between ECM terminal 47 and CKP sensor (OBD) terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F38, F102
- Harness for open or short between ECM and crankshaft position sensor (OBD)

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR (OBD) GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between sensor terminal 1 and ECM terminal 43. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F38, F102
- Harness for open between crankshaft position sensor (OBD) and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CKP SENSOR (OBD) SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors F102, F38.
2. Check harness continuity between harness connector F38 terminal 7 and ground. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

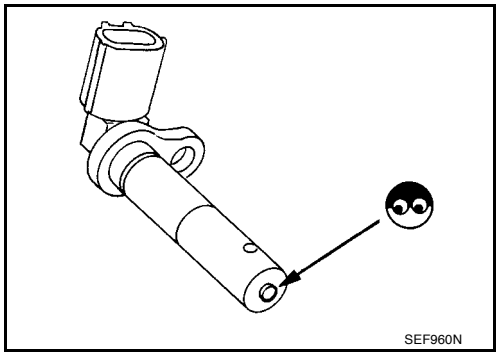
Check the following.

- Harness connector F38
- Harness connectors F50, F51
- Harness for open or short between harness connector F38 and ground

>> Repair open circuit or short to power in harness or connectors.

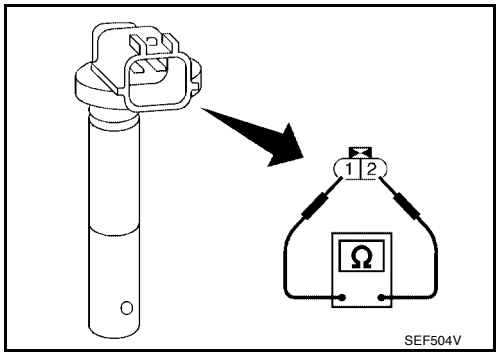
8. CHECK CRANKSHAFT POSITION SENSOR (OBD)

1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]



OK or NG

OK >> GO TO 9.
NG >> Replace crankshaft position sensor (OBD).

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

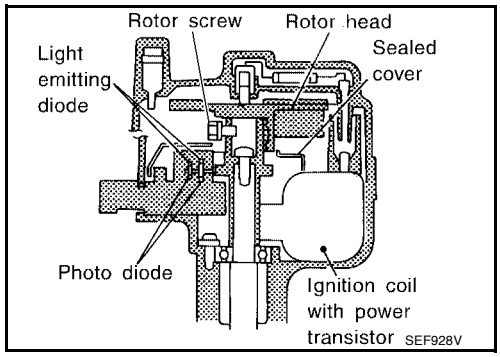
DTC P0340 CMP SENSOR

PFP:22100

Component Description

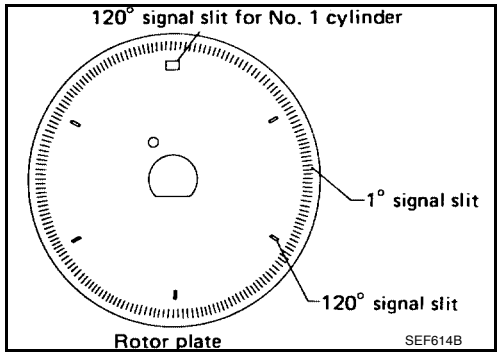
UBS00DX5

The camshaft position sensor is a basic component of the engine control system. It monitors engine speed and piston position. These input signals to the ECM are used to control fuel injection, ignition timing and other functions.
The camshaft position sensor has a rotor plate and a wave-forming circuit. The rotor plate has 360 slits for a 1° (POS) signal and 6 slits for a 120° (REF) signal. The wave-forming circuit consists of Light Emitting Diodes (LED) and photo diodes.
The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into ON-OFF signals by the wave-forming circuit and sent to the ECM.
The distributor is not repairable and must be replaced as an assembly except distributor cap and rotor head.



NOTE:
The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

: 3.6±0.3 N·m (37±3 kg-cm, 32±3 in-lb)



On Board Diagnosis Logic

UBS00DX6

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0340	Camshaft position sensor circuit	A)	● Either 1° or 120° signal is not sent to ECM for the first few seconds during engine cranking.	● Harness or connectors (The CMP sensor circuit is open or shorted) ● Camshaft position sensor ● Starter motor (Refer to SC-9 .) ● Starting system circuit (Refer to SC-9 .) ● Dead (Weak) battery
		B)	● Either 1° or 120° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed.	
		C)	● The relation between 1° and 120° signal is not in the normal range during the specified engine speed.	

DTC Confirmation Procedure

UBS00DX7

NOTE:
- **Perform PROCEDURE FOR MALFUNCTION A first. If DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B AND C.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

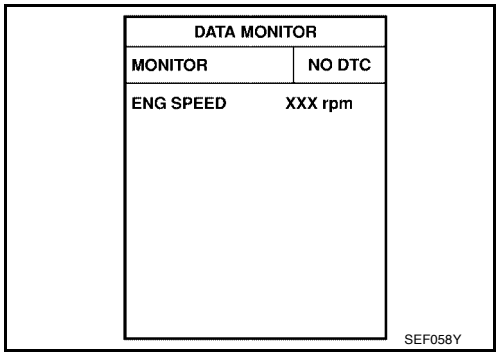
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Crank engine for at least 2 seconds.
4. If 1st trip DTC is detected, go to EC-1491, "Diagnostic Procedure" .



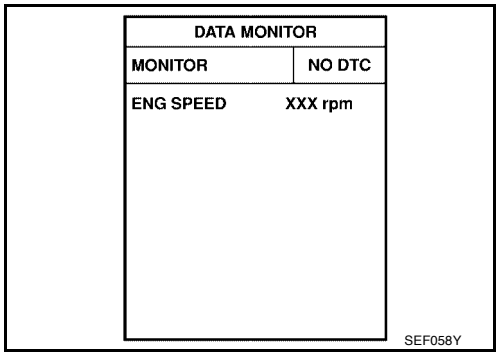
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B AND C

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and run it for at least 2 seconds at idle speed.
4. If 1st trip DTC is detected, go to EC-1491, "Diagnostic Procedure" .



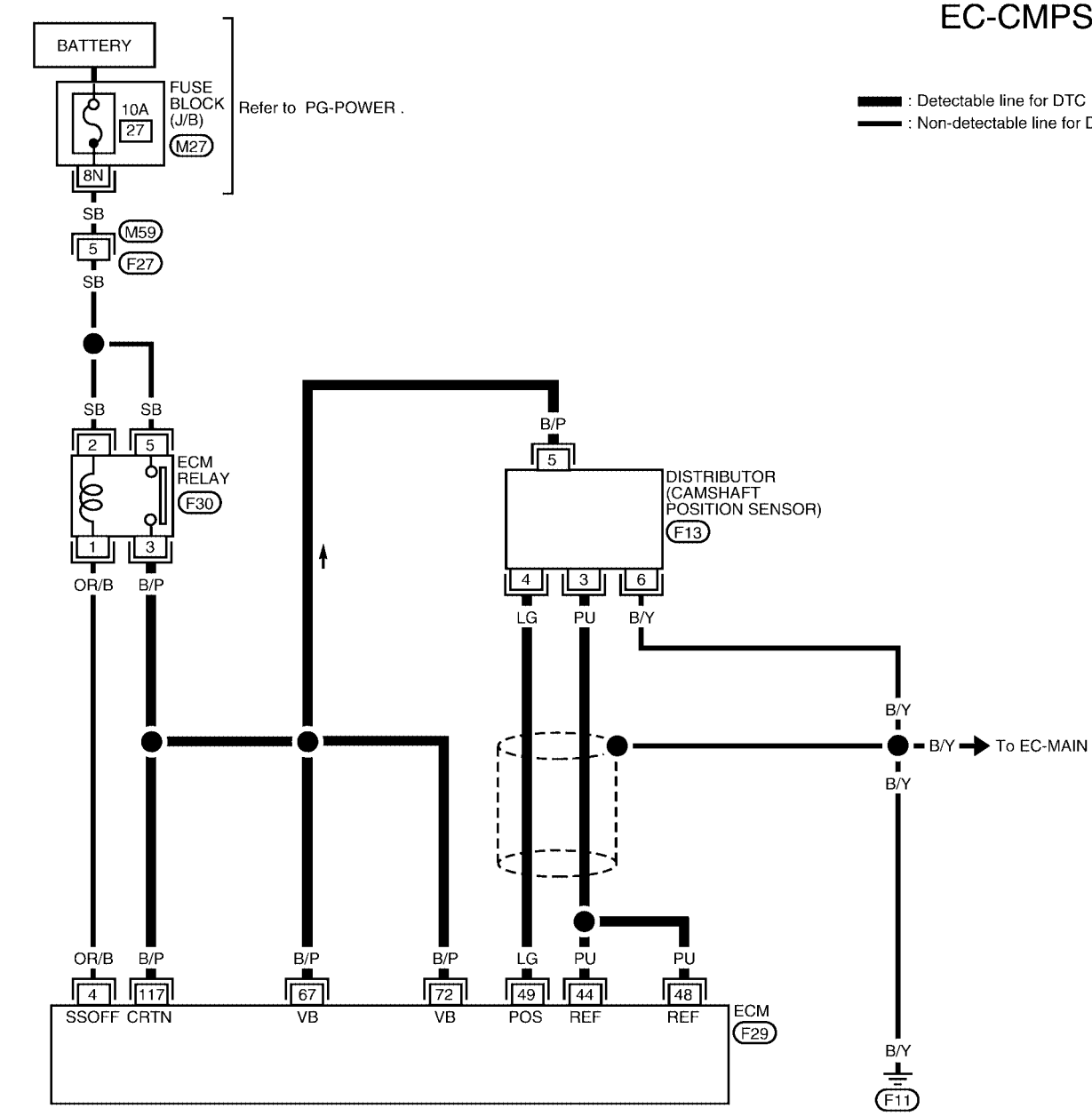
With GST

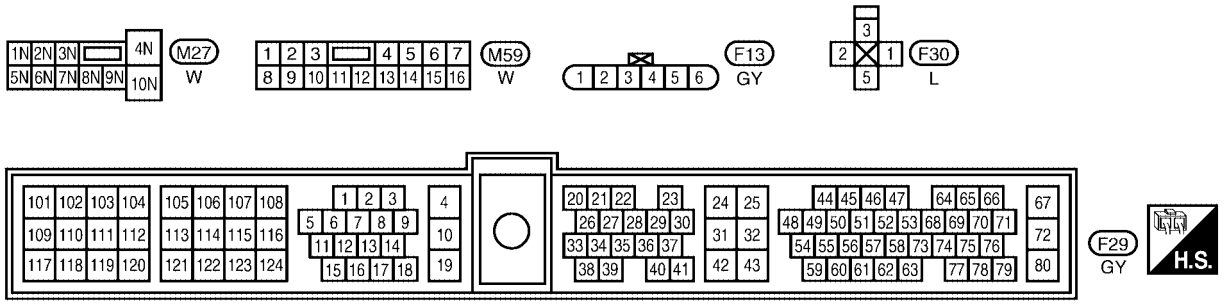
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00DX8

EC-CMPS-01



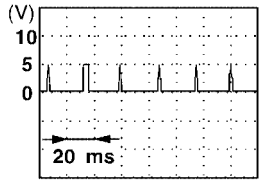
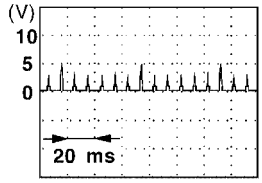
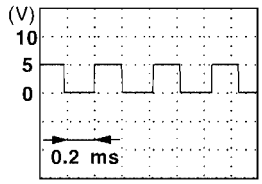
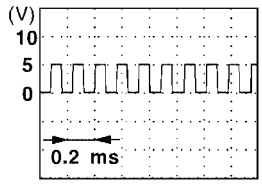


BBWA0482E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
44 48	PU PU	Camshaft position sensor (Reference signal)	**[Engine is running]** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0.3 - 0.5V★  SEF997U
			[Engine is running] ● Engine speed is 2,000 rpm	0.3 - 0.5V★  SEF998U
49	LG	Camshaft position sensor (Position signal)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 2.5V★  SEF999U
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 2.5V★  SEF001V
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P		**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

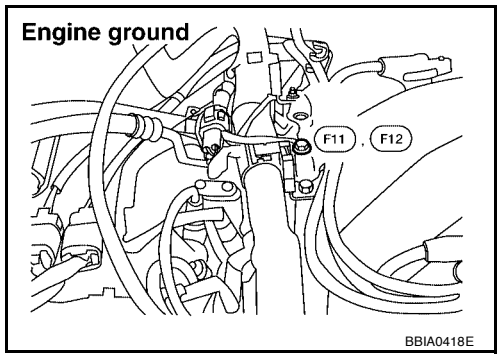
UBS00DX9

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

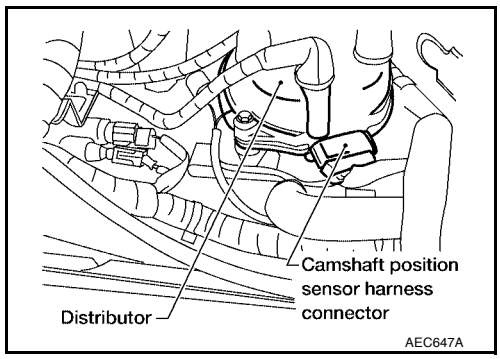
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



2. CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor harness connector.
2. Turn ignition switch ON.

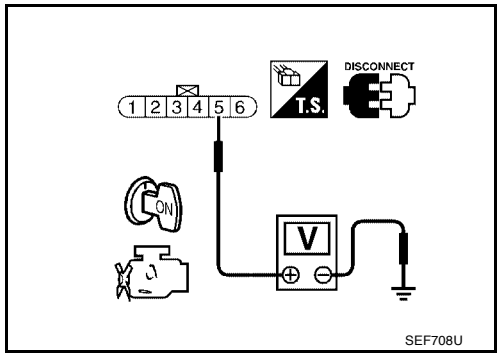


3. Check voltage between CMP sensor terminal 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between camshaft position sensor and ECM relay
- Harness for open or short between camshaft position sensor and ECM

>> Repair harness or connectors.

4. CHECK CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between CMP sensor terminal 4 and ECM terminal 49, CMP sensor terminal 3 and ECM terminals 44, 48. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between CMP sensor terminal 6 and ground.

Continuity should exist.

2. Also check harness for short to power.

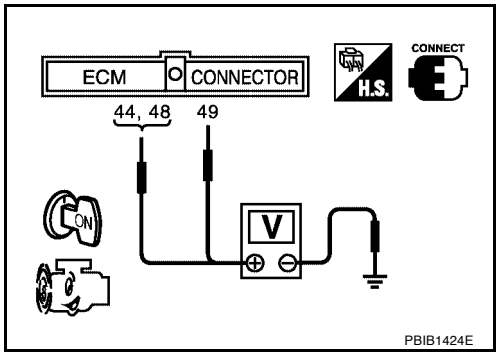
OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connector.

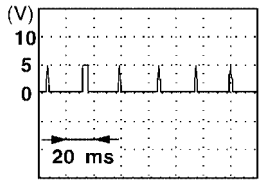
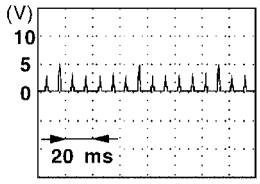
6. CHECK CAMSHAFT POSITION SENSOR

1. Install any parts removed.
2. Start engine.
3. Check voltage between ECM terminals 44, 48 and ground, ECM terminal 49 and ground with DC range.

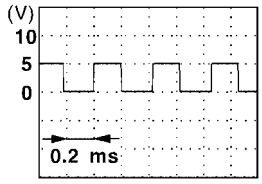
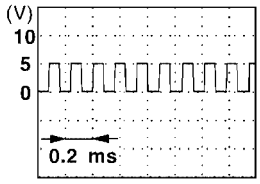
NOTE:
The pulse cycle changes depending on rpm at idle.



<Terminal 44 or 48 and ground>

Condition	Idle	2,000 rpm
Voltage	0.3 - 0.5V	0.3 - 0.5V
Pulse signal	 SEF997U	 SEF998U

<Terminal 49 and ground>

Condition	Idle	2,000 rpm
Voltage	Approximately 2.5V	Approximately 2.5V
Pulse signal	 SEF999U	 SEF001V

OK or NG

OK >> GO TO 7.
NG >> Replace distributor assembly with camshaft position sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DXA

DISTRIBUTOR

Refer to EM-80, "OUTER COMPONENT PARTS" .

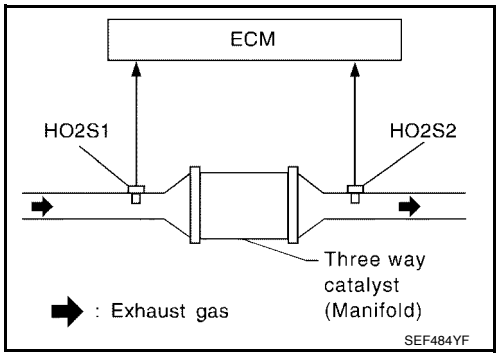
DTC P0420, P0430 THREE WAY CATALYST FUNCTION

PFP:20905

On Board Diagnosis Logic

UBS00DXB

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 and 2.
A three way catalyst (Manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of heated oxygen sensors 1 and 2 approaches a specified limit value, the three way catalyst (Manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420 (Bank 1)	Catalyst system efficiency below threshold	● Three way catalyst (Manifold) does not operate properly. ● Three way catalyst (Manifold) does not have enough oxygen storage capacity.	● Three way catalyst (Manifold) ● Exhaust tube ● Intake air leaks ● Fuel injector ● Fuel injector leaks ● Spark plug ● Improper ignition timing
P0430 (Bank 2)			

DTC Confirmation Procedure

UBS00DXC

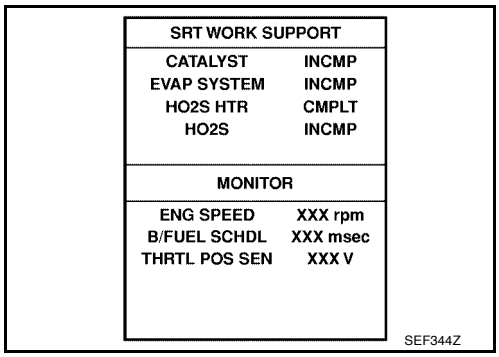
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

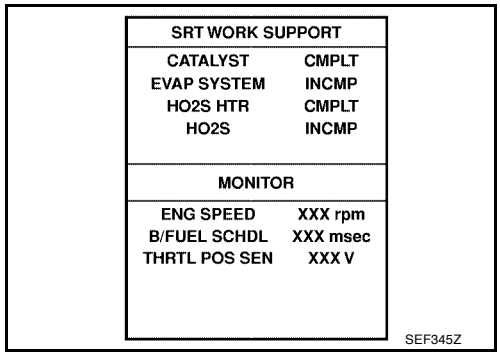
TESTING CONDITION

- **Do not hold engine speed for more than the specified minutes below.**

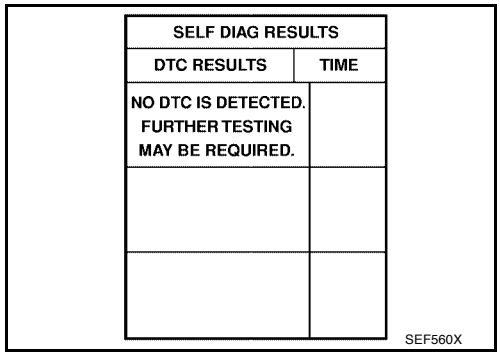
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Start engine and keep the engine speed at between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
7. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
   If “INCMP” of “CATALYST” changed to “COMPLT”, go to step 10.
8. Wait 5 seconds at idle.



9. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).
If not “CMPLT”, perform the following.



10. Select “SELF-DIAG RESULTS” mode with CONSULT-II.
11. Confirm that the 1st trip DTC is not detected.
If the 1st trip DTC is detected, go to EC-1497, "Diagnostic Procedure" .



Overall Function Check

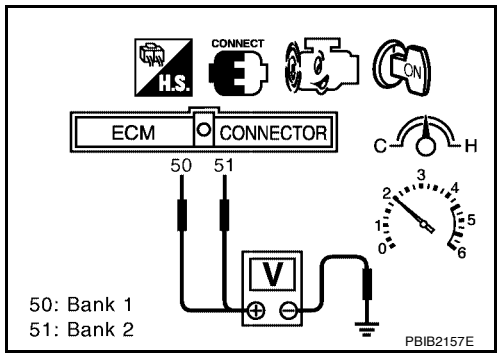
UBS00DXD

Use this procedure to check the overall function of the three way catalyst (manifold). During this check, a DTC might not be confirmed.

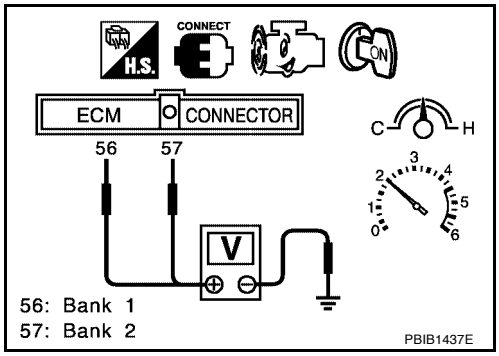
CAUTION:
Always drive vehicle at a safe speed.

WITH GST

1. Start engine and warm it up to the normal operation temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed at between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeters probes between ECM terminals 50 [HO2S1 (B1) signal], 51 [HO2S1 (B2) signal] and ground, and ECM terminals 56 [HO2S2 (B1) signal], 57 [HO2S2 (B2) signal] and ground.
6. Keep engine speed at 2,000 rpm constant under no load.



7. Make sure that the voltage switching frequency (high & low) between ECM terminals 56 and ground, or 57 and ground is very less than that of ECM terminals 50 and ground, or 51 and ground.
   Switching frequency ratio = A/B
   A: Heated oxygen sensor 2 voltage switching frequency
   B: Heated oxygen sensor 1 voltage switching frequency
   This ratio should be less than 0.75.
   If the ratio is greater than above, it means three way catalyst (manifold) does not operate properly. Go to EC-1497, "Diagnostic Procedure" .



NOTE:
If the voltage at terminal 50 or 51 does not switch periodically more than 5 times within 10 seconds at step 5, perform trouble diagnosis for DTC P0133, P0153 first. (See EC-1396 .)

Diagnostic Procedure

UBS00DXE

1. CHECK EXHAUST SYSTEM

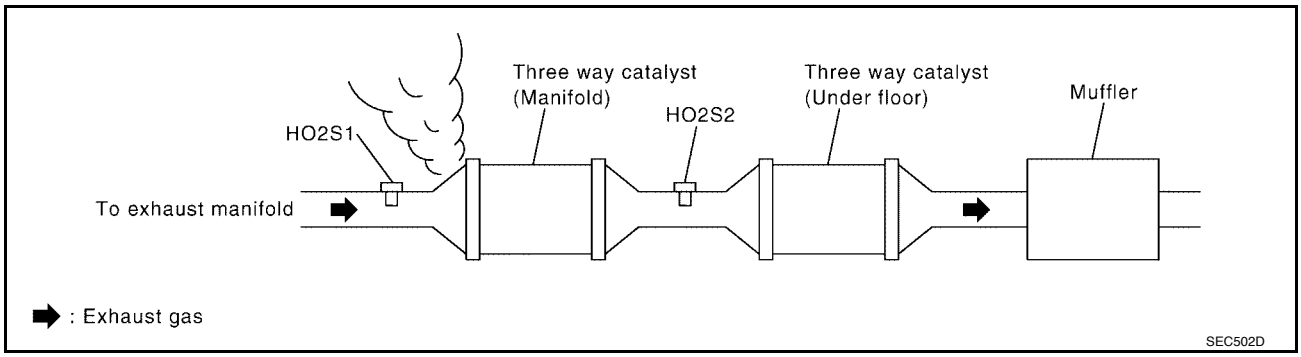
Visually check exhaust tubes and muffler for dent.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace it.

2. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK IGNITION TIMING

Check the following items. Refer to EC-1255, "Basic Inspection" .

Items	Specifications
Ignitions timing	M/T: 10 ± 5° BTDC (in Neutral position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

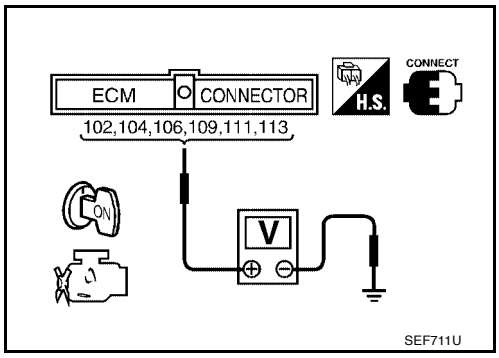
OK or NG

OK >> GO TO 5.
NG >> Adjust ignition timing.

5. CHECK INJECTORS

1. Refer to EC-1726, "Wiring Diagram"
2. Stop engine and then turn ignition switch ON.
3. Check voltage between ECM terminals 102, 104, 106, 109, 111 and 113 and ground with CONSULT-II or tester.

Battery voltage should exist.

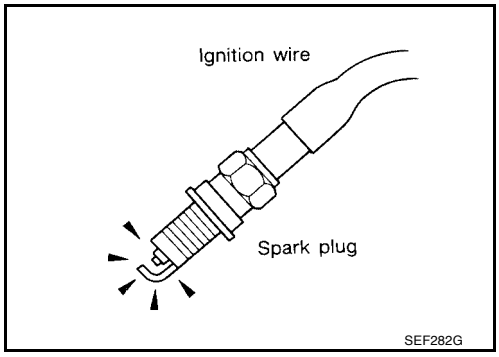


OK or NG

OK >> GO TO 6.
NG >> Perform EC-1725, "INJECTOR CIRCUIT"

6. CHECK IGNITION SPARK

1. Turn ignition switch OFF.
2. Disconnect ignition wire from spark plug.
3. Connect a known-good spark plug to the ignition wire.
4. Disconnect all injector harness connectors
5. Place end of spark plug against a suitable ground and crank engine.
6. Check for spark.

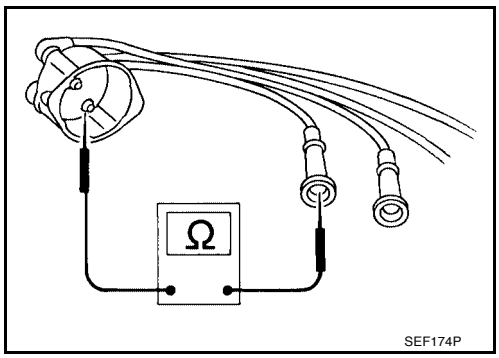


OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. CHECK IGNITION WIRES

1. Inspect wires for cracks, damage, burned terminals and for improper fit.
2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.
Resistance:



Cylinder No.	Resistance kΩ [at 25°C (77°F)]
1	Approx. 6.5
2	Approx. 10.0
3	Approx. 8.5
4	Approx. 12.5
5	Approx. 8.5
6	Approx. 11.0

If the resistance exceeds the above specification, inspect ignition wire to distributor cap connection. Clean connection or replace the ignition wire with a new one.

OK or NG

OK >> Check ignition coil, power transistor and their circuits. Refer to EC-1719, "IGNITION SIGNAL" .
NG >> Replace.

8. CHECK INJECTOR

1. Turn ignition switch OFF.
2. Remove injector assembly.
   Refer to EM-80, "OUTER COMPONENT PARTS" .
   Keep fuel hose and all injectors connected to injector gallery.
3. Reconnect all injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Turn ignition switch ON.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip)>>GO TO 9.
NG (Drips)>>Replace the injector(s) from which fuel is dripping.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Trouble is fixed>>**INSPECTION END**.
Trouble is not fixed>>Replace three way catalyst (manifold).

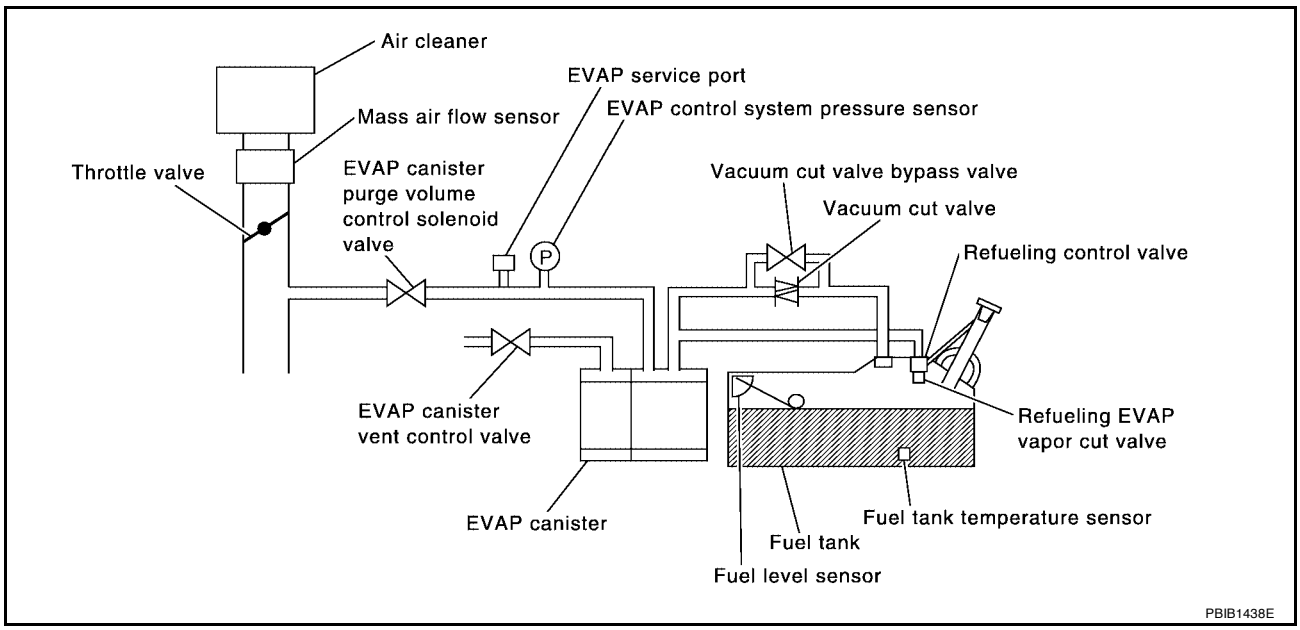
DTC P0441 EVAP CONTROL SYSTEM

PFP:14950

System Description

UBS00DXF

NOTE:
If DTC P0441 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See EC-1589 .)



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. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

UBS00DXG

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0441	EVAP control system incorrect purge flow	EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	● 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 ● Closed throttle position switch ● Blocked purge port ● EVAP canister vent control valve

DTC Confirmation Procedure

UBS00DXH

CAUTION:
Always drive vehicle at a safe speed.

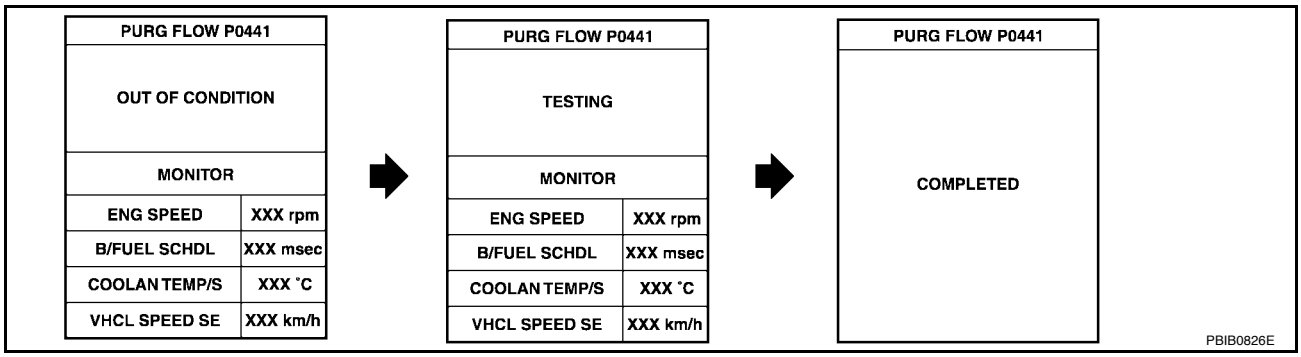
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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 5 seconds.
3. Start engine and let it idle for at least 70 seconds.
4. Select “PURG FLOW P0441” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” 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
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,400 rpm
B/FUEL SCHDL	1.0 - 13.0 msec
COOLAN TEMP/S	0 - 119°C (32 - 246°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 EC-1502, "Diagnostic Procedure" .

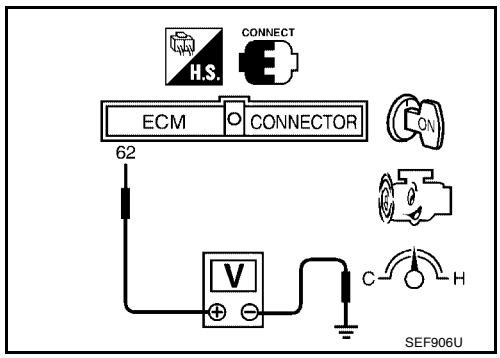
Overall Function Check

UBS00DXI

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 5 seconds.
4. Start engine and wait at least 70 seconds.
5. Set voltmeter probes to ECM terminals 62 (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
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 EC-1502, "Diagnostic Procedure" .

Diagnostic Procedure

UBS00DXJ

1. CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

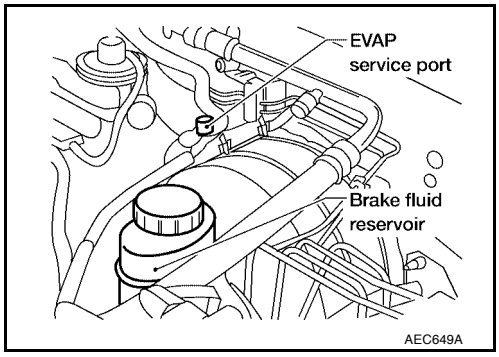
OK or NG

OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> Replace EVAP canister.

2. CHECK PURGE FLOW

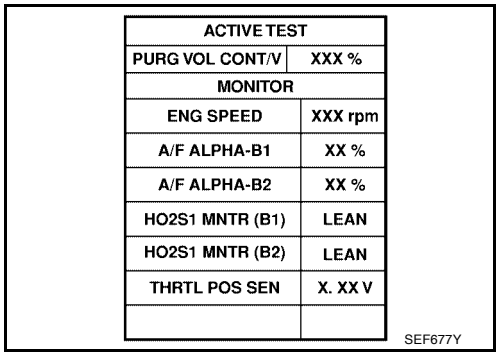
With CONSULT-II

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.

PURG VOL CONT/V	VACUUM
100%	Should exist
0%	Should not exist



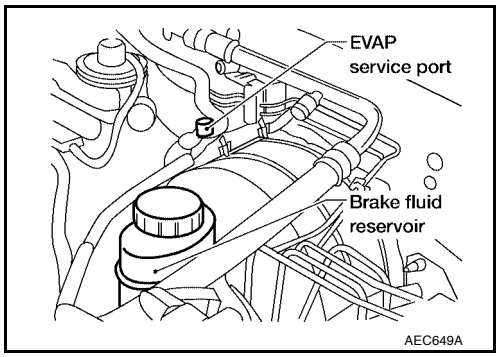
OK or NG

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

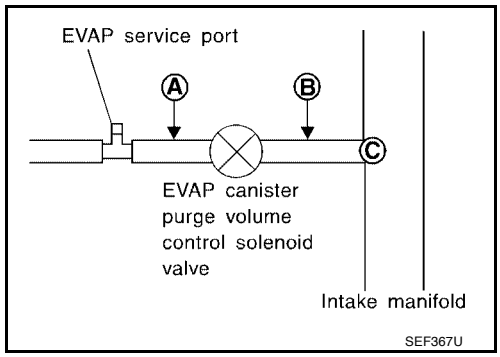
1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection.
   Refer to EC-1751, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 5.
NG >> Repair it.

5. CHECK EVAP PURGE HOSE AND PURGE PORT

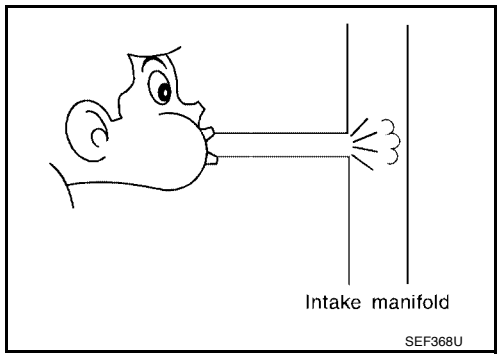
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B** .
2. Blow air into each hose and EVAP purge port **C** .



3. Check that air flows freely.

OK or NG

OK (with CONSULT-II)>>GO TO 6.
OK (without CONSULT-II)>>GO TO 7.
NG >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

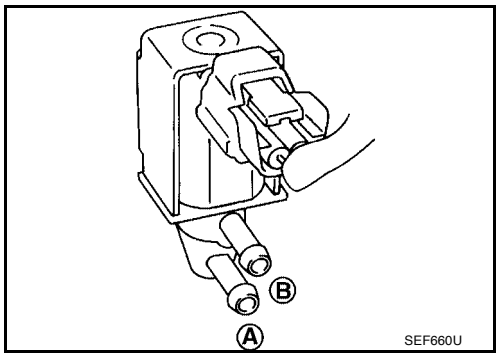
1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.
   If OK, inspection end. If NG, go to following step.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No



SEF660U

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

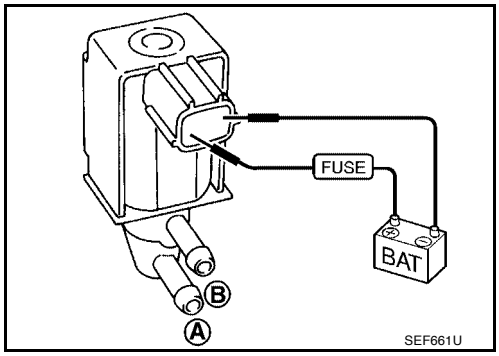
OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Without CONSULT-II

Check air passage continuity.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



SEF661U

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

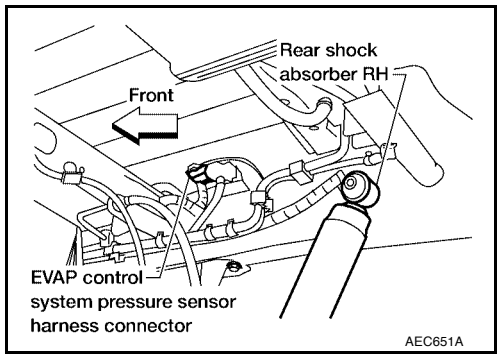
1. Turn ignition switch OFF.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

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 P0452, EC-1533, "DTC Confirmation Procedure" or P0453, EC-1539, "DTC Confirmation Procedure" .

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP control system pressure sensor.

11. CHECK EVAP CANISTER VENT CONTROL VALVE

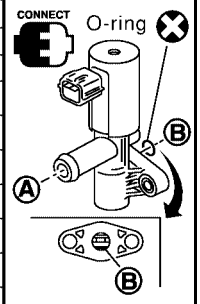
With CONSULT-II

1. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1second.

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
THRTL POS SEN	XXX V

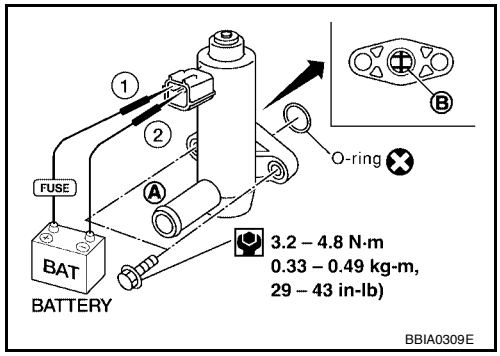


Without CONSULT-II

1. Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.
Make sure new O-ring is installed properly.

OK or NG

OK (With CONSULT-II)>>GO TO 12.
OK (Without CONSULT-II)>>GO TO 13.
NG >> Replace EVAP canister vent control valve.

12. CHECK CLOSED THROTTLE POSITION SWITCH

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Check indication of “CLSD THL/P SW”.
   Measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely open	OFF

If NG, adjust closed throttle position switch.
Check the following items. Refer to EC-1255, "Basic Inspection" .

Items	Specifications
Ignitions timing	M/T: 10 ± 5° BTDC (in Neutral position) A/T:10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

6. If it is impossible to adjust closed throttle position switch in Basic Inspection, replace closed throttle position switch.

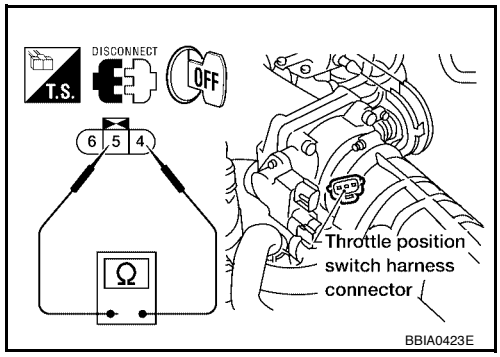
OK or NG

OK >> GO TO 14.
NG >> Replace throttle position switch with throttle position sensor.

13. CHECK CLOSED THROTTLE POSITION SWITCH

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect closed throttle position switch harness connector.
4. Check continuity between closed throttle position switch terminals 4 and 5.
   Resistance measurement must be made with closed throttle position switch installed in vehicle.



Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely closed	No

If NG, adjust closed throttle position switch.
Check the following items. Refer to EC-1255, "Basic Inspection".

Items	Specifications
Ignitions timing	M/T: 10 ± 5° BTDC (in Neutral position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

5. If it is impossible to adjust closed throttle position switch in Basic Inspection, replace closed throttle position switch.

OK or NG

OK >> GO TO 14.
NG >> Replace throttle position switch with throttle position sensor.

14. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to EC-1751, "EVAPORATIVE EMISSION LINE DRAWING".

OK or NG

OK >> GO TO 15.
NG >> Replace it.

15. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 16.

16. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT".

>> **INSPECTION END**.

DTC P0442 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS00DXK

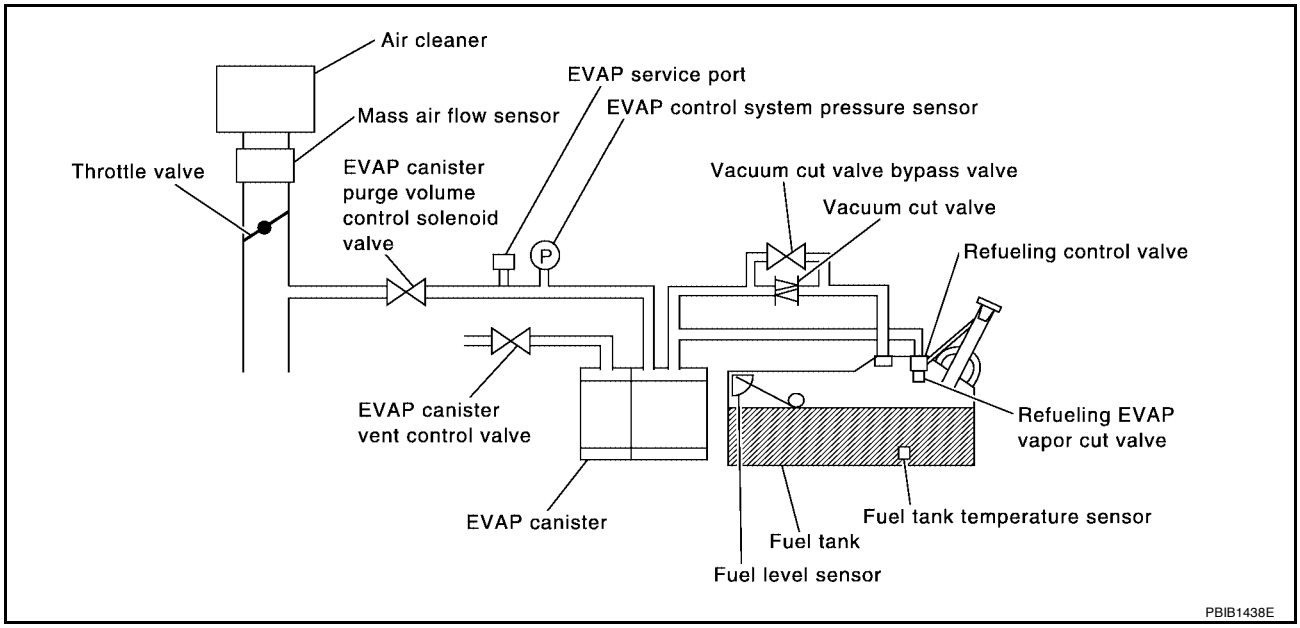
NOTE:

If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (EC-1667 .)

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.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	● 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 ● 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 ● Refueling EVAP vapor cut valve ● ORVR system leaks

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.**

DTC Confirmation Procedure

UBS00DXL

NOTE:

- **If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (EC-1667 .)**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

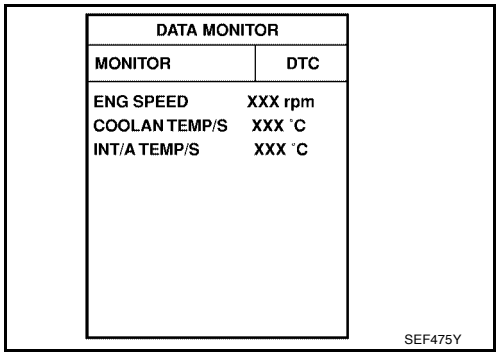
TESTING CONDITION:

- **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 procedure.**

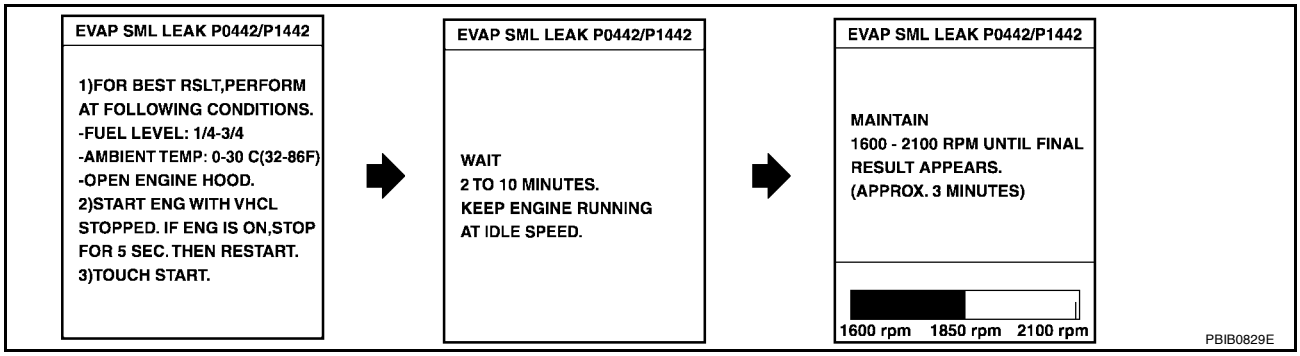
WITH CONSULT-II

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 5 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 - 32°C (32 - 90°F)
   INT/A TEMP SE: More than 0°C (32°F)



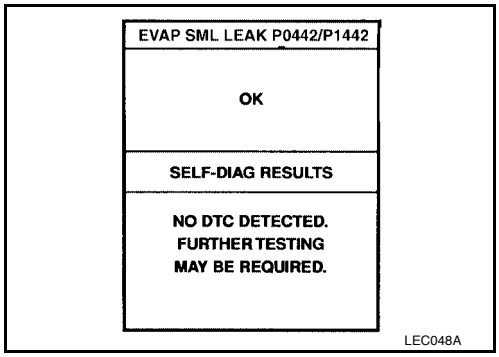
5. Select “EVAP SML LEAK P0442/P1442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.



NOTE:
If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-1255, "Basic Inspection" .

6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-1511, "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 EC-1238, "Driving Pattern" before driving vehicle.

1. Start engine.
2. Drive vehicle according to EC-1238, "Driving Pattern" .
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 5 seconds.
6. Start engine.
   It is not necessary to cool engine down before driving.
7. Drive vehicle again according to the EC-1238, "Driving Pattern" .
8. Stop vehicle.
9. Select MODE 3 with GST.

- If P0442 is displayed on the screen, go to EC-1511, "Diagnostic Procedure" .
- If P0441 is displayed on the screen, go to EC-1502, "Diagnostic Procedure" .
- If P0442 and P0441 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

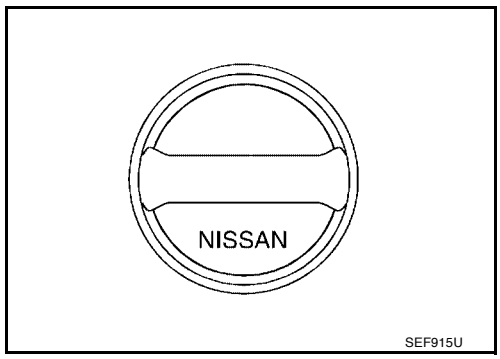
UBS00DXM

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

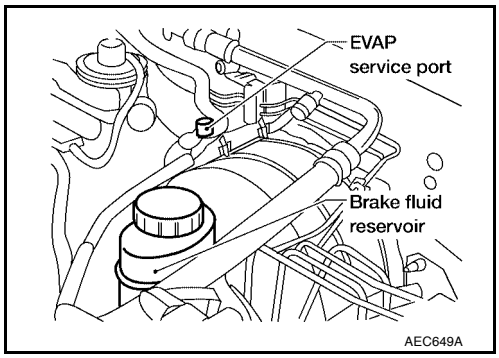
Refer to EC-1753, "Component Inspection" .

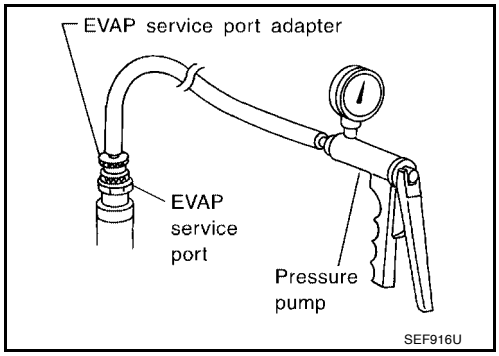
OK or NG

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.

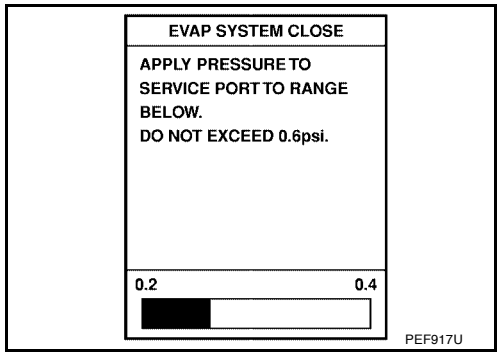
With CONSULT-II>>GO TO 6.
Without CONSULT-II>>GO TO 7.

6. CHECK FOR EVAP LEAK

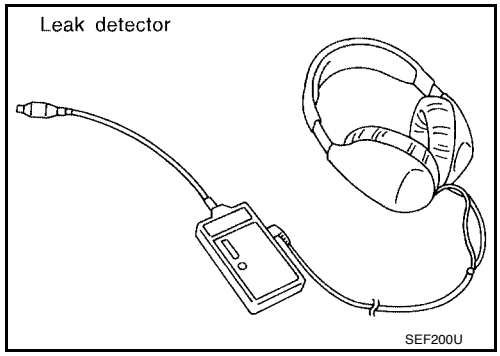
With CONSULT-II

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-1751, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

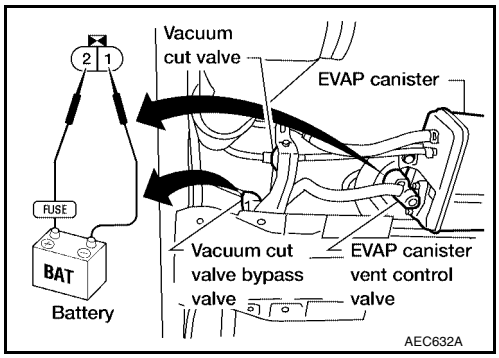
OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

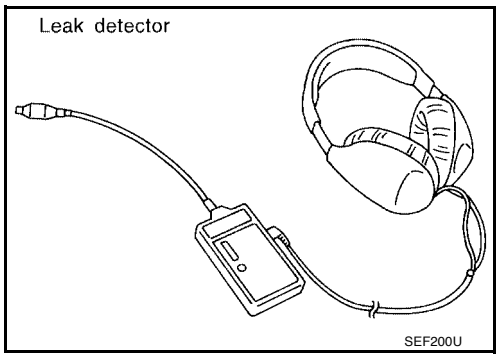
Without CONSULT-II

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-1751, "EVAPORATIVE EMISSION LINE DRAWING" .



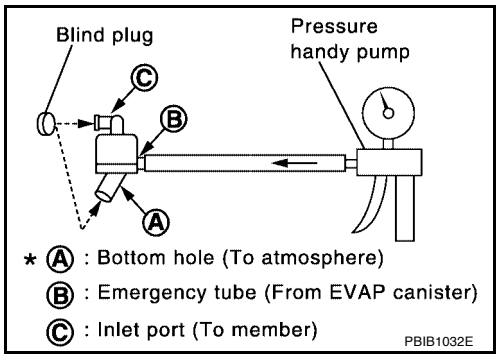
OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK 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.



OK or NG

OK >> GO TO 9.
NG >> Replace water separator.

9. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

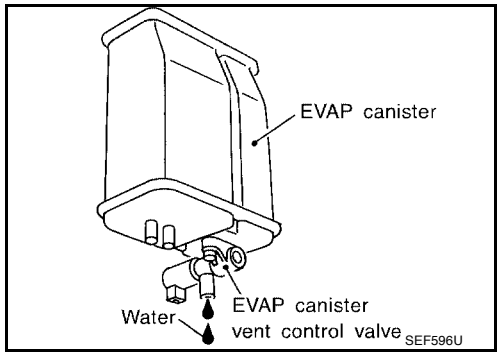
Refer to EC-1667, "DTC Confirmation Procedure" .

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. Check if water will 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

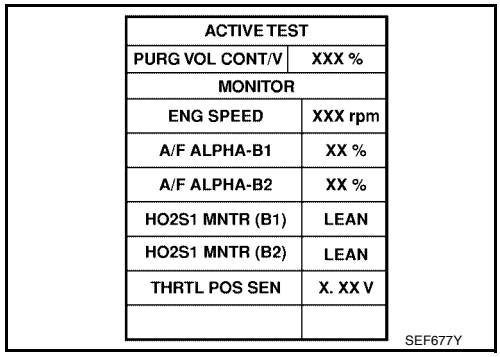
>> Repair hose or replace EVAP canister.

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%.
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.

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-1208, "Vacuum Hose Drawing" .

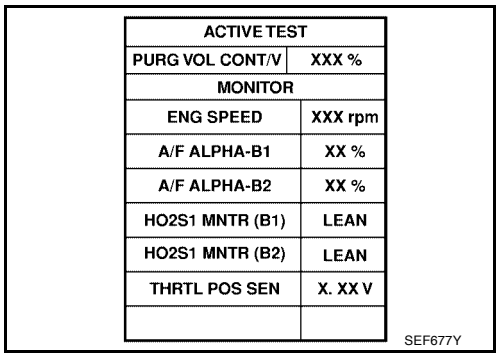
OK or NG

OK >> GO TO 16.
NG >> Repair or reconnect the hose.

16. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

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.



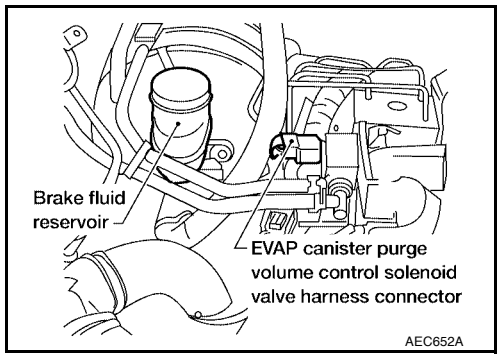
OK or NG

OK >> GO TO 18.
NG >> GO TO 17.

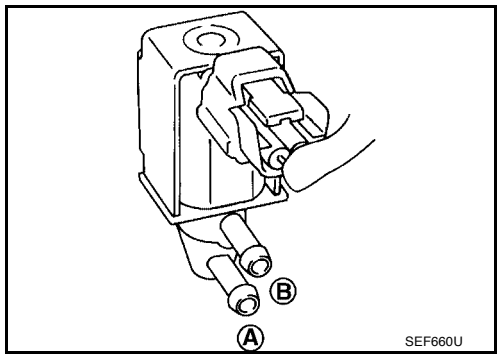
17. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

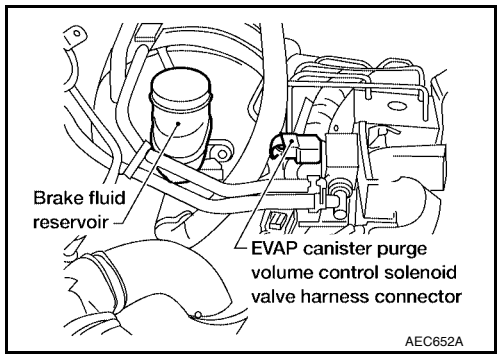


Condition PURG VOL CONT/V value	Air passage continuity between A or B
100%	Yes
0%	No

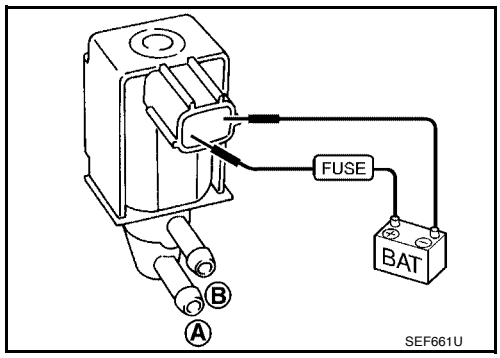


Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition	Air passage continuity between A or B
12V direct supply between terminals 1 and 2	Yes
No supply	No

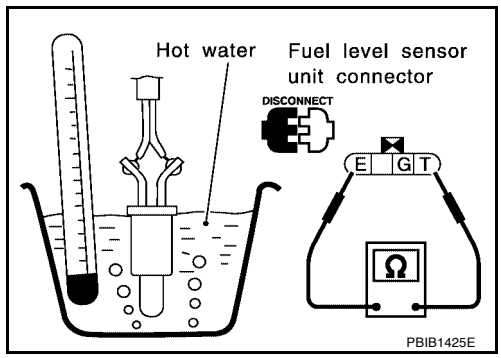


OK or NG

OK >> GO TO 18.
NG >> Replace EVAP canister purge volume control solenoid valve.

18. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit and fuel pump terminals T and E by heating with hot water or heat gun as shown in the figure.



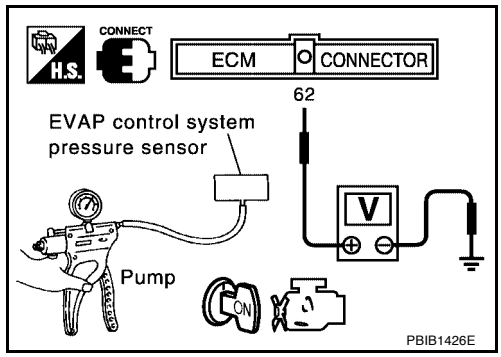
Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

OK or NG

OK >> GO TO 19.
NG >> Replace fuel tank temperature sensor.

19. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
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.
5. Check input voltage between ECM terminal 62 and ground.



Applied vacuum	Voltage V
Not applied	1.8 - 4.8
-26.7 kpa (-200 mmHg, -7.87 inHg)	2.1 to 2.5V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

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-1751, "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-1758, "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-1758, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)"

OK or NG

OK >> GO TO 25.
NG >> Replace refueling control valve with fuel tank.

25. CHECK FUEL LEVEL SENSOR

Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 26.
NG >> Replace fuel level sensor unit.

26. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

UBS00DXN

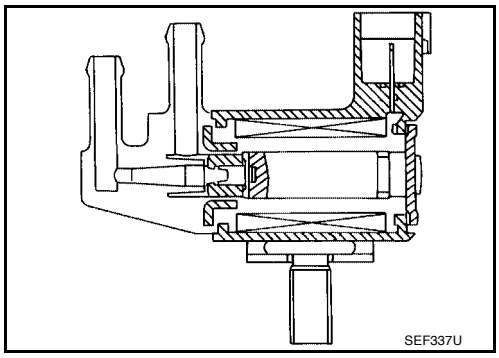
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	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		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	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

UBS00DXO

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

On Board Diagnosis Logic

UBS00DXP

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	● Harness or connectors (The solenoid valve circuit is open or shorted.) ● EVAP canister purge volume control solenoid valve
P0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	● Harness or connectors (The solenoid valve circuit is shorted.) ● EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

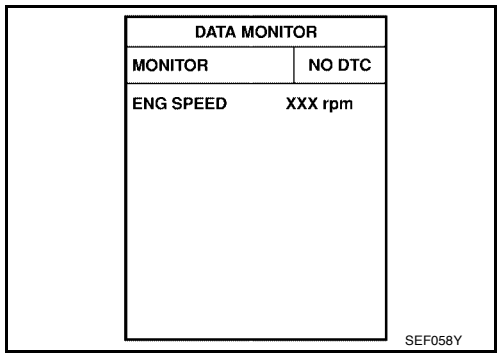
UBS00DXQ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-1524, "Diagnostic Procedure" .



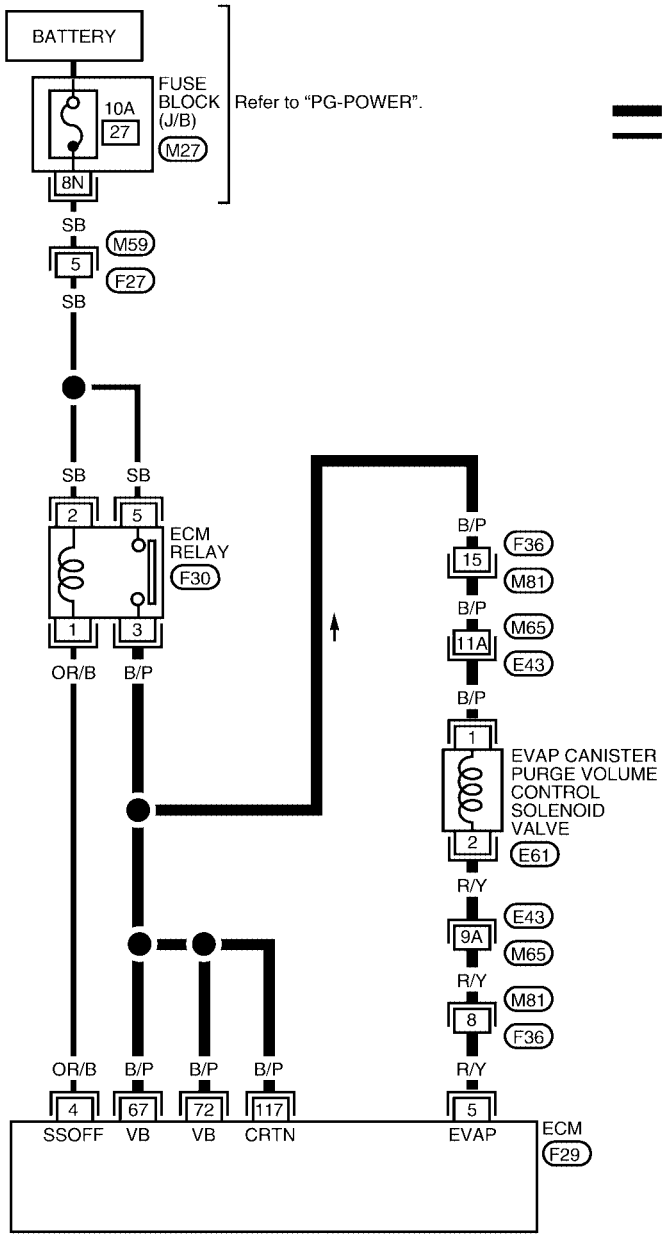
WITH GST

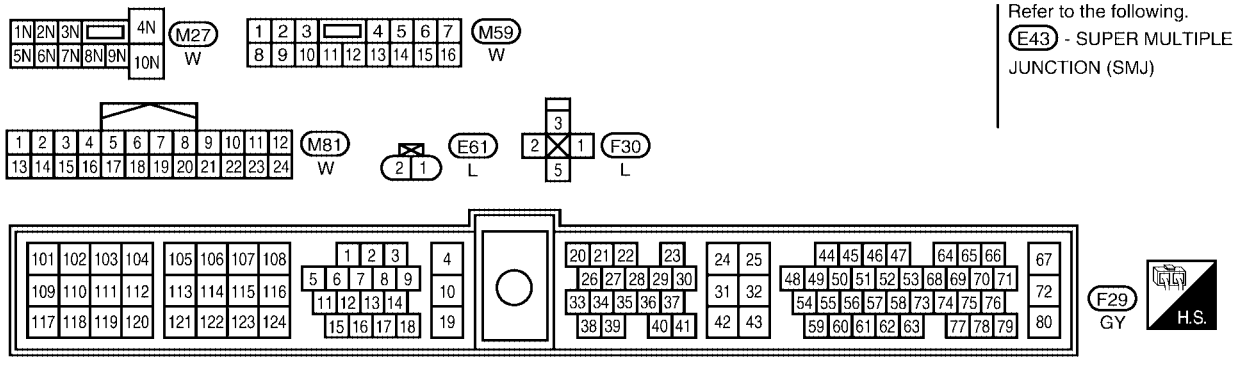
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DXR

EC-PGC/V-01



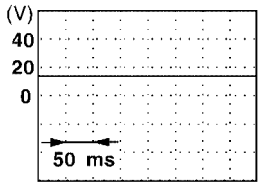
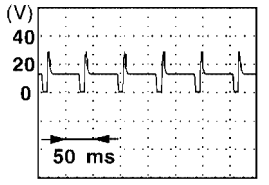


BBWA1085E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★  SEF995U
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

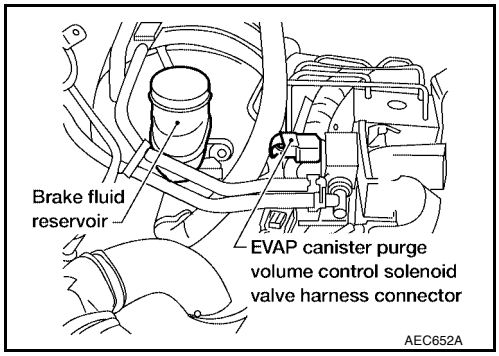
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00DXS

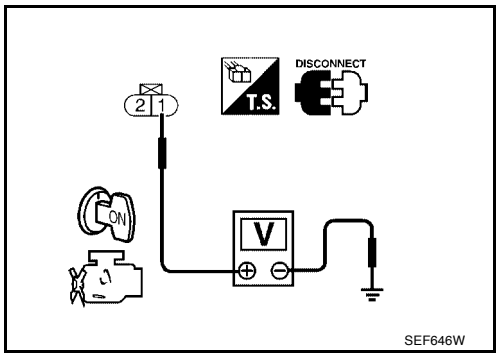
1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.



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.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F36, M81
- Harness connectors M65, E43
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 5 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 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M81, F36
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

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 7.
NG >> GO TO 6.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

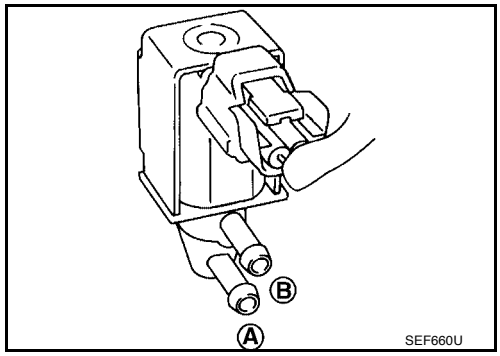
SEF677Y

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Check air passage continuity under the following conditions.

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No



SEF660U

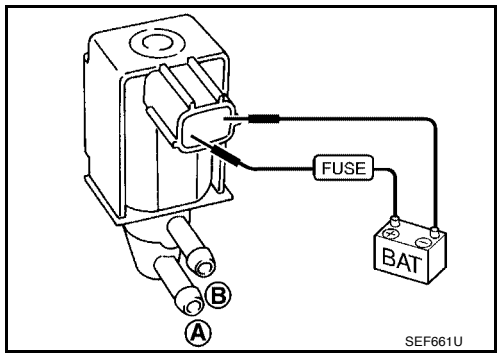
Without CONSULT-II

1. Check air passage continuity 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

OK or NG

OK >> GO TO 7.
NG >> Replace EVAP canister purge volume control solenoid valve.



SEF661U

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

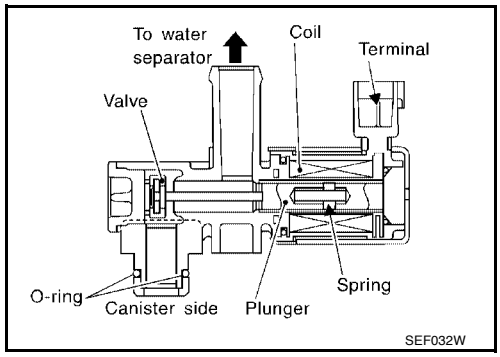
DTC P0447 EVAP CANISTER VENT CONTROL VALVE

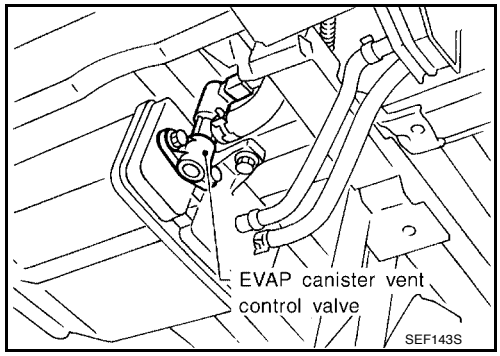
PFP:14935

Component Description

UBS00DXT

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

UBS00DXU

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00DXV

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447	EVAP canister vent control valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	● Harness or connectors (The valve circuit is open or shorted.) ● EVAP canister vent control valve

DTC Confirmation Procedure

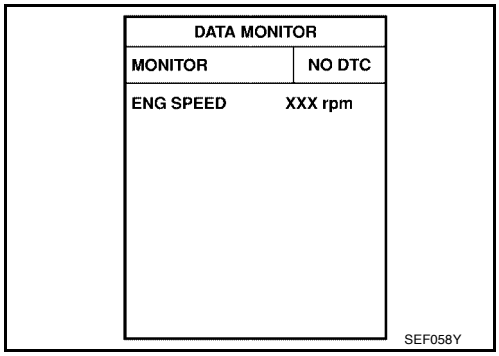
UBS00DXW

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-1530, "Diagnostic Procedure" .

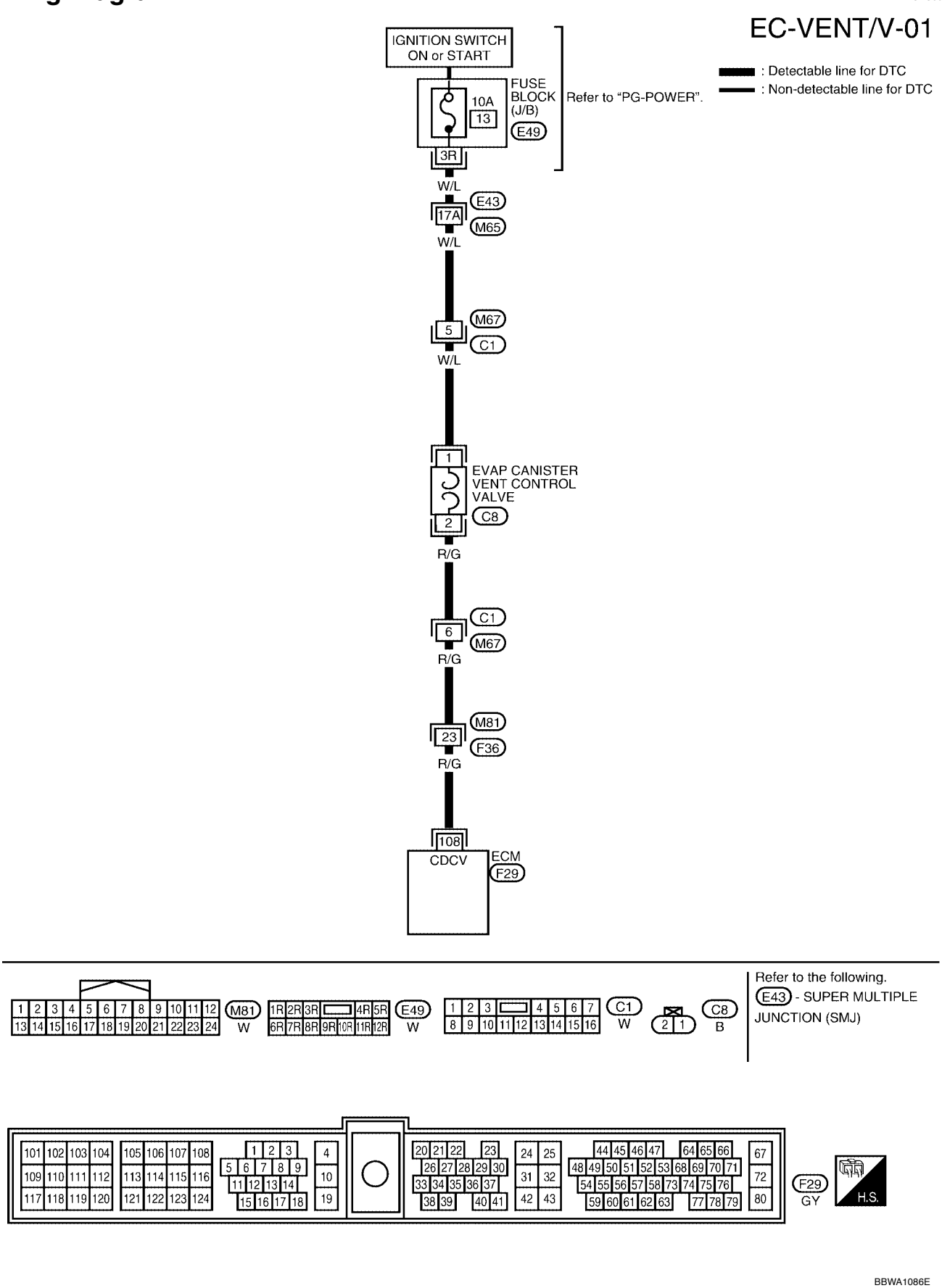


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DXX



BBWA1086E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00DXY

1. INSPECTION START

Do you have CONSULT-II?

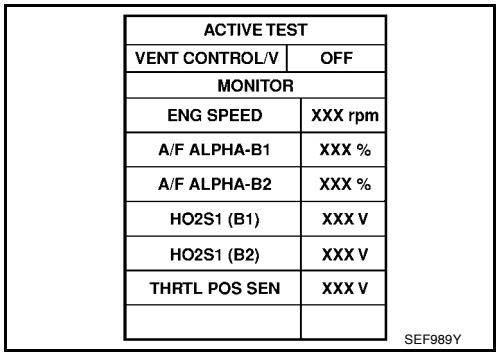
Yes or No

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.

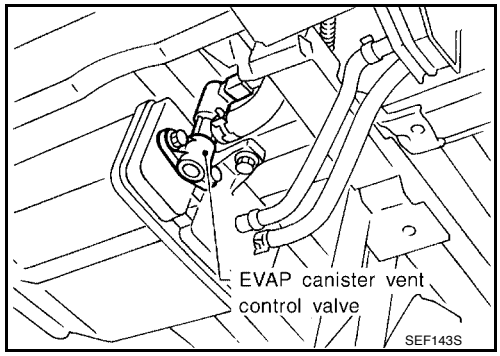


OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

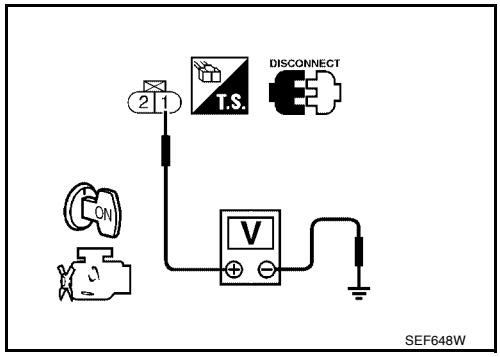
3. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

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 E43, M65
- Harness connectors M67, C1
- Fuse block (J/B) connector E49
- 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 108 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 C1, M67
- Harness connectors M81, F36
- 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.

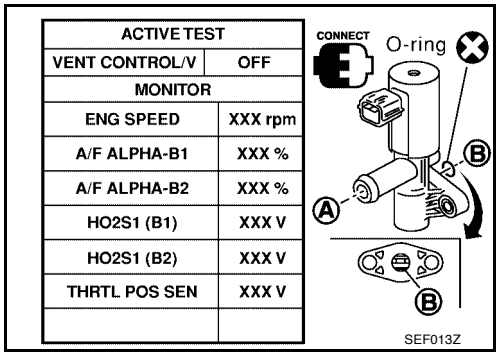
7. CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1second.

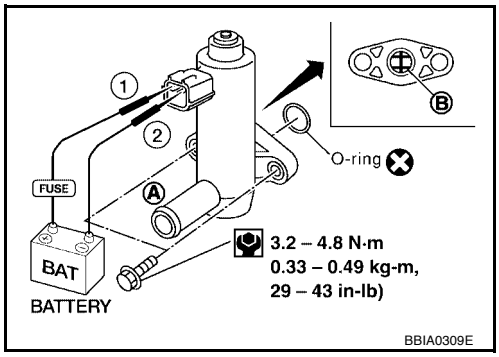


Without CONSULT-II

1. Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.
Make sure new O-ring is installed properly.

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP canister vent control valve.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

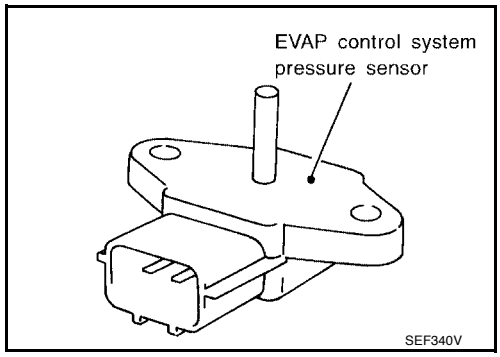
DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

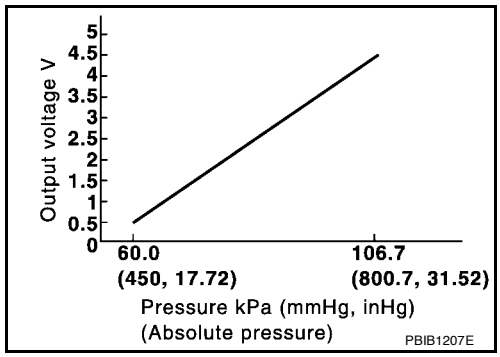
PFP:25085

Component Description

UBS00DXZ

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

UBS00DY0

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	1.8 - 4.8V

On Board Diagnosis Logic

UBS00DY1

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● EVAP control system pressure sensor

DTC Confirmation Procedure

UBS00DY2

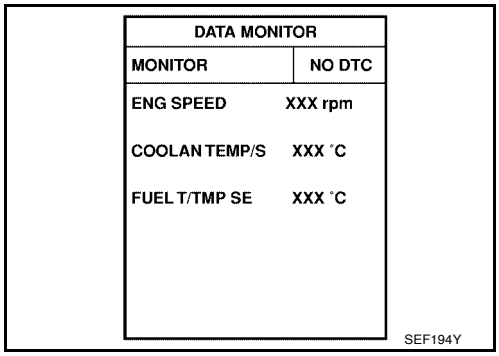
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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 5 seconds.
3. Turn ignition switch ON.

4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “FUEL T/TMP 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-1536, "Diagnostic Procedure" .



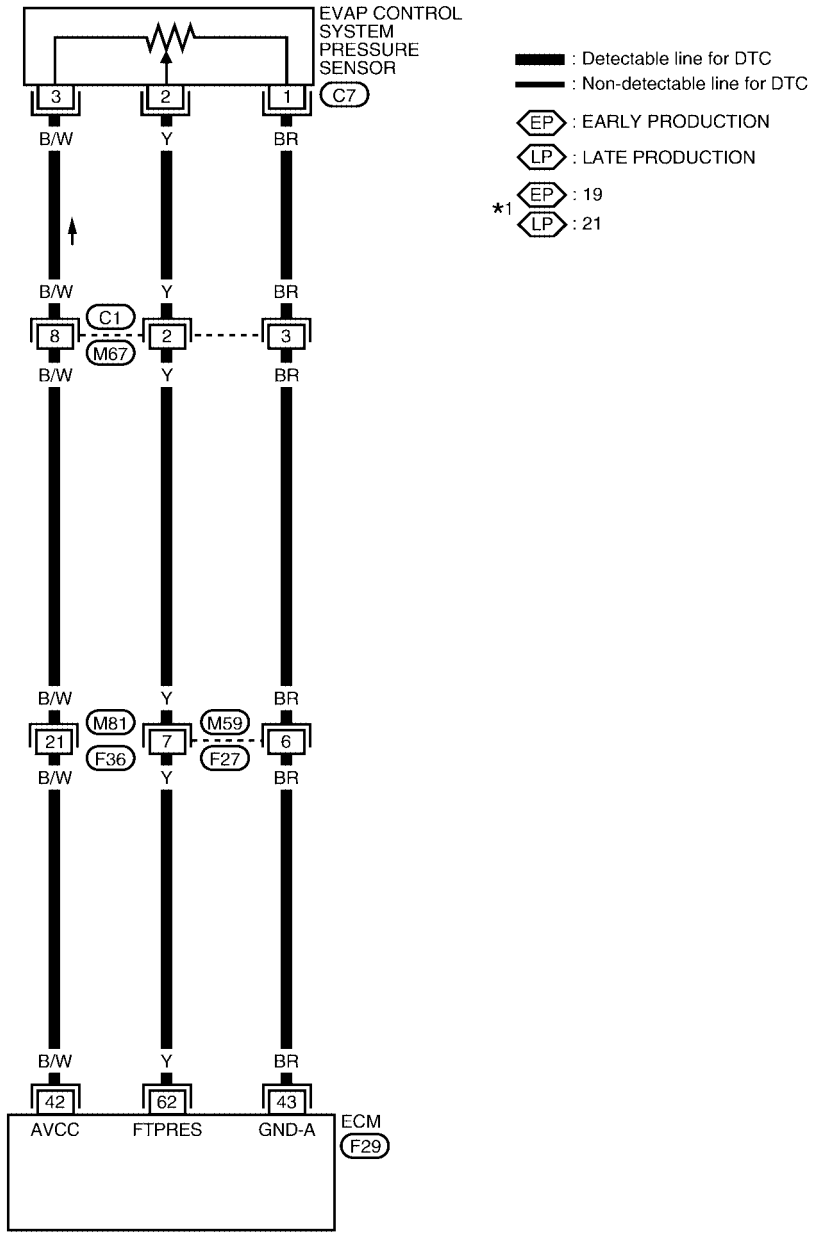
WITH GST

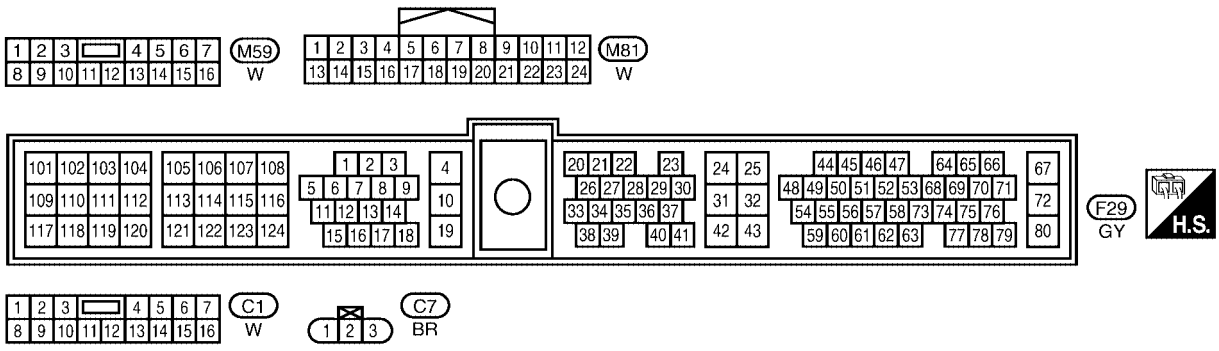
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 60 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select MODE 7 with GST.
   If 1st trip DTC is detected, go to EC-1536, "Diagnostic Procedure" .

Wiring Diagram

UBS00DY3

EC-PRE/SE-01





BBWA1087E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	B/W	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
43	BR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
62	Y	EVAP control system pressure sensor	**[Ignition switch: ON]**	1.8 - 4.8V

Diagnostic Procedure

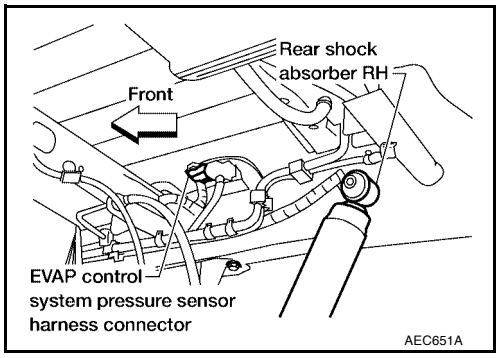
UBS00DY4

1. CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.

OK or NG

OK >> GO TO 2.
NG >> Reconnect, repair or replace.

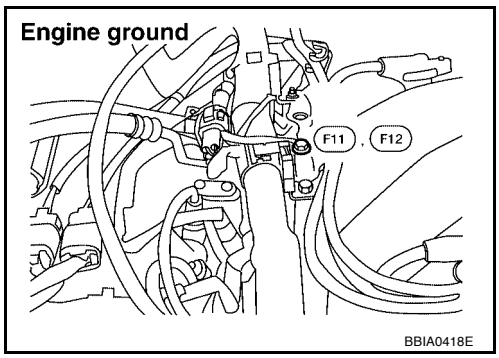


2. CHECK GROUND CONNECTIONS

Loosen and retighten ground screw.
Refer to EC-1311, "Ground Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.



3. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.
   Water should not exist.

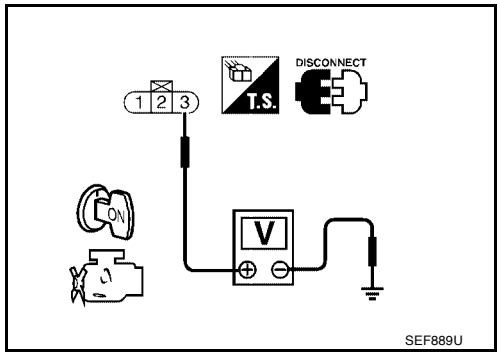
OK or NG

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 3 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 C1, M67
- Harness connectors M81, F36
- 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. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 43.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, M67
- Harness connectors M59, F27
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 62 and EVAP control system pressure sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

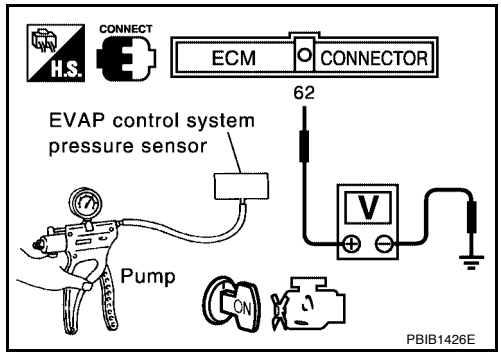
- Harness connectors C1, M67
- Harness connectors M59, F27
- Harness for open or short between ECM and EVAP control system pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
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.
5. Check input voltage between ECM terminal 62 and ground.

Applied vacuum	Voltage V
Not applied	1.8 - 4.8
−26.7 kpa (−200 mmHg, −7.87 inHg)	2.1 to 2.5 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.**

OK or NG

OK >> GO TO 14.
NG >> Replace EVAP control system pressure sensor.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

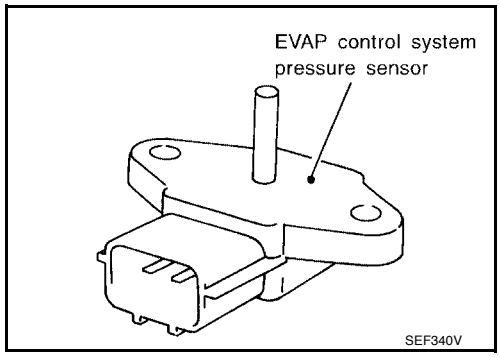
DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

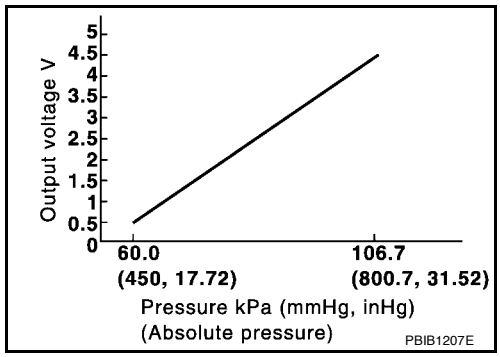
PFP:25085

Component Description

UBS00DY5

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

UBS00DY6

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	1.8 - 4.8V

On Board Diagnosis Logic

UBS00DY7

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453	EVAP control system pressure sensor high input	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● EVAP control system pressure sensor ● EVAP canister vent control valve ● EVAP canister ● Water separator ● Rubber hose from EVAP canister vent control valve to water separator

DTC Confirmation Procedure

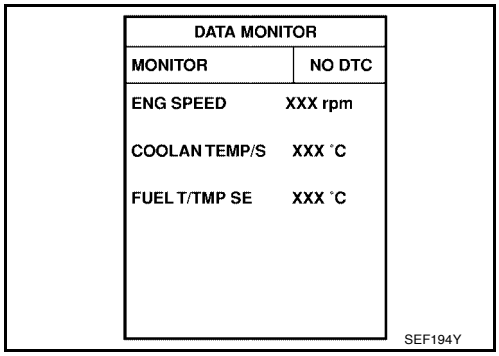
UBS00DY8

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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/TMP SE” is more than 0°C (32°F).
6. Wait at least 10 seconds.
7. If 1st trip DTC is detected, go to EC-1542, "Diagnostic Procedure" .



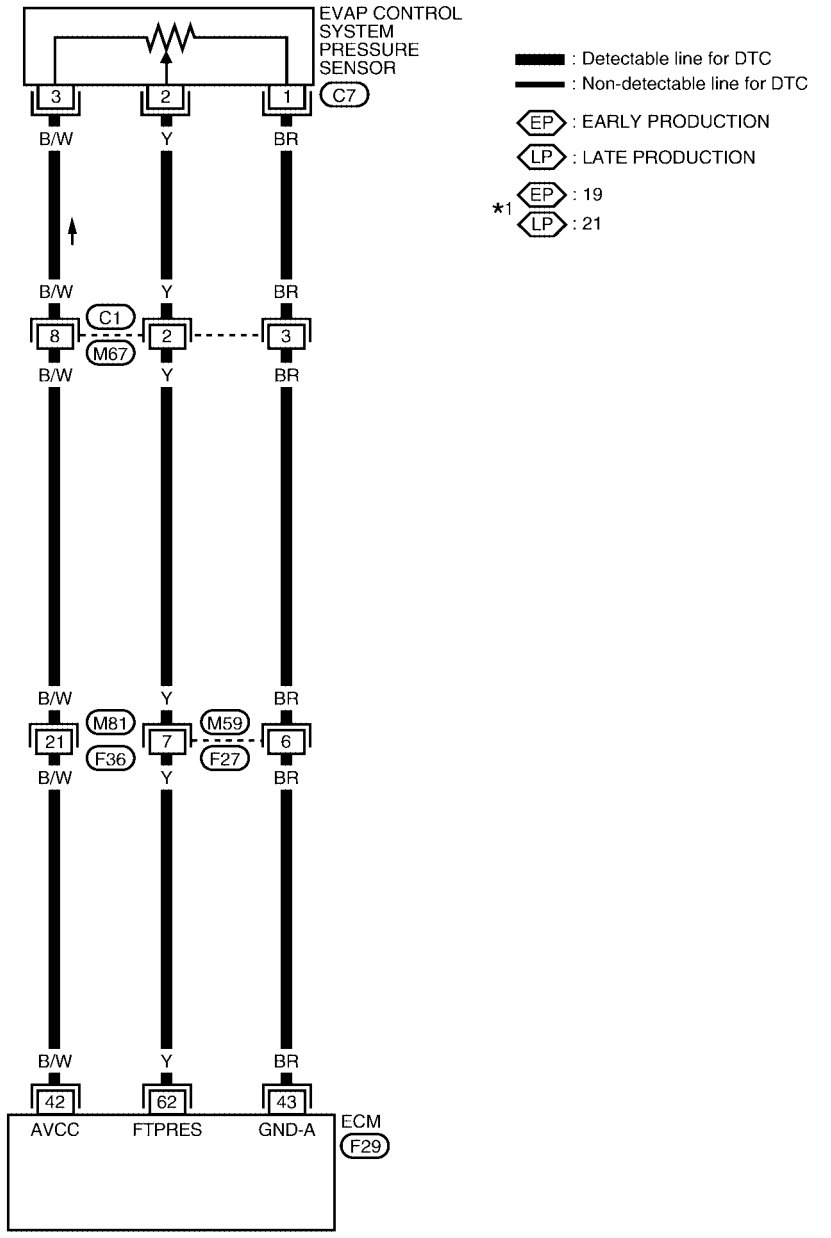
WITH GST

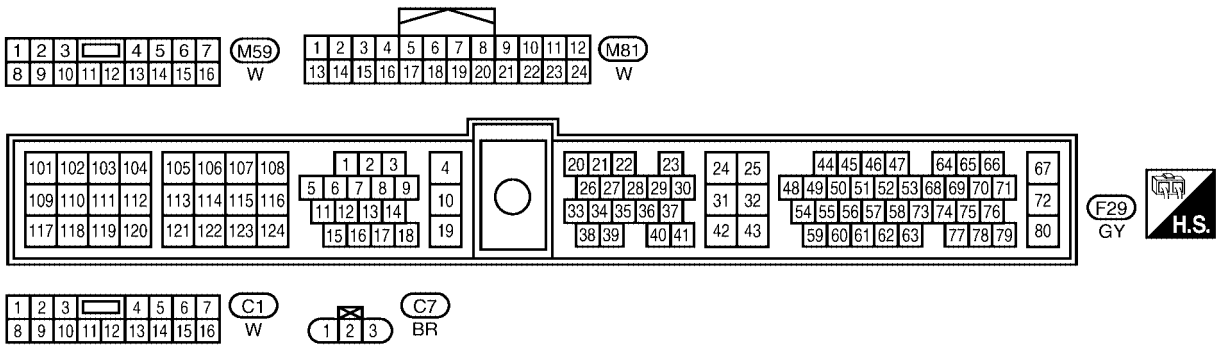
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 60 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Wait at least 10 seconds.
5. Select MODE 7 with GST.
   If 1st trip DTC is detected, go to EC-1542, "Diagnostic Procedure" .

Wiring Diagram

UBS00DY9

EC-PRE/SE-01





BBWA1087E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	B/W	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
43	BR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
62	Y	EVAP control system pressure sensor	**[Ignition switch: ON]**	1.8 - 4.8V

Diagnostic Procedure

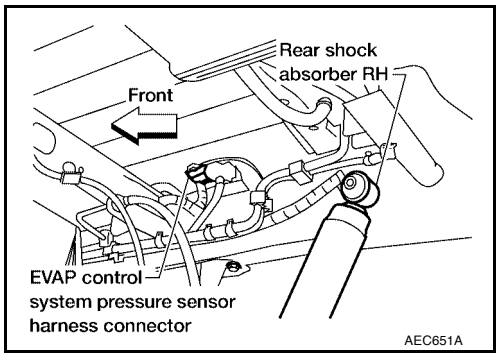
UBS00DYA

1. CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.

OK or NG

OK >> GO TO 2.
NG >> Reconnect, repair or replace.

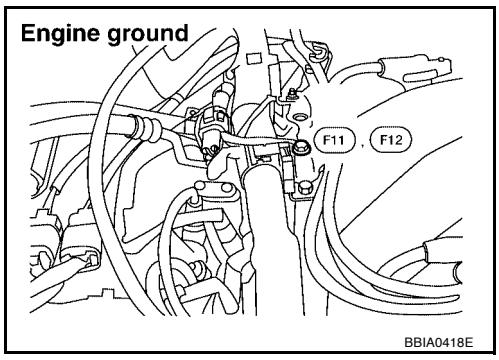


2. CHECK GROUND CONNECTIONS

Loosen and retighten ground screw.
Refer to EC-1311, "Ground Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.



3. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.
   Water should not exist.

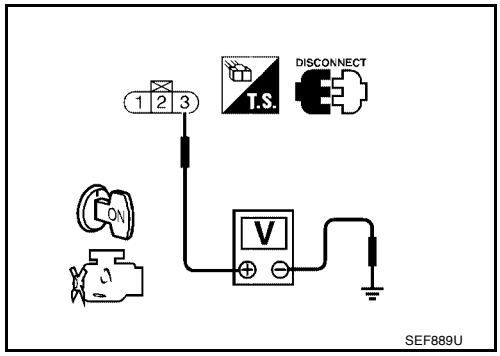
OK or NG

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 3 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 C1, M67
- Harness connectors M81, F36
- 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. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 43.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, M67
- Harness connectors M59, F27
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 62 and EVAP control system pressure sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C1, M67
- Harness connectors M59, F27
- 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.

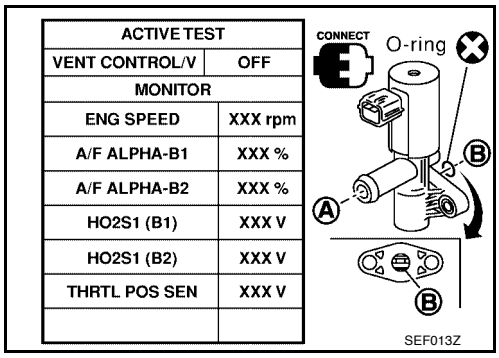
10. CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1second.

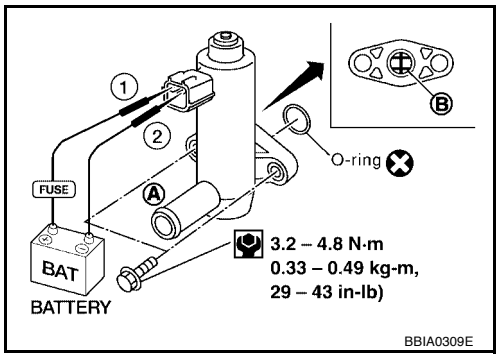


Without CONSULT-II

1. Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.
Make sure new O-ring is installed properly.

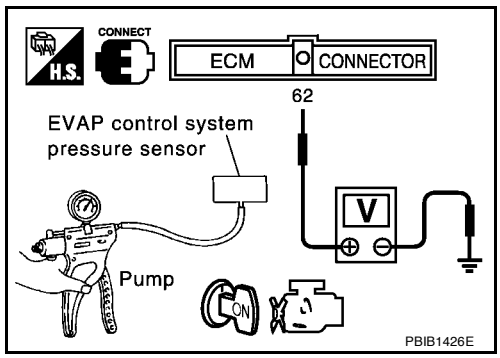
OK or NG

OK >> GO TO 11.
NG >> Replace EVAP canister vent control valve.

11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
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.
5. Check input voltage between ECM terminal 62 and ground.

Applied vacuum	Voltage V
Not applied	1.8 - 4.8
−26.7 kpa (−200 mmHg, −7.87 inHg)	2.1 to 2.5 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.**

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP control system pressure sensor.

12. CHECK RUBBER TUBE

Check obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

OK >> GO TO 13.
NG >> Clean, repair or replace rubber tube.

13. CHECK WATER SEPARATOR

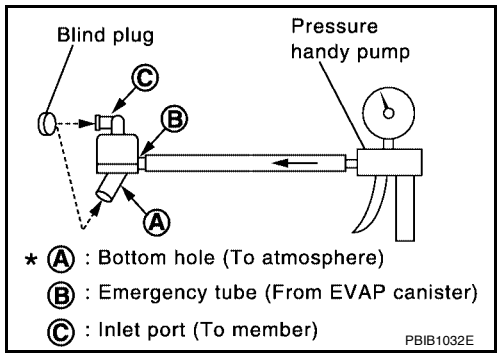
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

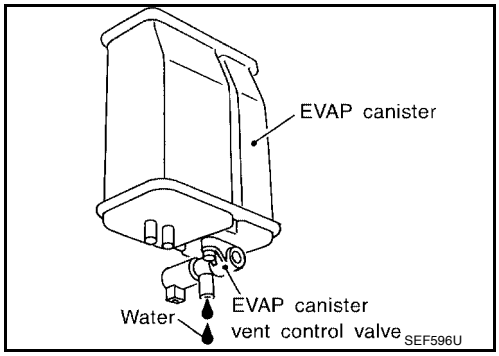
OK or NG

OK >> GO TO 14.
NG >> Replace water separator.



14. 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 15.
No >> GO TO 17.

15. 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 17.
NG >> GO TO 16.

16. 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.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

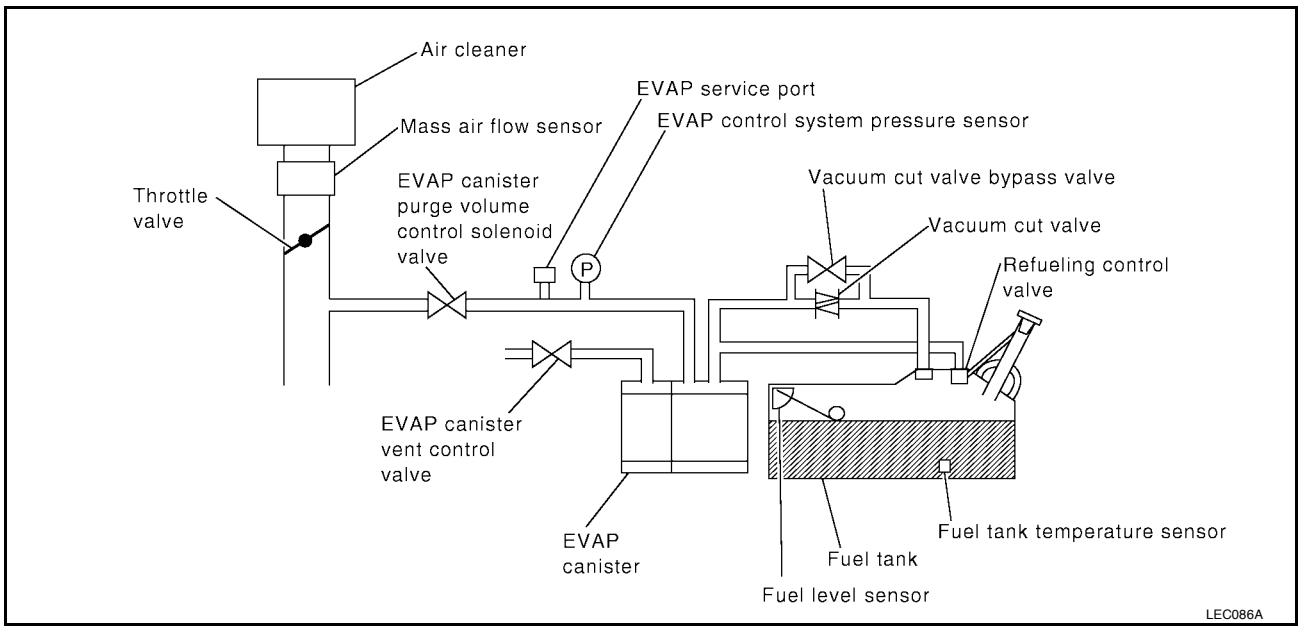
DTC P0455 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS00DYB

NOTE:
If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (EC-1667 .)
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.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0455	EVAP control system gross leak detected	EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.	● 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 ● 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

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.**

DTC Confirmation Procedure

UBS00DYC

CAUTION:

Never remove fuel filter cap during the DTC confirmation procedure.

NOTE:

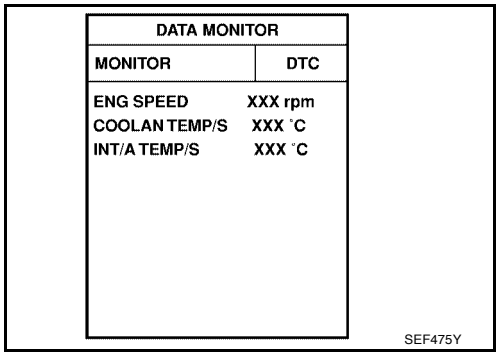
- **If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1667 .)**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

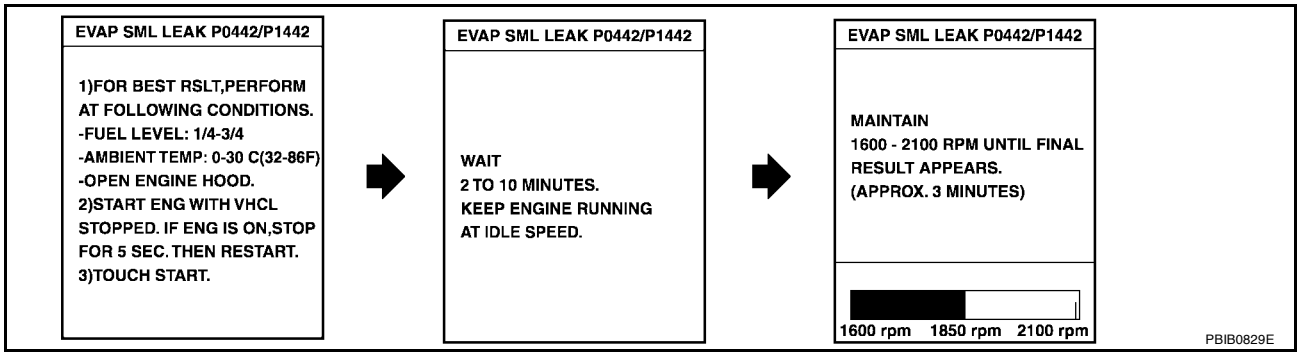
- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedure.**

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 5 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 - 32°C (32 - 90°F)
   INT/A TEMP SE: More than 0°C (32°F)



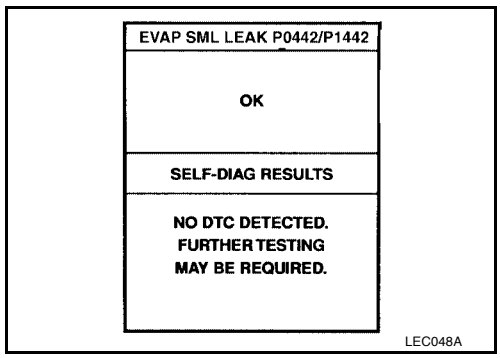
6. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.



NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-1255, "Basic Inspection" .

7. Make sure that “OK” is displayed.
If “NG” is displayed, select “SELF-DIAG RESULTS” mode with CONSULT-II and make sure that “EVAP GROSS LEAK [P0455]” is displayed, refer to EC-1549, "Diagnostic Procedure" .
If P0442 is displayed, perform EC-1511, "Diagnostic Procedure" .



WITH GST

NOTE:
Be sure to read the explanation to EC-1238, "Driving Pattern" before driving vehicle.

1. Start engine.
2. Drive vehicle according to EC-1238, "Driving Pattern" .
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 5 seconds.
6. Start engine.
It is not necessary to cool engine down before driving.
7. Drive vehicle again according to EC-1238, "Driving Pattern" .
8. Stop vehicle.
9. Select MODE 3 with GST.

- If P0455 is displayed on the screen, go to EC-1549, "Diagnostic Procedure" .
- If P0442 or P1442 is displayed on the screen, go to DTC P0442 EC-1511, "Diagnostic Procedure" or for DTC P1442 EC-1651, "Diagnostic Procedure" .
- If P0441 is displayed on the screen, go to EC-1502, "Diagnostic Procedure" .
- If P0442, P0455 and P0441 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

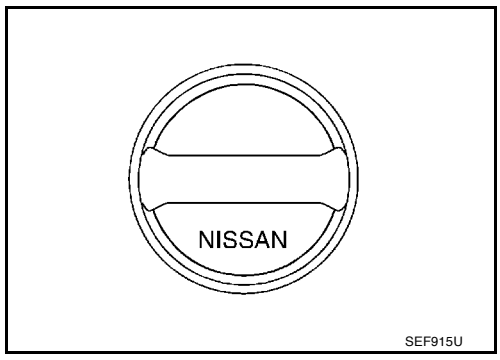
UBS00DYD

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 >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. 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 (BUILT INTO FUEL FILLER CAP)

Refer to EC-1753, "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-1751, "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

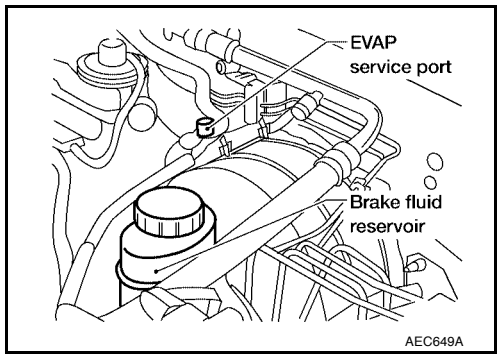
Refer to EC-1667, "DTC Confirmation Procedure" .

OK or NG

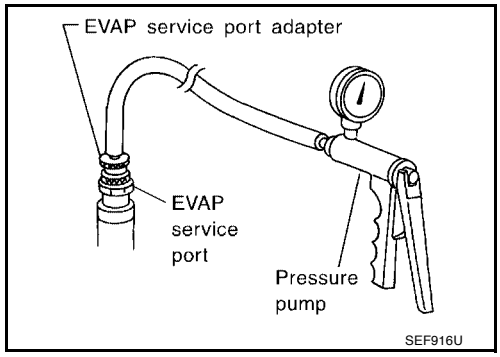
OK >> GO TO 8.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

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.



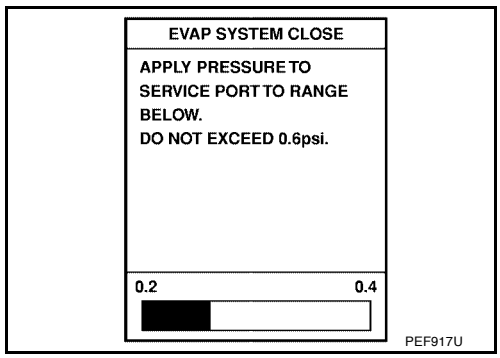
Models with CONSULT-II>>GO TO 9.
Models without CONSULT-II>>GO TO 10.

9. CHECK FOR EVAP LEAK

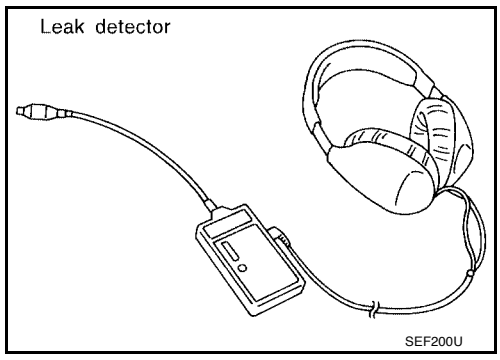
With CONSULT-II

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-1751, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

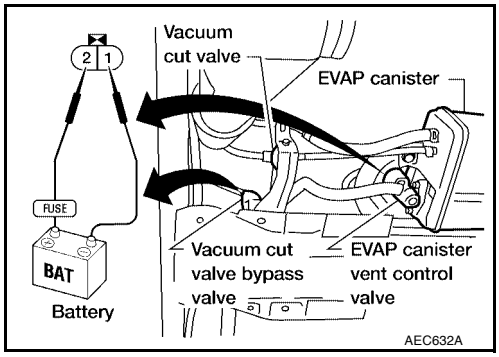
OK >> GO TO 11.
NG >> Repair or replace.

10. CHECK FOR EVAP LEAK

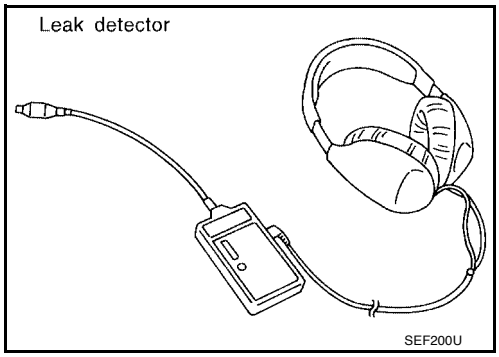
Without CONSULT-II

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-1751, "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%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

   Vacuum should exist.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

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-1208, "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.
   If OK, inspection end. If NG, go to following step.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

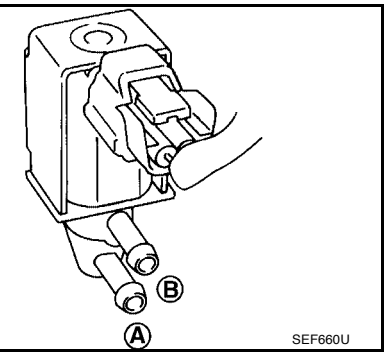
SEF985Y

3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister purge volume control solenoid valve.



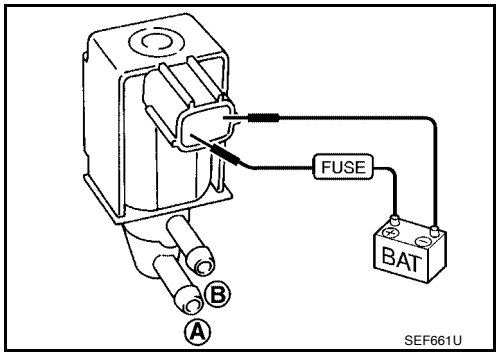
SEF660U

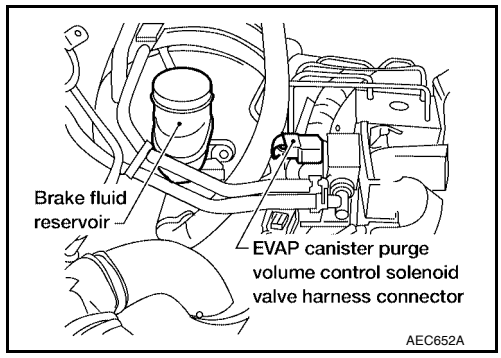
15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Without CONSULT-II

Check air passage continuity.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



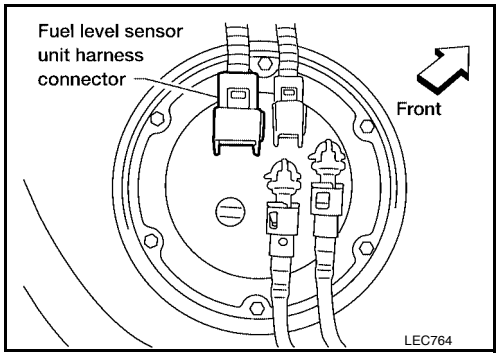


OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister purge volume control solenoid valve.

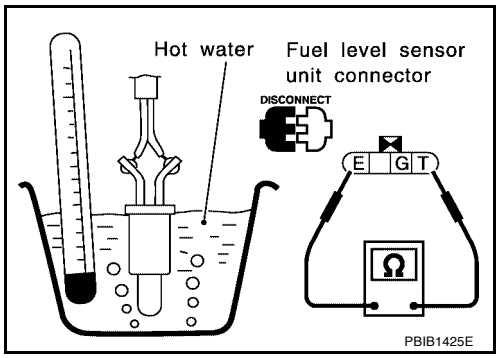
16. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.



2. Check resistance between fuel level sensor unit terminals T and E by heating with hot water or heat gun as shown in the figure.

Temperature °C	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.78 - 0.90

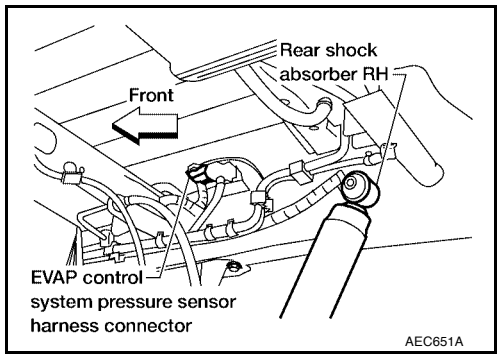


OK or NG

OK >> GO TO 17.
NG >> Replace fuel tank temperature sensor.

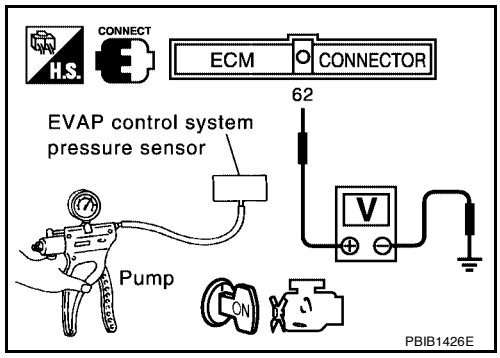
17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
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.



5. Check input voltage between ECM terminal 62 and ground.

Applied vacuum	Voltage V
Not applied	1.8 - 4.8
−26.7 kpa (−200 mmHg, −7.87 inHg)	2.1 to 2.5V lower than above value



CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

18. 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-1758, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 19.
NG >> Repair or replace hoses and tubes.

19. 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 20.
NG >> Repair or replace hoses, tubes or filler neck tube.

20. CHECK REFUELING CONTROL VALVE

Refer to EC-1758, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)"

OK or NG

OK >> GO TO 21.
NG >> Replace refueling control valve with fuel tank.

21. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

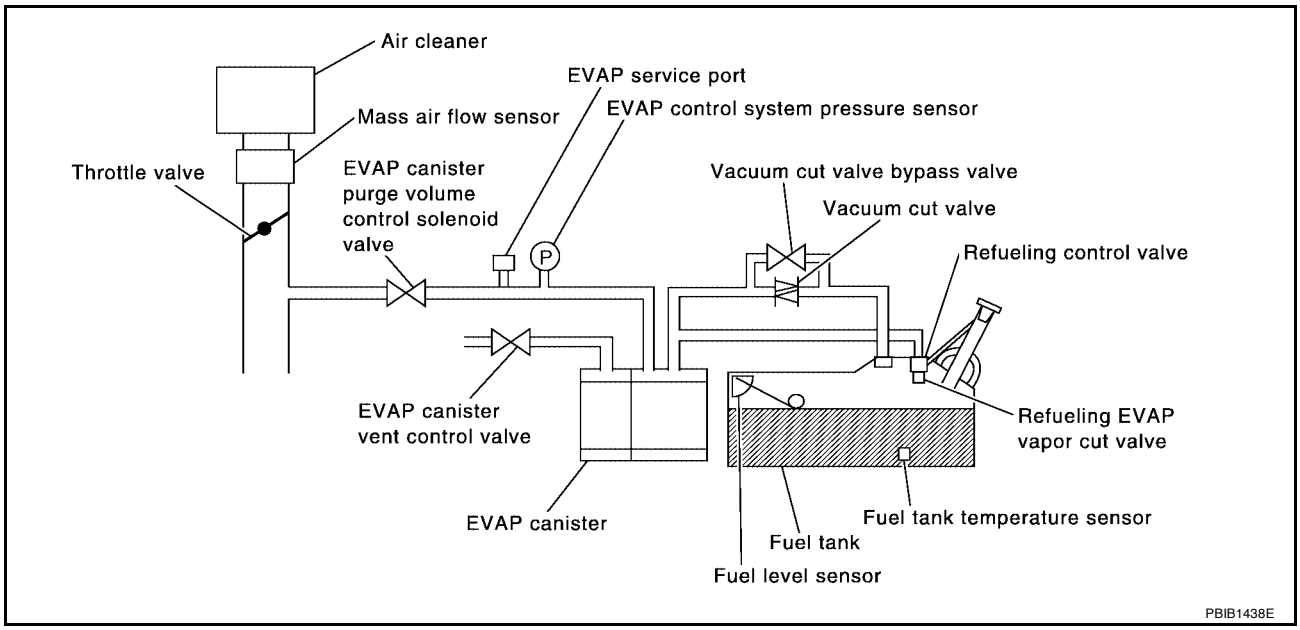
DTC P0456 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS00DYE

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.
If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be detected.
If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 will be detected.
If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456	Evaporative emission control system very small leak (negative pressure check)	● EVAP system has a very small leak. ● EVAP system does not operate properly.	● 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 ● 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 ● Refueling control valve ● ORVR system leaks ● Fuel level sensor and the circuit ● Foreign matter caught in EVAP canister purge volume control solenoid valve

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.**

DTC Confirmation Procedure

UBS00DYF

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

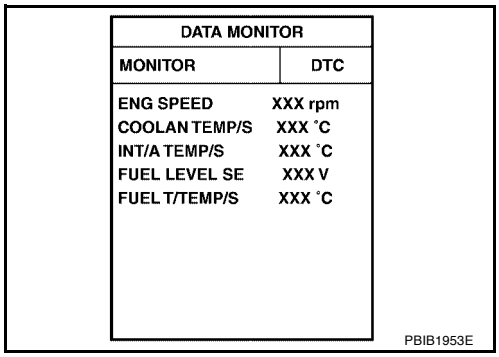
- **If DTC P0456 or P1456 is displayed with P0442, first perform trouble diagnosis for DTC P0456 or P1456.**
- **After repair, make sure that the hoses and clips are installed properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

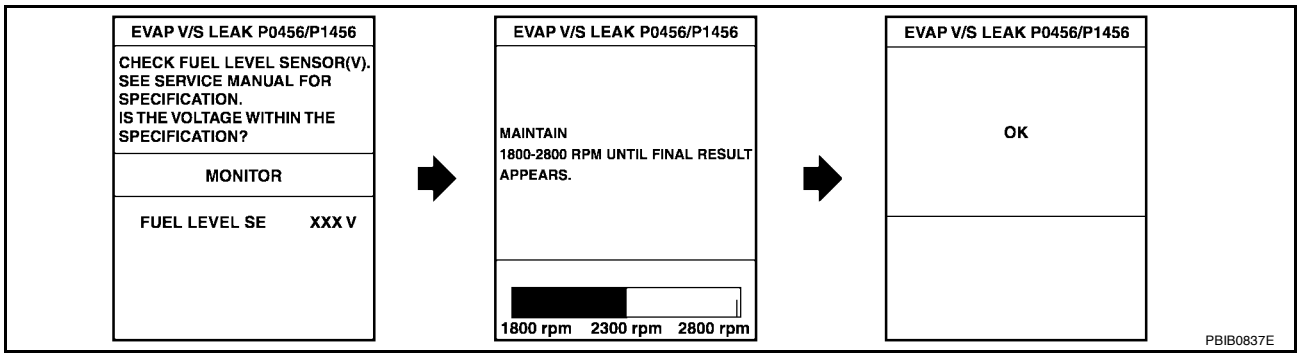
- **Open engine hood before conducting following procedure.**
- **If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**
  - **Fuel filler cap is removed.**
  - **Refilled or drained the fuel.**
  - **EVAP component parts is/are removed.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Make sure the following conditions are met.
   FUEL LEVEL SE: 1.08 - 0.2V
   COOLAN TEMP/S: 0 - 35°C (32 - 95°F)
   FUEL T/TMP SE: 0 - 32°C (32 - 90°F)
   INT A/TEMP SE: More than 0°C (32°F)
   If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the “FUEL LEVEL SE” meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).



3. Turn ignition switch OFF and wait at least 5 seconds.
4. Turn ignition switch ON.
5. Select “EVAP V/S LEAK P0456/P1456” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.



6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-1559, "Diagnostic Procedure" .

NOTE:

- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to EC-1255, "Basic Inspection" .**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

Overall Function Check

UBS00DYG

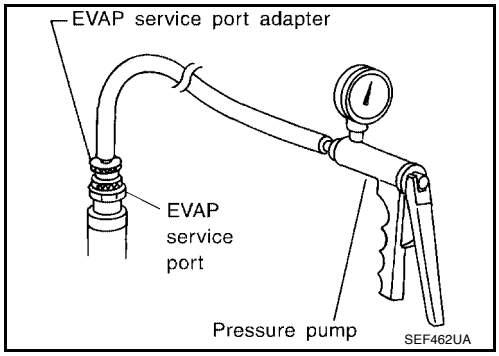
WITH GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a DTC might not be confirmed.

CAUTION:

- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2 , 0.6 psi).**

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Set the pressure pump and a hose.
3. Also set a vacuum gauge via 3-way connector and a hose.
4. Turn ignition switch ON.
5. Connect GST and select MODE 8.
6. Using MODE 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
7. Apply pressure and make sure the following conditions are satisfied.



Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)
Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg)
If NG, go to EC-1559, "Diagnostic Procedure" .

NOTE:
For more information, refer to GST instruction manual.

Diagnostic Procedure

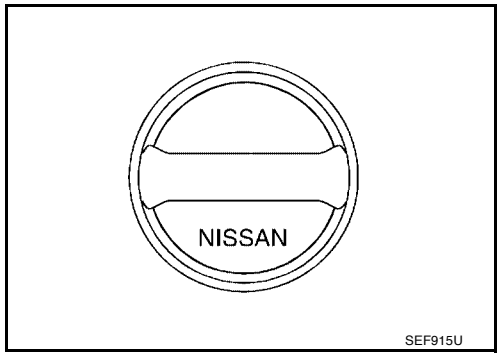
UBS00DYH

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

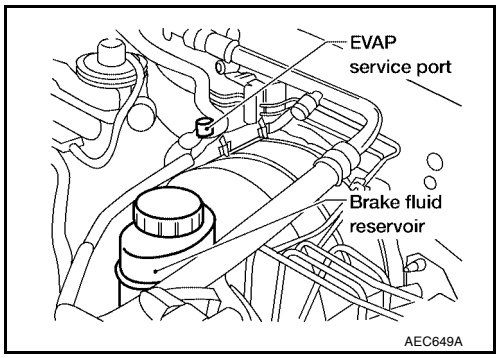
Refer to EC-1753, "Component Inspection" .

OK or NG

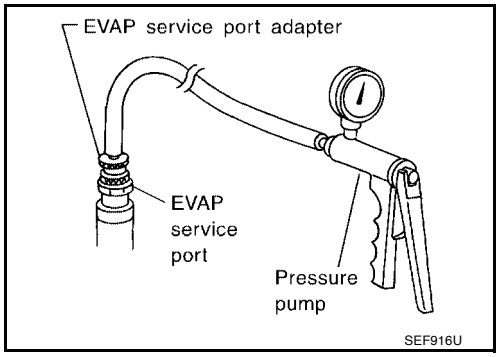
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

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.



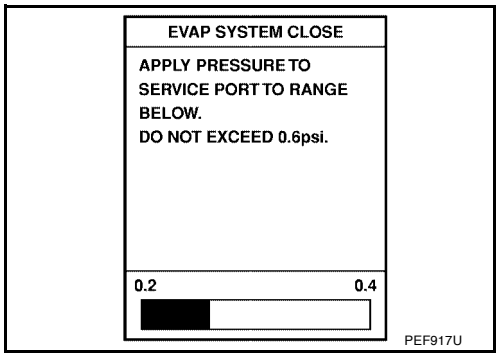
With CONSULT-II>>GO TO 6.
Without CONSULT-II>>GO TO 7.

6. CHECK FOR EVAP LEAK

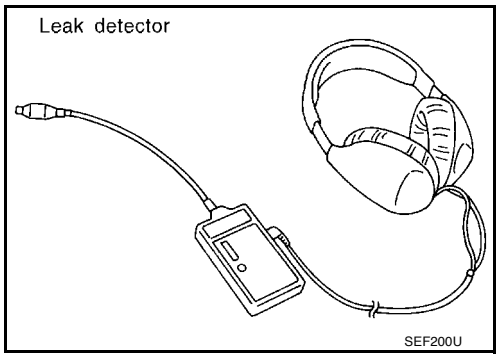
With CONSULT-II

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-1751, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

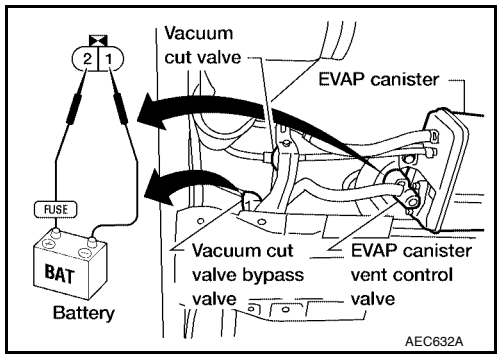
OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

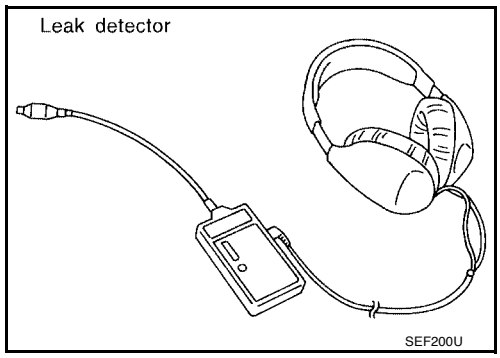
Without CONSULT-II

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-1751, "EVAPORATIVE EMISSION LINE DRAWING" .



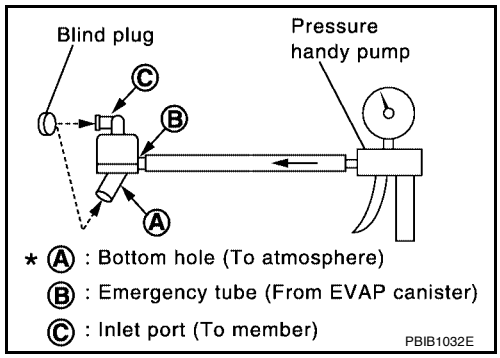
OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK 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.



OK or NG

OK >> GO TO 9.
NG >> Replace water separator.

9. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

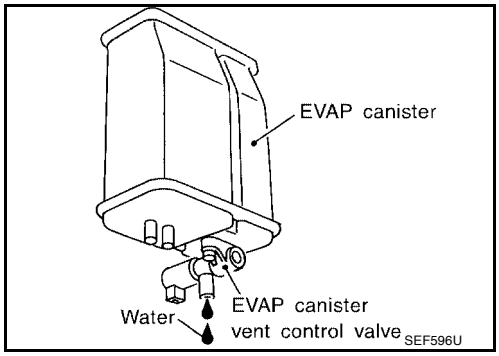
Refer to EC-1667, "DTC Confirmation Procedure" .

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%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

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-1208, "Vacuum Hose Drawing" .

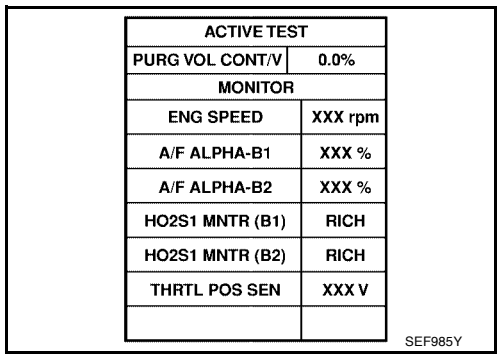
OK or NG

OK (With CONSULT-II)>>GO TO 16.
OK (Without CONSULT-II)>>GO TO 17.
NG >> Repair or reconnect the hose.

16. 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.



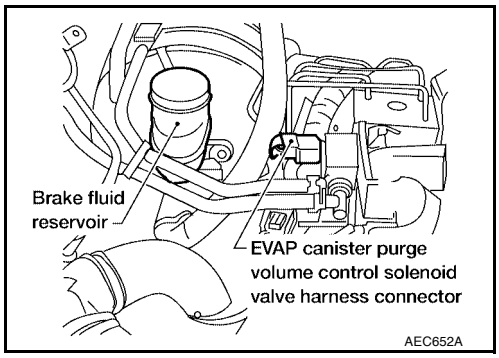
OK or NG

OK >> GO TO 18.
NG >> GO TO 17.

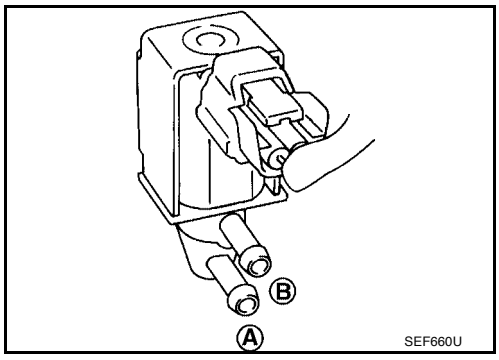
17. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

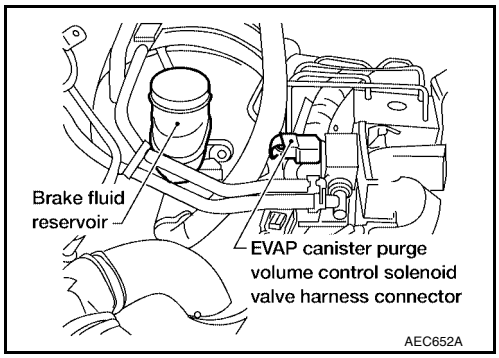


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100 %	Yes
0%	No

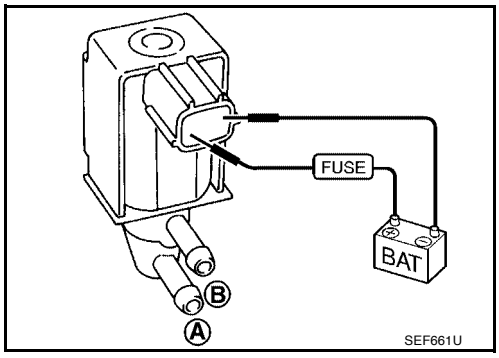


Without CONSULT-II

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 1and 2	Yes
No supply	No



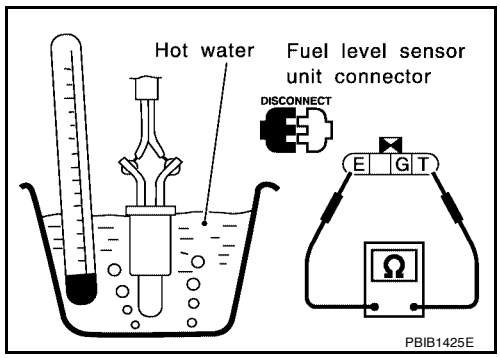
OK or NG

OK >> GO TO 18.

NG >> Replace EVAP canister purge volume control solenoid valve.

18. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit terminals T and E by heating with hot water or heat gun as shown in the figure.



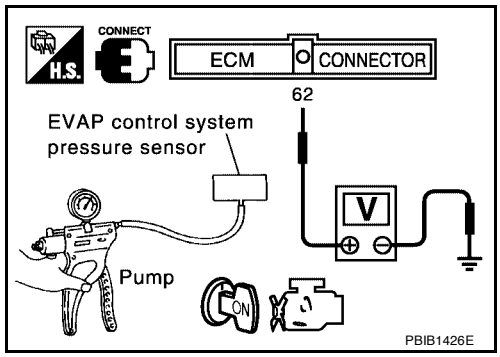
Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

OK or NG

OK >> GO TO 19.
NG >> Replace fuel level sensor unit.

19. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
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.
5. Check input voltage between ECM terminal 62 and ground.



Applied vacuum	Voltage V
Not applied	1.8 - 4.8
−26.7 kpa (−200 mmHg, −7.87 inHg)	2.1 to 2.5V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

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-1751, "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-1758, "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-1758, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)"

OK or NG

OK >> GO TO 25.
NG >> Replace refueling control valve with fuel tank.

25. CHECK FUEL LEVEL SENSOR

Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 26.
NG >> Replace fuel level sensor unit.

26. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

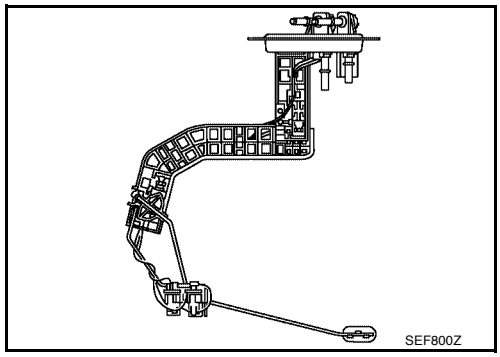
DTC P0460 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00DYI

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 is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnosis Logic

UBS00DYJ

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.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Fuel level sensor

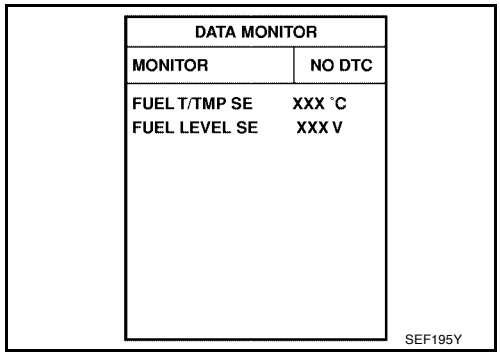
DTC Confirmation Procedure

UBS00DYK

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-1569, "Diagnostic Procedure" .



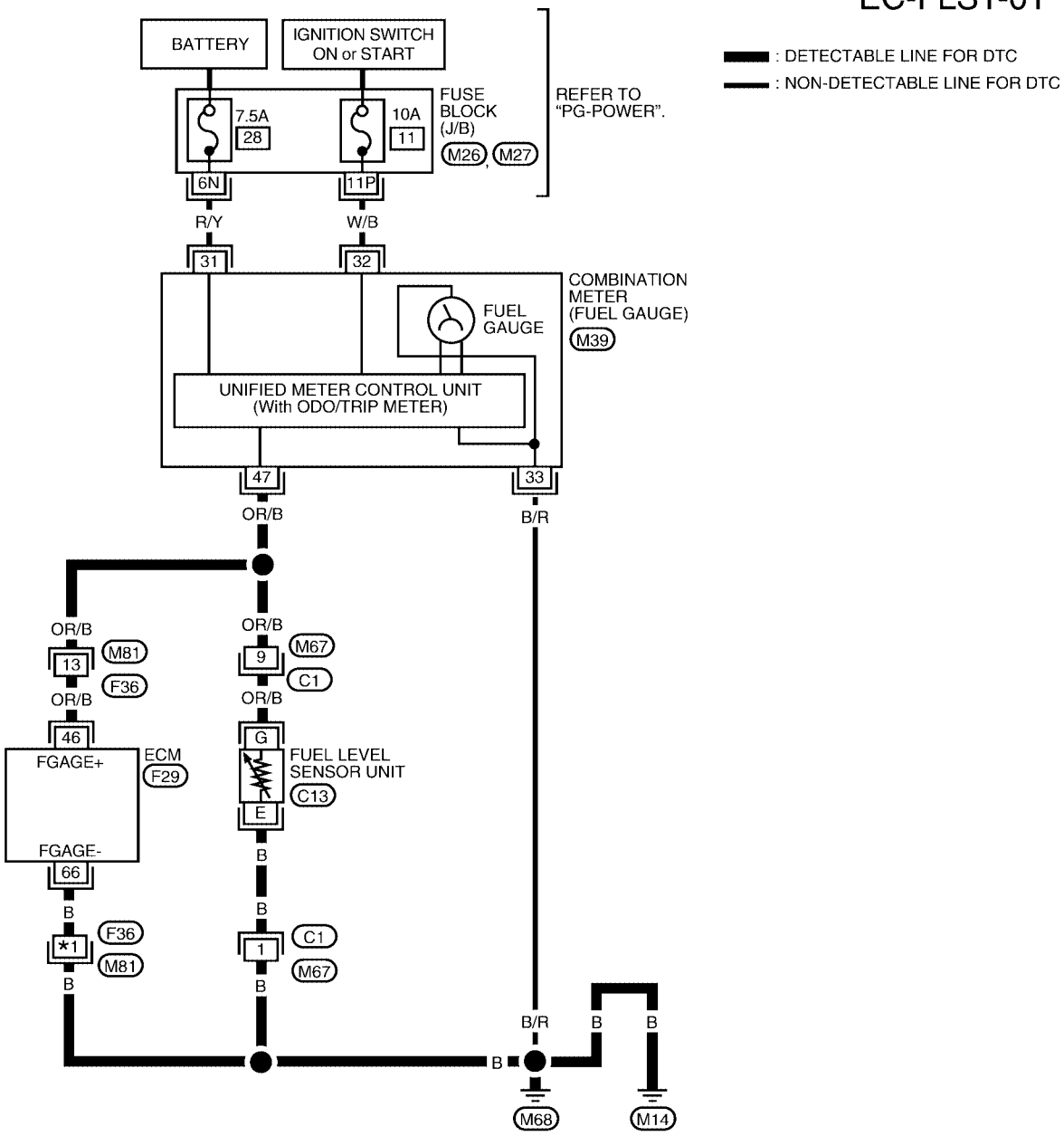
WITH GST

Follow the procedure “WITH CONSULT-II” above.

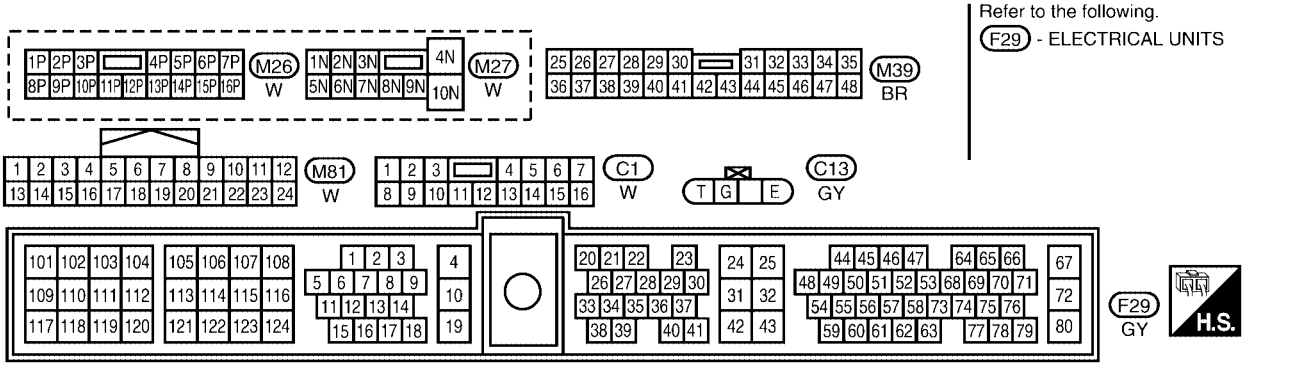
Wiring Diagram

UBS00DYL

EC-FLS1-01



Refer to the following.
F29 - ELECTRICAL UNITS



BBWA1088E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	OR/B	Fuel level sensor	**[Ignition switch: ON]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V

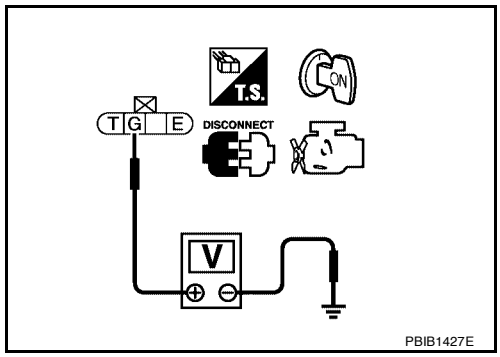
Diagnostic Procedure

UBS00DYM

1. CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit harness connector.
3. Turn ignition switch ON.
4. Check voltage between fuel level sensor unit terminal G 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 M67, C1
- Harness for open or short between combination meter and fuel level sensor unit

>> 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. Check harness continuity between fuel level sensor unit terminal E and 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.

- Harness connectors M67, C1
- Harness for open or short between fuel level sensor unit and ground

>> Repair open circuit 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 46 and fuel level sensor unit terminal G, ECM terminal 66 and 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 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M67, C1
- Harness connectors M81, F36
- Harness for open or short between ECM and fuel level sensor
- Harness for open or short between ECM and ground

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK FUEL LEVEL SENSOR

Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 8.
NG >> Replace fuel level sensor unit.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DYN

FUEL LEVEL SENSOR

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

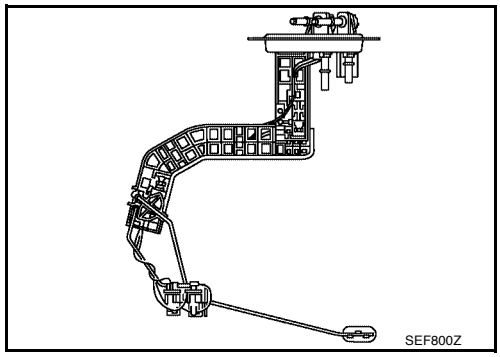
DTC P0461 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00DYO

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 is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnosis Logic

UBS00DYP

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.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0461	Fuel level sensor circuit range/performance	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.	● Harness or connectors (The sensor circuit is open or shorted) ● Fuel level sensor

Overall Function Check

UBS00DYQ

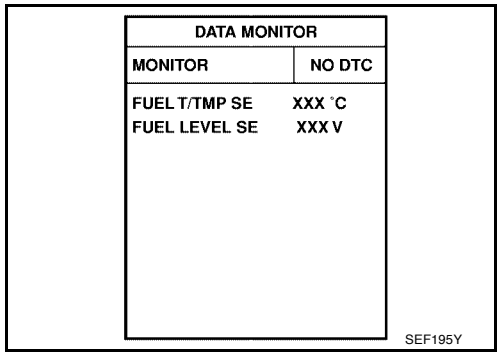
Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

WARNING:
When performing following procedure, be sure to observe the handling of the fuel. Refer to FL-3, "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-1227, "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 5 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. Check “FUEL LEVEL SE” output voltage and note it.
11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
12. Check “FUEL LEVEL SE” output voltage and note it.

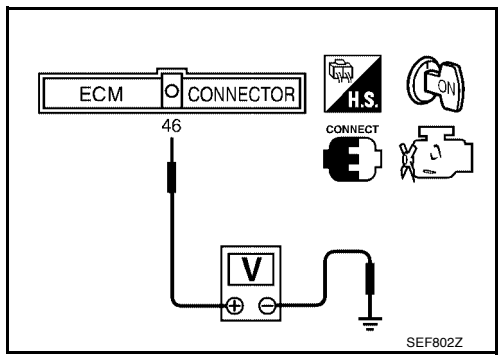


13. Confirm whether the voltage changes more than 0.03V during step 7 to 10 and 10 to12.
If NG, check the fuel level sensor, refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

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-1227, "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 46 (fuel level sensor signal) and ground.
7. Turn ignition switch ON.
8. Check voltage between ECM terminal 46 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 46 and ground changes more than 0.03V during step 8 - 10.
    If NG, check component of fuel level sensor, refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .



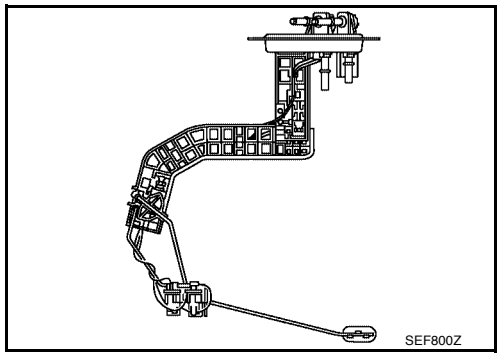
DTC P0462, P0463 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00DYR

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 is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnosis Logic

UBS00DYS

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.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462	Fuel level sensor circuit low input	An excessively low voltage is sent from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Fuel level sensor
P0463	Fuel level sensor circuit high input	An excessively high voltage is sent from the sensor is sent to ECM.	

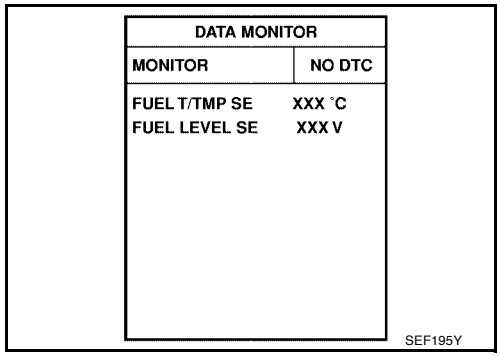
DTC Confirmation Procedure

UBS00DYT

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-1575, "Diagnostic Procedure" .

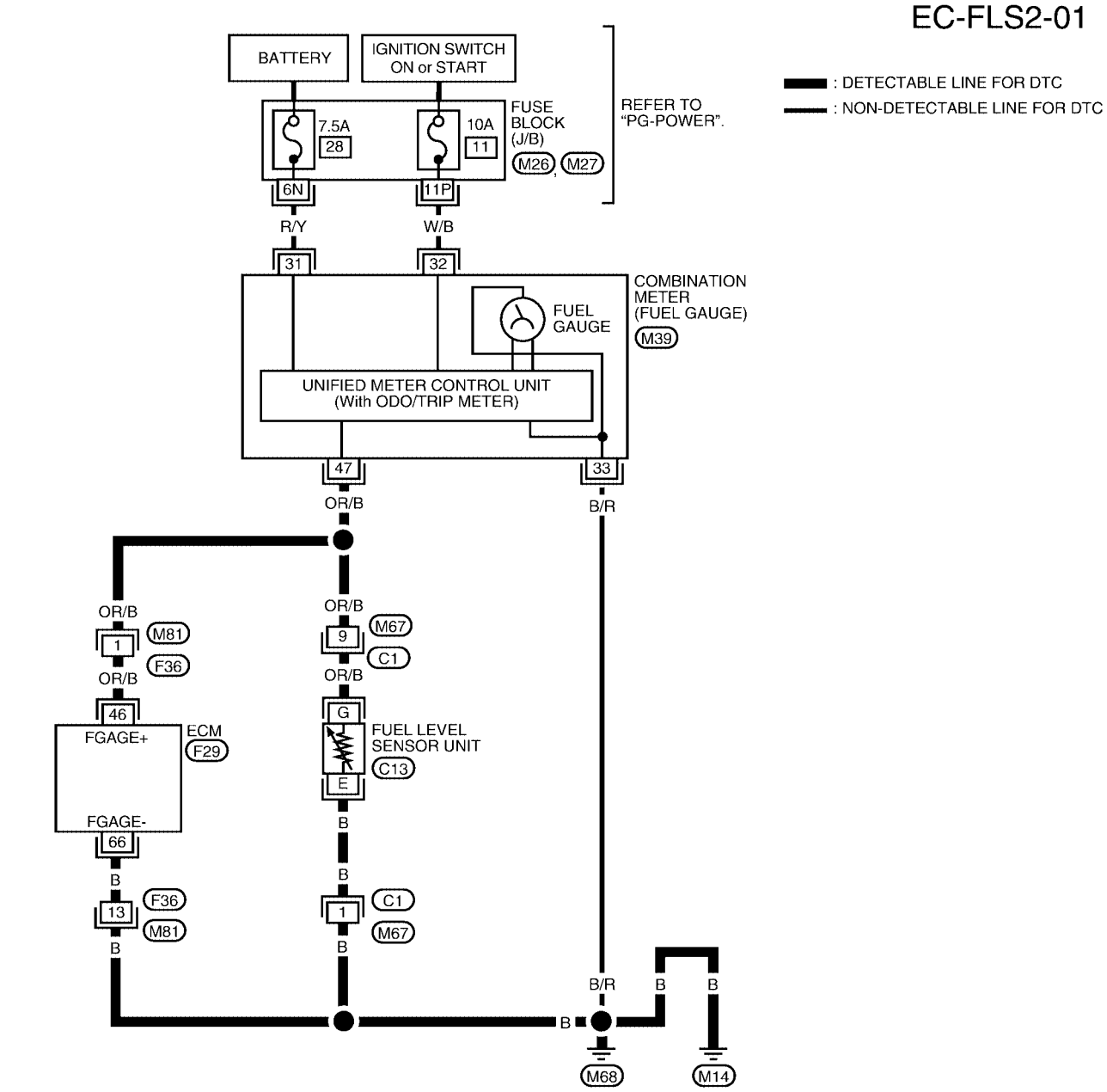


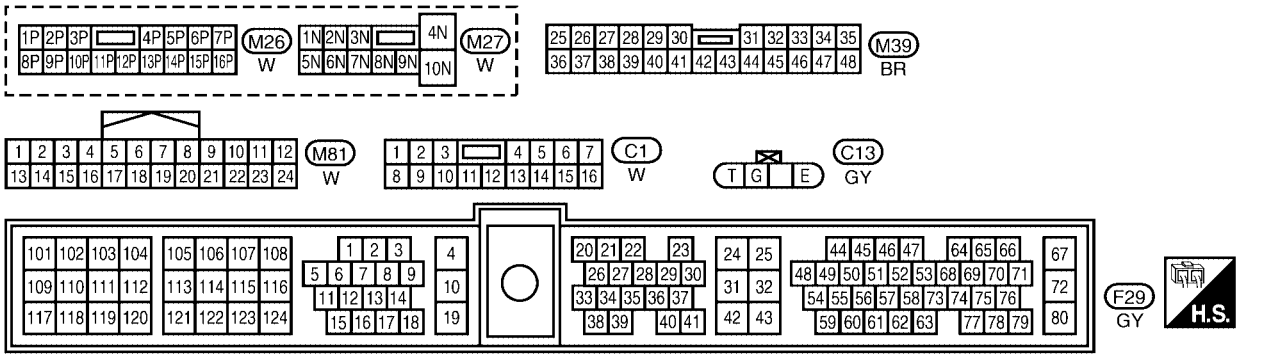
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00DYU





BBWA1089E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	OR/B	Fuel level sensor	**[Ignition switch: ON]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V

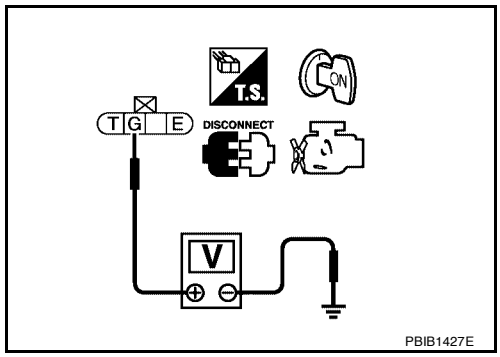
Diagnostic Procedure

UBS00DYV

1. CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit harness connector.
3. Turn ignition switch ON.
4. Check voltage between fuel level sensor unit terminal G 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 M67, C1
- Harness for open or short between combination meter and fuel level sensor unit

>> 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. Check harness continuity between fuel level sensor unit terminal E and 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.

- Harness connectors M67, C1
- Harness for open or short between fuel level sensor unit and ground

>> Repair open circuit or short to power in harness or connectors.

5. CHECK FUEL LEVEL SENSOR INPUT CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 46 and fuel level sensor unit terminal G. 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 M67, C1
- Harness connectors M81, F36
- Harness for open or short between ECM and fuel level sensor unit

>> Repair open circuit or short to ground or short to power in harness on connectors.

7. CHECK FUEL LEVEL SENSOR

Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 8.
NG >> Replace fuel level sensor unit.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00DYW

FUEL LEVEL SENSOR

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

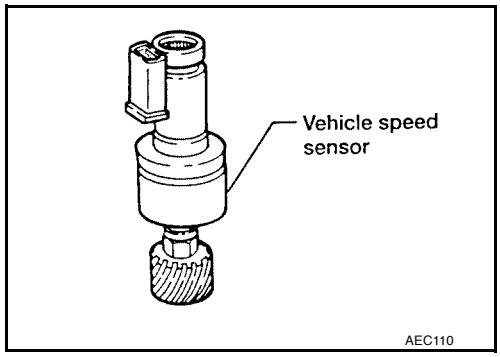
DTC P0500 VSS

PFP:32702

Component Description

UBS00DYX

The vehicle speed sensor is installed in the transmission. It contains a pulse generator which provides a vehicle speed signal to the speedometer. The speedometer then sends a signal to the ECM.



On Board Diagnosis Logic

UBS00DYY

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	● Harness or connectors (The vehicle speed sensor circuit is open or shorted.) ● Vehicle speed sensor

DTC Confirmation Procedure

UBS00DYZ

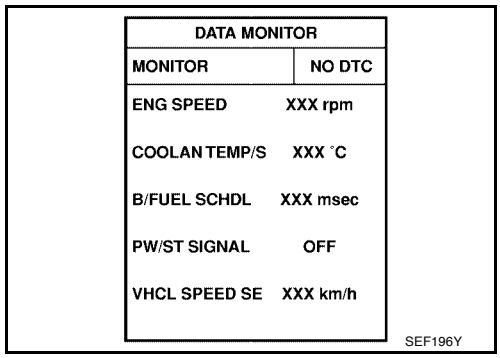
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
   If NG, go to EC-1580, "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.



END SPEED	1,700 - 6,000 rpm (A/T models) 2,000 - 6,000 rpm (M/T models)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	5.5 - 31.8 msec
Selector lever	Suitable position
PW/ST SIGNAL	OFF

6. If 1st trip DTC is detected, go to EC-1580, "Diagnostic Procedure" .

Overall Function Check

UBS00DZ0

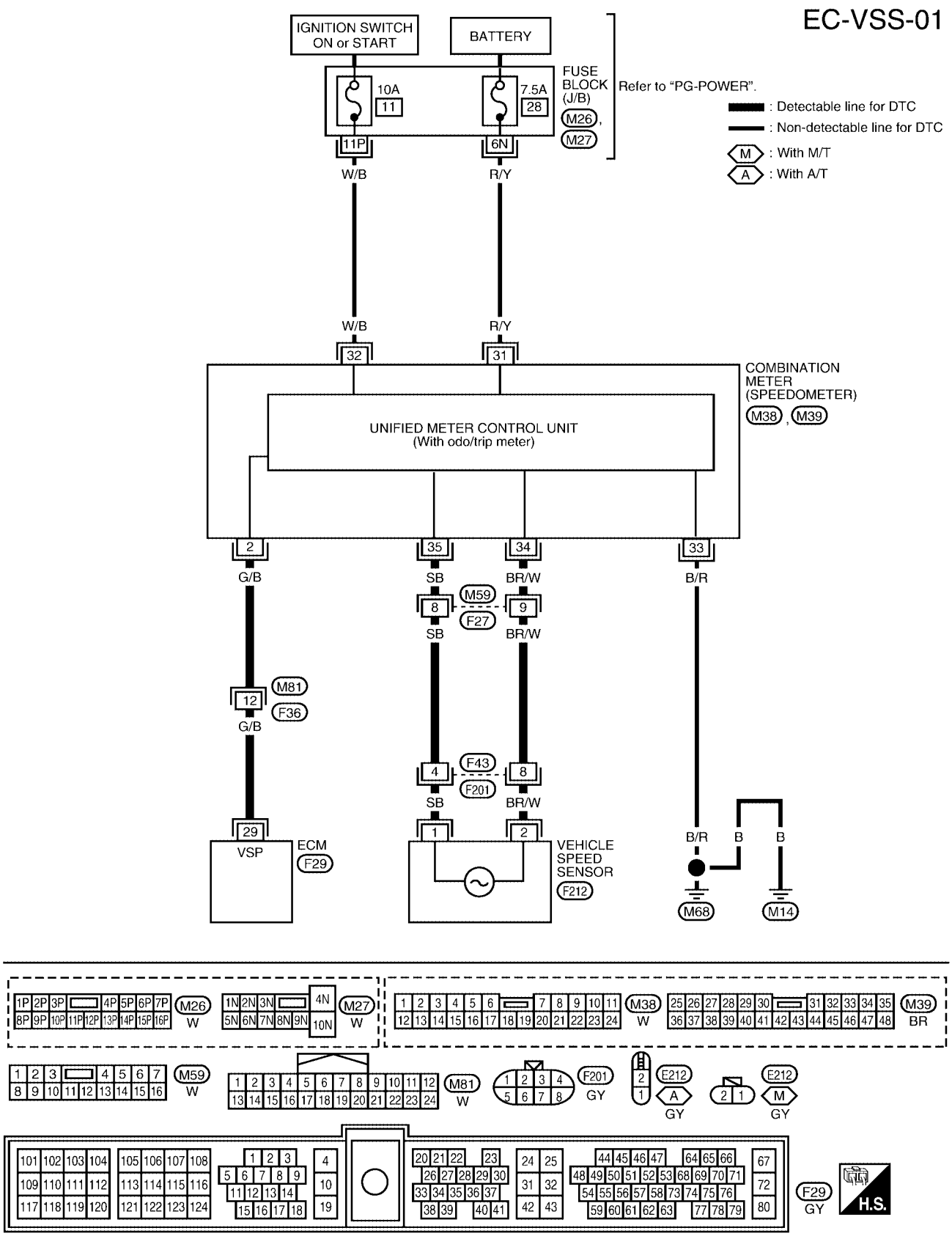
Use this procedure to check the overall function of the vehicle speed sensor circuit. During this check, a 1st trip DTC might not be confirmed.

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-1580, "Diagnostic Procedure" .

Wiring Diagram

UBS00DZ1

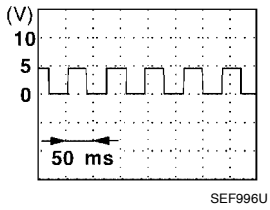


BBWA1090E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	G/B	Vehicle speed sensor	**[Engine is running]** ● Lift up the vehicle. ● Shift lever: 2nd (M/T), D (A/T) ● Vehicle speed is 40 km/h (25 MPH)	2 - 3V★  SEF996U

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00DZ2

1. CHECK VEHICLE SPEED SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and combination meter harness connector.
3. Check harness continuity between ECM terminal 29 and combination meter 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 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M81, F36
- 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.

3. CHECK SPEEDOMETER FUNCTION

Make sure that speedometer functions properly.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK SPEEDOMETER CIRCUIT FOR OPEN AND SHORT

Check the following.

- Harness connectors M59, F27
- Harness connectors F43, F201
- Harness for open or short between combination meter and vehicle speed sensor

OK or NG

OK >> Check combination meter and vehicle speed sensor. Refer to DI-3, "METERS AND GAUGES" .
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

DTC P0505 ISC SYSTEM

PFP:23781

Description

UBS00DZ3

SYSTEM DESCRIPTION

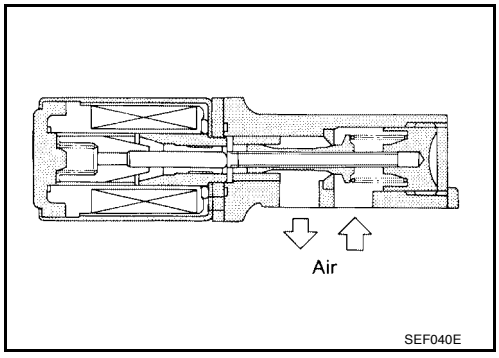
Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Idle air control	IACV-AAC valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Throttle position sensor	Throttle position		
Park/neutral position (PNP) switch	Park/neutral position		
Air conditioner switch	Air conditioner operation		
Power steering oil pressure switch	Power steering load signal		
Battery	Battery voltage		
Vehicle speed sensor	Vehicle speed		
Ambient air temperature switch	Ambient air temperature		
Intake air temperature sensor	Intake air temperature		

This system automatically controls engine idle speed to a specified level. Idle speed is controlled through fine adjustment of the amount of air which bypasses the throttle valve via IACV-AAC valve. The IACV-AAC valve repeats ON/OFF operation according to the signal sent from the ECM. The camshaft position sensor detects the actual engine speed and sends a signal to the ECM. The ECM then controls the ON/OFF time of the IACV-AAC valve so that engine speed coincides with the target value memorized in 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 warm up, deceleration, and engine load (air conditioner and power steering).

COMPONENT DESCRIPTION

IACV-AAC Valve

The IACV-AAC valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of air that will flow through the valve. The more air that flows through the valve, the higher the idle speed.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DZ4

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
IACV-AAC/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	10 - 20%
		2,000 rpm	—

On Board Diagnosis Logic

UBS00DZ5

DTC No.	Trouble diagnosis name		DTC detecting condition	Possible cause
P0505	A)	Idle speed control system circuit	The IACV-AAC valve does not operate properly	● Harness or connectors (The IACV-AAC valve circuit is open) ● IACV-AAC valve
	B)	Idle speed control system RPM lower than expected	The IACV-AAC valve does not operate properly	● Harness or connectors (The IACV-AAC valve circuit is open) ● IACV-AAC valve
	C)	Idle speed control system RPM higher than expected	The IACV-AAC valve does not operate properly	● Harness or connectors (The IACV-AAC valve circuit is open) ● IACV-AAC valve

DTC Confirmation Procedure

UBS00DZ6

NOTE:

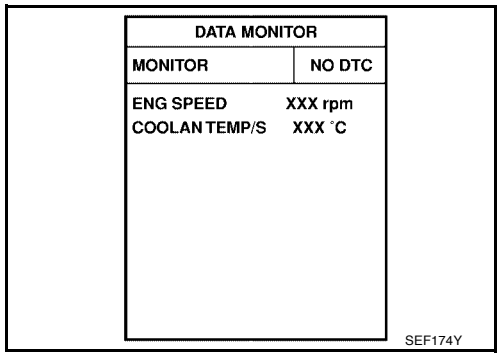
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- **Perform PROCEDURE FOR MALFUNCTION A first. If 1st trip DTC cannot confirmed, perform PROCEDURE FOR MALFUNCTION B AND C.**

PROCEDURE FOR MALFUNCTION A

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. Wait at least 2 seconds.
4. If 1st trip DTC is detected, go toEC-1586, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

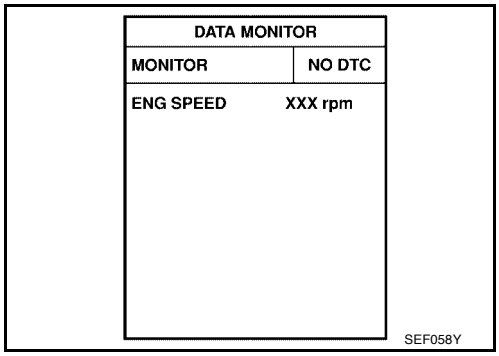
PROCEDURE FOR MALFUNCTION B AND C

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. Turn ignition switch OFF and wait at least 5 seconds.

3. Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and run it for at least 1 minute at idle speed.
5. If 1st trip DTC is detected, go to EC-1586, "Diagnostic Procedure" .



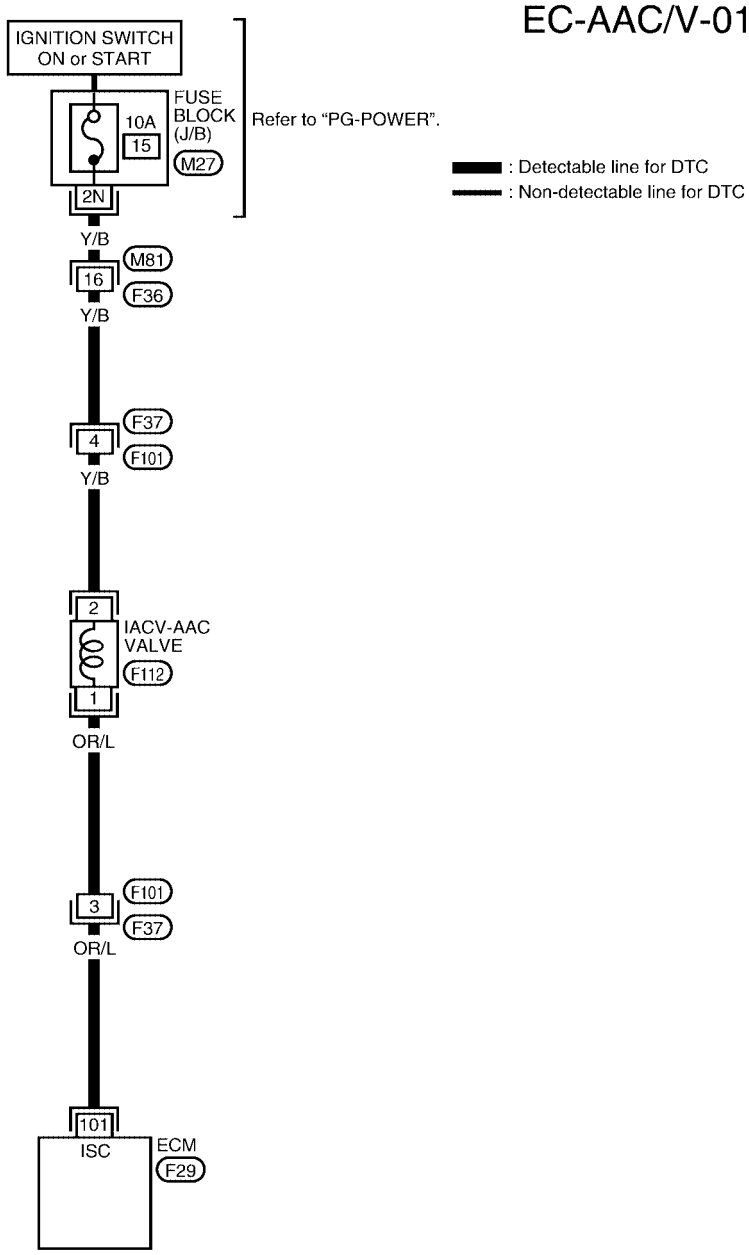
With GST

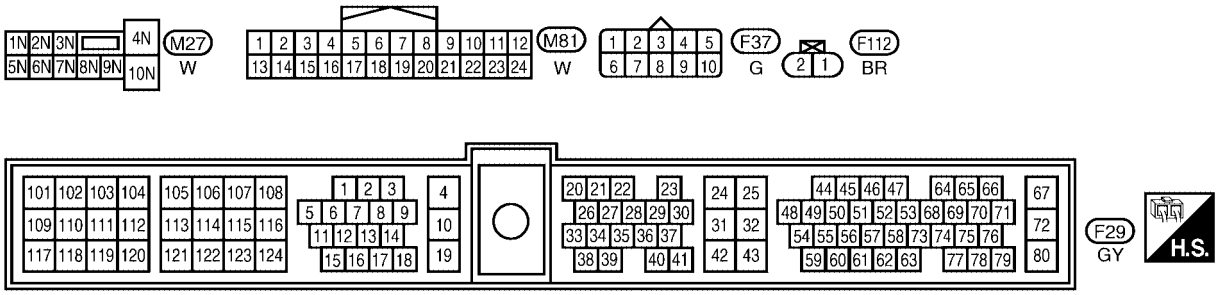
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00DZ7

EC-AAC/V-01



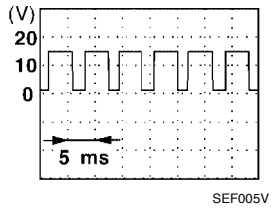
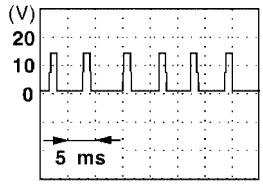


BBWA1104E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	OR/L	IACV-AAC valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	8 - 11V★  SEF005V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 3,000 rpm	7 - 10V★  SEF692W

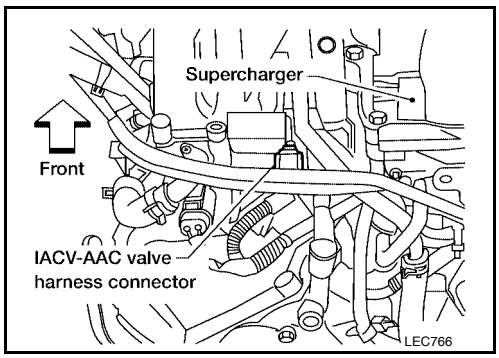
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00DZ8

1. CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.
3. Turn ignition switch ON.

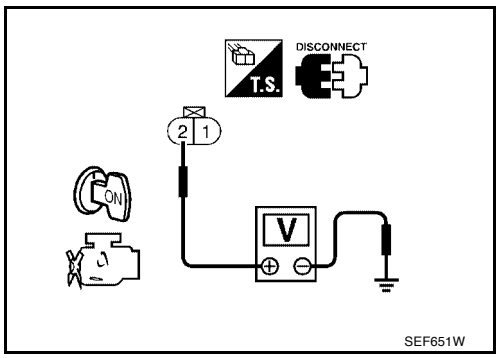


4. Check voltage between IACV-ACC valve terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M81, F36
- Harness connectors F37, F101
- Fuse block (J/B) connector M27
- 10A fuse
- Harness for open or short between IACV-AAC valve and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK IACV-AAC 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 101 and IACV-AAC valve terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

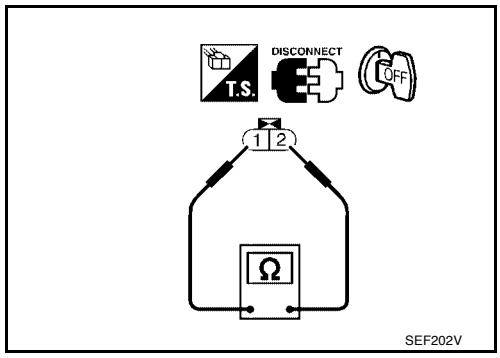
- Harness connectors F101, F37
- Harness for open or short between IACV-AAC valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK IACV-AAC VALVE

1. Remove IACV-AAC valve.
- Check IACV-AAC valve resistance.

Resistance: Approximately 10Ω [at 20°C (68°F)]



- Check plunger for seizing or sticking.
- Check for broken spring.

2. Supply battery voltage between IACV-AAC valve connector terminals.
Plunger should move.

OK or NG

OK >> GO TO 6.
NG >> Replace IACV-AAC valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END.**

Removal and Installation

UBS00DZ9

IACV-AAC VALVE

Refer to EM-80, "OUTER COMPONENT PARTS" .

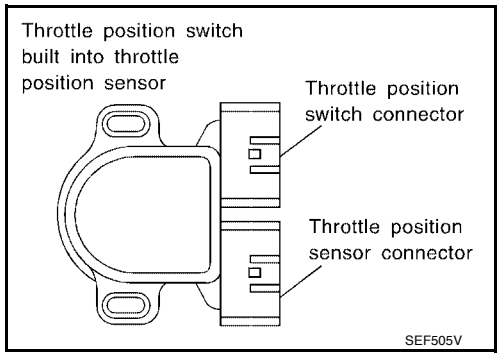
DTC P0510 CLOSED TP SWITCH

PFP:22620

Component Description

UBS00DZA

A closed throttle position switch and wide open throttle position switch are built into the throttle position sensor unit. The wide open throttle position switch is used only for A/T control.
When the throttle valve is in the closed position, the closed throttle position switch sends a voltage signal to the ECM. The ECM only uses this signal to open or close the EVAP canister purge volume control solenoid valve when the throttle position sensor is malfunctioning.



CONSULT-II Reference Value in Data Monitor Mode

UBS00DZB

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
CLSD THL/P SW	● Engine: After warming up, idle the engine	Throttle valve: Idle position	ON
		Throttle valve: Slightly open	OFF

On Board Diagnosis Logic

UBS00DZC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0510	Closed throttle position switch	Battery voltage from the closed throttle position switch is sent to ECM with the throttle valve opened	● Harness or connectors (The closed throttle position switch circuit is open or shorted) ● Closed throttle position switch ● Throttle position sensor

DTC Confirmation Procedure

UBS00DZD

CAUTION:
Always drive vehicle at a safe speed.

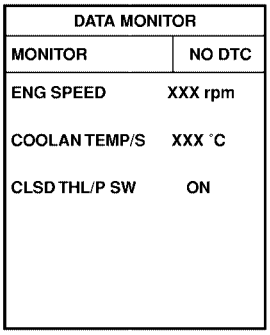
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF, wait at least 10 seconds and then start engine.
3. Select “CLSD THL/P SW” in “DATA MONITOR” mode.
4. Check the signal under the following conditions.

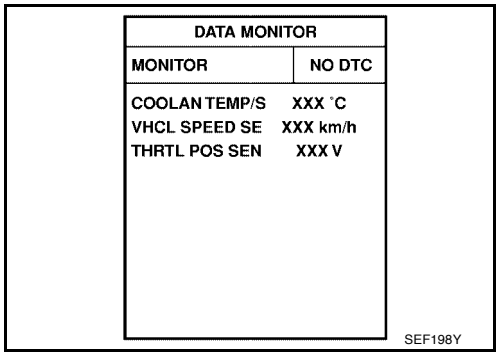
Condition	Signal indication
Throttle valve: Idle position	ON
Throttle valve: Slightly open	OFF

If the result is NG, go to EC-1592, "Diagnostic Procedure" .
If OK, go to following step.



5. Select “DATA MONITOR” mode with CONSULT-II.
6. Drive the vehicle for at least 5 consecutive seconds under the following condition.

THRTL POS SEN	More than 2.5V
VHCL SPEED SE	More than 5 km/h (3 MPH)
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.



7. If 1st trip DTC is detected, go to EC-1592, "Diagnostic Procedure" .

Overall Function Check

UBS00DZE

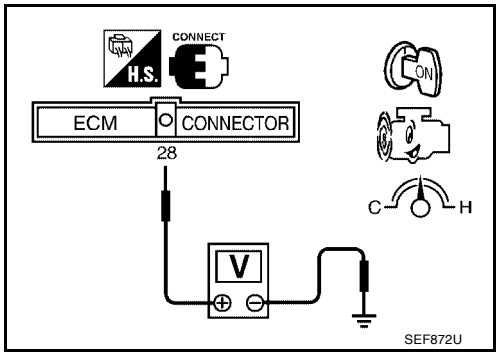
Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM terminal 28 (Closed throttle position switch signal) and ground under the following conditions.

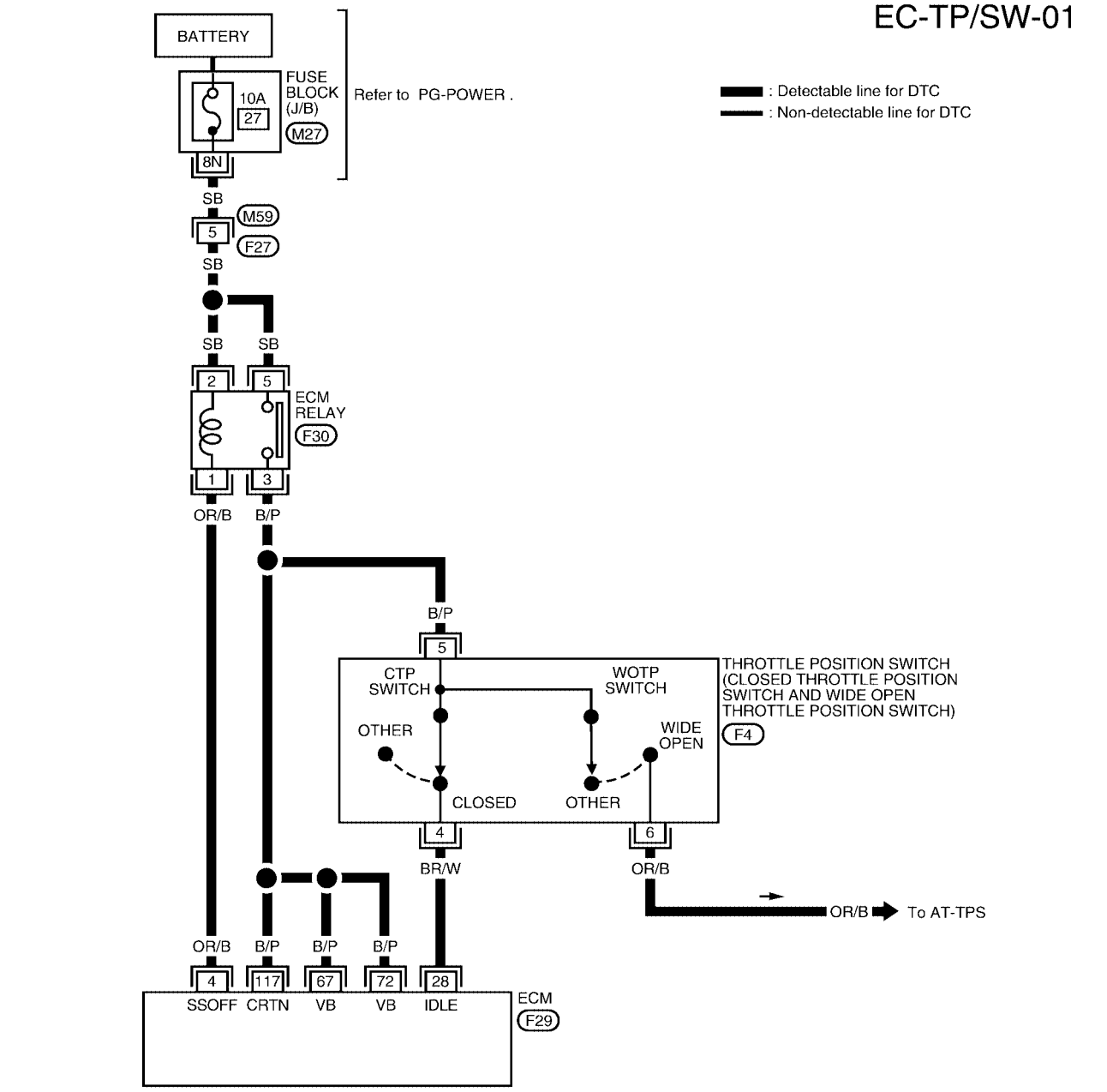
   At idle : Battery voltage
   At 2,000 rpm : Approximately 0V

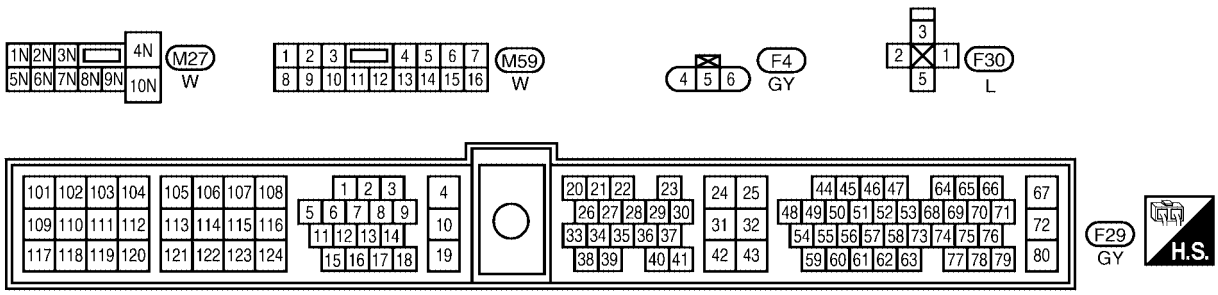
3. If NG, go to EC-1592, "Diagnostic Procedure" .



Wiring Diagram

UBS00DZF





BBWA0490E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

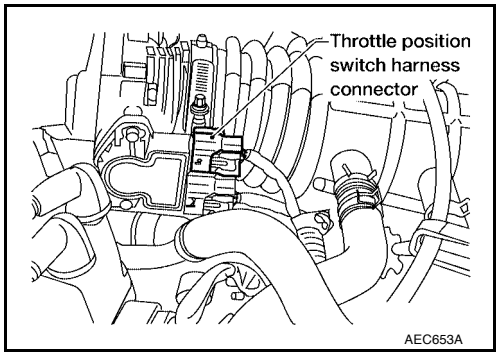
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	BR/W	Throttle position switch (Closed position)	**[Engine is running]** ● **Warm-up condition** ● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump ● Accelerator pedal is fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal is depressed	Approximately 0V

Diagnostic Procedure

UBS00DZG

1. CHECK CLOSED THROTTLE POSITION SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect throttle position switch harness connector.
3. Turn ignition switch ON.

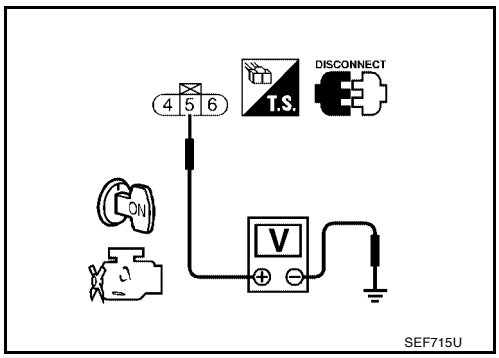


4. Check voltage between throttle position switch terminal 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between throttle position switch and ECM relay
- Harness for open or short between throttle position switch and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK CLOSED THROTTLE POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 28 and throttle position switch terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK IGNITION TIMING AND ENGINE IDLE SPEED

Check the following items. Refer to EC-1255, "Basic Inspection" .

Items	Specifications
Ignition timing	M/T: 10 ± 5° BTDC (in Neural position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

With CONSULT-II>>GO TO 5.
Without CONSULT-II>>GO TO 6.

5. CHECK CLOSED THROTTLE POSITION SWITCH

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Check indication of “CLSD THL/P SW”.
   Measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	CLSD THL/P SW
Completely closed	ON
Partially open or completely closed	OFF

OK or NG

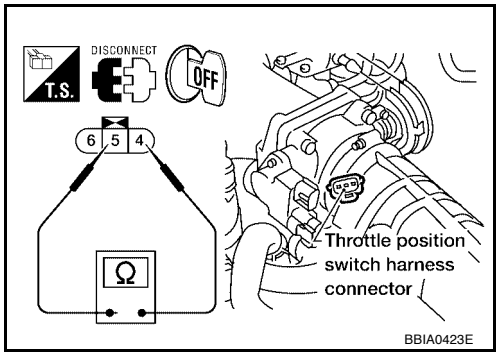
OK >> GO TO 8.
NG >> GO TO 7.

6. CHECK CLOSED THROTTLE POSITION SWITCH

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect closed throttle position switch harness connector.
4. Check continuity between closed throttle position switch terminals 4 and 5.
   Resistance measurement must be made with closed throttle position switch installed in vehicle.

Throttle valve conditions	Continuity
Completely closed	Yes
Partially open or completely closed	No



OK or NG

OK >> GO TO 9.
NG >> GO TO 7.

7. ADJUST THROTTLE POSITION SWITCH

Check the following items. Refer to EC-1255, "Basic Inspection" .

Items	Specifications
Ignitions timing	M/T: 10 ± 5° BTDC (in Neutral position) A/T: 10 ± 5° BTDC (in P or N position)
Base idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Closed throttle position switch idle position adjustment	Feeler gauge thickness and switch condition 0.3 mm (0.012 in): ON 0.4 mm (0.016 in): OFF
Target idle speed	M/T: 750 ± 50 rpm (in Neutral position) A/T: 750 ± 50 rpm (in P or N position)

If it is impossible to adjust closed throttle position switch in Basic Inspection, replace closed throttle position switch.

OK or NG

OK (with CONSULT-II)>>GO TO 8.
OK (without CONSULT-II)>>GO TO 9.
NG >> Replace throttle position switch.

8. CHECK THROTTLE POSITION SENSOR

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Check voltage of “THRTL POS SEN”.

Throttle valve conditions	Voltage [V]
Completely closed	0.15 - 0.85
Completely open	3.5 - 4.7

Voltage measurement must be made with throttle position sensor installed in vehicle.
If NG, adjust closed throttle position switch. Refer to EC-1255, "Basic Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace throttle position sensor.

9. CHECK THROTTLE POSITION SENSOR

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine (ignition switch OFF).
3. Turn ignition switch ON.
4. Check voltage between ECM terminal 23 (Throttle position sensor signal) and ground.
Voltage measurement must be made with throttle position sensor installed in vehicle.

Throttle valve conditions	Voltage [V]
Completely closed	0.15 - 0.85
Completely open	3.5 - 4.7

If NG, adjust closed throttle position switch. Refer to EC-1255, "Basic Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace throttle position sensor.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

DTC P0600 A/T COMMUNICATION LINE

PFP:23710

System Description

UBS00DZH

These circuit lines are used to control the smooth shifting up and down of A/T during the hard acceleration/ deceleration.
Voltage signals are exchanged between ECM and TCM (Transmission Control Module).

On Board Diagnosis Logic

UBS00DZI

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0600*	A/T control serial communication link	ECM receives incorrect voltage from TCM (Transmission Control Module) continuously.	● Harness or connectors [The circuit between ECM and TCM (Transmission Control Module) is open or shorted.]

*: This DTC can be detected only by “DATA MONITOR (AUTO TRIG)” with CONSULT-II.

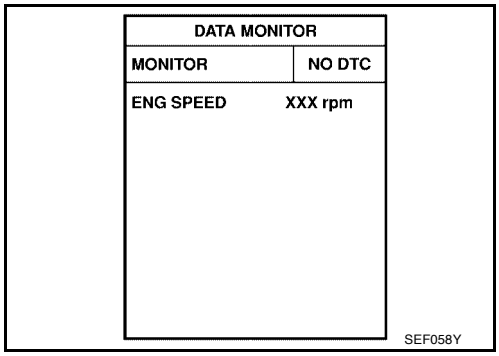
DTC Confirmation Procedure

UBS00DZJ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 rev engine more than 1,000 rpm once, then let it idle for more than 40 seconds.
4. If DTC 1st trip is detected, go to EC-1600, "Diagnostic Procedure" .



WITH GST

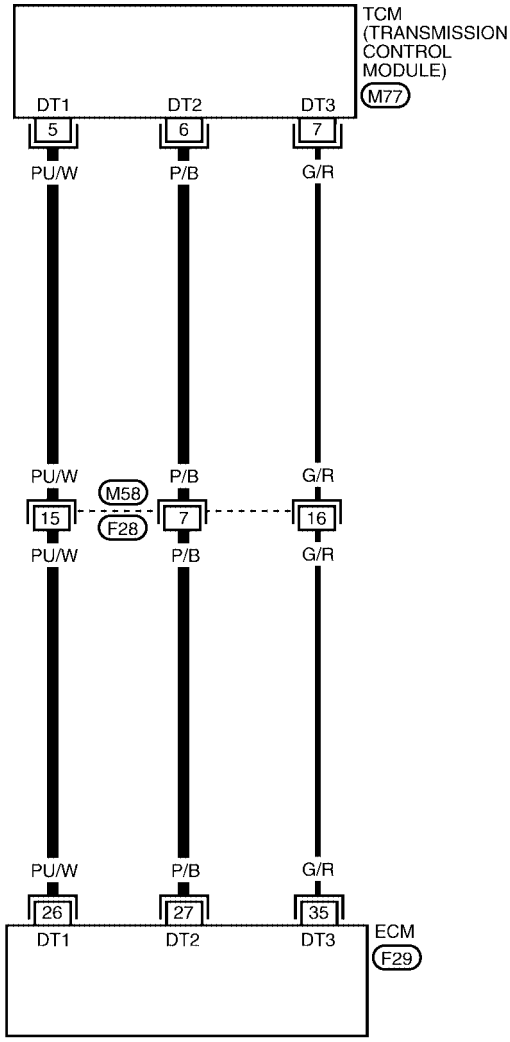
Follow the procedure “WITH CONSULT-II” above.

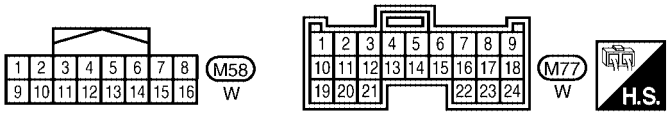
Wiring Diagram
WITHOUT VDC

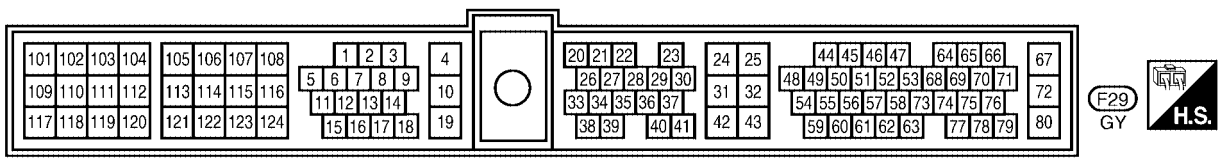
UBS00DZK

EC-AT/C-01

: Detectable line for DTC
: Non-detectable line for DTC







BBWA1092E

Specification data are reference values and are measured between each terminal and ground.

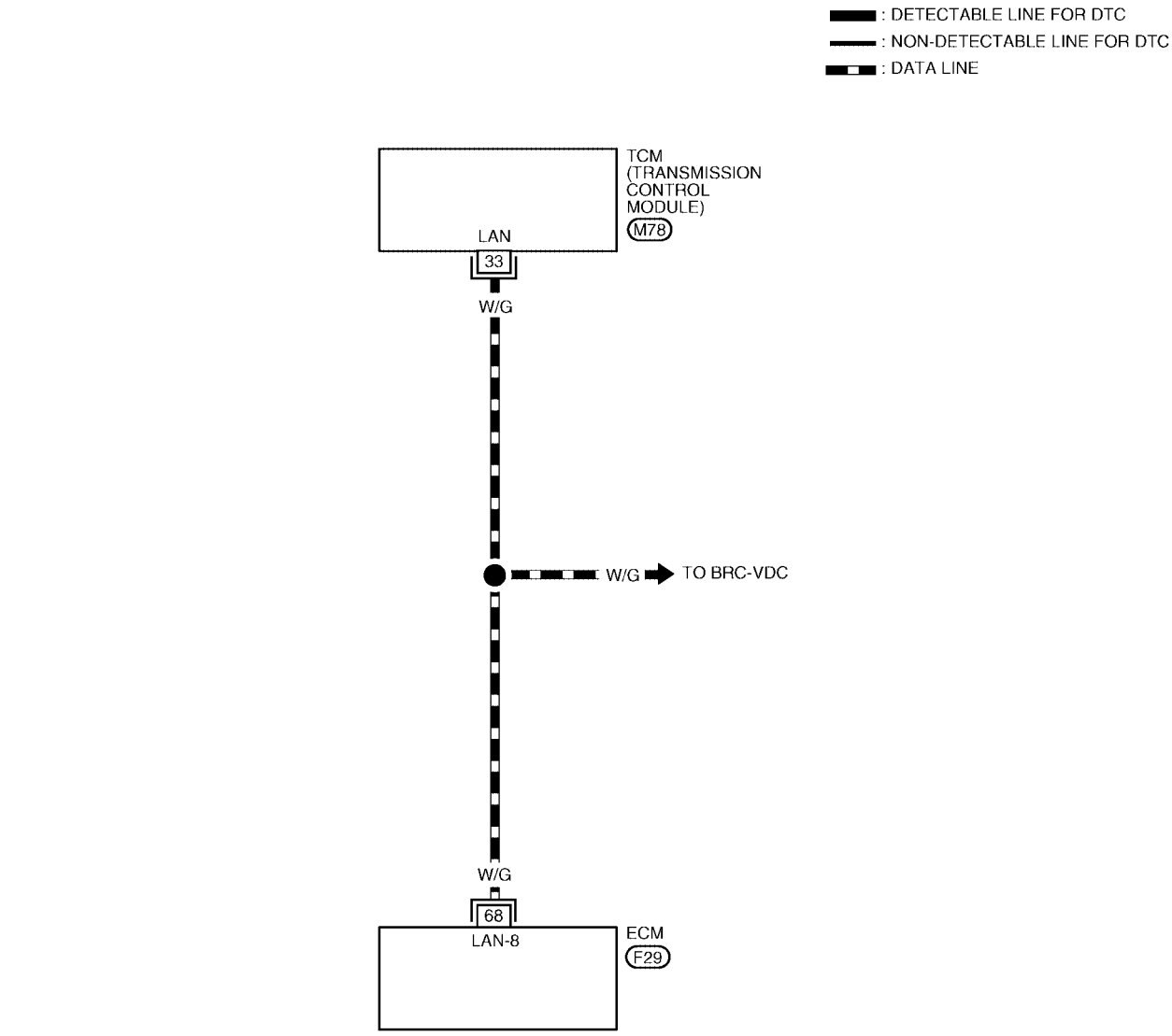
CAUTION:

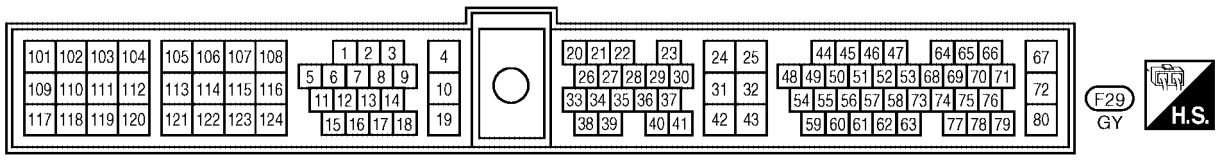
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

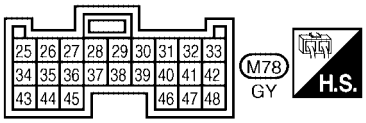
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
26	PU/W	A/T signal No. 1	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
27	P/B	A/T signal No. 2	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V
35	G/R	A/T signal No. 3	**[Engine is running]** ● Idle speed	Approximately 0 - 1.0V

WITH VDC

EC-AT/C-02







BBWA1329E

TER-MINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
68	W/G	A/T signal	**[Engine is running]** ● Idle speed	Approximately 0 - 5.0V

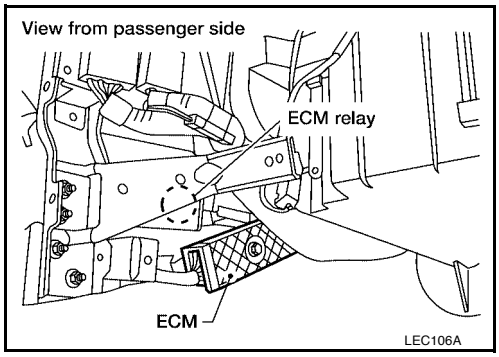
Diagnostic Procedure

UBS00DZL

WITHOUT VDC

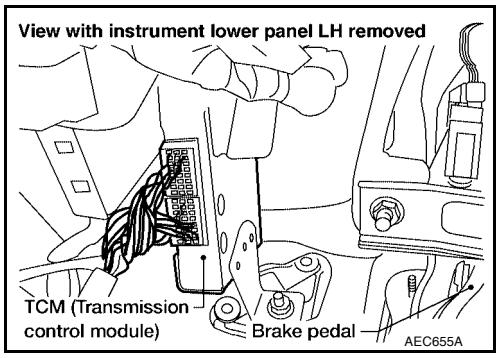
1. CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR OPEN

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.



3. Check harness continuity between ECM terminal 26 and TCM terminal 5, ECM terminal 27 and TCM terminal 6, ECM terminal 35 and TCM terminal 7.
   Refer to Wiring Diagram.

Continuity should exist.



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F28
- Harness for open or short between ECM and TCM (Transmission Control Module)

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR SHORT

1. Check harness continuity between ECM terminal 26 and ground, ECM terminal 27 and ground, ECM terminal 35 and ground.
   Refer to Wiring Diagram.

Continuity should not exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM and TCM (Transmission Control Module).

>> Repair open circuit or short to ground or short to power in harness.

5. CHECK INTERMITTENT INCIDENT

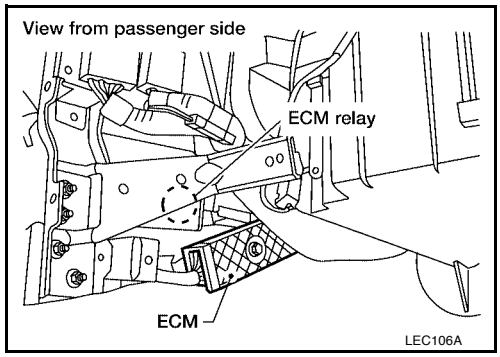
Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

WITH VDC

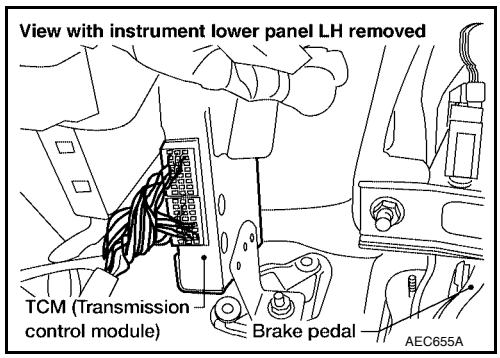
1. CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR OPEN

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.



3. Disconnect TCM harness connector.
4. Check harness continuity between ECM terminal 68 and TCM terminal 33.
   Refer to Wiring Diagram.

Continuity should exist.



OK or NG

OK >> GO TO 2.
NG >> Repair harness or connectors.

2. CHECK A/T CONTROL INPUT SIGNAL FOR SHORT

1. Check harness continuity between ECM terminal 68 and ground.
   Refer to Wiring Diagram.

Continuity should not exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair short to ground or short to power in harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END.**

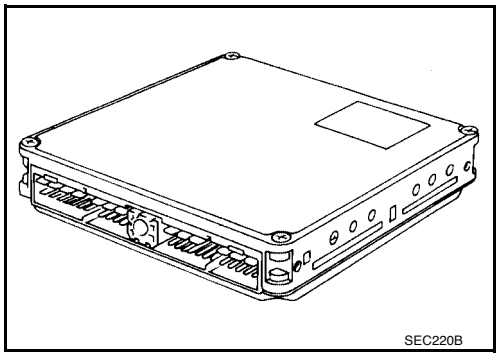
DTC P0605 ECM

PFP:23710

Component Description

UBS00DZM

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine.


SEC220B

On Board Diagnosis Logic

UBS00DZN

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0605	Engine control module	ECM calculation function is malfunctioning.	● ECM

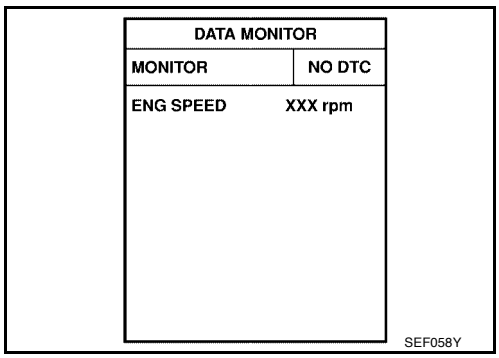
DTC Confirmation Procedure

UBS00DZO

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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. Run engine for at least 2 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-1603, "Diagnostic Procedure" .



SEF058Y

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00DZP

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-1602, "DTC Confirmation Procedure" .
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-1602, "DTC Confirmation Procedure" .
5. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes >> Replace ECM.
No >> **INSPECTION END**.

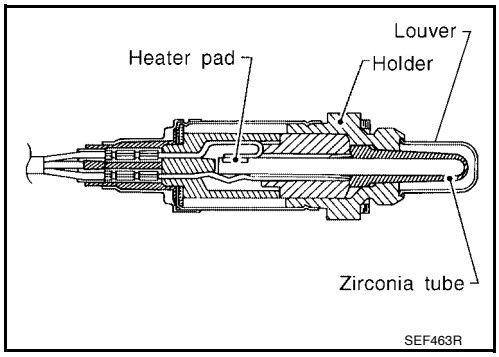
DTC P1143, P1163 HO2S1

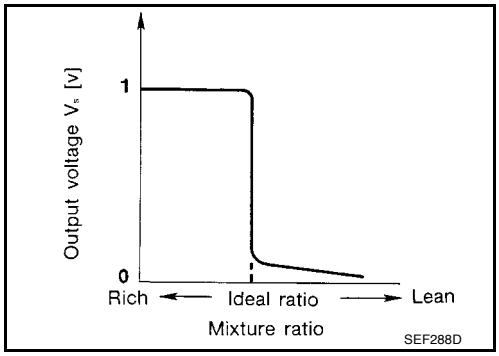
PFP:22690

Component Description

UBS00DZQ

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

UBS00DZR

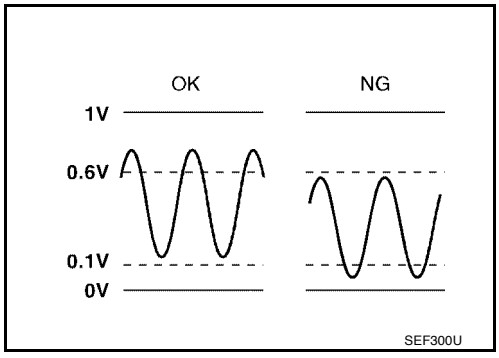
Specification data are reference values.

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

UBS00DZS

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1143 (Bank 1) P1163 (Bank 2)	Heated oxygen sensor 1 lean shift monitoring	The maximum and minimum voltage from the sensor are not reached to the specified voltages.	● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Fuel injector ● Intake air leaks

DTC Confirmation Procedure

UBS00DZT

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 5 seconds before conducting the next test.

TESTING CONDITION:

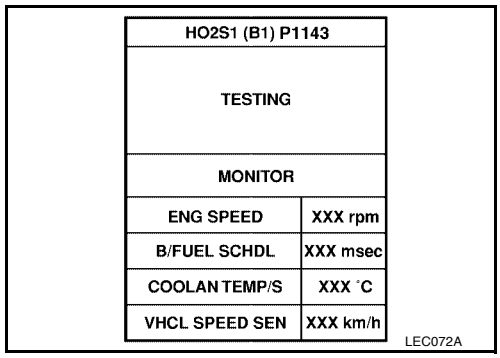
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 5 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1)/(B2) P1143/ P1163” 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.

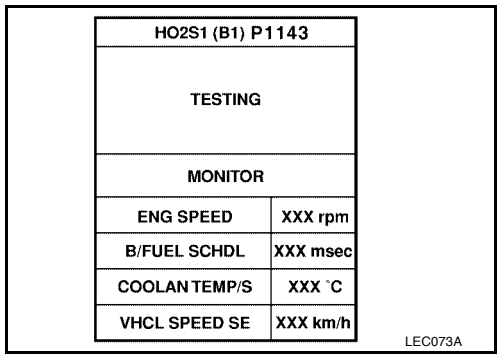
   NOTE:

   Never raise engine speed above 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 5.



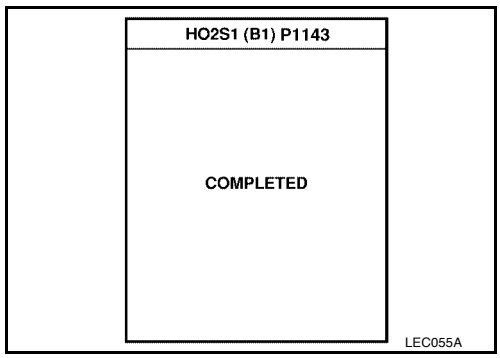
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

EGN SPEED	1,200 - 2,700 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.0 - 14.0 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-1606, "Diagnostic Procedure" .



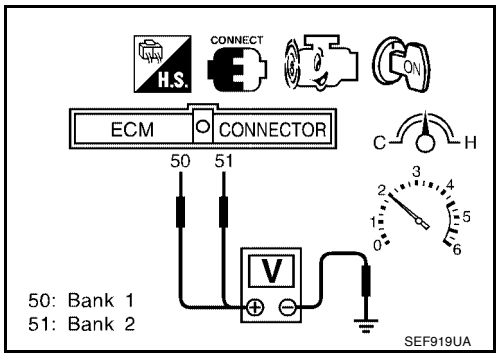
Overall Function Check

UBS00DZU

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and 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 1 time.
   - The minimum voltage is over 0.1V at least 1 time.
4. If NG, go to EC-1606, "Diagnostic Procedure" .



Diagnostic Procedure

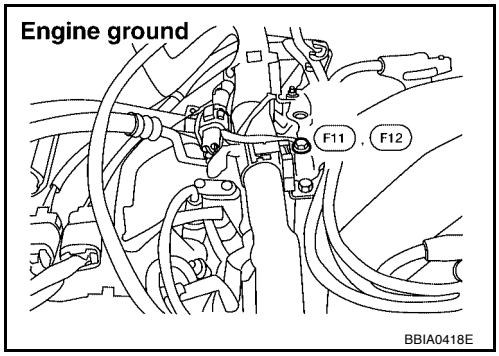
UBS00DZV

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

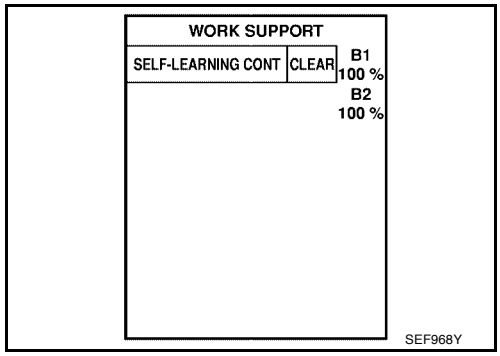
Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> 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 DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-1241, "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-1437 .
No >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 1 HEATER

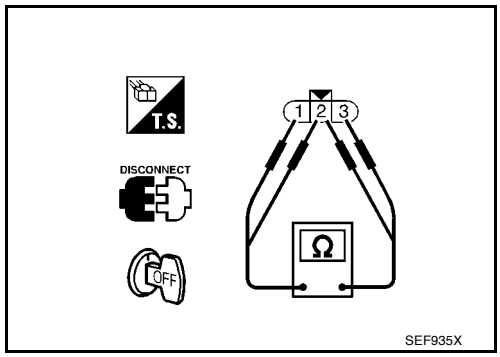
1. Stop engine.
2. Check resistance between HO2S1 terminals 3 and 1.

   Resistance: 3.3 - 4.0Ω [at 25°C (77°F)]

3. Check continuity between HO2S1 terminals 2 and 1, 3 and 2.

   Continuity should not exist.

   CAUTION:
   - **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
   - **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> Replace malfunctioning heated oxygen sensor 1.

5. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. 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 (B2)	XXX V
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

PBIB2025E

5. Check the following.

- “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
  5 times (cycles) are counted as shown below.
- “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.

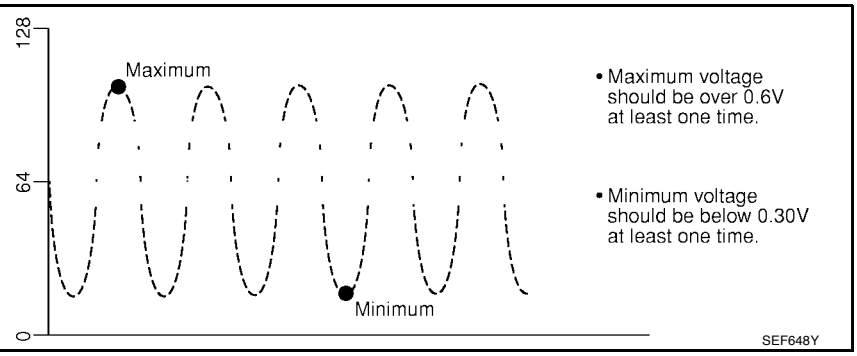
Bank 1						
	cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L-R-L-R-L-R-L-R-L-R					
Bank 2						
	cycle	1	2	3	4	5
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R					

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 oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 1.

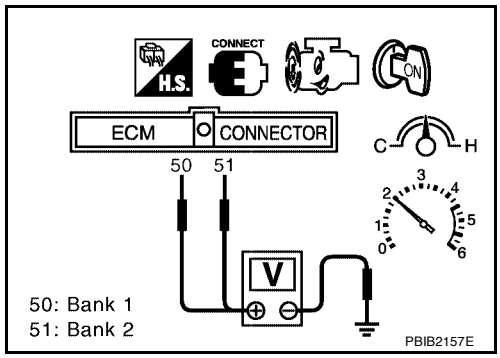
6. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and 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 1 time.
- The minimum voltage is below 0.3V at least 1 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 → 0 - 0.3V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 1.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For circuit, refer to EC-1389, "Wiring Diagram" .

>> **INSPECTION END**.

Removal and Installation

UBS00DZW

HEATED OXYGEN SENSOR 1

Refer to EM-80, "OUTER COMPONENT PARTS" .

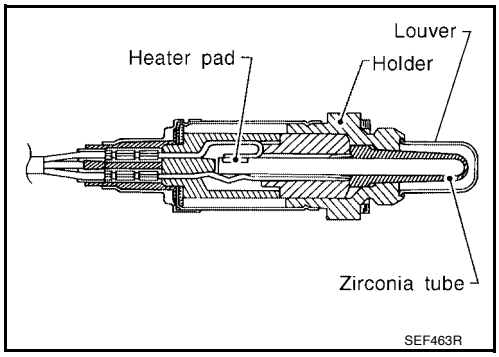
DTC P1144, P1164 HO2S1

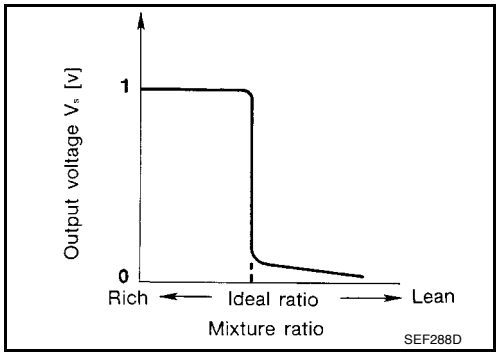
PFP:22690

Component Description

UBS00DZX

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

UBS00DZY

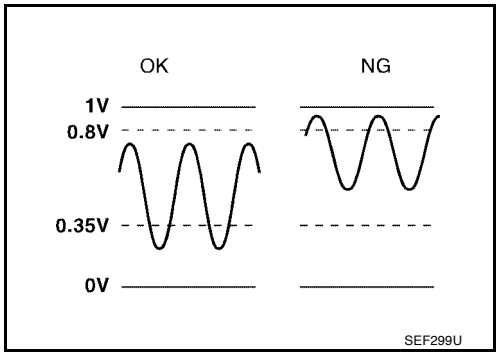
Specification data are reference values.

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

UBS00DZZ

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high. The “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1144 (Bank 1) P1164 (Bank 2)	Heated oxygen sensor 1 rich shift monitoring	The maximum and minimum voltages from the sensor are beyond the specified voltages.	● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Fuel injector

DTC Confirmation Procedure

UBS00E00

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 5 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)/(B2) P1144/P1164” 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 2,800 rpm after this step. If the engine speed limit is exceeded, return to step 5.

HO2S1 (B1) P1144	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

LEC074A

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	1,200 - 2,700 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	2.0 - 14.0 msec
Selector lever	Suitable position

HO2S1 (B1) P1144	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

LEC075A

   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-1612, "Diagnostic Procedure" .

HO2S1 (B1) P1144
COMPLETED

LEC058A

Overall Function Check

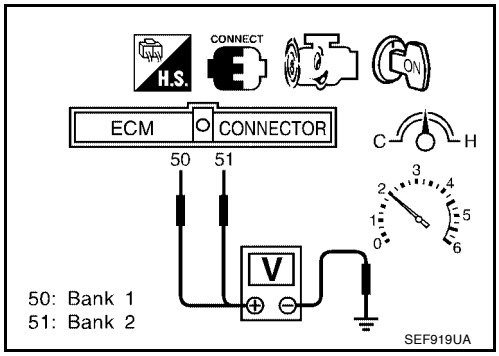
UBS00E01

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.

2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and 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 1 time.
- The minimum voltage is below 0.35V at least 1 time.
4. If NG, go to EC-1612, "Diagnostic Procedure" .



Diagnostic Procedure

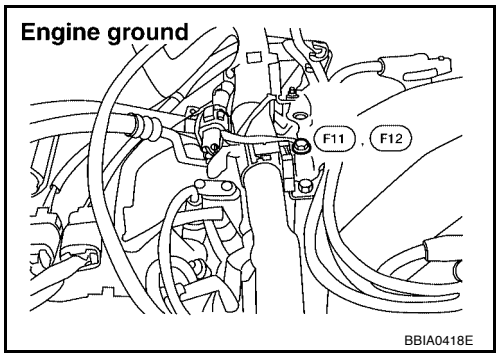
UBS00E02

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
Refer to EC-1311, "Ground Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

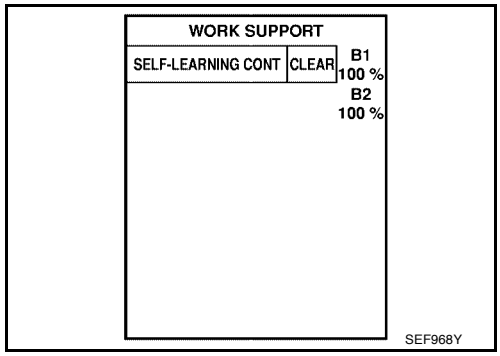
Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> 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 DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-1241, "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 toEC-1445 .
No >> GO TO 4.

4. CHECK HO2S 1 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.

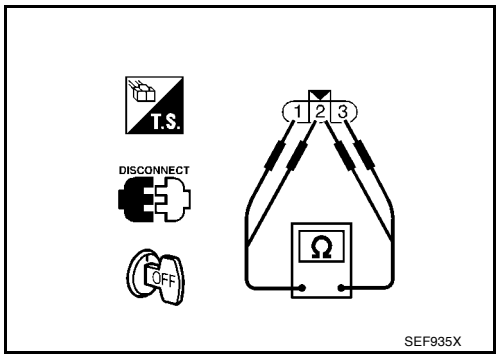
5. CHECK HEATED OXYGEN SENSOR 1 HEATER

Check resistance between HO2S1 terminals 3 and 1.

Resistance: 3.3 - 4.0Ω [at 25°C (77°F)]

Check continuity between HO2S1 terminals 2 and 1, 3 and 2.

Continuity should not exist.



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 1.

6. CHECK HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II, and select “HO2S1 (B1)/(B2)” and “HO2S1 MNTR (B1)/(B2)”.
3. Hold engine speed at 2,000 rpm under no load during the following steps.
4. 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 (B2)	XXX V
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	RICH

PBIB2025E

5. Check the following.

– “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
5 times (cycles) are counted as shown below.

– “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									

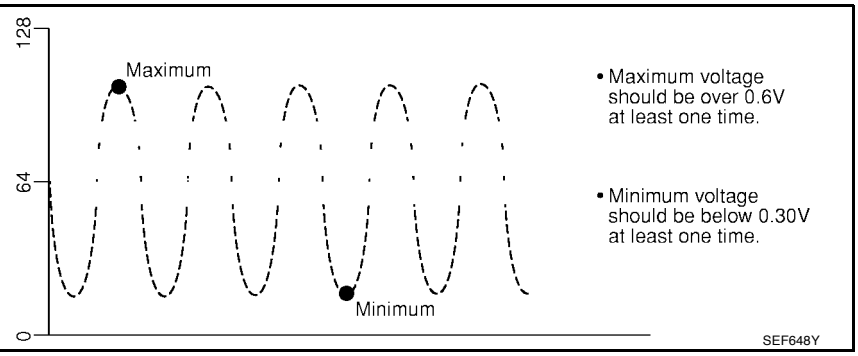
Bank 2										
cycle		1	2	3	4	5				
HO2S1 MNTR (B2)	R-L-R-L-R-L-R-L-R-L-R									

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 oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

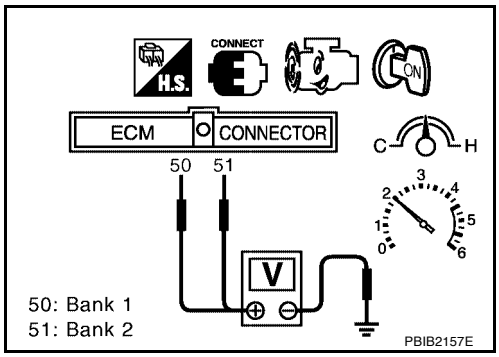
OK >> GO TO 8.
NG >> Replace malfunctioning heated oxygen sensor 1.

7. CHECK HEATED OXYGEN SENSOR 1

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and 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 1 time.
- The minimum voltage is below 0.3V at least 1 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 → 0 - 0.3V

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 8.
NG >> Replace malfunctioning heated oxygen sensor 1.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For circuit, refer to EC-1389, "Wiring Diagram" .

>> **INSPECTION END**.

Removal and Installation

UBS00E03

HEATED OXYGEN SENSOR 1

Refer to EM-80, "OUTER COMPONENT PARTS" .

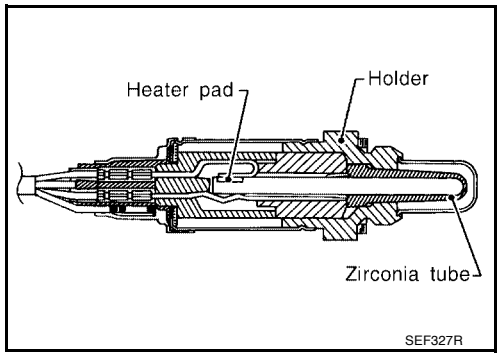
DTC P1146, P1166 HO2S2

PFP:226A0

Component Description

UBS00E04

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00E05

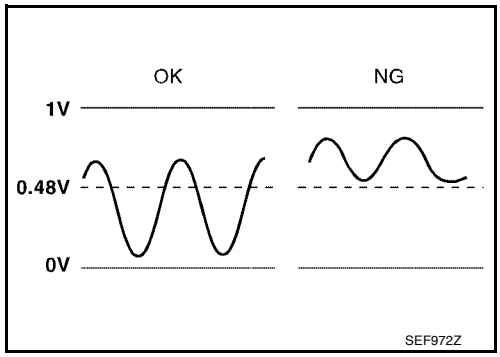
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Warm-up condition ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for1e minute under no load.	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS00E06

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146 (Bank 1) P1166 (Bank 2)	Heated oxygen sensor 2 minimum voltage monitoring	The minimum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector

DTC Confirmation Procedure

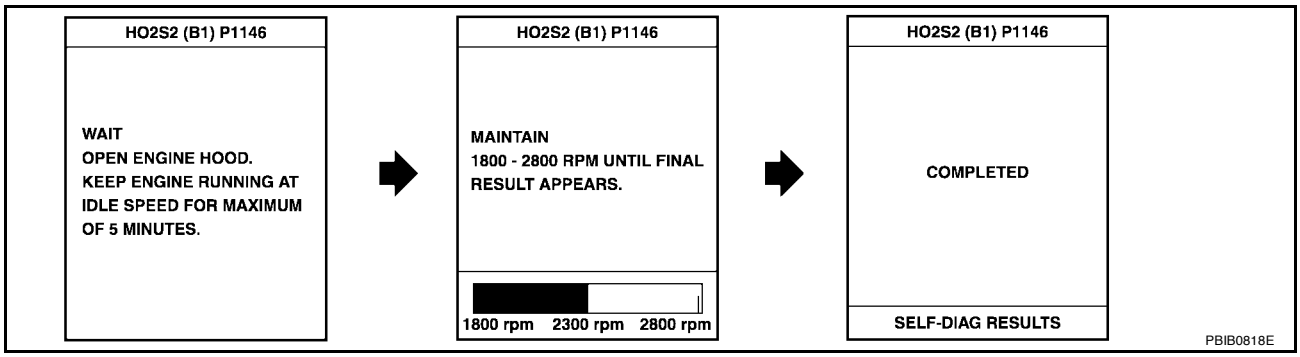
UBS00E07

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.

4. Let engine idle for 1 minute.
5. Select “HO2S2 (B1) P1146” or “HO2S2 (B2) P1166” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.



6. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-1623, "Diagnostic Procedure" .
   If “CAN NOT 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

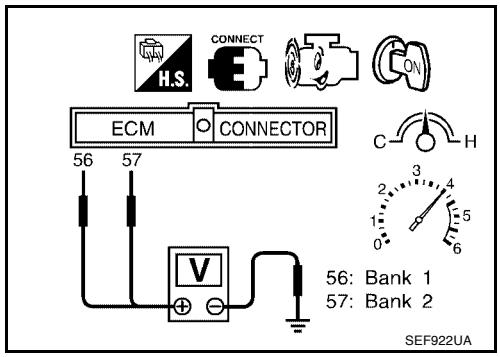
UBS00E08

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

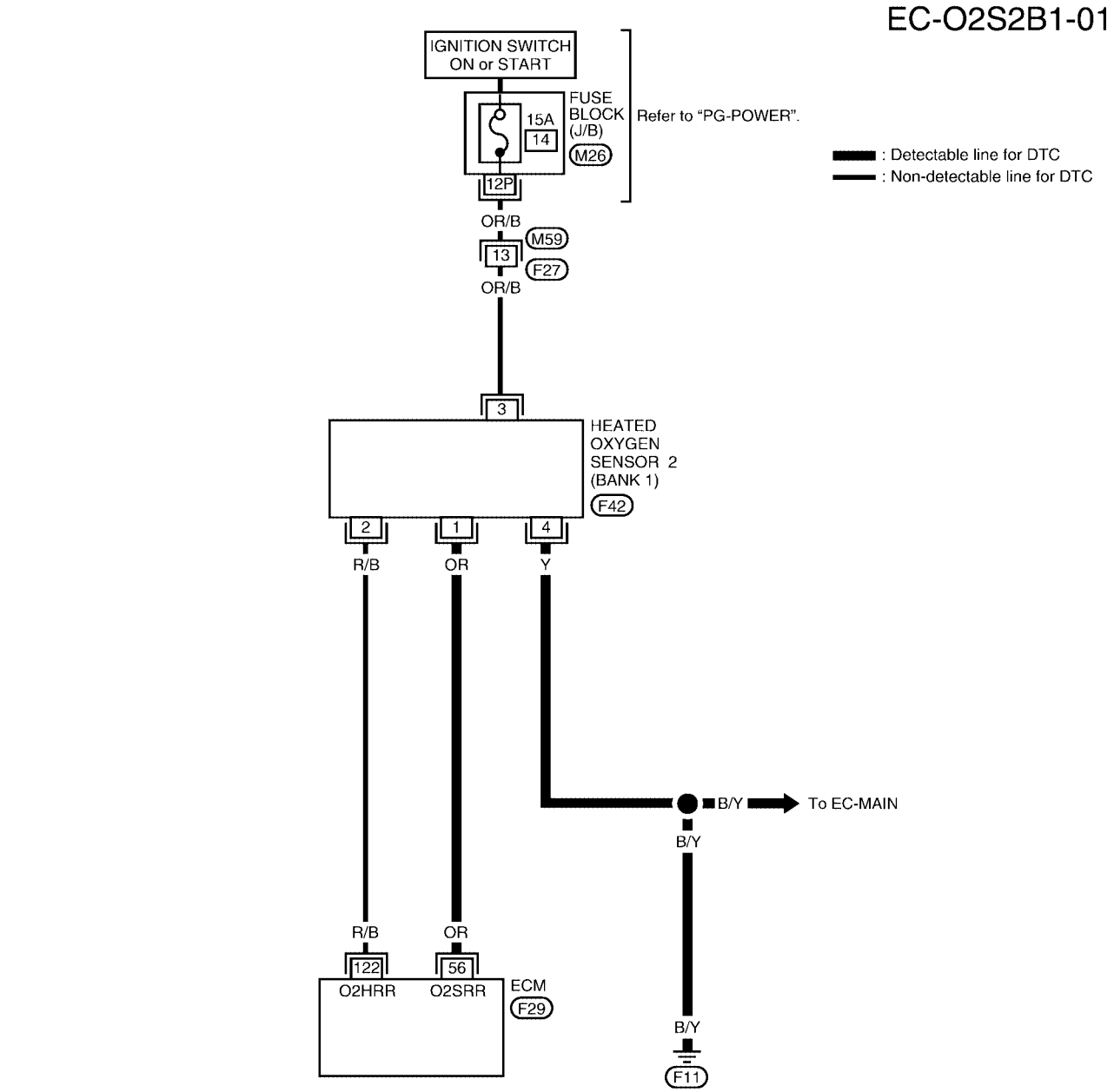
WITH GST

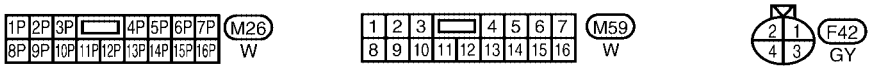
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.48V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.48V at least once during this procedure.
8. If NG, go to EC-1623, "Diagnostic Procedure" .

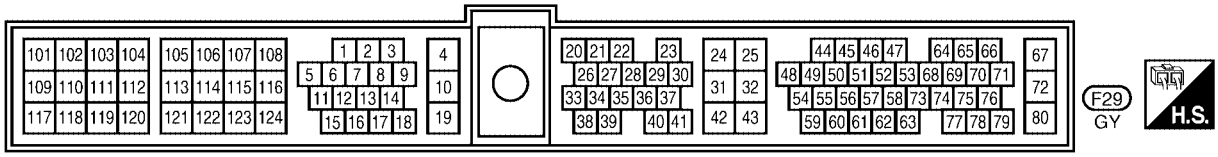


Wiring Diagram
BANK 1

UBS00E09







BBWA1079E

Specification data are reference values and are measured between each terminal and ground.

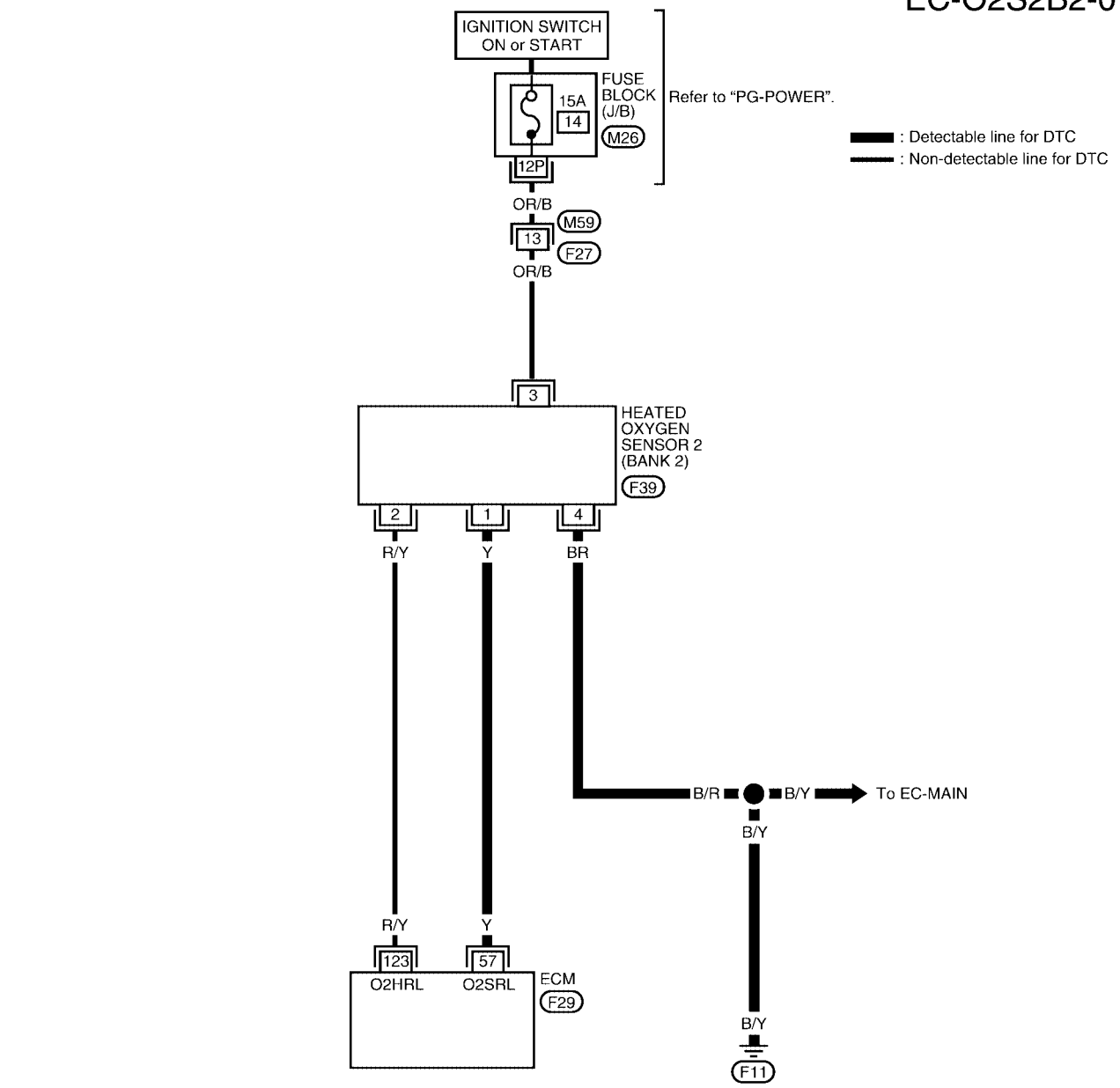
CAUTION:

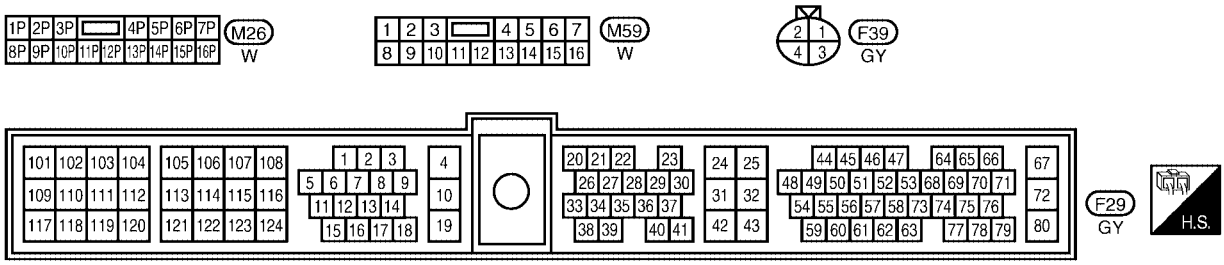
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

BANK 2

EC-O2S2B2-01





BBWA1080E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	Y	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

Diagnostic Procedure

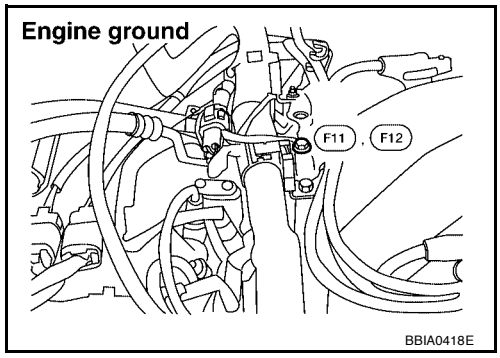
UBS00E0A

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

OK or NG

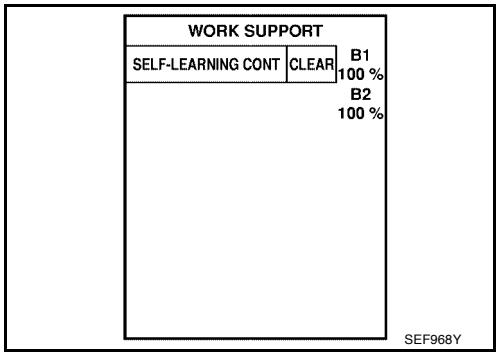
OK >> GO TO 2.
NG >> Repair or replace ground connections.



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 DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-1241, "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-1445 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

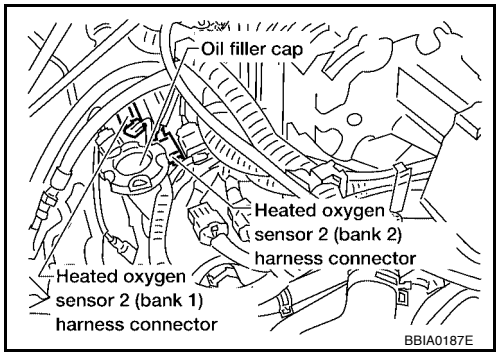
1. Disconnect heated oxygen sensor 2 harness connector.
2. Check harness continuity between HO2S2 terminal 4 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.



4. CHECK HO2S2 INPUT 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	
P1146	56	1	Bank 1
P1166	57	1	Bank 2

Continuity should exist.

4. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1146	56	1	Bank 1
P1166	57	1	Bank 2

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

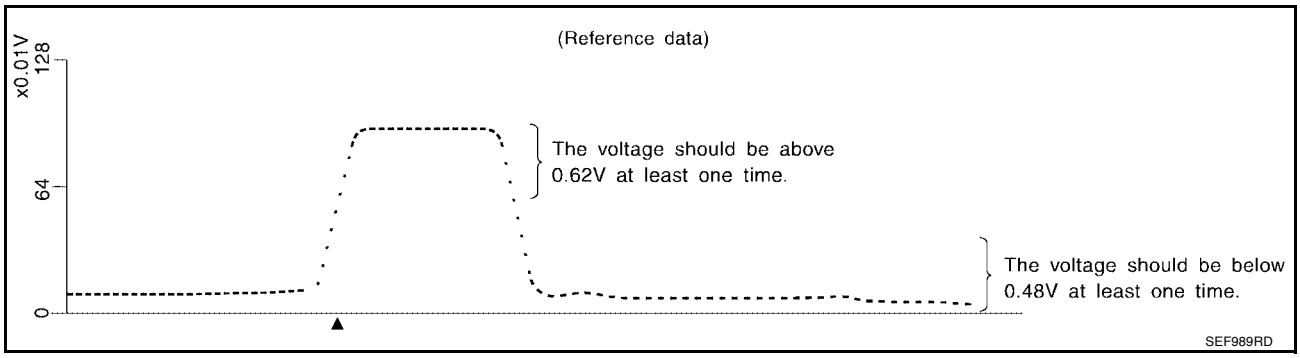
With CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperate.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

7. Check “HO2S2 (B1)/(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 oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

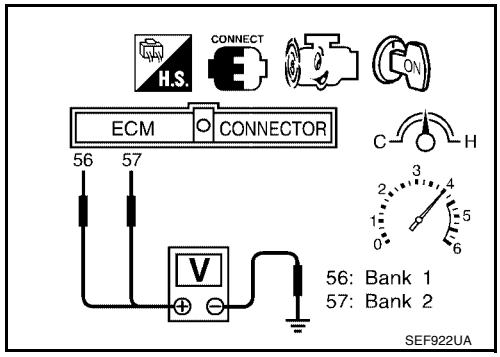
OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK HEATED OXYGEN SENSOR 2

Without CONSULT-II

1. Start engine warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.62V at least once during this procedure.
   If the voltage is above 0.62V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.48V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00E0B

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

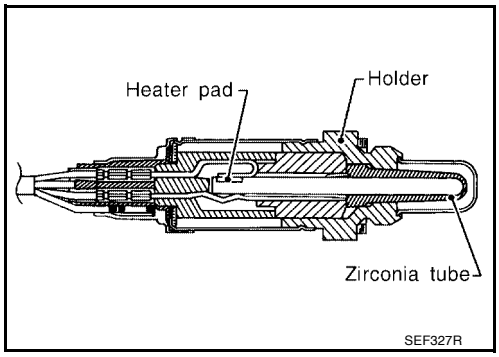
DTC P1147, P1167 HO2S2

PFP:226A0

Component Description

UBS00E0C

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00E0D

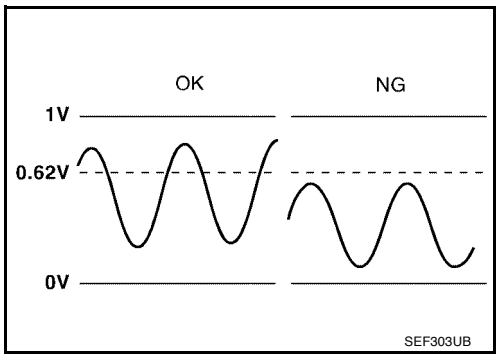
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1) HO2S2 (B2)	● Warm-up condition ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	Revving engine from idle up to 3,000 rpm quickly	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1) HO2S2 MNTR (B2)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS00E0E

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1147 (Bank 1) P1167 (Bank 2)	Heated oxygen sensor 2 maximum voltage monitoring	The maximum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector ● Intake air leaks

DTC Confirmation Procedure

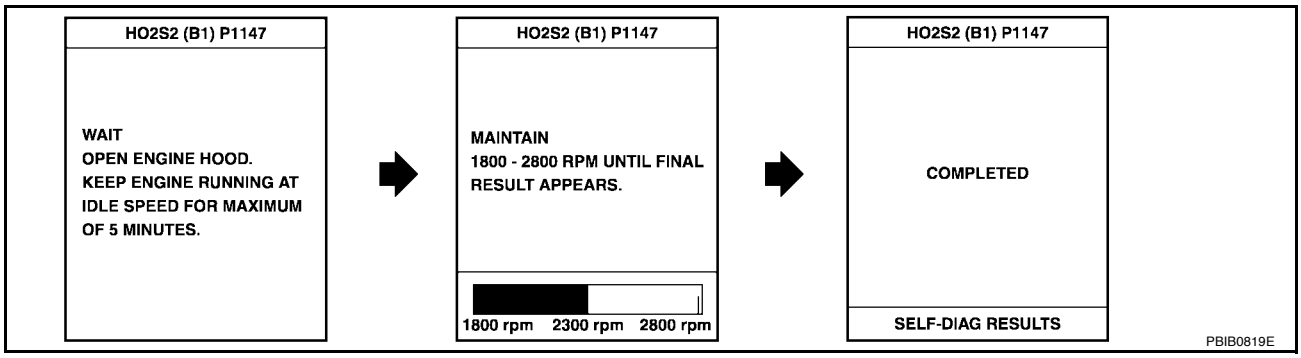
UBS00E0F

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “HO2S2 (B1) P1147” or “HO2S2 (B2) P1167” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.



6. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-1634, "Diagnostic Procedure" .
   If “CAN NOT 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

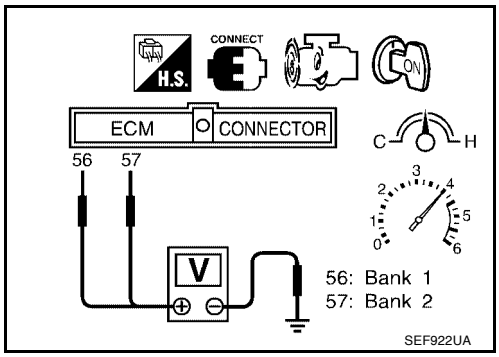
UBS00E0G

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

WITH GST

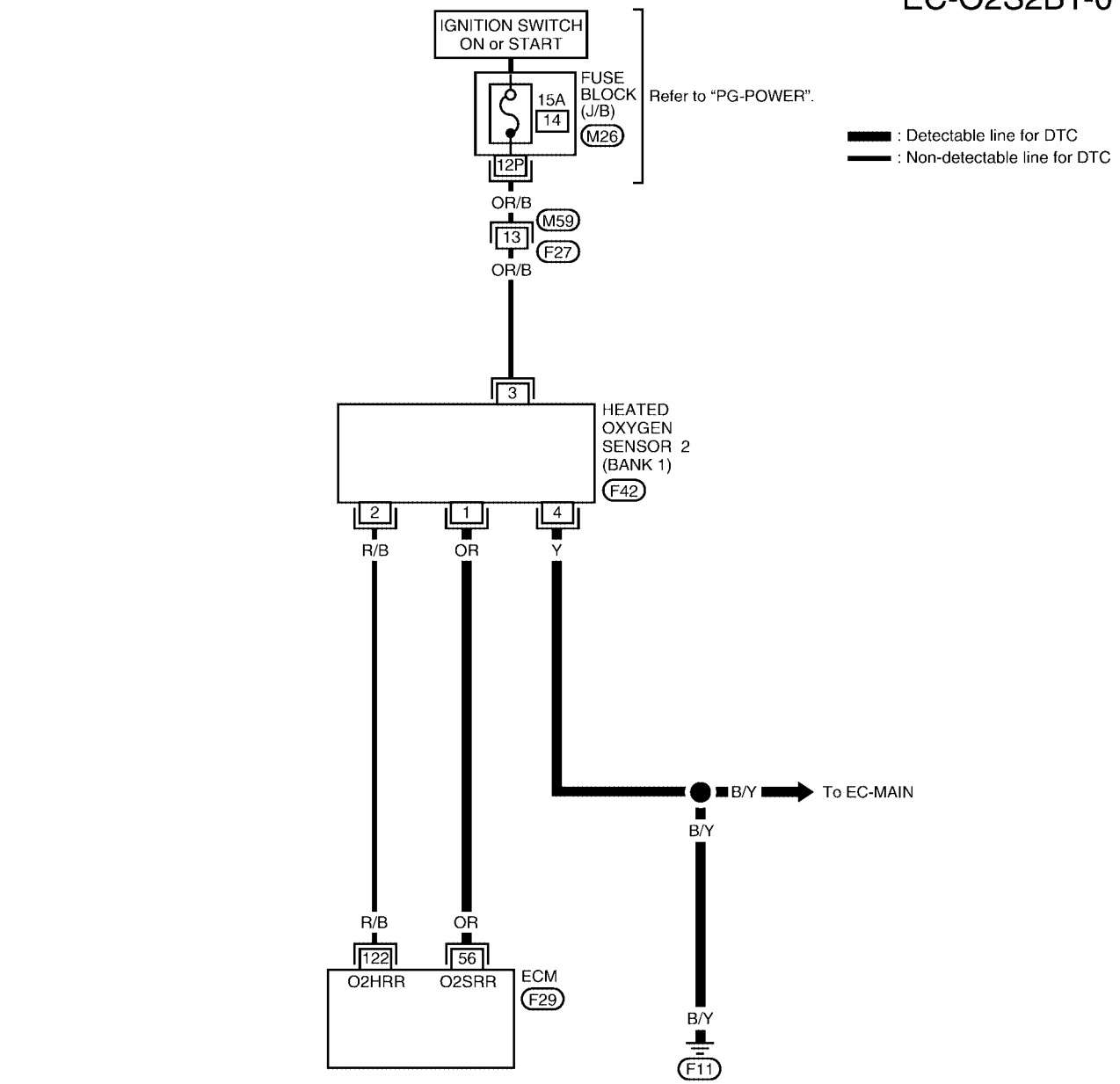
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.62V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be above 0.62V at least once during this procedure.
8. If NG, go to EC-1634, "Diagnostic Procedure" .

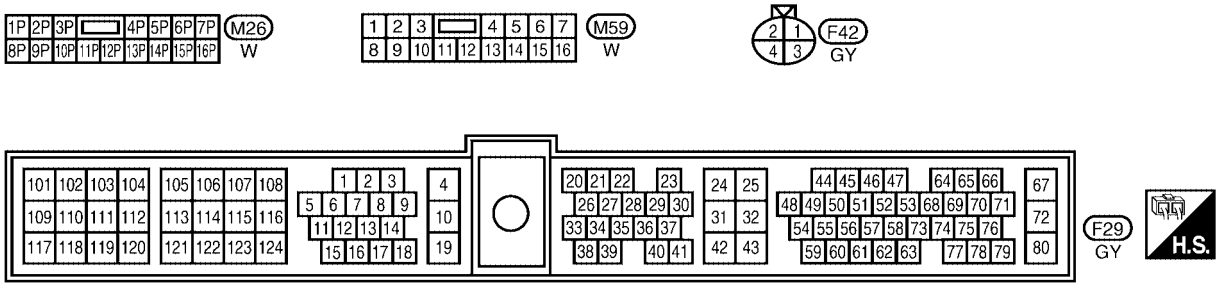


Wiring Diagram
BANK 1

UBS00E0H

EC-O2S2B1-01





BBWA1079E

Specification data are reference values and are measured between each terminal and ground.

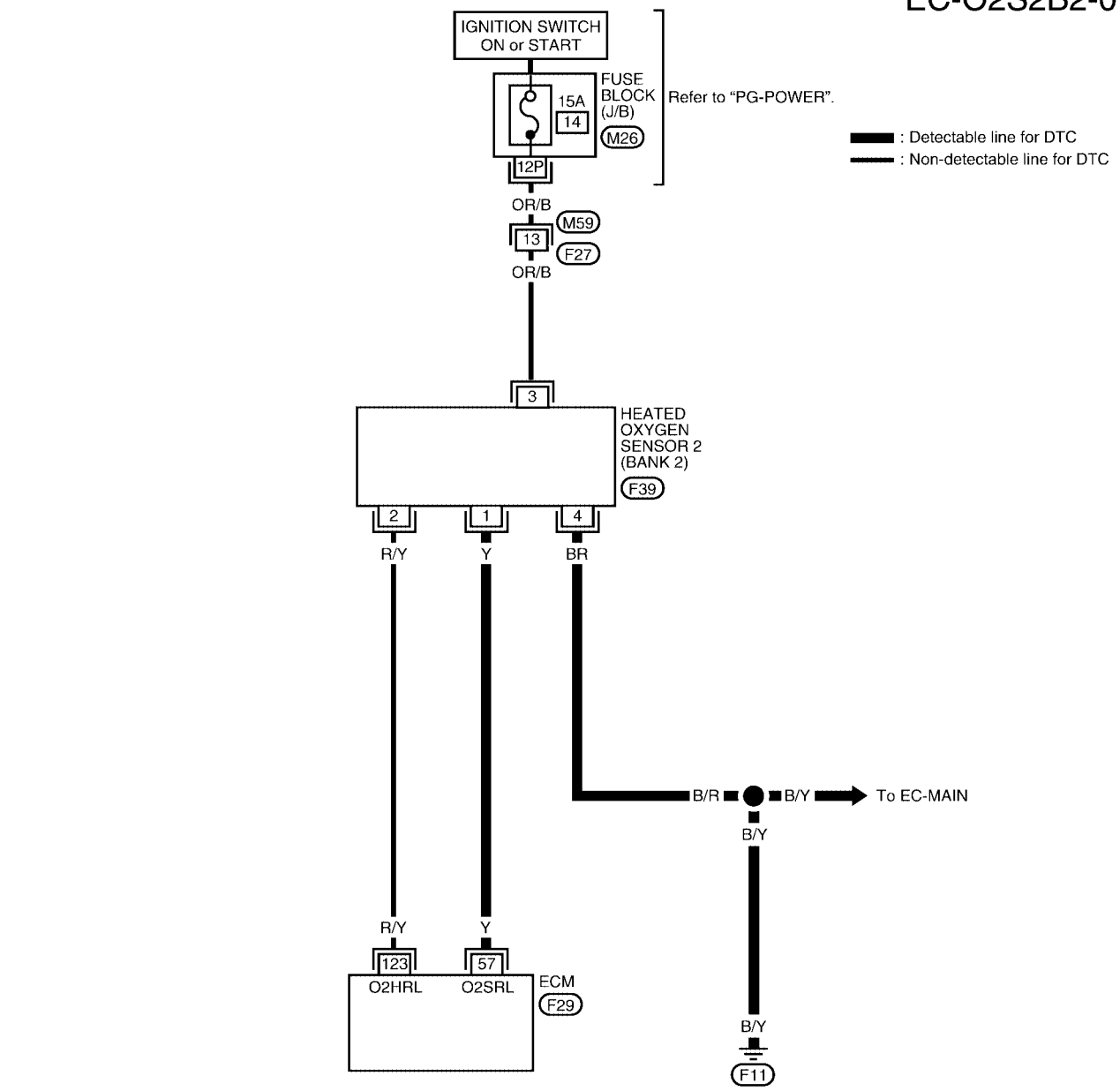
CAUTION:

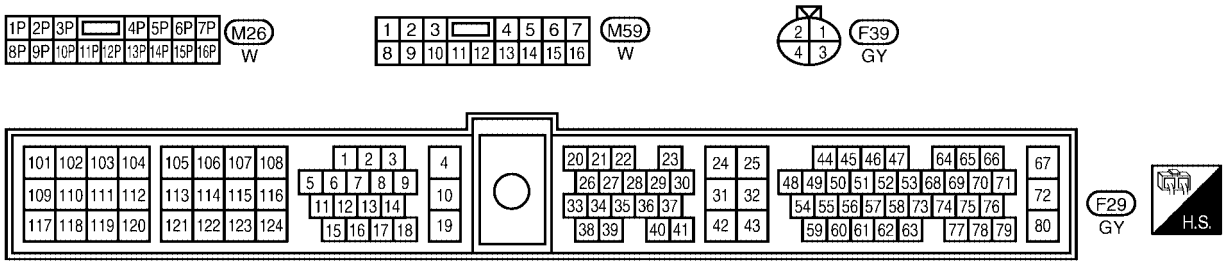
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
56	OR	Heated oxygen sensor 2 (bank 1)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

BANK 2

EC-O2S2B2-01





BBWA1080E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	Y	Heated oxygen sensor 2 (bank 2)	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

Diagnostic Procedure

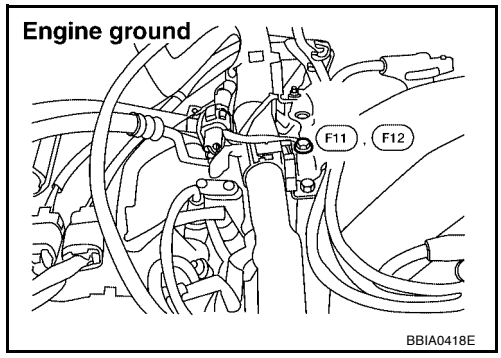
UBS00E0I

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

OK or NG

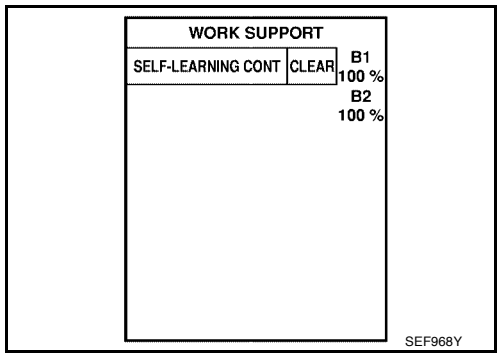
OK >> GO TO 2.
NG >> Repair or replace ground connections.



2. CLEAR THE SELF-LEARNING DATA

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or 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 DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-1241, "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 toEC-1437 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

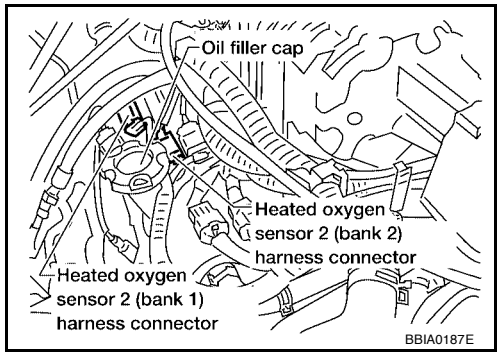
1. Disconnect heated oxygen sensor 2 harness connector.
2. Check harness continuity between HO2S2 terminal 4 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.



4. CHECK HO2S2 INPUT 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	
P1147	56	1	Bank 1
P1167	57	1	Bank 2

Continuity should exist.

4. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

DTC	Terminals		Bank
	ECM	Sensor	
P1147	56	1	Bank 1
P1167	57	1	Bank 2

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 5.
OK (Without CONSULT-II)>>GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

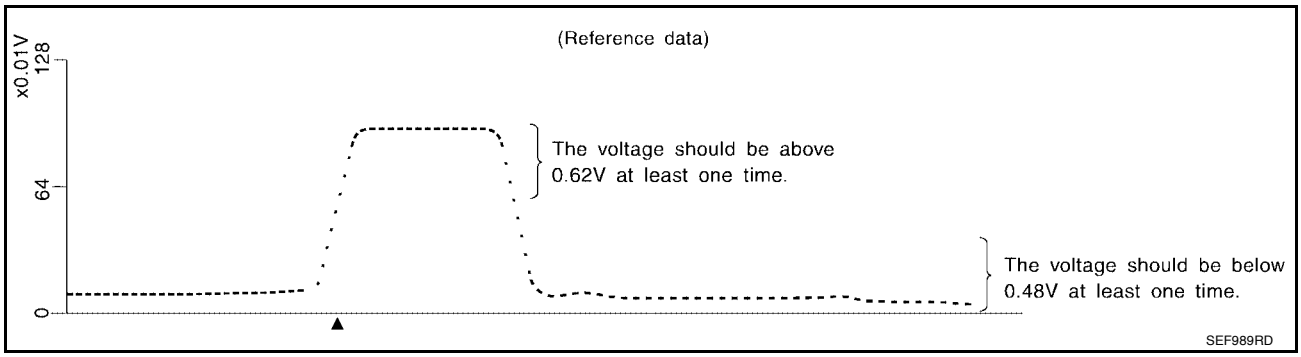
With CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperate.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

7. Check “HO2S2 (B1)/(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 oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

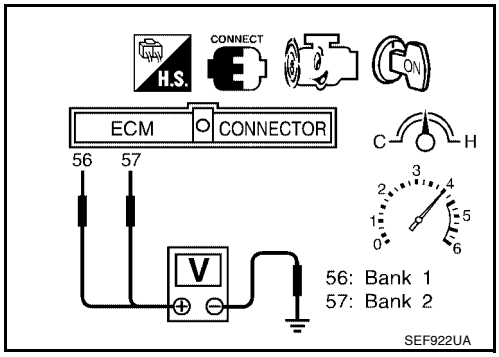
OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK HEATED OXYGEN SENSOR 2

Without CONSULT-II

1. Start engine warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.62V at least once during this procedure.
   If the voltage is above 0.62V at step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.48V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00E0J

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

DTC P1148, P1168 CLOSED LOOP CONTROL

PFP:22690

On Board Diagnosis Logic

UBS00E0K

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148 (Bank 1)	Closed loop control function	The closed loop control function for bank 1 does not operate even when vehicle is driving in the specified condition.	● The heated oxygen sensor 1 circuit is open or shorted. ● Heated oxygen sensor 1 ● Heated oxygen sensor heater
P1168 (Bank 2)		The closed loop control function for bank 2 does not operate even when vehicle is driving in the specified condition.	

DTC Confirmation Procedure

UBS00E0L

CAUTION:
Always drive vehicle at a safe speed.

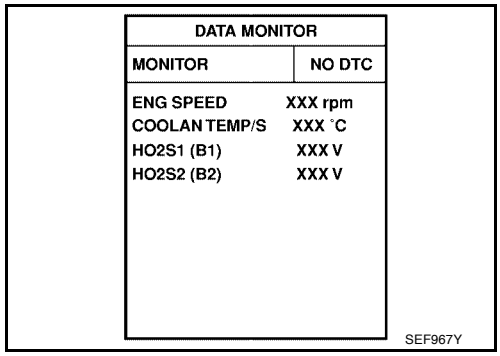
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

- **Never raise engine speed above 2,800 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-1640, "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	2.0 msec or more
ENG SPEED	1,500 rpm or more
Selector lever	Suitable position
VHCL SPEED SE	More than 70 km/h (43 MPH)

During this test, P0134 and/or P0154 may be displayed on CONSULT-II screen.

6. If DTC is detected, go to EC-1640, "Diagnostic Procedure" .

Overall Function Check

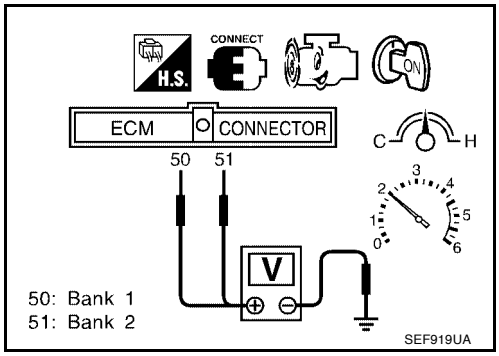
UBS00E0M

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 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and 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-1640, "Diagnostic Procedure" .



Diagnostic Procedure

UBS00E0N

Perform trouble diagnosis for EC-1402, "Diagnostic Procedure" .

DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

PFP:00021

On Board Diagnosis Logic

UBS00E0O

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

This self-diagnosis has one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over temperature (Overheat)	● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant was not added to the system using the proper filling method. ● Engine coolant is not within the specified range.	● Cooling fan (crankshaft driven) ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to EC-1643, "Main 12 Causes of Overheating" .

CAUTION:

When a malfunction is indicated be sure to replace the coolant, follow the procedure in MA-26, "Changing Engine Coolant" . Also, replace the engine oil. Refer to MA-30, "Changing Engine Oil" .

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute like pouring coolant by kettle. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "ANTIFREEZE COOLANT MIXTURE RATIO" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

UBS00E0P

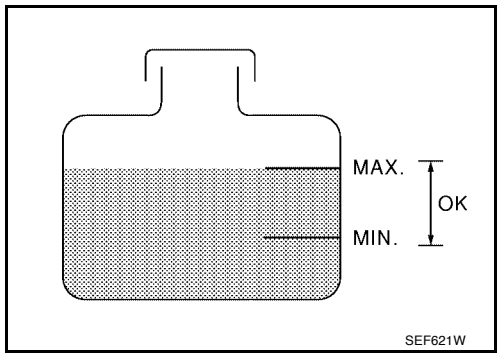
Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

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-1642, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1642, "Diagnostic Procedure" .
3. Start engine.
4. Make sure that cooling fan (crankshaft driven) operates.
5. If NG, go to EC-1642, "Diagnostic Procedure" .



WITH GST

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-1642, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1642, "Diagnostic Procedure" .
3. Start engine and make sure that cooling fan (crankshaft driven) operates.
   Be careful not to overheat engine.
4. If NG, go to EC-1642, "Diagnostic Procedure" .

Diagnostic Procedure

UBS00E0Q

1. CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION

Start engine and make sure that cooling fan (crankshaft driven) operates.

OK or NG

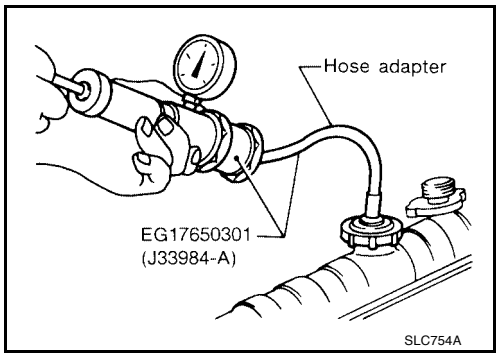
OK >> GO TO 2.
NG >> Check cooling fan (crankshaft driven). Refer to CO-32, "COOLING FAN (CRANKSHAFT DRIVEN)" .

2. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

CAUTION:
Higher than the specified pressure may cause radiator damage.

Testing pressure: 157 kPa (1.6 kg/cm^2 , 23 psi)



Pressure should not drop.

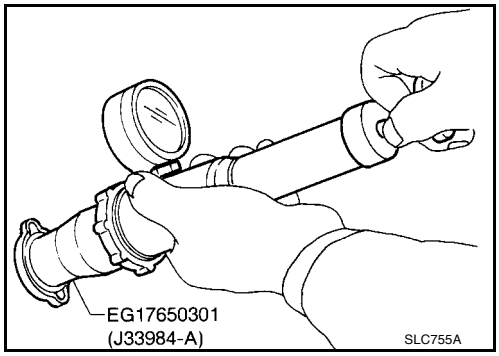
OK or NG

OK >> GO TO 3.
NG >> Check the following for leak
- Hose
- Radiator
- Water pump
  Refer to CO-25, "WATER PUMP" .

3. 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

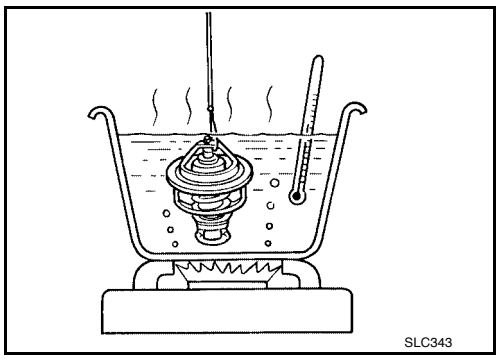
OK >> GO TO 4.
NG >> Replace radiator cap.

4. CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
   It should seat tightly.
2. Check valve opening temperature and valve lift.

   Valve opening temperature : 76.5°C (170°F) [standard]

   Valve lift : More than 10 mm/90°C (0.39 in/194°F)



3. Check if valve is closed at 5°C (41°F) below valve opening temperature.

For details, refer to CO-28, "THERMOSTAT" .

OK or NG

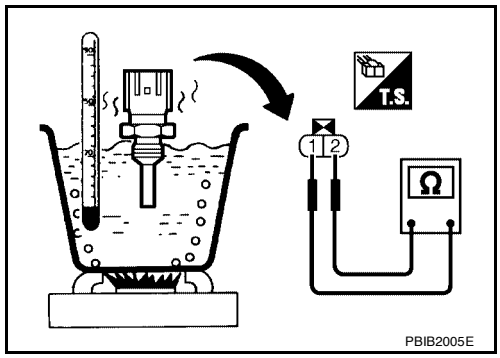
OK >> GO TO 5.
NG >> Replace thermostat

5. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.

<Reference data>

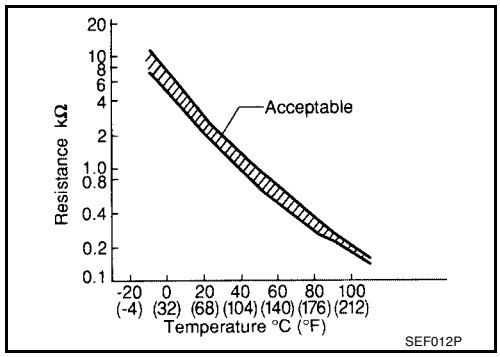
Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



OK or NG

OK >> GO TO 6.

NG >> Replace engine coolant temperature sensor.



6. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to EC-1643, "Main 12 Causes of Overheating" .

>> **INSPECTION END**.

Main 12 Causes of Overheating

UBS00E0R

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-14 .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-26 .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See CO-23 .
ON*1	5	● Coolant leaks	● Visual	No leaks	See CO-23 .
ON*1	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-28 .
ON*1	7	● Cooling fan (crankshaft driven)	● Visual	Operating	See CO-32 .
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*2	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 MA-26 .
OFF*3	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See MA-14 .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-102 .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-131 .

*1: Engine running at 3,000 rpm for 10 minutes.
*2: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*3: After 60 minutes of cool down time.
For more information, refer to CO-21, "OVERHEATING CAUSE ANALYSIS" .

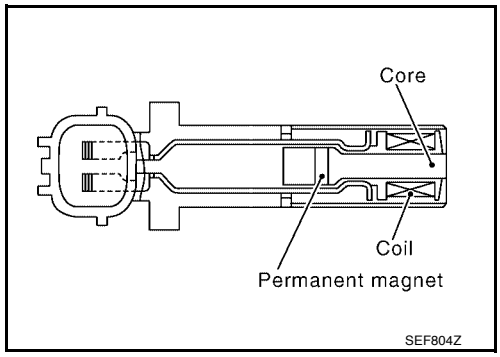
DTC P1336 CKP SENSOR (OBD)

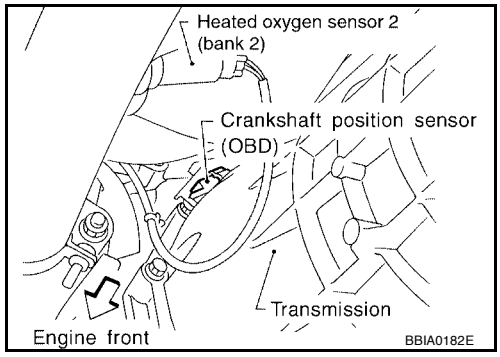
PFP:23731

Component Description

UBS00E0S

The crankshaft position sensor (OBD) is located on the transmission housing facing the gear teeth (cogs) of the flywheel or drive plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet, core and coil.
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.
This sensor is not used to control the engine system.
It is used only for the on board diagnosis.





On Board Diagnosis Logic

UBS00E0T

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1336	Crankshaft position sensor (OBD) range/ performance	A chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Crankshaft position sensor (OBD) ● Drive plate/Flywheel

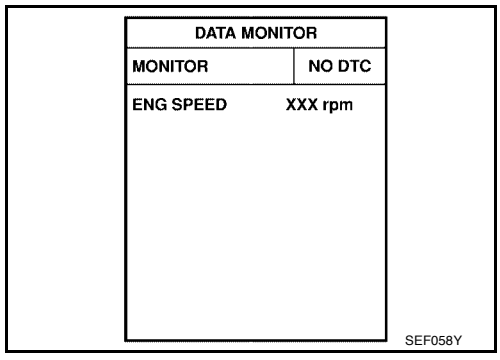
DTC Confirmation Procedure

UBS00E0U

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 run it for at least 2 minutes at idle speed.
3. If 1st trip DTC is detected, go to EC-1647, "Diagnostic Procedure" .

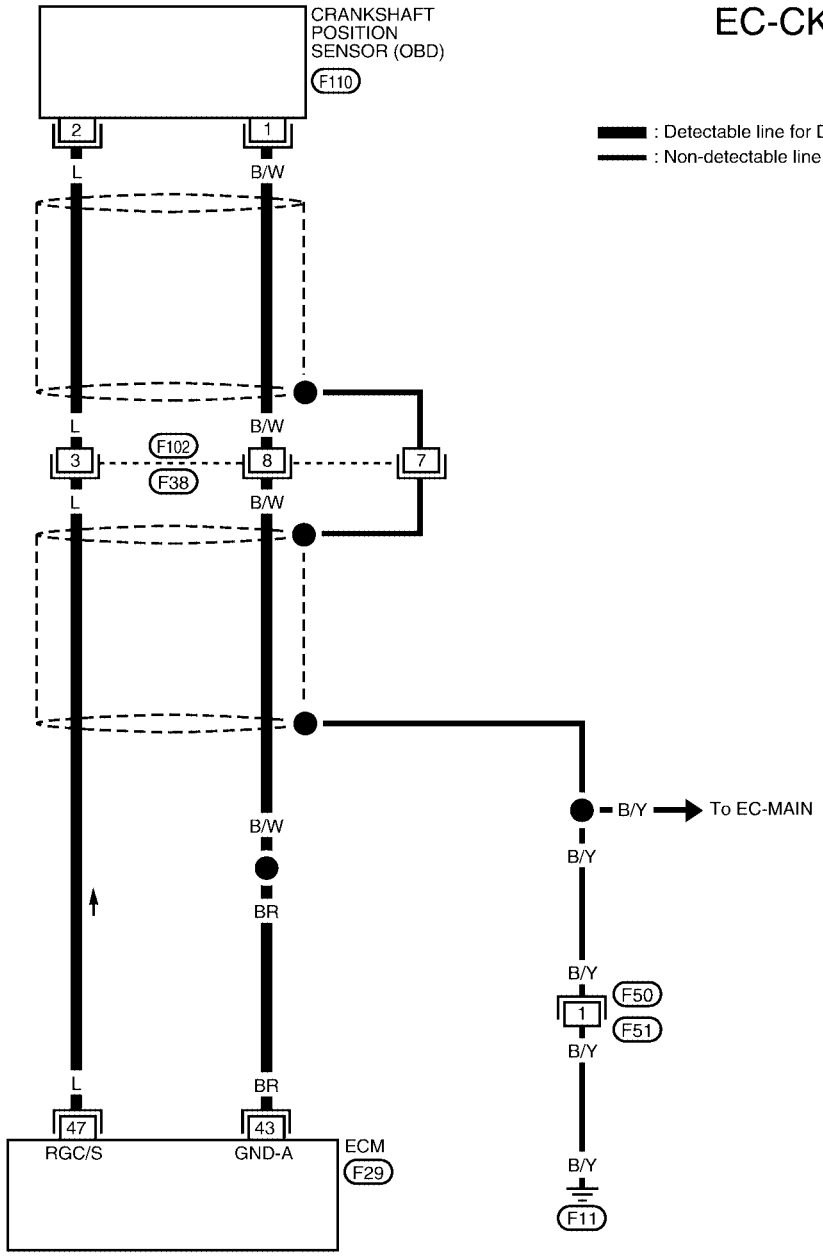


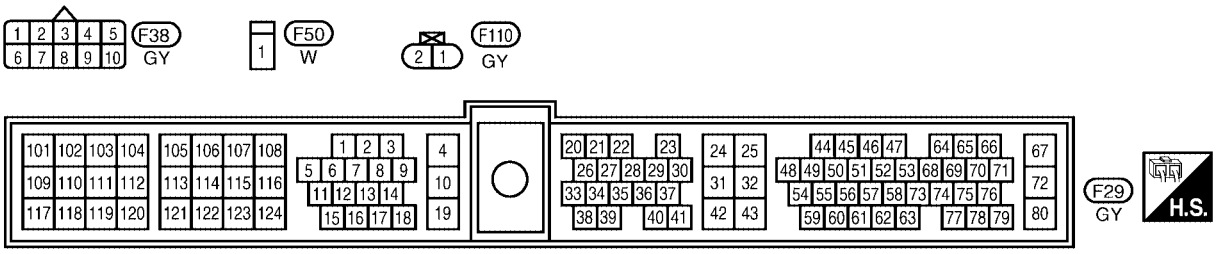
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00E0V



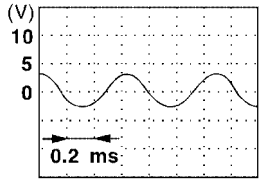
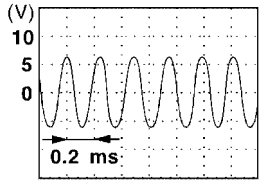


BBWA0513E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (AC Voltage)
43	BR	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
47	L	Crankshaft position sensor (OBD)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1 - 2V★ (AC range)  SEF690W
			[Engine is running] ● Engine speed is 2,000 rpm	3 - 4V★ (AC range)  SEF691W

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

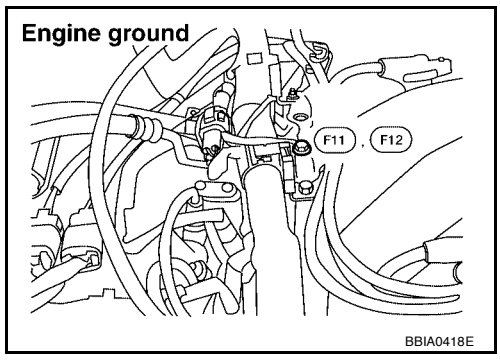
UBS00E0W

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw.
   Refer to EC-1311, "Ground Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.



BBIA0418E

2. CHECK CKP SENSOR (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

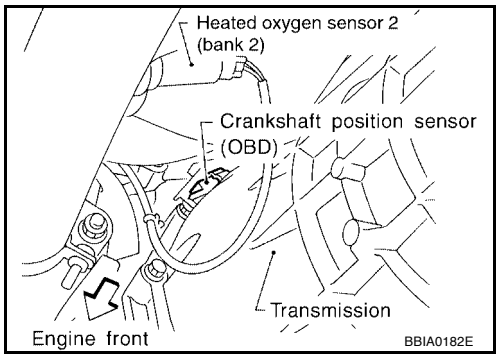
1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.
2. Check continuity between ECM terminal 47 and CKP sensor (OBD) terminal 2.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F38, F102
- Harness for open or short between ECM and crankshaft position sensor (OBD)

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR (OBD) GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between CKP sensor (OBD) terminal 1 and ECM terminal 43. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F38, F102
- Harness for open between crankshaft position sensor (OBD) and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CKP SENSOR (OBD) SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors F38, F102.
2. Check harness continuity between harness connector F38 terminal 7 and ground. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F38
- Harness for open or short between harness connector F38 and ground

>> Repair open circuit or short to power in harness connectors.

8. CHECK IMPROPER INSTALLATION

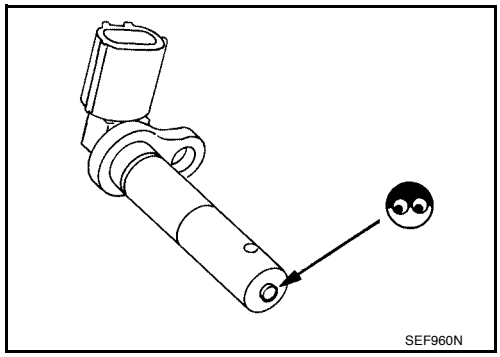
1. Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD).
2. Perform EC-1645, "DTC Confirmation Procedure" .

Is a 1st trip DTC P1336 detected?

Yes >> GO TO 9.
No >> **INSPECTION END**.

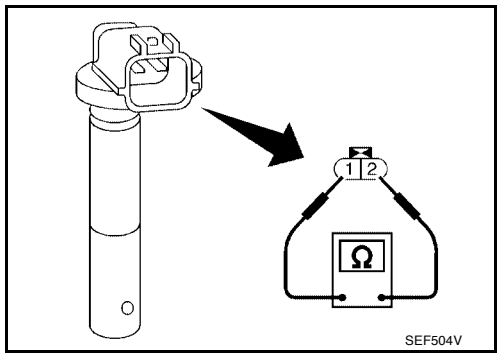
9. CHECK CRANKSHAFT POSITION SENSOR (OBD)

1. Disconnect crankshaft position sensor (OBD) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Resistance: Approximately 512 - 632Ω [at 20°C (68°F)]



OK or NG

OK >> GO TO 10.
NG >> Replace crankshaft position sensor (OBD).

10. CHECK GEAR TOOTH

Visually check for chipping flywheel or drive plate gear tooth (cog).

OK or NG

OK >> GO TO 11.
NG >> Replace the flywheel or drive plate.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

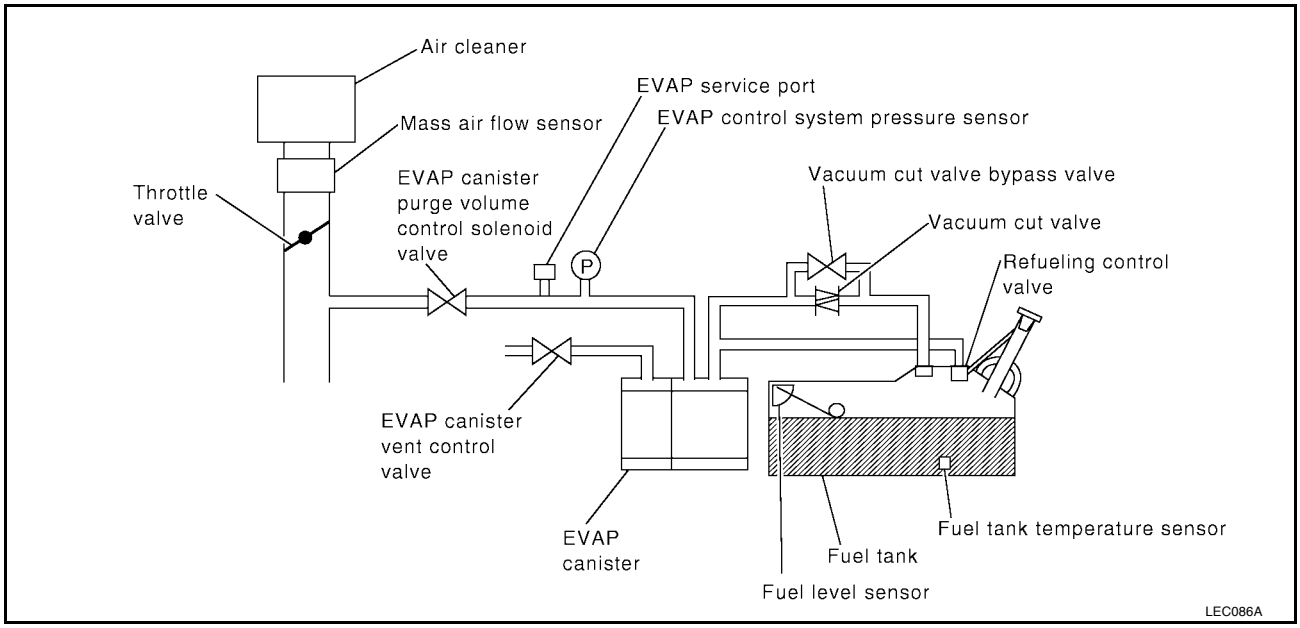
DTC P1442 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS00E0X

NOTE:
If DTC P1442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1667 .)
This diagnosis detects leaks in the EVAP purge line using of 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.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1442	EVAP control system small leak detected (positive pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	● 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 ● 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 ● 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 ● Foreign matter caught in EVAP canister purge volume control solenoid valve

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.**

DTC Confirmation Procedure

UBS00E0Y

Refer to EC-1509, "DTC Confirmation Procedure" .

Diagnostic Procedure

UBS00E0Z

Refer to EC-1511, "Diagnostic Procedure" .

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

UBS00E10

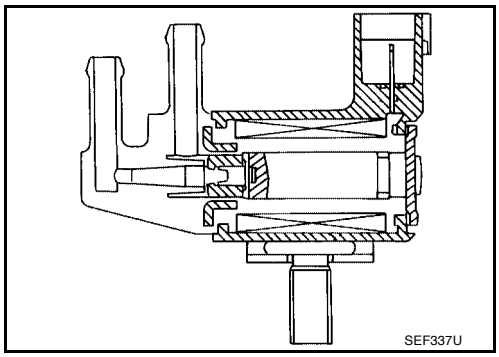
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	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		
Throttle position switch	Closed throttle position		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	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

UBS00E11

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle (Vehicle stopped)	0%
		2,000 rpm	—

On Board Diagnosis Logic

UBS00E12

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1444	EVAP canister purge volume control solenoid valve	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	● 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.)

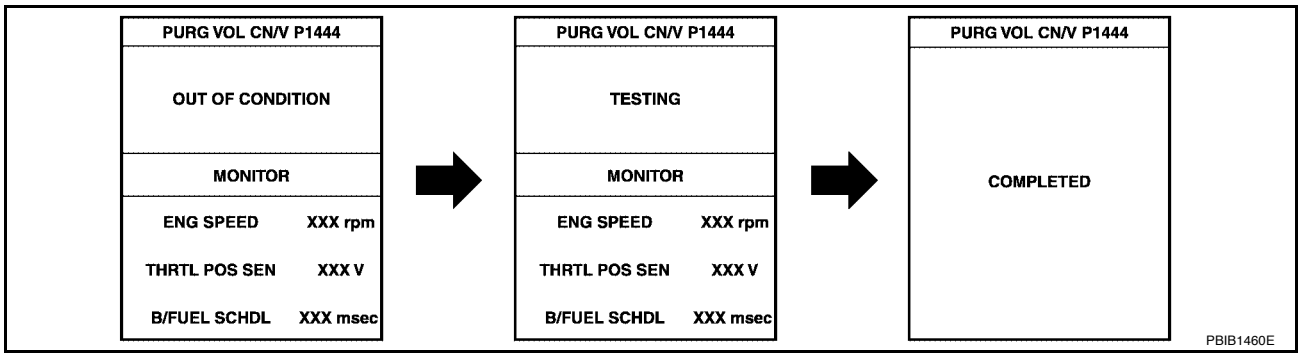
DTC Confirmation Procedure

UBS00E13

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 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”.



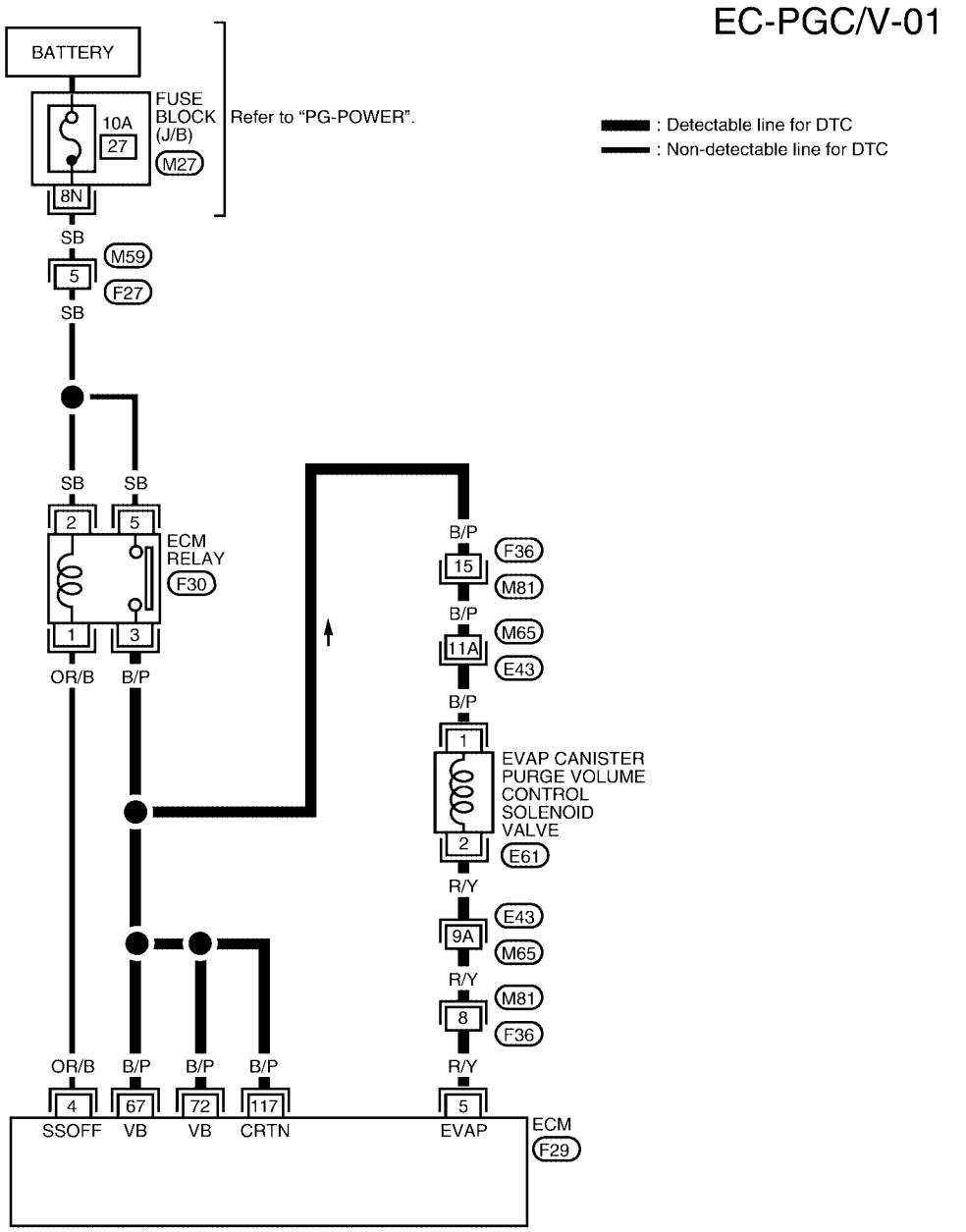
6. Start engine and let it idle until “TESTING” on CONSULT-II changes to “COMPLETED”. (It will take for approximately 10 seconds.)
   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-1656, "Diagnostic Procedure" .

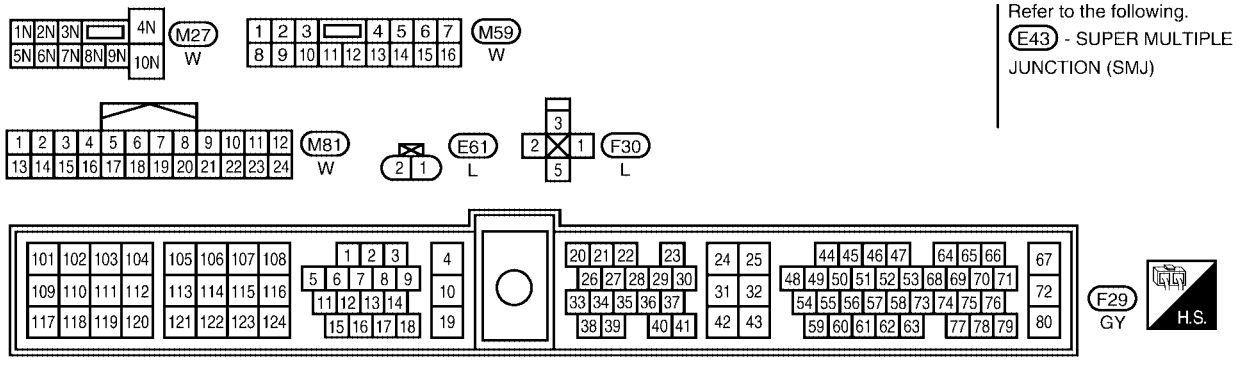
WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 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 EC-1656, "Diagnostic Procedure" .

Wiring Diagram

UBS00E14



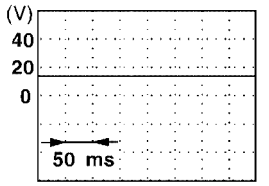
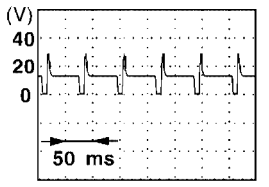


BBWA1085E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	OR/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.5V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
5	R/Y	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  SEF994U
			[Engine is running] ● Engine speed is 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14V)★  SEF995U
67	B/P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
72	B/P			
117	B/P	Current return	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

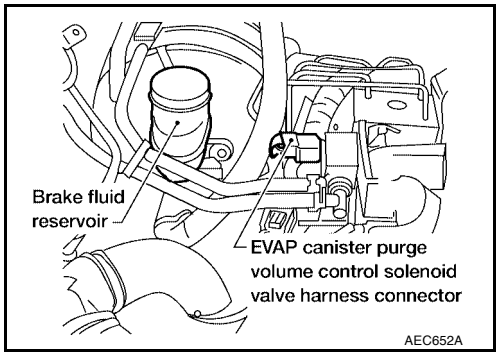
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00E15

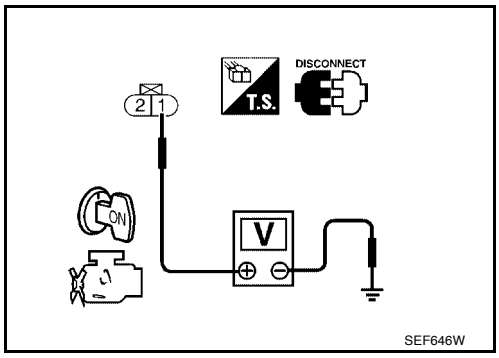
1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.



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.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F36, M81
- Harness connectors M65, E43
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 5 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 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M81, F36
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

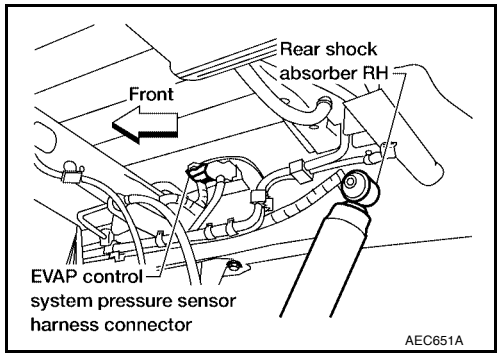
OK >> GO TO 6.
NG >> Repair it.

6. 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 7.
NG >> Replace EVAP control system pressure sensor.



7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
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.
5. Check input voltage between ECM terminal 62 and ground.

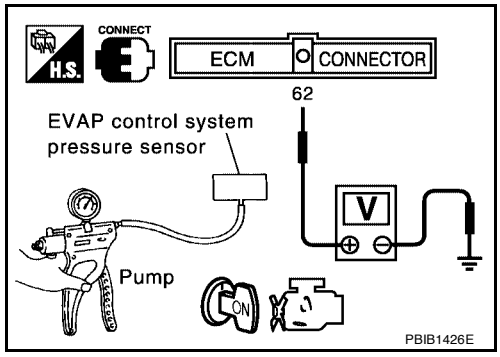
Applied vacuum	Voltage V
Not applied	1.4 - 4.8
-26.7 kpa (-200 mmHg, -7.87 inHg)	2.1 to 2.5V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

OK or NG

OK (with CONSULT-II)>>GO TO 8.
OK (without CONSULT-II)>>GO TO 9.
NG >> Replace EVAP control system pressure sensor.



8. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

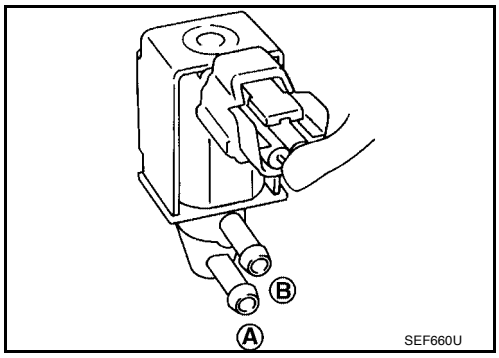
1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.
   If OK, inspection end. If NG, go to following step.

ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100%	Yes
0%	No



SEF660U

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

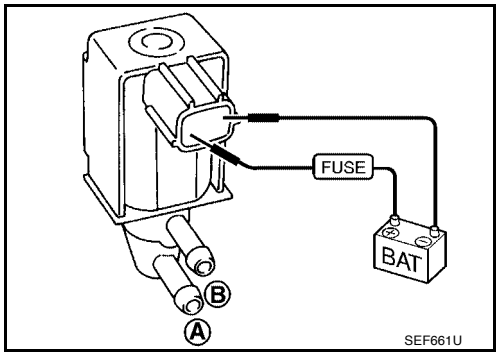
OK >> GO TO 10.
NG >> Replace EVAP canister purge volume control solenoid valve.

9. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Without CONSULT-II

Check air passage continuity.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



SEF661U

If NG, replace the EVAP canister purge volume control solenoid valve.

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP canister purge volume control solenoid valve.

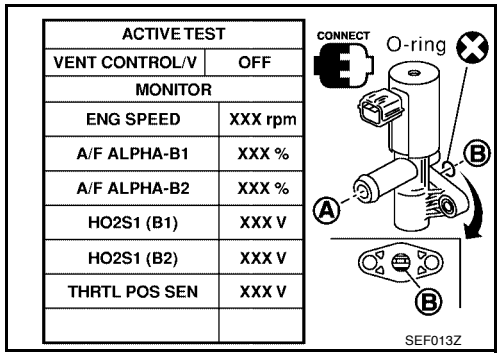
10. CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1second.

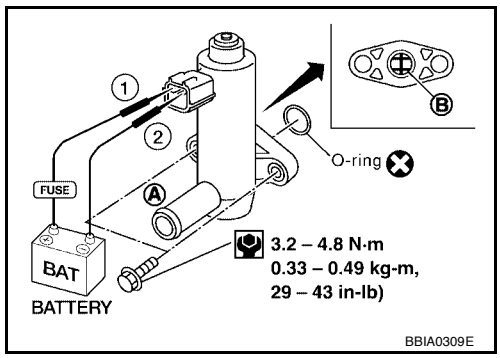


Without CONSULT-II

1. Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.
Make sure new O-ring is installed properly.

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP canister vent control valve.

11. CHECK RUBBER TUBE

Check for obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

OK >> GO TO 12.
NG >> Clean, repair or replace rubber tube.

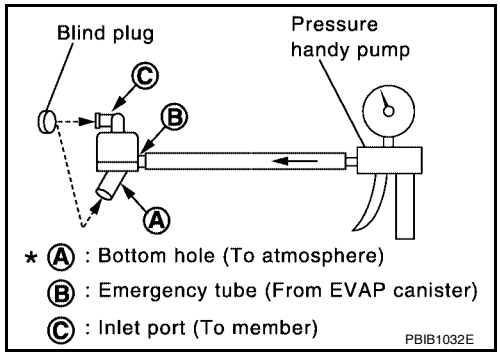
12. CHECK WATER SEPARATOR

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.

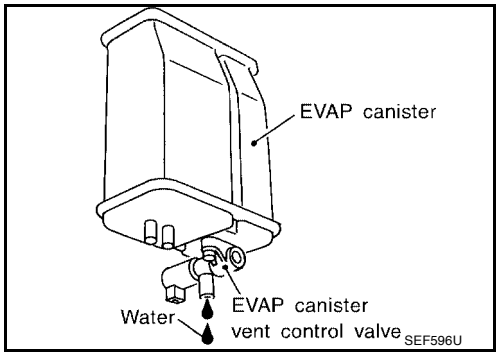
OK or NG

OK >> GO TO 13.
NG >> Replace water separator.



13. 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 14.
No >> GO TO 16.

14. 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 16.
NG >> GO TO 15.

15. 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.

16. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

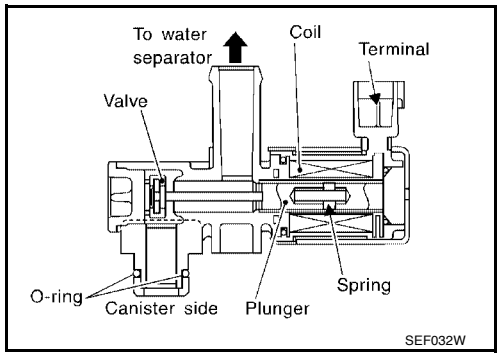
DTC P1446 EVAP CANISTER VENT CONTROL VALVE

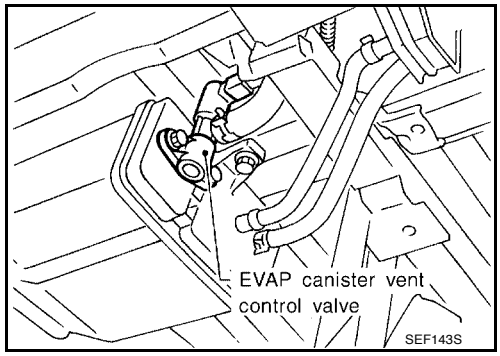
PFP:14935

Component Description

UBS00E16

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

UBS00E17

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00E18

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1446	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	● 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

UBS00E19

CAUTION:
Always drive vehicle at a safe speed.

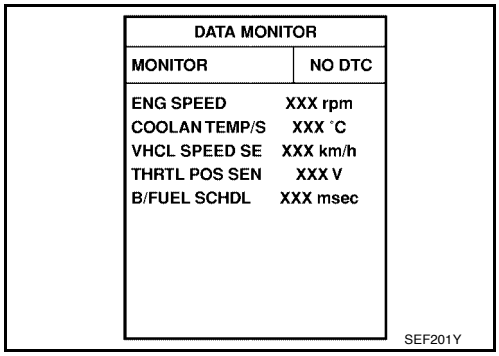
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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 EC-1664, "Diagnostic Procedure" .

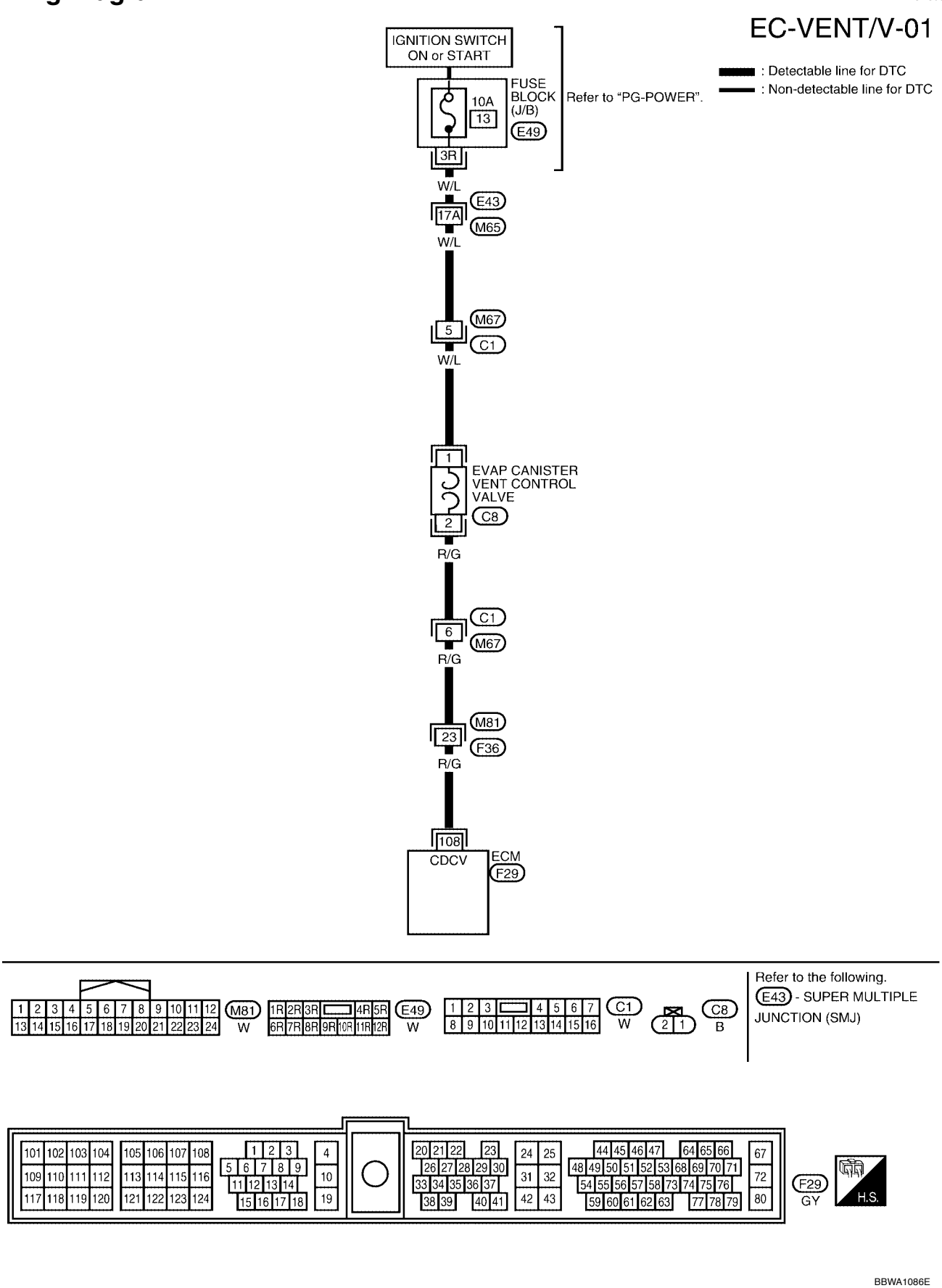


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00E1A



BBWA1086E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

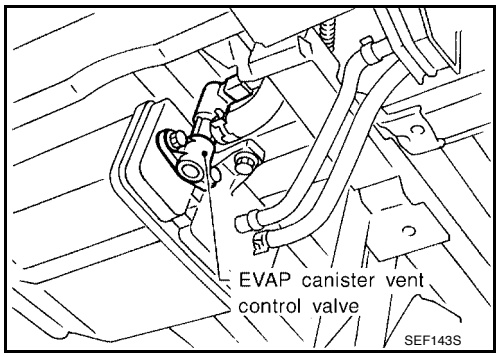
UBS00E1B

1. CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Check obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

OK >> GO TO 2.
NG >> Clean, repair or replace rubber tube.



2. CHECK WATER SEPARATOR

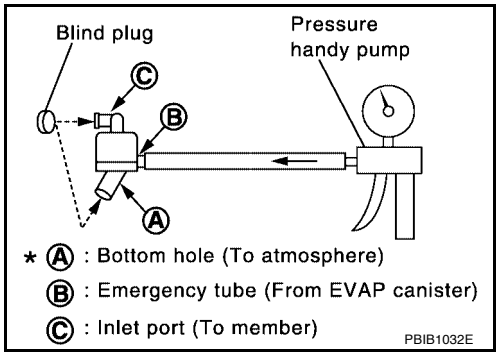
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

OK or NG

OK >> GO TO 3.
NG >> Replace water separator.



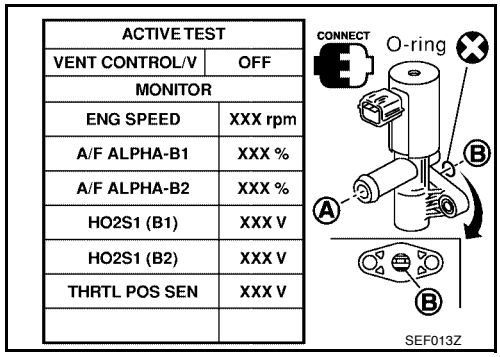
3. CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

With CONSULT-II

1. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

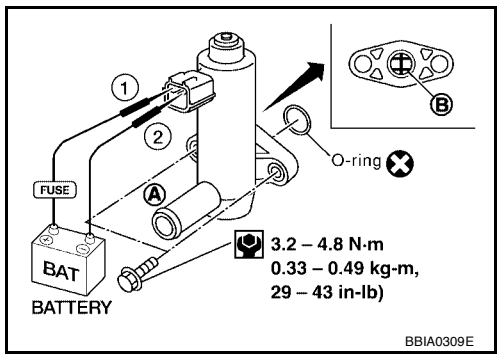


Without CONSULT-II

1. Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



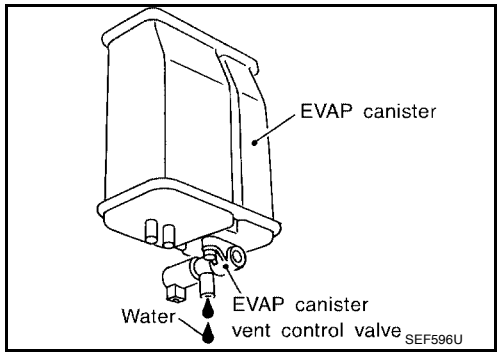
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.
Make sure new O-ring is installed properly.

OK or NG

OK >> GO TO 4.
NG >> Replace EVAP canister vent control valve and O-ring.

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

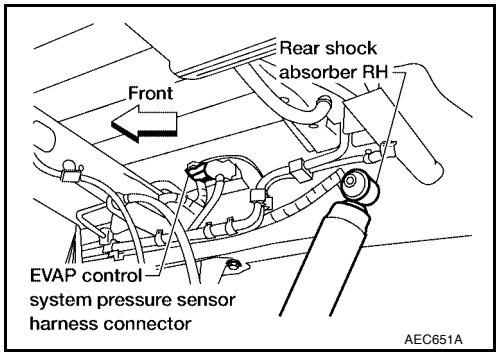
OK >> GO TO 8.
NG >> Repair it.

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 FUNCTION

Refer to P0452 EC-1533, "DTC Confirmation Procedure" or P0453 EC-1539, "DTC Confirmation Procedure" .

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

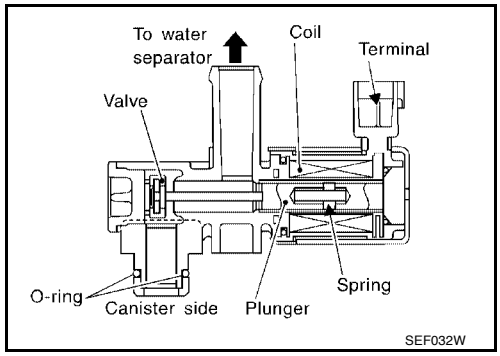
DTC P1448 EVAP CANISTER VENT CONTROL VALVE

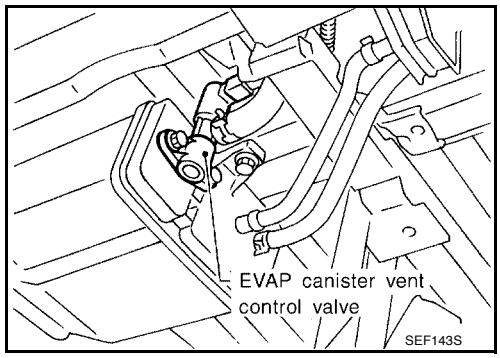
PFP:14935

Component Description

UBS00E1C

NOTE:
If DTC P1448 is displayed with P0442, 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

UBS00E1D

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00E1E

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1448	EVAP canister vent control valve open	EVAP canister vent control valve remains open under specified driving conditions.	● 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 ● Vacuum cut valve

DTC Confirmation Procedure

UBS00E1F

NOTE:
- **If DTC P1448 is displayed with P0442, perform trouble diagnosis for DTC P1448 first.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

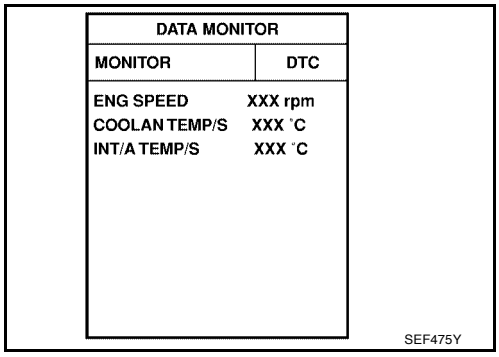
TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is less than 3/4 full and vehicle is placed on flat level surface.**

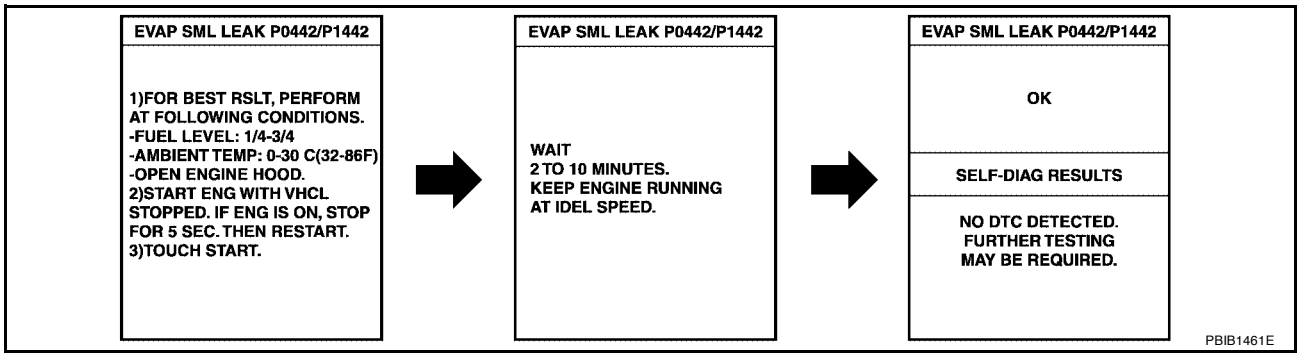
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**
- **It is better that the fuel level is low.**

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 5 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 - 32°C (32 - 90°F)
INT/A TEMP SE	More than 0°C (32°F)



5. Select “EVAP SML LEAK P0442/P1442” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.



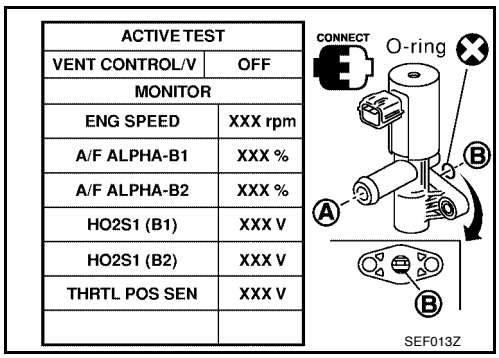
NOTE:
If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-1255, "Basic Inspection" .

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 5 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 EC-1671, "Diagnostic Procedure" .
If the result is OK, go to EC-1511, "Diagnostic Procedure" .



Overall Function Check

UBS00E1G

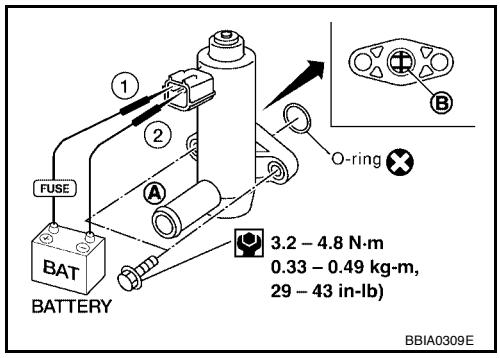
Use this procedure to check the overall function of the EVAP canister vent control valve circuit. During this check, a DTC might not be confirmed.

WITH GST

1. Disconnect hose from water separator.
2. Disconnect EVAP canister vent control valve harness connector.
3. Verify the following.

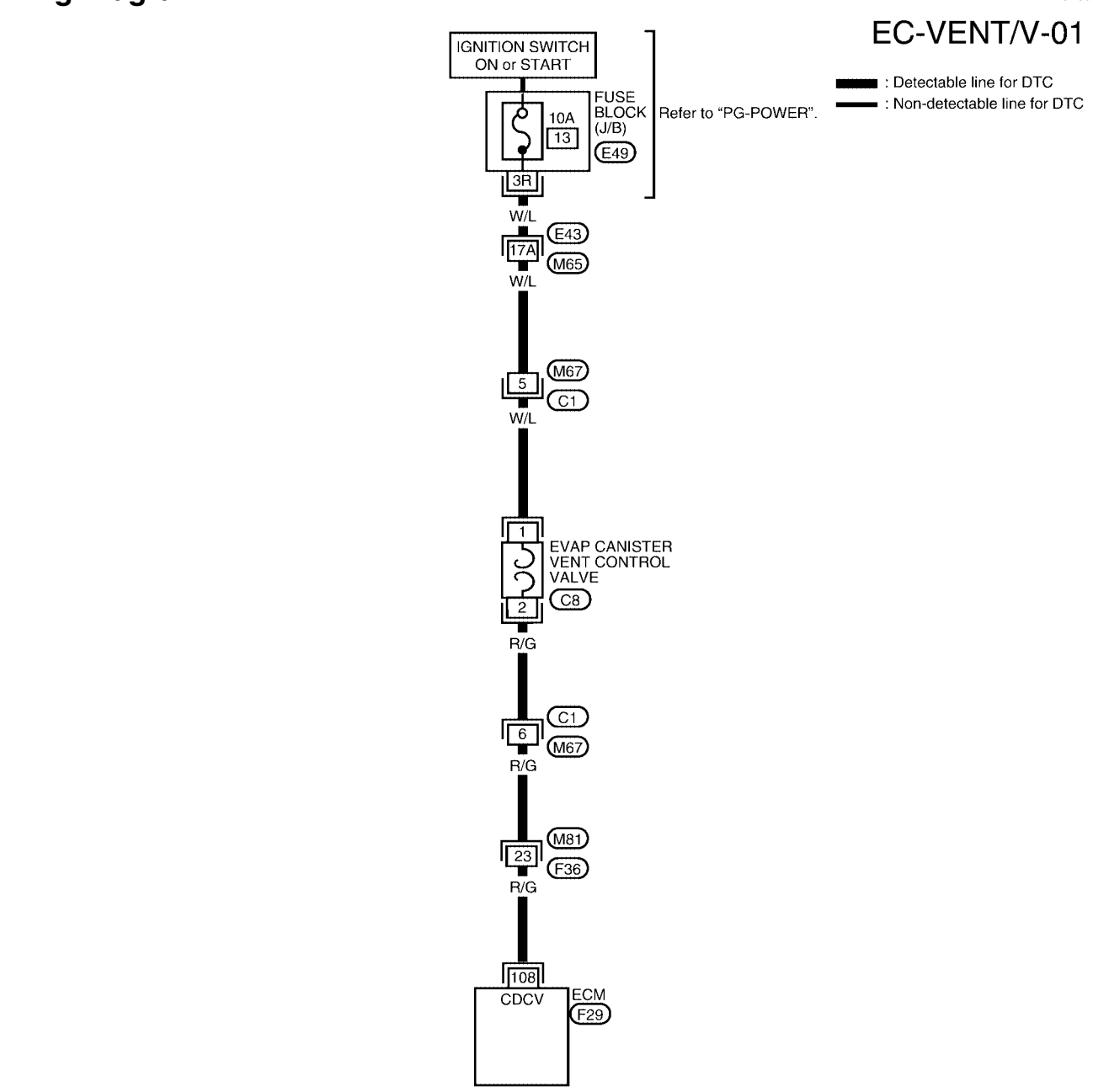
Condition	Air passage continuity
12V direct current supply between terminals 1 and 2	No
No supply	Yes

If the result is NG, go to EC-1671, "Diagnostic Procedure" .
If the result is OK, go to EC-1511, "Diagnostic Procedure" .



Wiring Diagram

UBS00E1H



BBWA1086E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	R/G	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

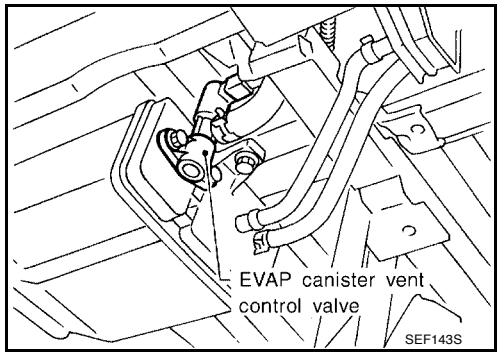
UBS00E1I

1. CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Check obstructed rubber tube connected to EVAP canister vent control valve.

OK or NG

OK >> GO TO 2.
NG >> Clean, repair or replace rubber tube.



2. CHECK WATER SEPARATOR

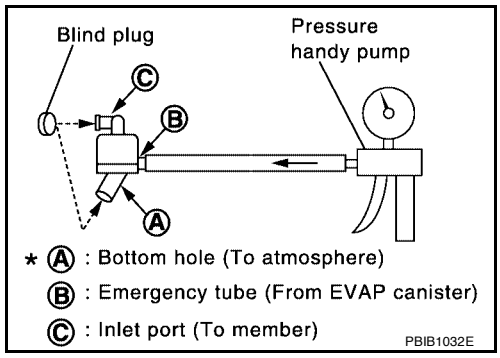
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

OK or NG

OK >> GO TO 3.
NG >> Replace water separator.



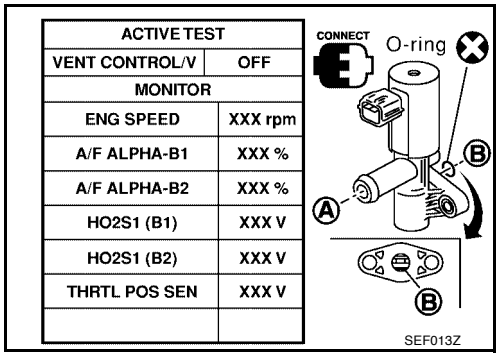
3. CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

With CONSULT-II

1. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

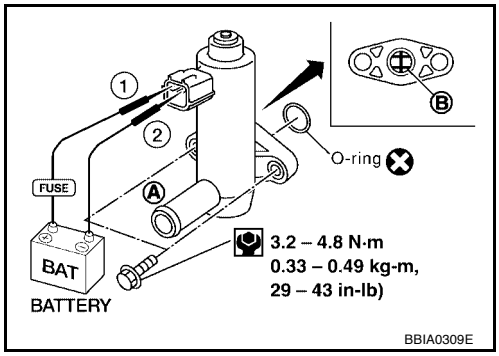


Without CONSULT-II

1. Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.
Make sure new O-ring is installed properly.

OK or NG

OK >> GO TO 4.
NG >> Replace EVAP canister vent control valve and O-ring.

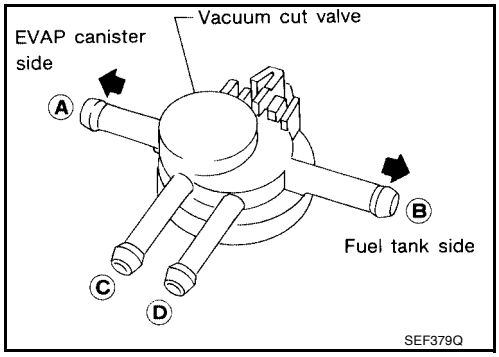
4. CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:

1. Plug port **C** and **D** with fingers.
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. Open port **C** and **D** .
6. Blow air in port **A** check that air flows freely out of port **C** .
7. Blow air in port **B** check that air flows freely out of port **D** .

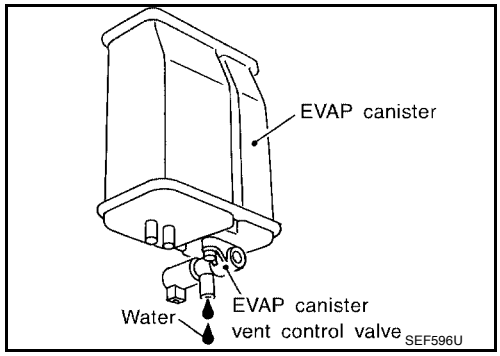
OK or NG

OK >> GO TO 5.
NG >> Replace vacuum cut valve.



5. 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.



OK or NG

OK >> GO TO 6.
NG >> GO TO 8.

6. 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 8.
NG >> GO TO 7.

7. 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.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR HOSE

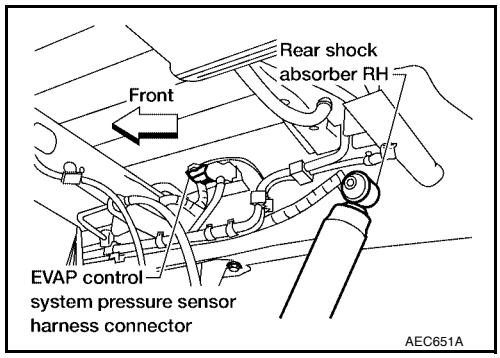
Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

OK >> GO TO 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 P0452 EC-1533, "DTC Confirmation Procedure" or DTC P0453 EC-1539, "DTC Confirmation Procedure" .

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP control system pressure sensor.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

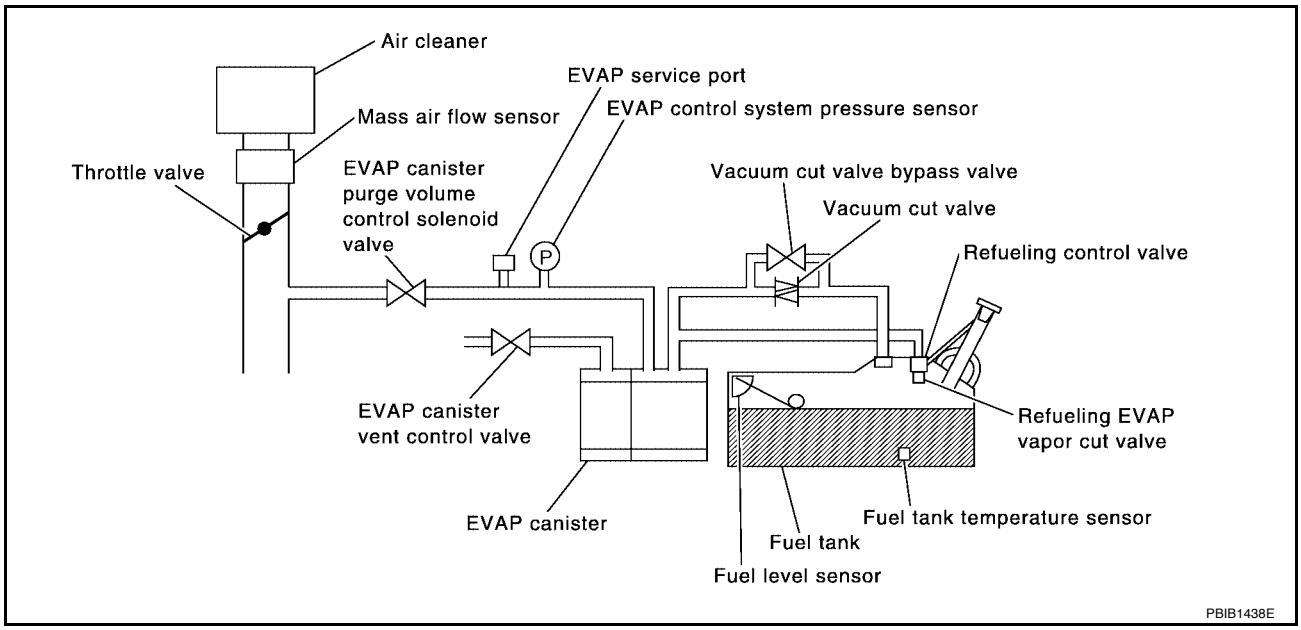
DTC P1456 EVAP CONTROL SYSTEM

PFP:14710

On Board Diagnosis Logic

UBS00E1J

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using of vapor pressure in the fuel tank in the same way as conventional EVAP small leak diagnosis.
If ECM judges a leak which corresponds to a very small leak, the very small leak P1456 will be detected.
If ECM judges a leak equivalent to a small leak, EVAP small leak P1442 will be detected.
If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1456	Evaporative emission control system very small leak (positive pressure check)	● EVAP system has a very small leak. ● EVAP system does not operate properly.	● 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 ● 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

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.**

DTC Confirmation Procedure

UBS00E1K

CAUTION:

Never remove fuel filler cap during the DTC confirmation procedure.

NOTE:

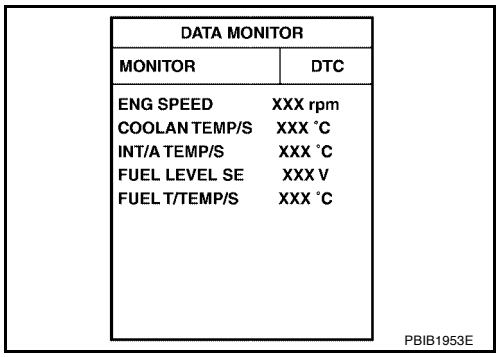
- **If DTC P0456 or P1456 is displayed with P0442 or P1442, perform trouble diagnosis for DTC P0456 or P1456 first.**
- **After repair, make sure that the hoses and clips are installed properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

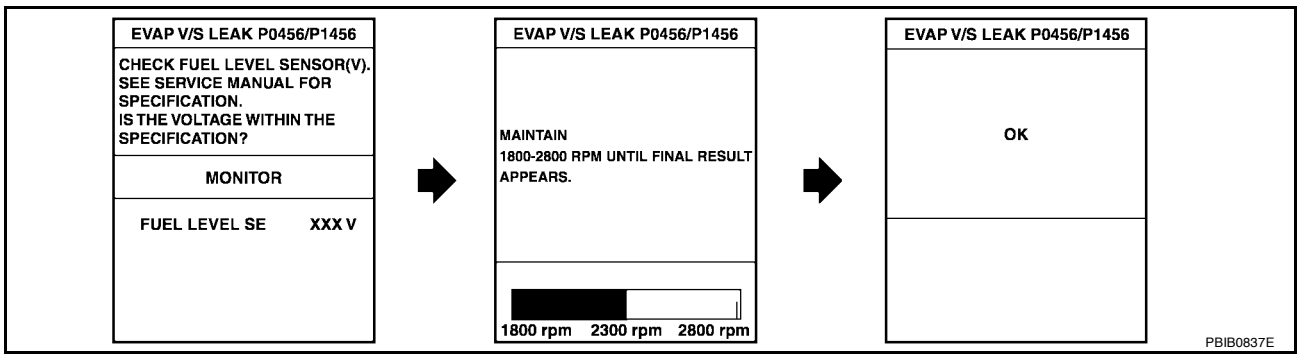
- **Open engine hood before conducting following procedure.**
- **If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**
  - **Fuel filler cap is removed.**
  - **Refilled or drained the fuel.**
  - **EVAP component parts is/are removed.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Make sure the following conditions are met.
   FUEL LEVEL SE: 1.08 - 0.2V
   COOLAN TEMP/S: 0 - 35°C (32 - 95°F)
   FUEL T/TMP SE: 0 - 32°C (32 - 90°F)
   INT A/TEMP SE: More than 0°C (32°F)
   If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the “FUEL LEVEL SE” meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).



3. Turn ignition switch OFF and wait at least 5 seconds.
4. Turn ignition switch ON.
5. Select “EVAP V/S LEAK P0456/P1456” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.



6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-1677, "Diagnostic Procedure" .

NOTE:

- **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to EC-1255, "Basic Inspection" .**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

Overall Function Check

UBS00E1L

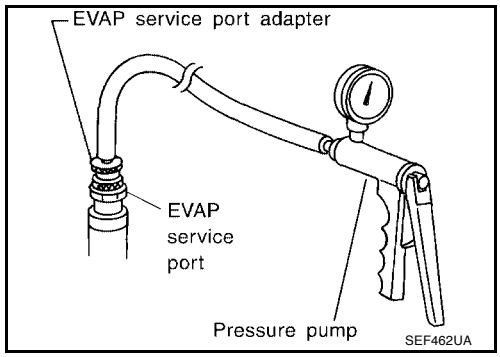
WITH GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

CAUTION:

- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2 , 0.6 psi).**

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Set the pressure pump and a hose.
3. Also set a vacuum gauge via 3-way connector and a hose.
4. Turn ignition switch ON.
5. Connect GST and select MODE 8.
6. Using MODE 8 control the EVAP canister vent control valve (close) and vacuum cut valve bypass valve (open).
7. Apply pressure and make sure the following conditions are satisfied.
   Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)
   Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg)
   If NG, go to EC-1677, "Diagnostic Procedure" .



NOTE:
For more information, refer to GST instruction manual.

Diagnostic Procedure

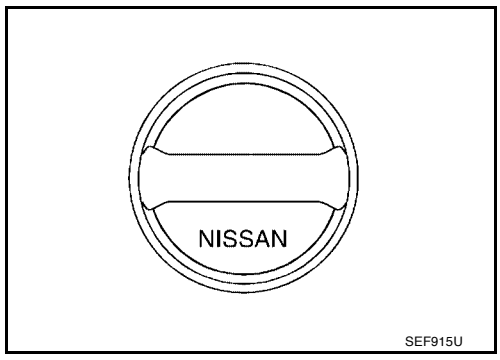
UBS00E1M

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 >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. 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

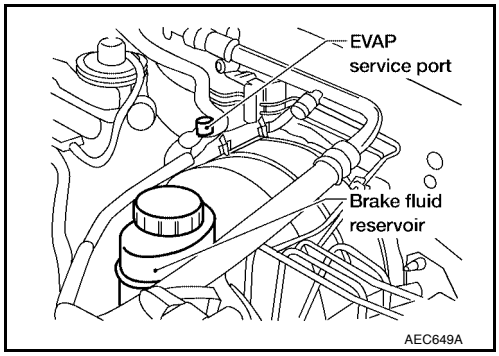
Refer to EC-1753, "Component Inspection"

OK or NG

OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

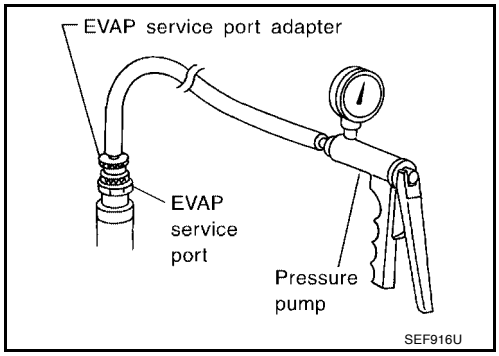
5. INSTALL THE PRESSURE PUMP

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.

With CONSULT-II>>GO TO 6.
Without CONSULT-II>>GO TO 7.

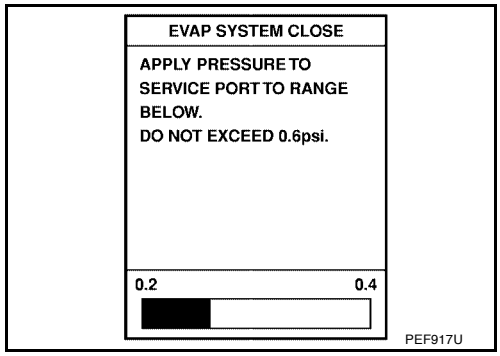


6. CHECK FOR EVAP LEAK

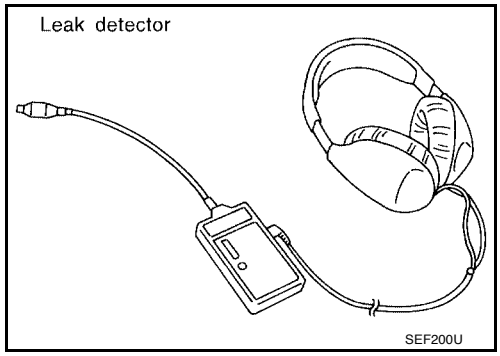
With CONSULT-II

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-1751, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

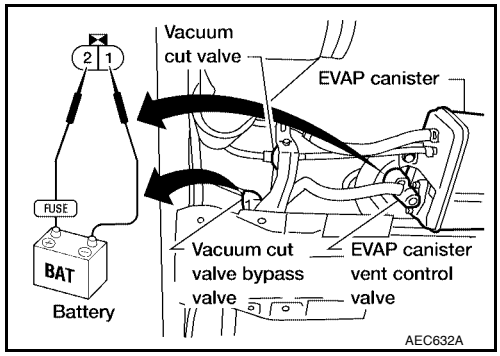
OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

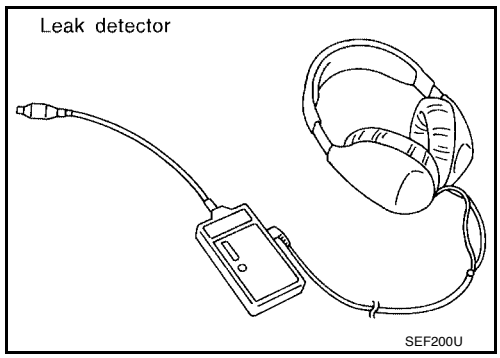
Without CONSULT-II

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-1751, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK WATER SEPARATOR

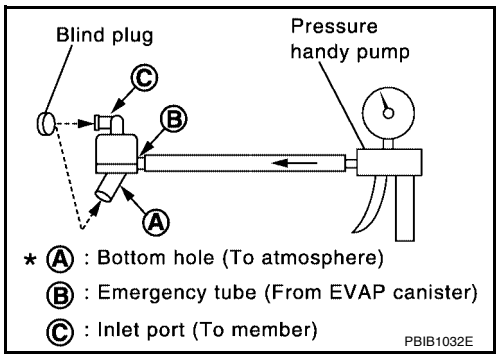
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

OK or NG

OK >> GO TO 9.
NG >> Replace water separator.



9. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

Refer to EC-1667, "DTC Confirmation Procedure" .

OK or NG

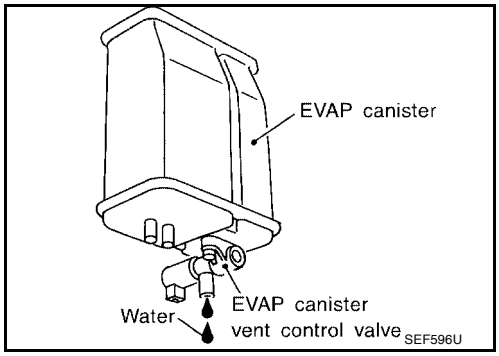
OK >> GO TO 10.
NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

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%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XX %
A/F ALPHA-B2	XX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	X. XX V

SEF677Y

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

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-1208, "Vacuum Hose Drawing" .

OK or NG

OK (With CONSULT-II)>>GO TO 16.
OK (Without CONSULT-II)>>GO TO 17.
NG >> Repair or reconnect the hose.

16. 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	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

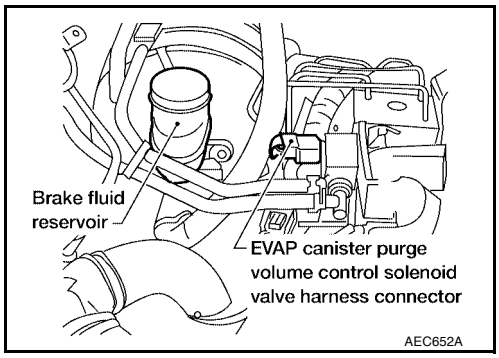
OK or NG

OK >> GO TO 18.
NG >> GO TO 17.

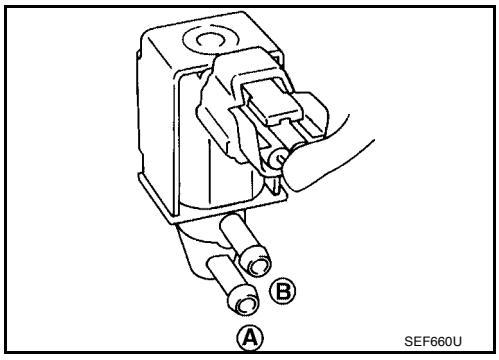
17. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

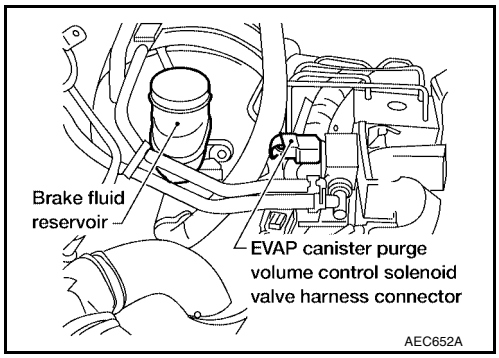


Condition PURG VOL CONT/V value	Air passage continuity between A and B
100 %	Yes
0%	No

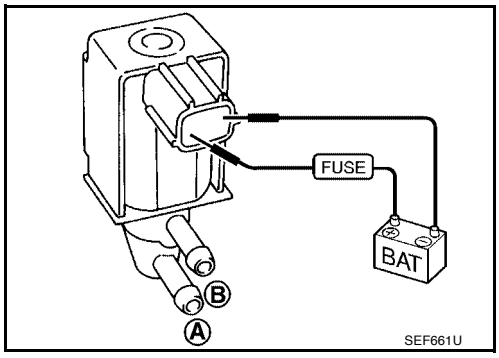


Without CONSULT-II

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



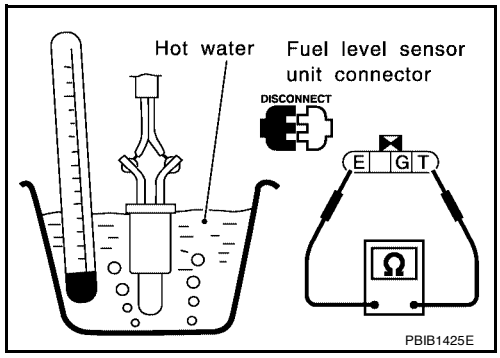
OK or NG

OK >> GO TO 18.
NG >> Replace EVAP canister purge volume control solenoid valve.

18. CHECK FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between fuel level sensor unit terminals T and E 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



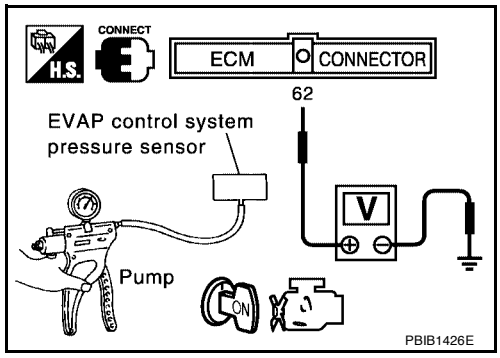
OK or NG

OK >> GO TO 19.
NG >> Replace fuel level sensor unit.

19. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.
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.
5. Check input voltage between ECM terminal 62 and ground.

Applied vacuum	Voltage V
Not applied	1.8 - 4.8
-26.7 kpa (-200 mmHg, -7.87 inHg)	2.1 to 2.5V lower than above value



CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below −93.3 kPa (−700 mmHg, −27.56 inHg) or over 101.3 kPa (760 mmHg, 29.92 inHg) of pressure.**

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-1751, "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-1758, "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-1758, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)"

OK or NG

OK >> GO TO 25.
NG >> Replace refueling control valve with fuel tank.

25. CHECK FUEL LEVEL SENSOR

Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 26.
NG >> Replace fuel level sensor unit.

26. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

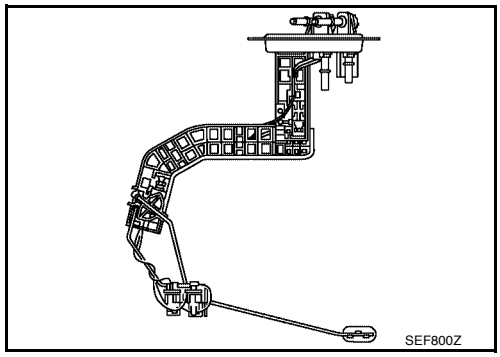
DTC P1464 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00E1N

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 is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.


SEF800Z

On Board Diagnosis Logic

UBS00E1O

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.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1464	Fuel level sensor circuit ground signal	A high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted)

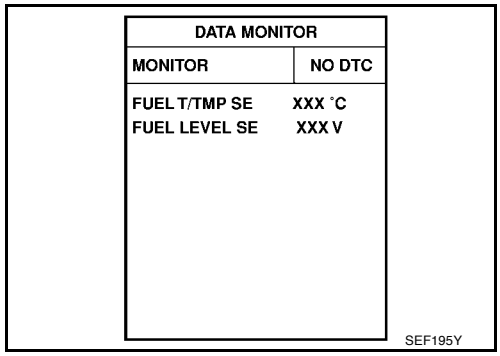
DTC Confirmation Procedure

UBS00E1P

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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-1687, "Diagnostic Procedure" .



SEF195Y

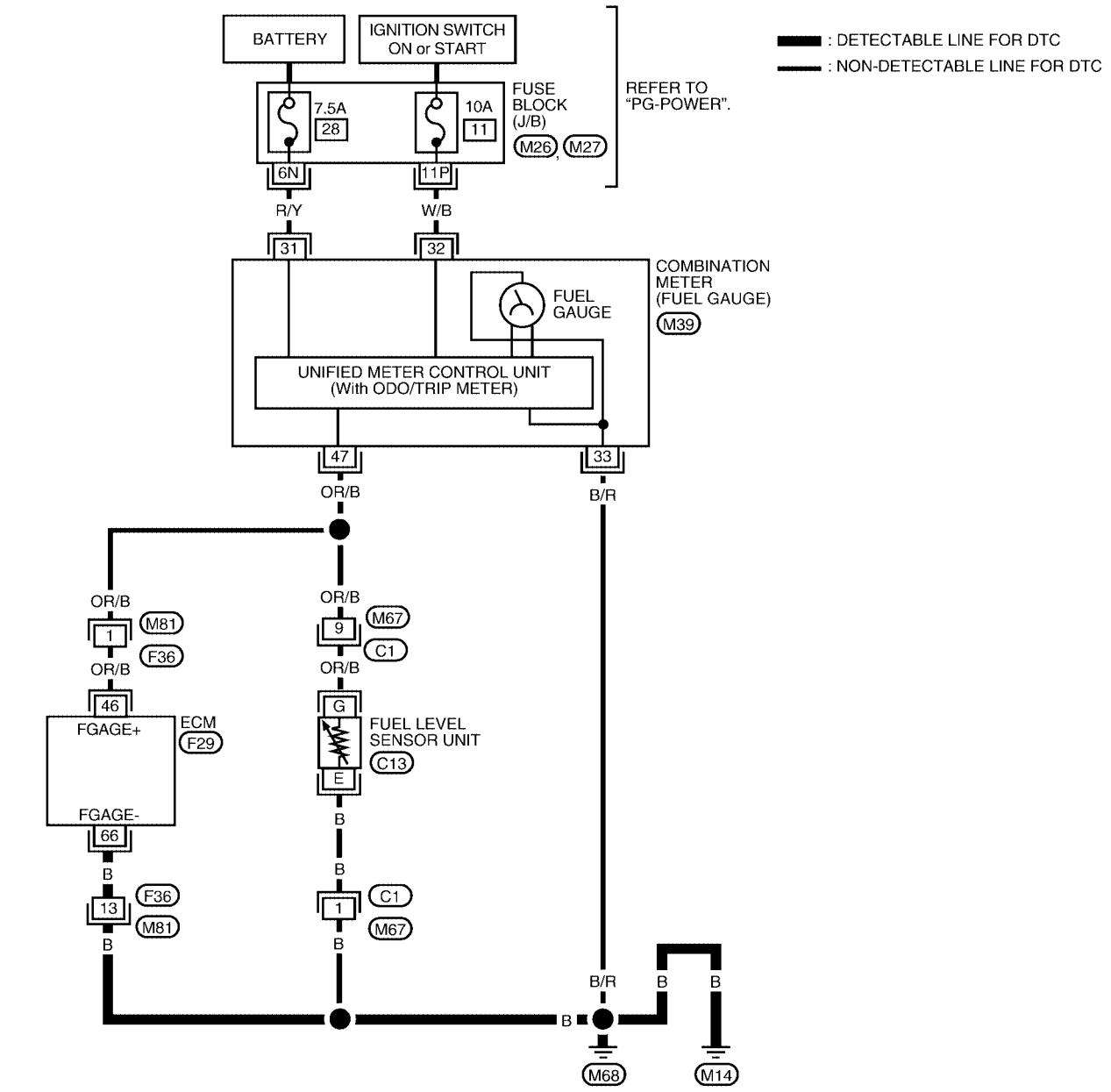
WITH GST

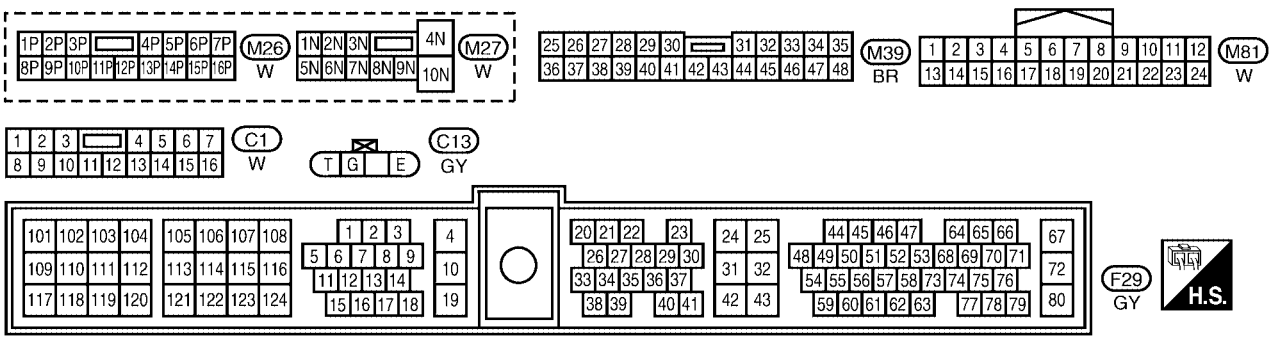
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00E1Q

EC-FLS3-01





BBWA1093E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	OR/B	Fuel level sensor	**[Ignition switch: ON]**	Approximately 0 - 4.8V Output voltage varies with fuel level.
66	B	Fuel level sensor ground	**[Engine is running]** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00E1R

1. 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 66 and ground. Refer to Wiring Diagram.
   Continuity should exist.
4. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F36, M81
- Harness for open and short between ECM and ground

>> Replace open circuit or short to power in harness or connectors.

3. CHECK FUEL LEVEL SENSOR

Refer to DI-18, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel level sensor unit.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00E1S

FUEL LEVEL SENSOR

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

DTC P1490 VACUUM CUT VALVE BYPASS VALVE

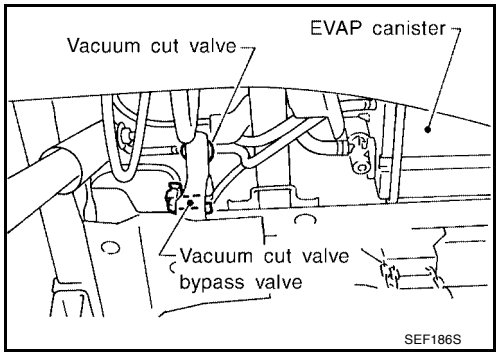
PFP:17372

Description

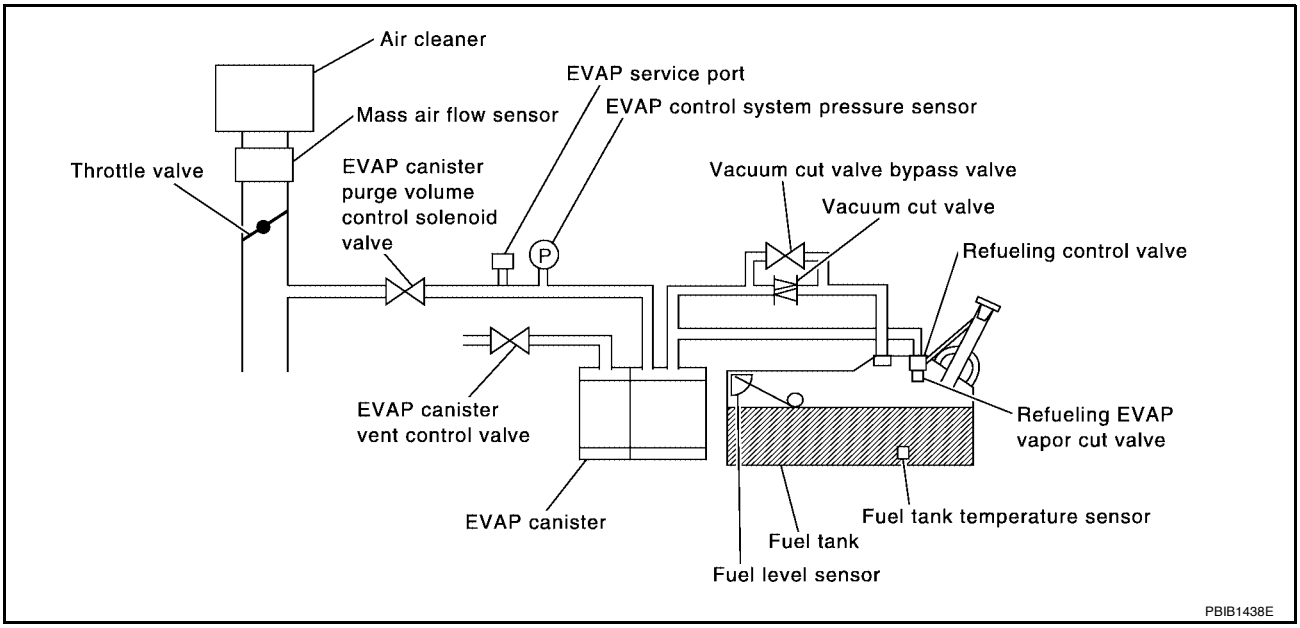
UBS00E1T

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

UBS00E1U

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00E1V

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1490	Vacuum cut valve bypass valve circuit	An improper voltage signal is sent to ECM through vacuum cut valve bypass valve.	● Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted) ● Vacuum cut valve bypass valve

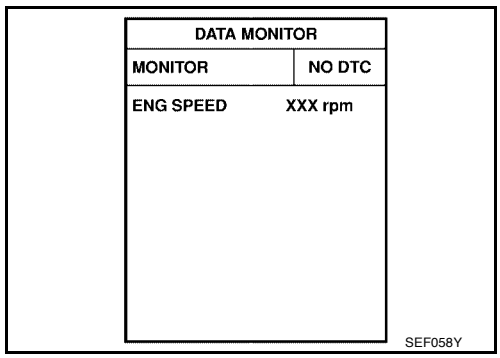
DTC Confirmation Procedure

UBS00E1W

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 EC-1691, "Diagnostic Procedure" .

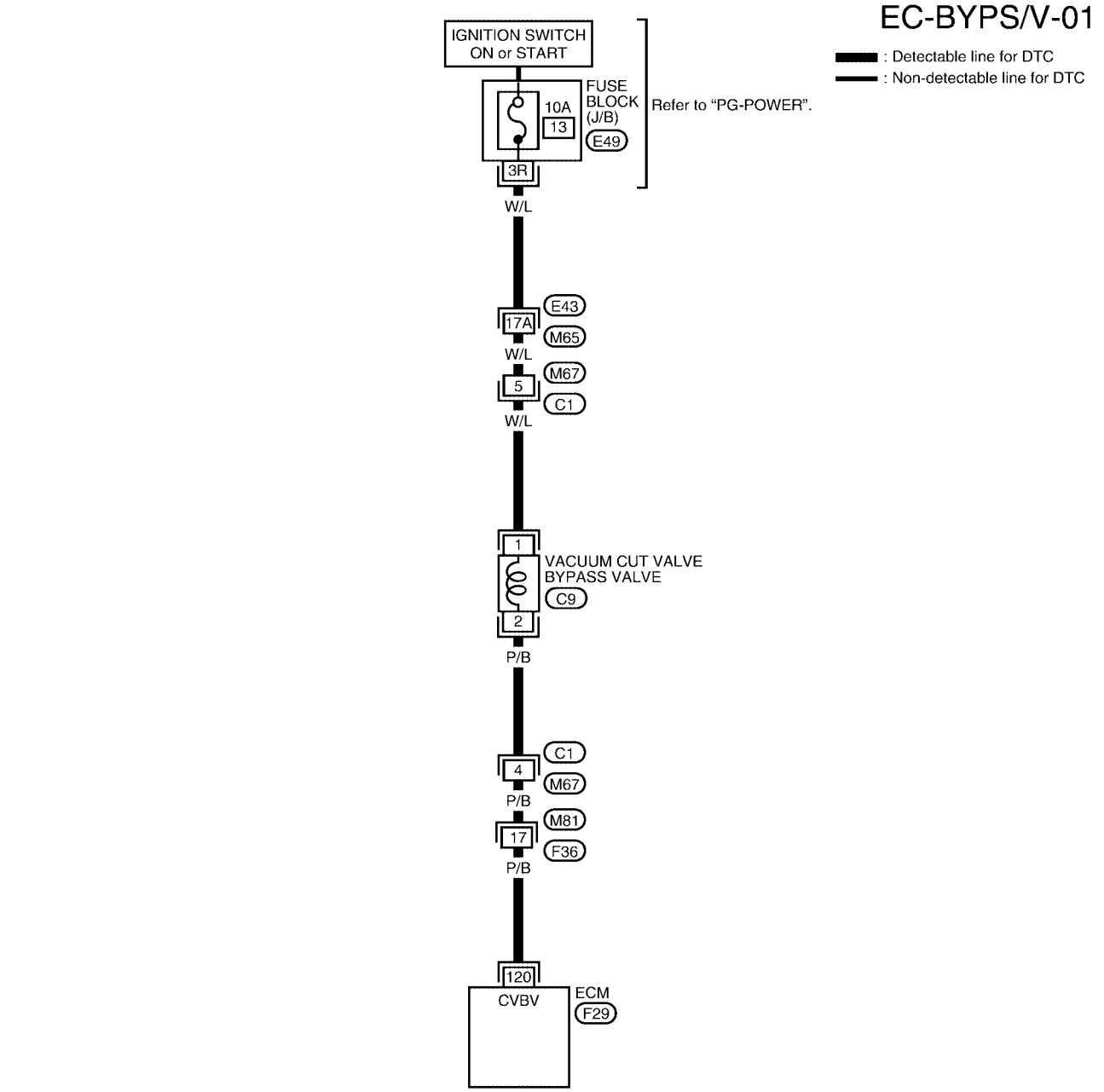


WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00E1X



BBWA1094E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00E1Y

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.

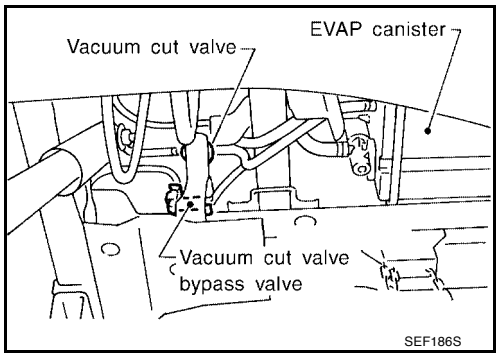
ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

SEF014Z

3. CHECK VACUUM CUT VALVE BYPASS VALUE POWER SUPPLY CIRCUIT

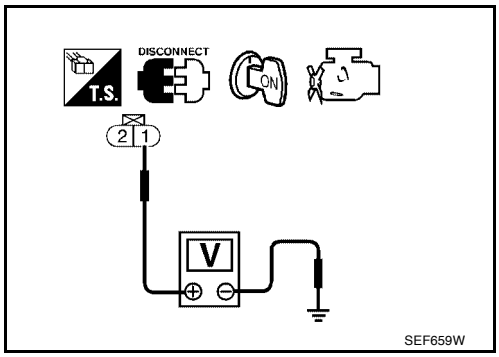
Without CONSULT-II

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 E43, M65
- Harness connectors M67, C1
- Fuse block (J/B) connector E49
- 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 120 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 C1, M67
- Harness connectors M81, F36
- 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

With CONSULT-II

1. Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.

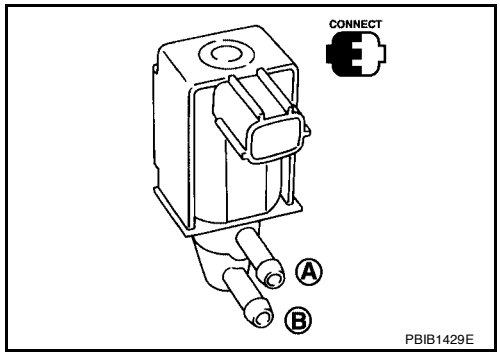
ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

SEF014Z

2. Check air passage continuity and operation delay time under the following conditions.

Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.



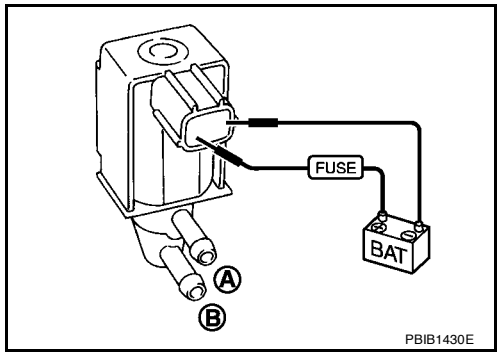
PBIB1429E

Without CONSULT-II

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.



PBIB1430E

OK or NG

OK >> GO TO 8.
NG >> Replace vacuum cut valve bypass valve.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

DTC P1491 VACUUM CUT VALVE BYPASS VALVE

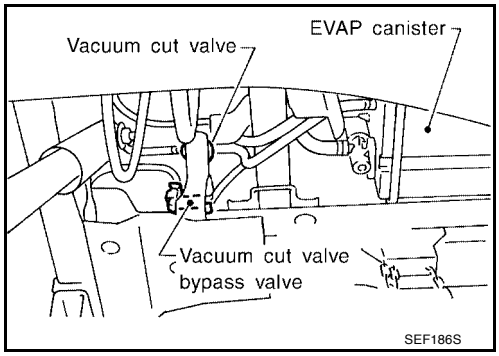
PFP:17372

Description

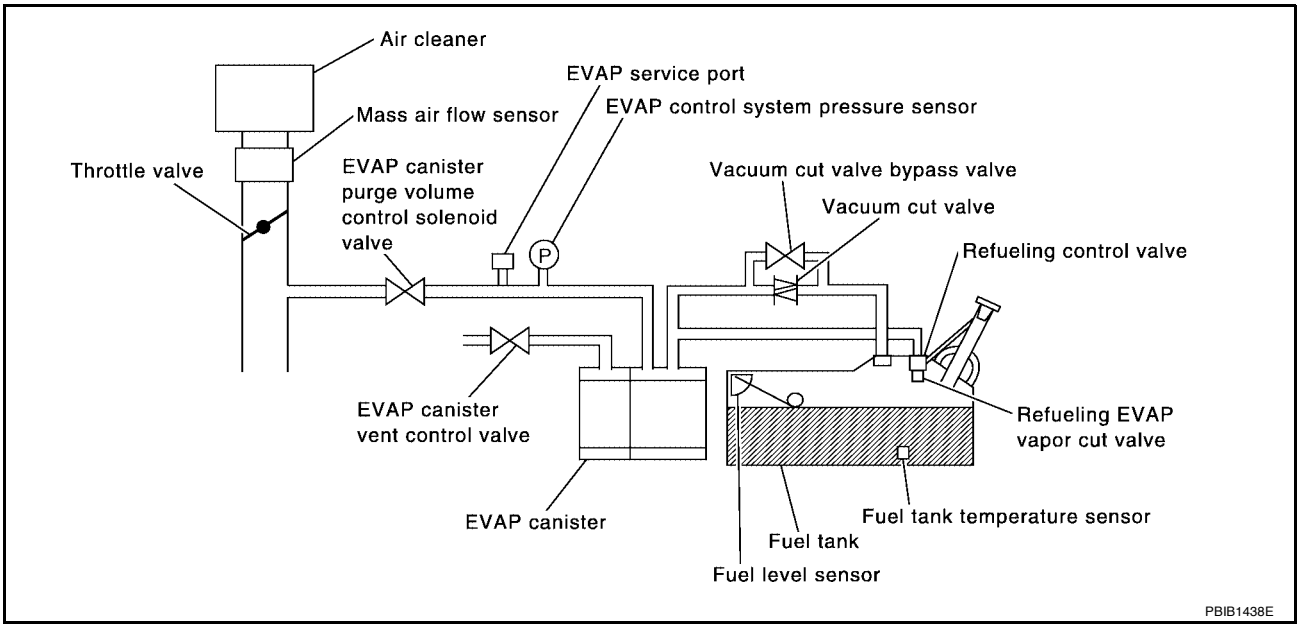
UBS00E1Z

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

UBS00E20

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VC/V BYPASS/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00E21

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1491	Vacuum cut valve bypass valve	Vacuum cut valve bypass valve does not operate properly.	● 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 ● Refueling control valve ● Refueling EVAP vapor cut valve

DTC Confirmation Procedure

UBS00E22

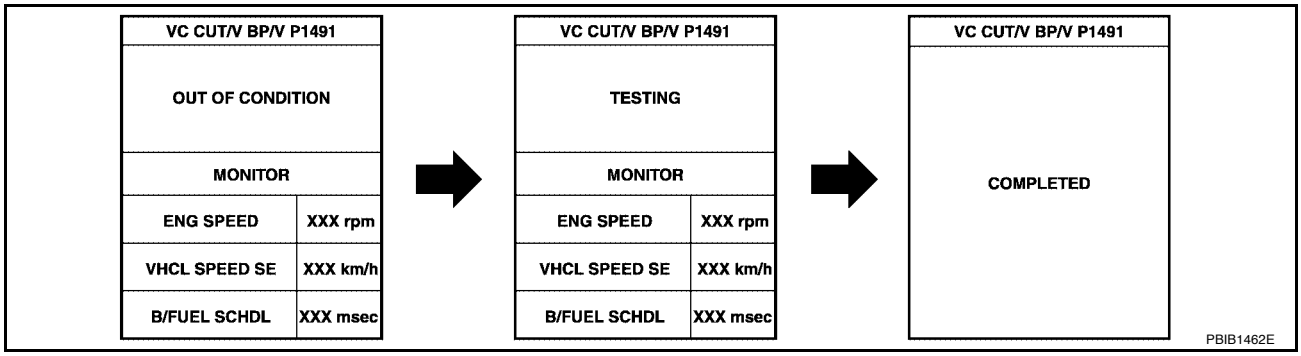
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 5 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.)

CMPS·RPM (POS)	More than 500 rpm
Selector lever	Suitable position
Vehicle speed	More than 36 km/h (22 MPH)
B/FUEL SCHDL	1.0 - 11.0 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 EC-1698, "Diagnostic Procedure" .

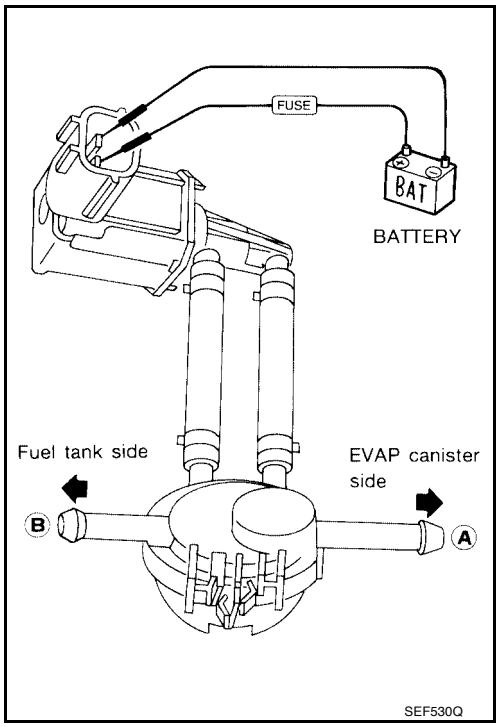
Overall Function Check

UBS00E23

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.

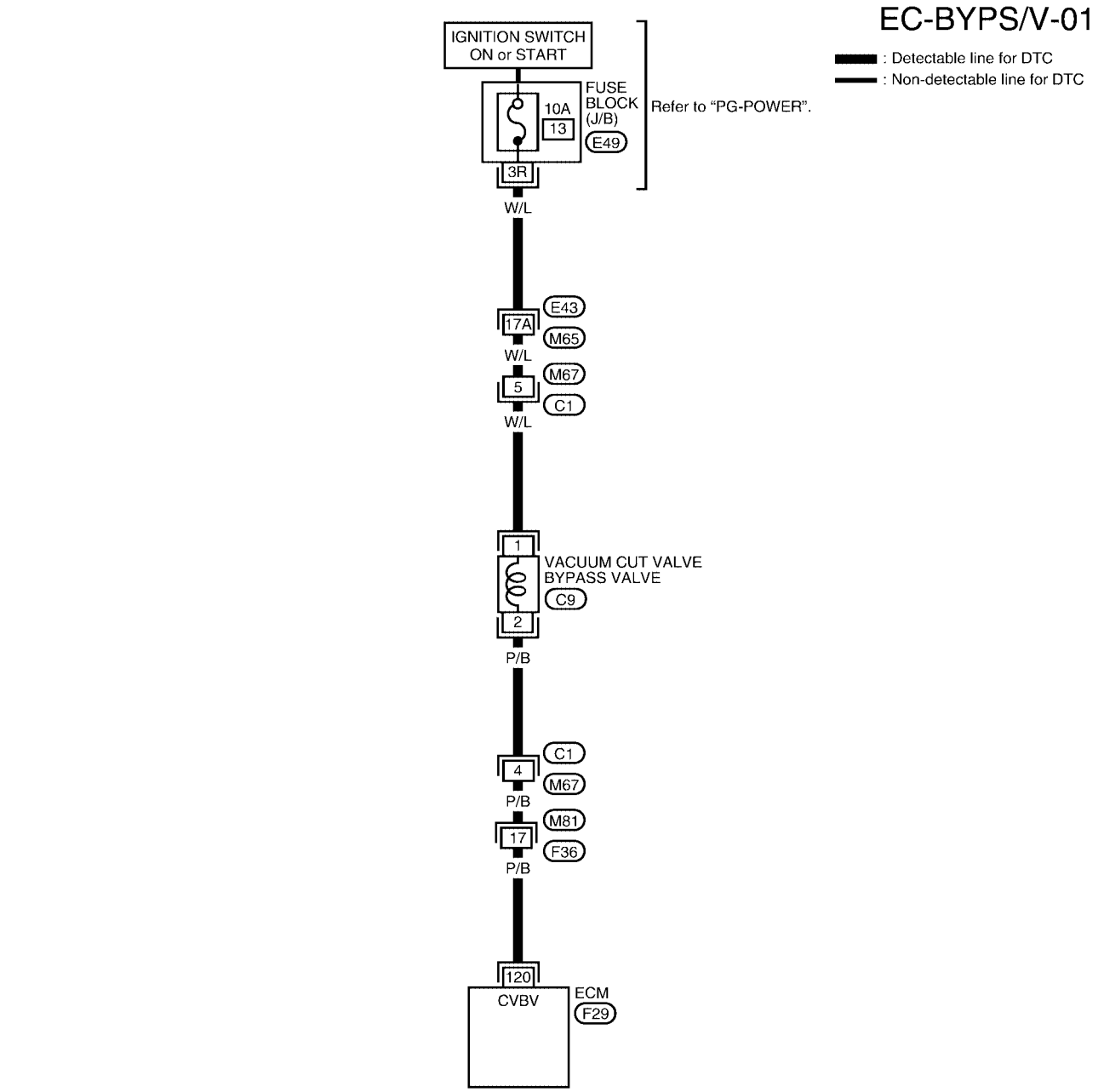
WITH GST

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 EC-1698, "Diagnostic Procedure" .



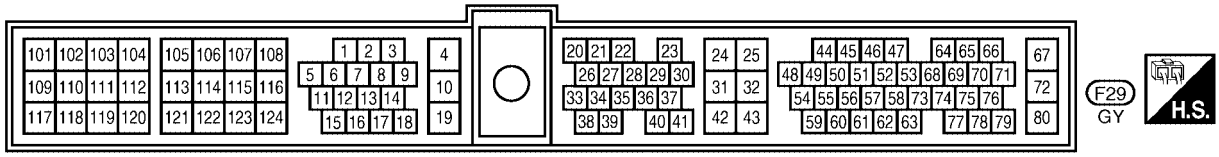
Wiring Diagram

UBS00E24





Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)



BBWA1094E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
120	P/B	Vacuum cut valve bypass valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00E25

1. INSPECTION START

Do you have CONSULT-II?

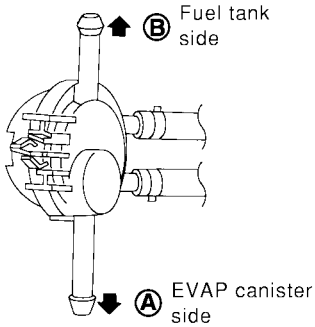
Yes or No

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
THRTL POS SEN	XXX V

SEF017Z

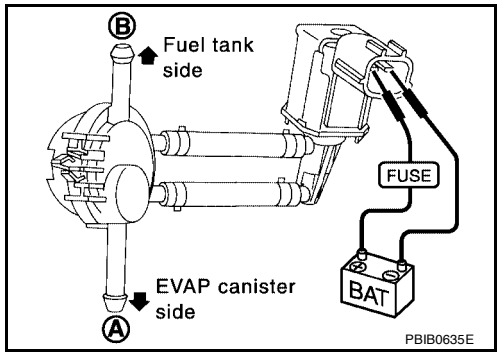
OK or NG

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 5.

4. CHECK EVAP PURGE LINE

1. Check EVAP purge line between EVAP canister and fuel tank for clogging or disconnection.
2. Check EVAP purge port of fuel tank for clogging.
3. Check EVAP canister. Refer to EC-1751, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 8.
NG (Step 1)>>Repair it.
NG (Step 2)>>Clean EVAP purge port.
NG (Step 3)>>Replace EVAP canister.

5. CHECK BYPASS HOSE

Check bypass hoses for clogging.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace hoses.

6. CHECK VACUUM CUT VALVE BYPASS VALVE

With CONSULT-II

1. Perform “VC/V BYPASS/V” in “ACTIVE TEST” mode.

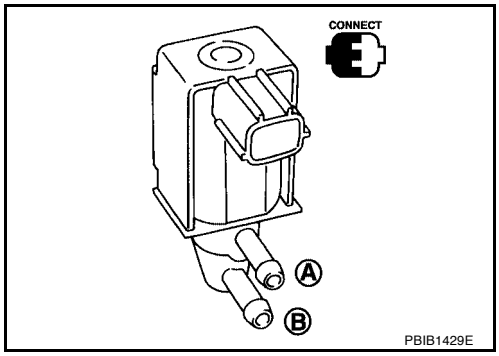
ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

SEF014Z

2. Check air passage continuity and operation delay time under the following conditions.

Condition VC/V BYPASS/V	Air passage continuity between A and B
ON	Yes
OFF	No

Operation takes less than 1 second.



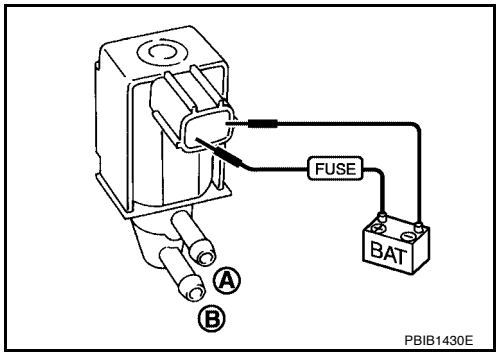
PBIB1429E

Without CONSULT-II

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.



PBIB1430E

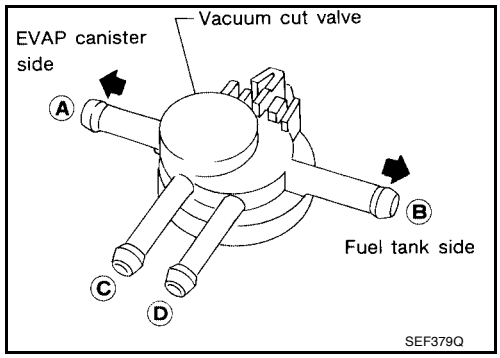
OK or NG

OK >> GO TO 7.
NG >> Replace vacuum cut valve bypass valve.

7. CHECK VACUUM CUT VALVE

Check vacuum cut valve as follows:

1. Plug port **C** and **D** with fingers.
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. Open port **C** and **D** .
6. Blow air in port **A** check that air flows freely out of port **C** .
7. Blow air in port **B** check that air flows freely out of port **D** .



OK or NG

OK >> GO TO 8.
NG >> Replace vacuum cut 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

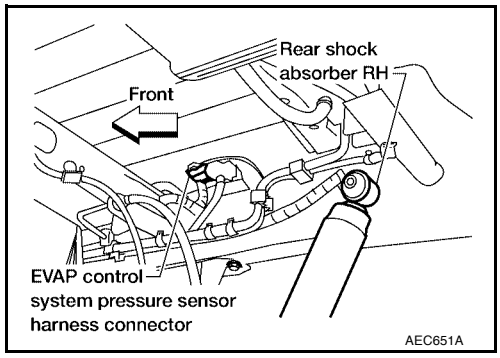
OK >> GO TO 9.
NG >> Repair or replace.

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 P0452 EC-1533, "DTC Confirmation Procedure" or P0453 EC-1539, "DTC Confirmation Procedure" .

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP control system pressure sensor.

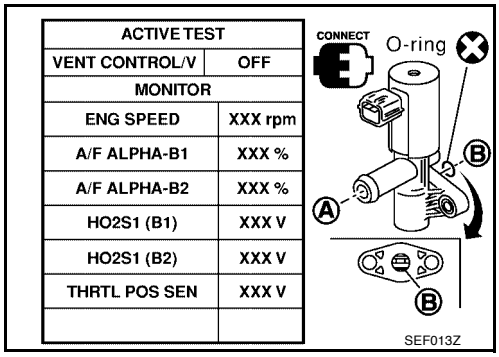
11. CHECK EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
2. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.

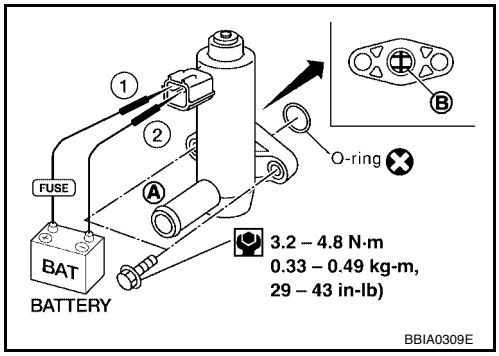


Without CONSULT-II

1. Check air passage continuity and operation delay time under the following condition.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.



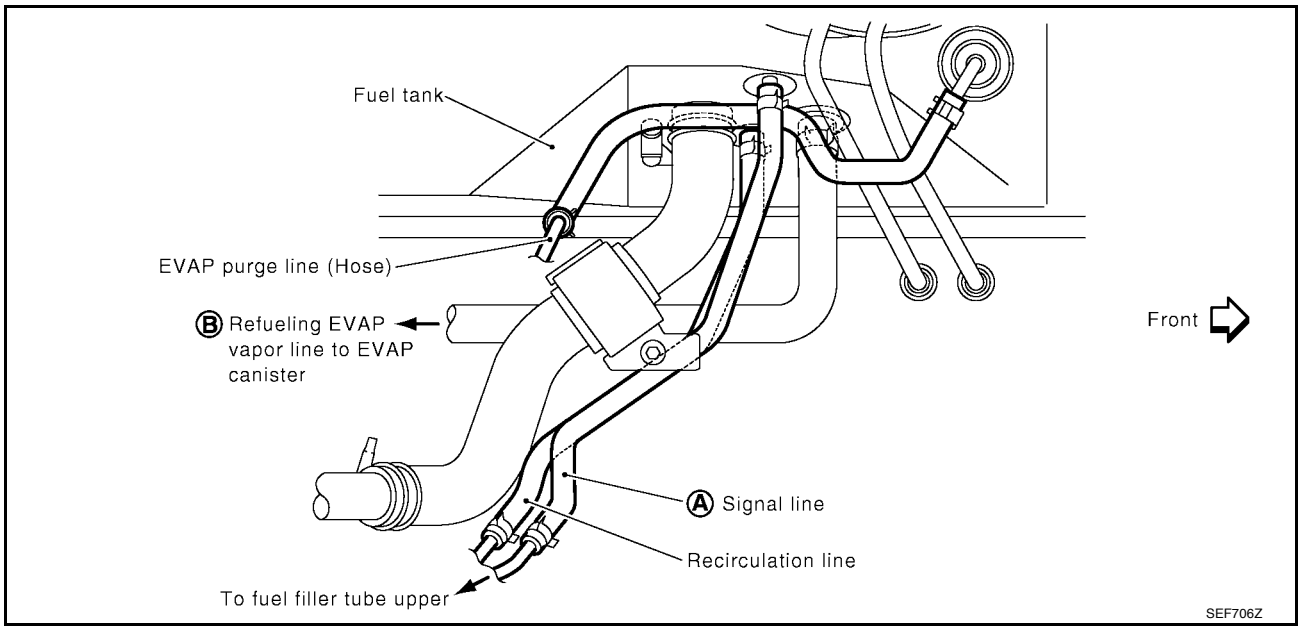
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.
If portion **B** is rusted, replace control valve.
Make sure new O-ring is installed properly.

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP canister vent control valve.

12. CHECK 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.



OK or NG

OK (With CONSULT-II)>>GO TO 13.
OK (Without CONSULT-II)>>GO TO 14
NG >> Replace refueling control valve with fuel tank.

13. CHECK REFUELING EVAP VAPOR CUT VALVE

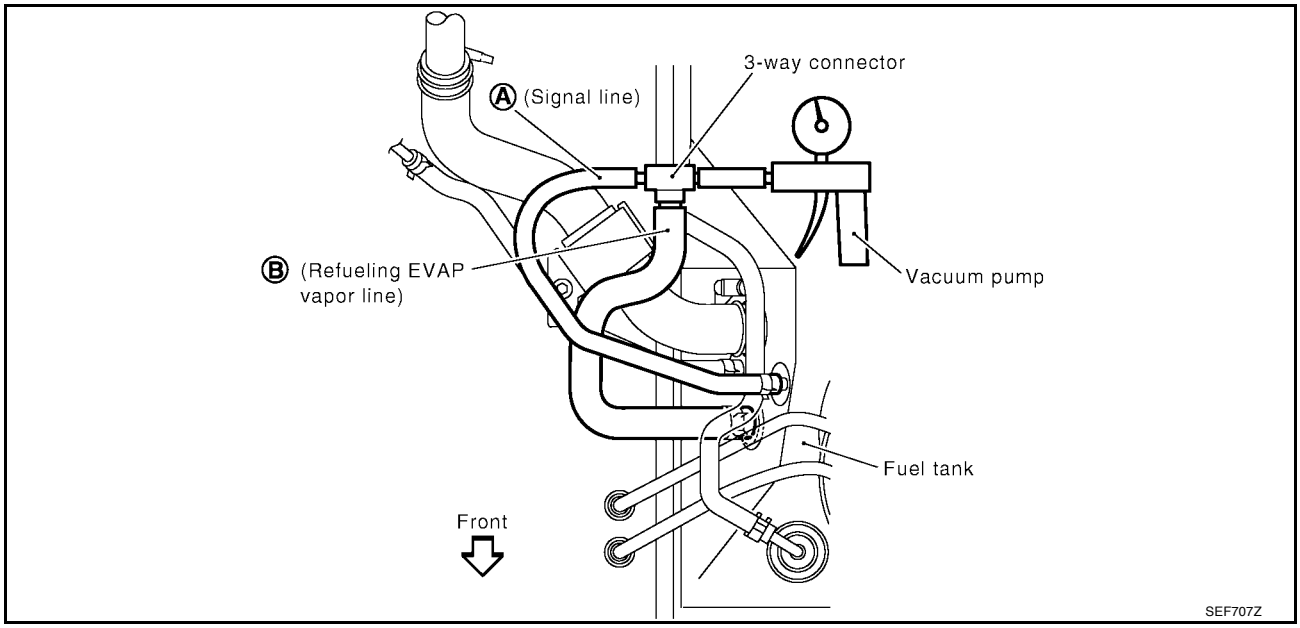
With CONSULT-II

1. Remove fuel tank. Refer to FL-3, "FUEL TANK" .
2. Drain fuel from the tank as follows:

- Remove fuel feed hose located on the fuel level sensor unit retainer.
- Connect a spare fuel hose, one side to fuel level sensor unit retainer where the hose was removed and the other side to a fuel container.
- 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.

- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel level sensor unit retainer with fuel level sensor unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



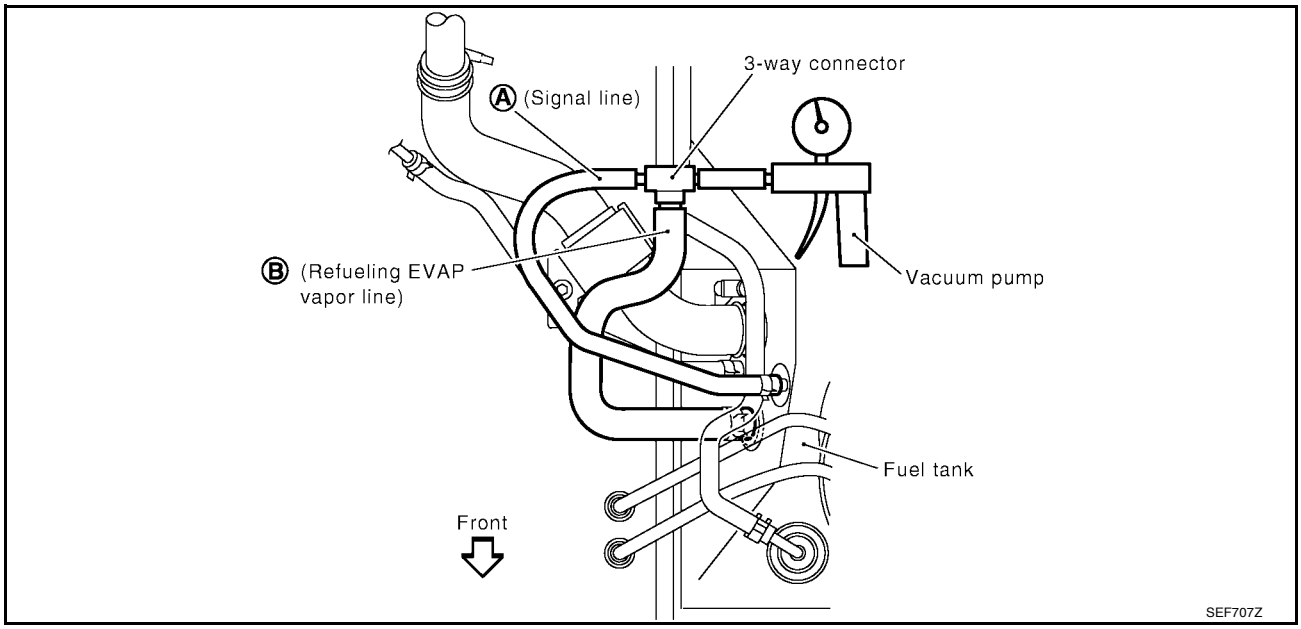
OK or NG

OK >> GO TO 15.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

14. CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT-II

1. Remove fuel tank. Refer to FL-3, "FUEL TANK" .
2. Drain fuel from the tank as follows:
- Remove fuel level sensor unit retainer.
- 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.
- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel level sensor unit retainer with fuel level sensor unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



OK or NG

OK >> GO TO 15.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

DTC P1605 A/T DIAGNOSIS COMMUNICATION LINE

PFP:23710

Component Description

UBS00E26

The malfunction information related to A/T (Automatic Transmission) is transferred through the line (circuit) from TCM (Transmission control module) to ECM. Therefore, be sure to erase the malfunction information such as DTC not only in TCM (Transmission control module) but also ECM after the A/T related repair.

On Board Diagnosis Logic

UBS00E27

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1605	A/T diagnosis communication line	An incorrect signal from TCM (Transmission Control Module) is sent to ECM.	● Harness or connectors [The communication line circuit between ECM and TCM (Transmission Control Module) is open or shorted.] ● Dead (Weak) battery ● TCM (Transmission Control Module)

DTC Confirmation Procedure

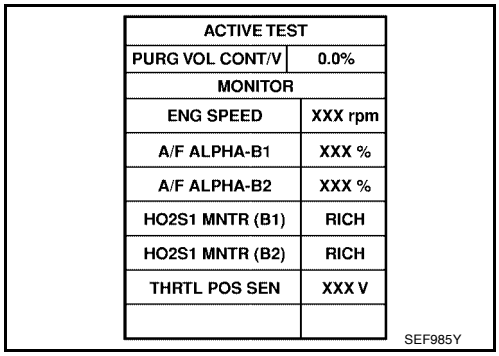
UBS00E28

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 70 seconds.
4. If 1st trip DTC is detected, go to EC-1710, "Diagnostic Procedure" .



WITH GST

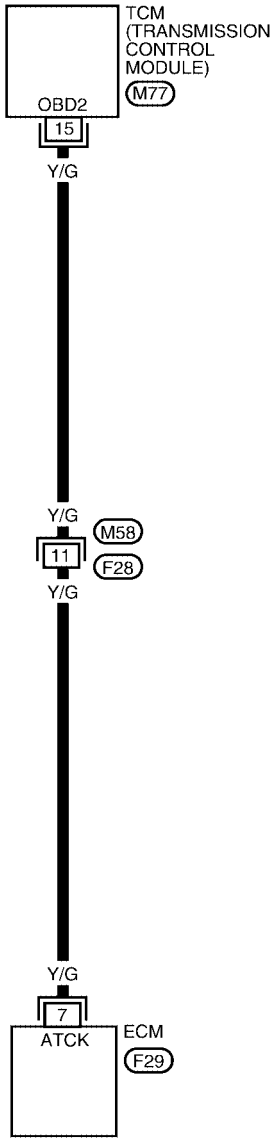
Follow the procedure “WITH CONSULT-II” above.

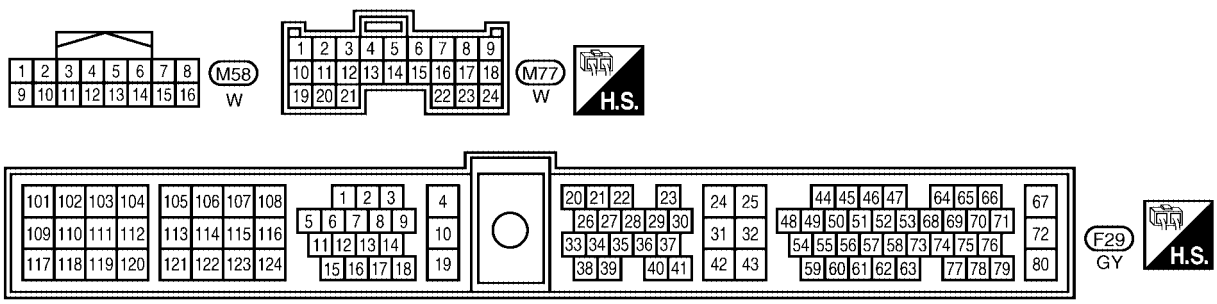
Wiring Diagram
WITHOUT VDC

UBS00E29

EC-ATDIAG-01

: Detectable line for DTC
: Non-detectable line for DTC





BBWA1095E

Specification data are reference values and are measured between each terminal and ground.

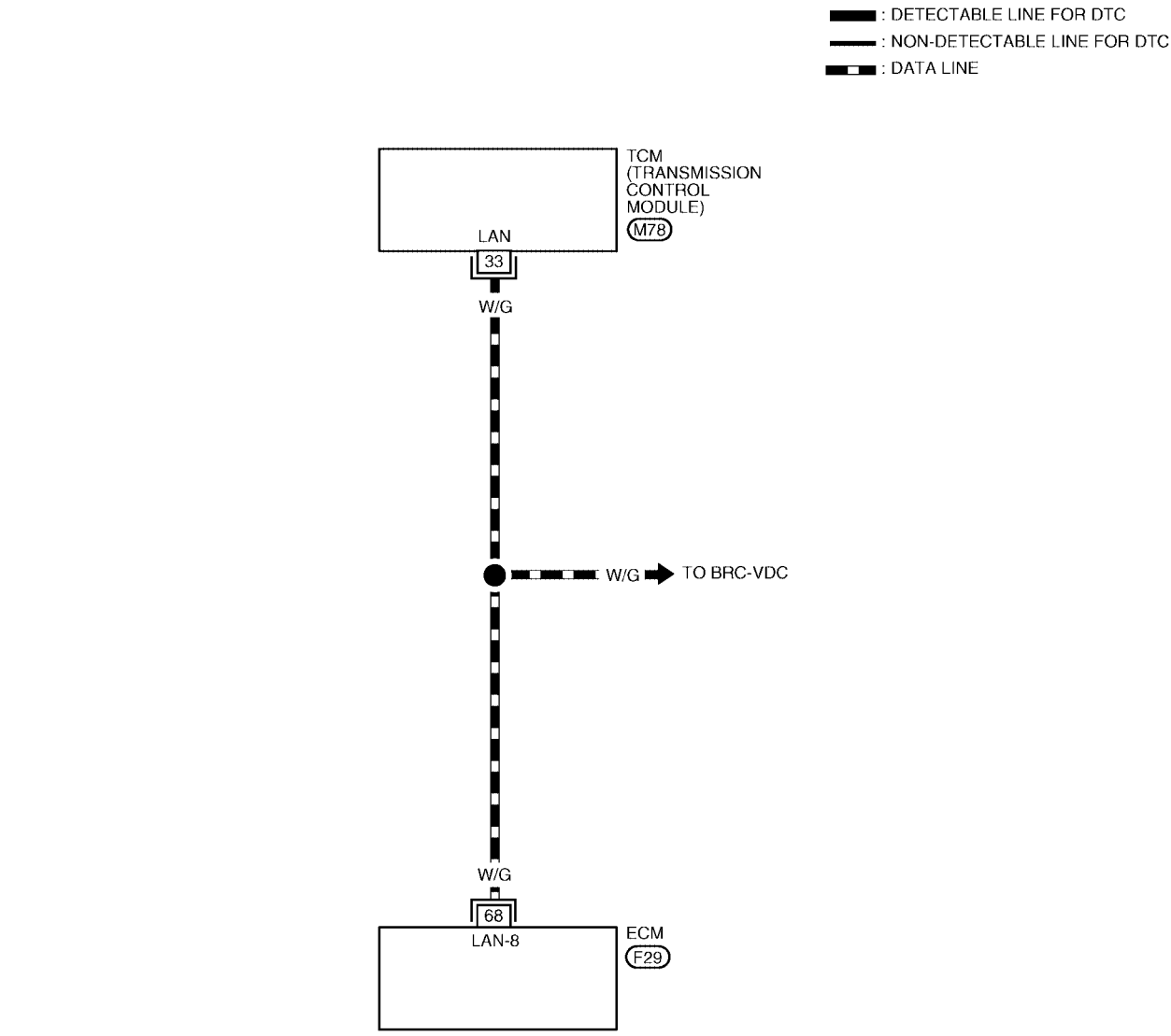
CAUTION:

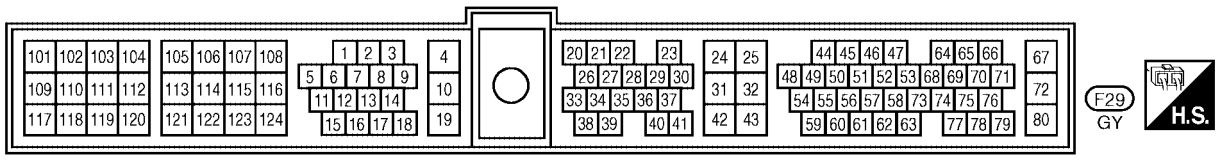
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

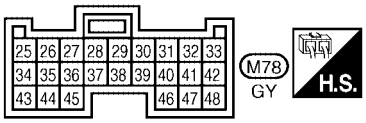
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
7	Y/G	A/T check signal	**[Ignition switch: ON]** **[Engine is running]**	0 - 3.0V

WITH VDC

EC-AT/C-02







BBWA1329E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
68	W/G	A/T signal	**[Ignition switch: ON]** ● Idle speed	0 - 5.0V

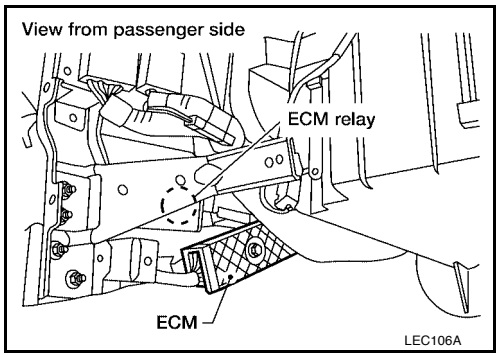
Diagnostic Procedure

UBS00E2A

WITHOUT VDC

1. CHECK A/T DIAGNOSIS COMMUNICATION LINE INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and TCM (Transmission Control Module) harness connector.



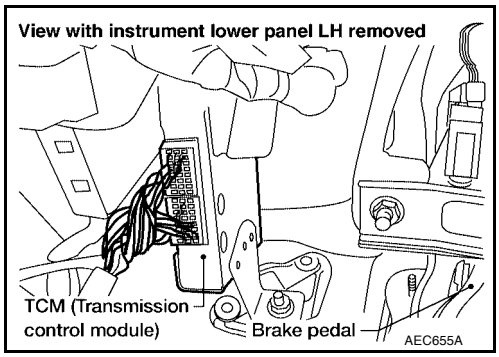
3. Check harness continuity between ECM terminal 7 and TCM terminal 15. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F28
- Harness for open or short between ECM and TCM (Transmission Control Module)

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK INTERMITTENT INCIDENT

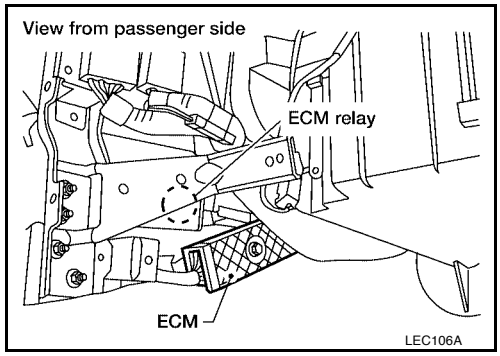
Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

WITH VDC

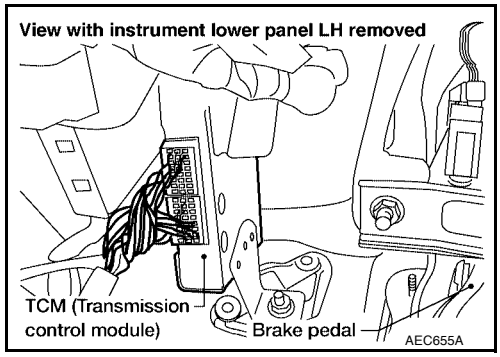
1. CHECK A/T CONTROL INPUT SIGNAL CIRCUIT FOR OPEN

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.



3. Disconnect TCM harness connector.
4. Check harness continuity between ECM terminal 68 and TCM terminal 33.
   Refer to Wiring Diagram.

Continuity should exist.



OK or NG

OK >> GO TO 2.
NG >> Repair harness or connectors.

2. CHECK A/T CONTROL INPUT SIGNAL FOR SHORT

1. Check harness continuity between ECM terminal 68 and ground.
   Refer to Wiring Diagram.

Continuity should not exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair short to ground or short to power in harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END.**

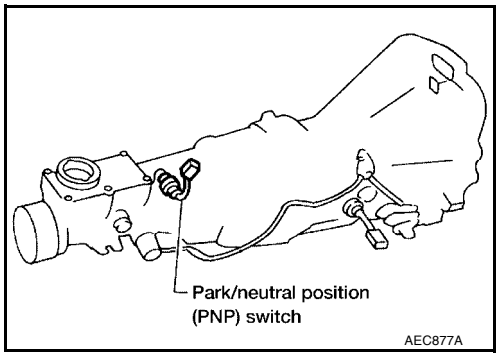
DTC P1706 PNP SWITCH

PFP:32006

Component Description

UBS00E2B

When the gear position is P or N (A/T), Neutral (M/T), 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

UBS00E2C

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Except above	OFF

On Board Diagnosis Logic

UBS00E2D

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	● Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] ● Park/neutral position (PNP) switch

DTC Confirmation Procedure

UBS00E2E

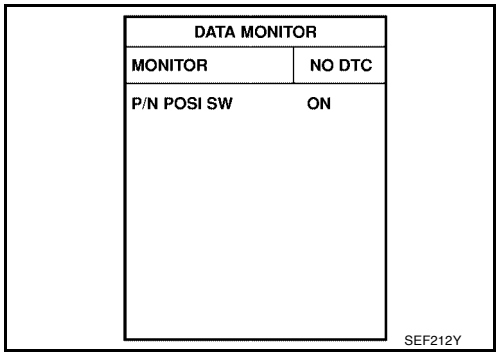
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 5 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 or P position (A/T) Neutral position (M/T)	ON
Except above position	OFF

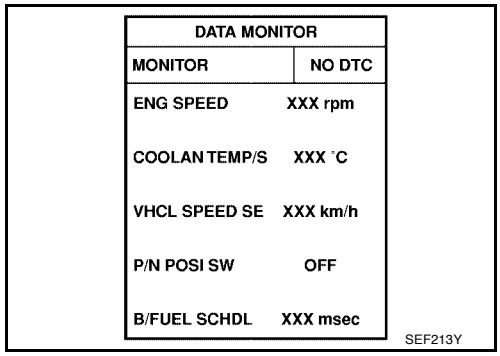


If NG, go to EC-1715, "Diagnostic Procedure" .
If OK, go to following step.

3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and warm it up to normal operating temperature.

5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,400 - 2,700 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.0 - 14.0 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position



6. If 1st trip DTC is detected, go to EC-1715, "Diagnostic Procedure" .

Overall Function Check

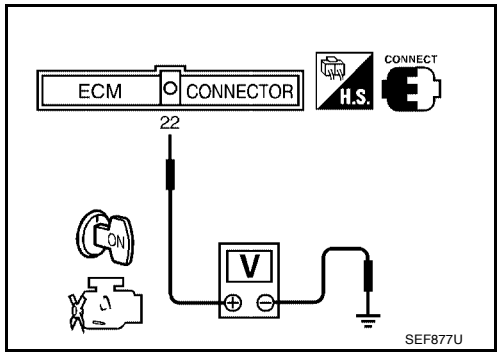
UBS00E2F

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 22 and ground under the following conditions.

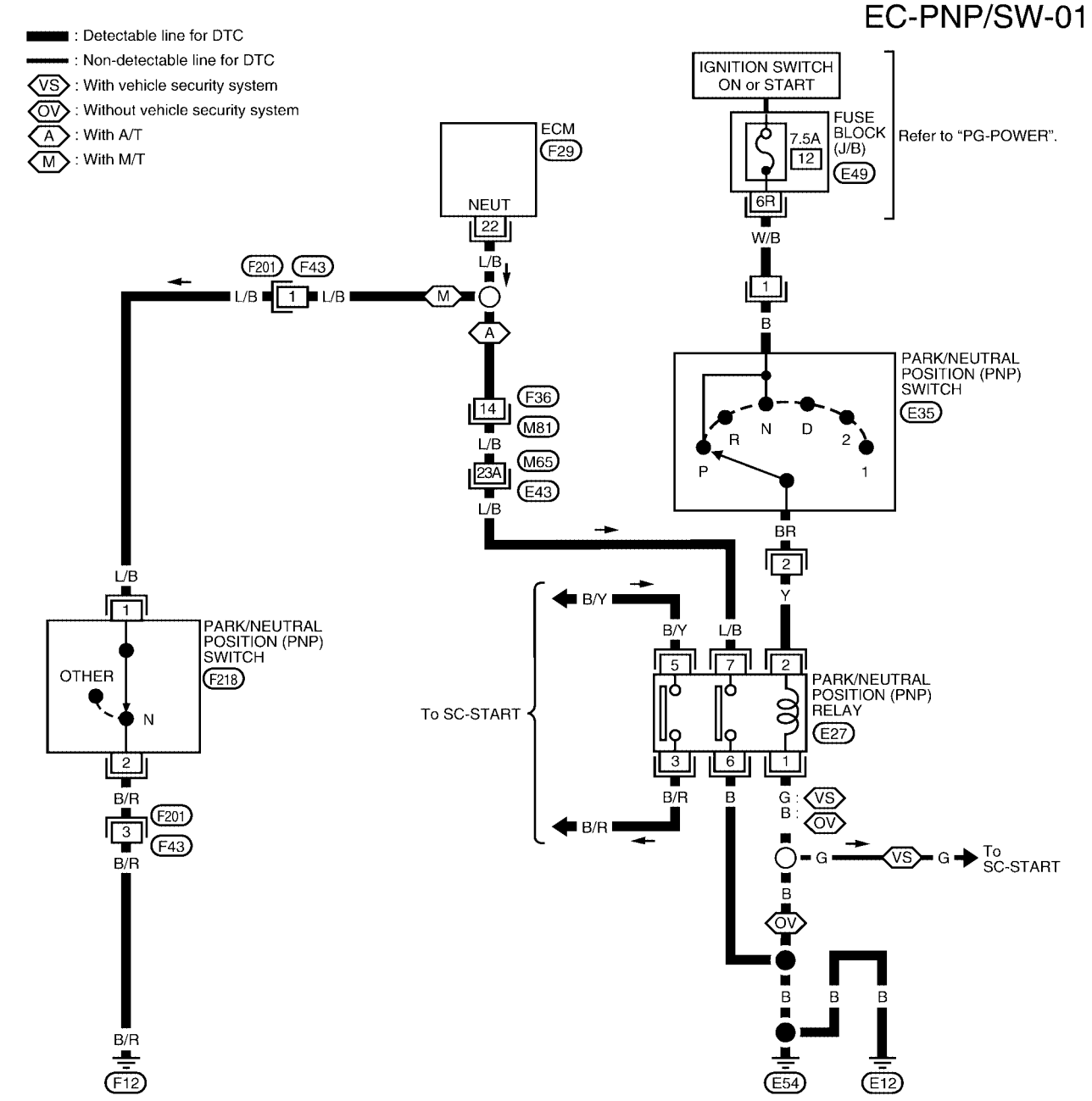
Condition (Gear position)	Voltage (V) (Known good data)
P or N position (A/T) Neutral position (M/T)	Approx. 0
Except above position	Approx. 5

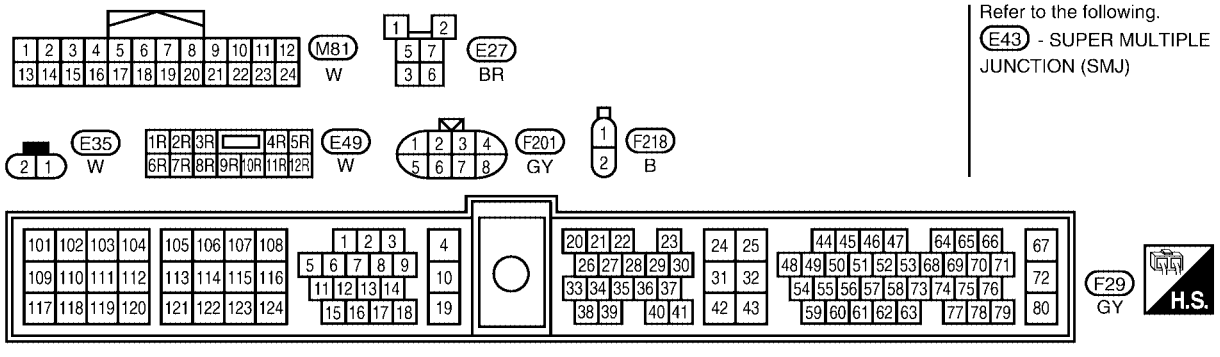


3. If NG, go to EC-1715, "Diagnostic Procedure" .

Wiring Diagram

UBS00E2G





Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)

BBWA1096E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22	L/B	Park/neutral position (PNP) switch	**[Ignition switch: ON]** ● Shift lever: N or P (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] ● Except above position	Approximately 5V

Diagnostic Procedure

UBS00E2H

FOR M/T MODELS

1. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

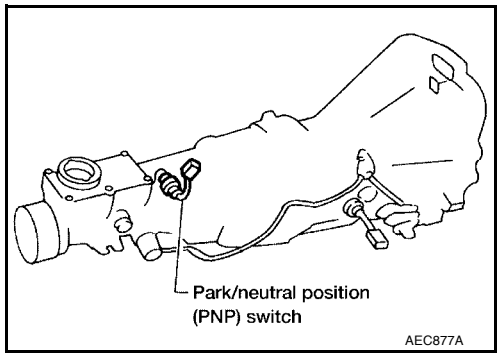
1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F201, F43
- Harness for open between park/neutral position (PNP) switch and ground

>> Repair open circuit or short to power in harness or connectors.

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 22 and PNP switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F43, F201
- Harness for open or short between ECM and park/neutral position (PNP) switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH

Refer to MT-46, "Position Switch Check" .

OK or NG

OK >> GO TO 6.
NG >> Replace park/neutral position (PNP) switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

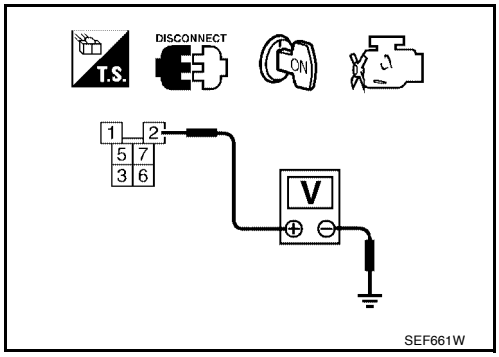
>> **INSPECTION END**.

FOR A/T MODELS

1. CHECK PNP SWITCH POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) relay.
3. Turn ignition switch ON.
4. Shift selector lever to P or N position.
5. Check voltage between PNP relay terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

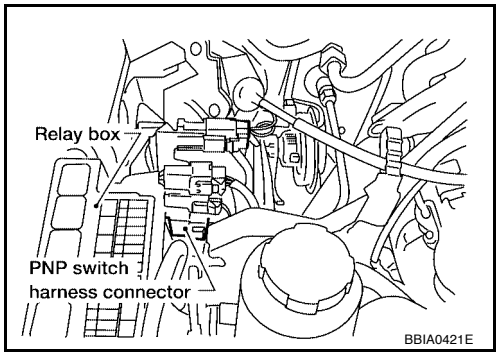
OK >> GO TO 6.
NG >> GO TO 2.

2. CHECK PNP SWITCH POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and PNP relay 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 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK PNP SWITCH POWER SUPPLY CIRCUIT-III

1. Turn ignition switch ON.
2. Check voltage between PNP switch terminal 1 and ground with CONSULT-II or tester. Refer to Wiring Diagram.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E49
- 7.5A fuse
- Harness for open or short between PNP switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH

Refer to AT-254, "PNP SWITCH" .

OK or NG

OK >> GO TO 11.
NG >> Replace park/neutral position (PNP) switch.

6. CHECK PNP RELAY GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between PNP relay terminals 1, 6 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 8.
NG (With vehicle security system)>>GO TO 7
NG (Without vehicle security system)>>Repair open circuit or short to power in harness or connectors.

7. DETECT MALFUNCTIONING PART

Check the circuit between PNP relay and ground.
Refer to SC-9, "STARTING SYSTEM" .

OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

8. CHECK PNP RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 22 and PNP relay terminal 7. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

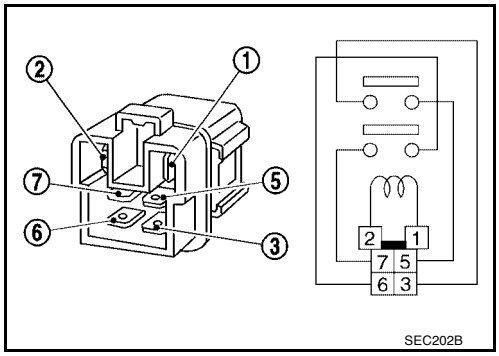
- Harness connectors F36, M81
- Harness connectors M65, E43
- Harness for open or short between ECM and park/neutral position (PNP) relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK PARK/NEUTRAL POSITION (PNP) RELAY

1. Apply 12V direct current between park/neutral position (PNP) relay terminals 1 and 2.
2. Check continuity between park/neutral position (PNP) relay terminals 3 and 5, 6 and 7.

12V (1 and 2) applied : Continuity should exist.
No voltage applied : Continuity should not exist.



OK or NG

OK >> GO TO 11.
NG >> Replace park/neutral position (PNP) relay.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

IGNITION SIGNAL

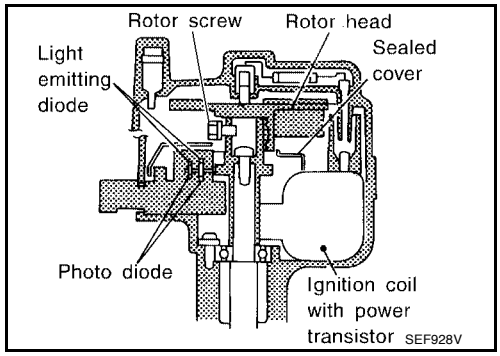
PFP:22448

Component Description

UBS00E2I

IGNITION COIL & POWER TRANSISTOR

The power transistor switches ON and OFF the ignition coil primary circuit according to the ECM signal. As the primary circuit is turned ON and OFF, the proper high voltage is induced in the secondary circuit. The distributor is not repairable except for the distributor cap and rotor head.



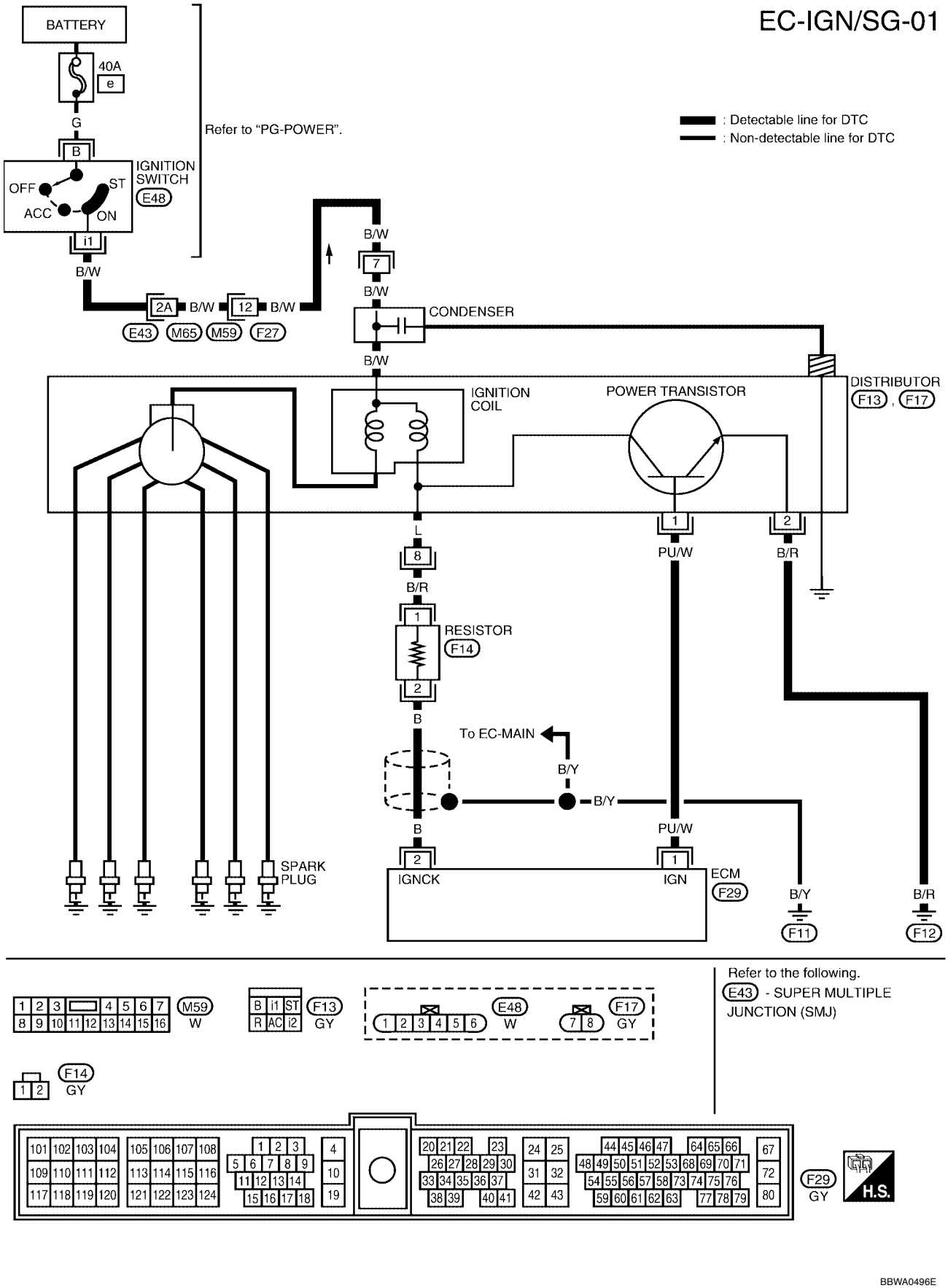
NOTE:
The rotor screw which secures the distributor rotor head to the distributor shaft must be torqued properly.

: 3.6±0.3 N·m (37±3 kg-cm, 32±3 in-lb)

Wiring Diagram

UBS00E2J

EC-IGN/SG-01

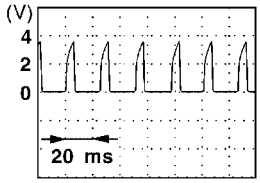
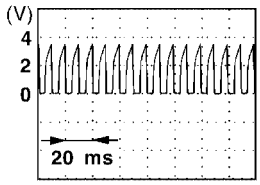


BBWA0496E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	PU/W	Ignition signal	**[Engine is running]** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 0.7V★  SEF988U
			[Engine is running] ● Engine speed is 2,000 rpm	1.1 - 1.5V★  SEF989U

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00E2K

1. INSPECTION START

Turn ignition switch OFF, and restart engine.

Is engine running?

Yes or No

Yes (With CONSULT-II)>>GO TO 2.
Yes (Without CONSULT-II)>>GO TO 3.
No >> GO TO 4.

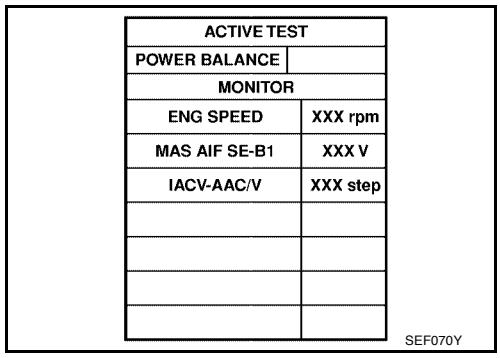
2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
2. Make sure that all circuits do not produce a momentary engine speed drop.

OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 4.



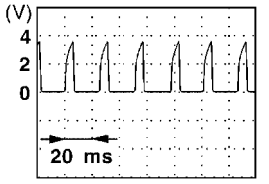
SEF070Y

3. CHECK OVERALL FUNCTION

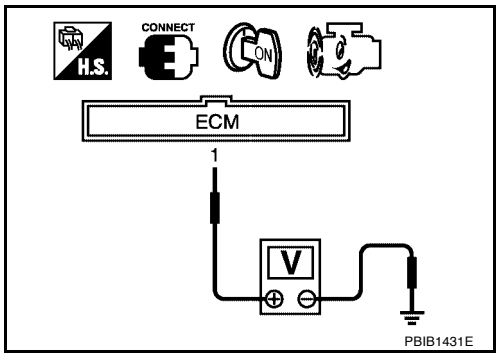
Without CONSULT-II

1. Let engine idle.
2. Read the voltage signal between ECM terminal 1 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.

   NOTE:
   The pulse cycle changes depending on rpm at idle.



SEF988U



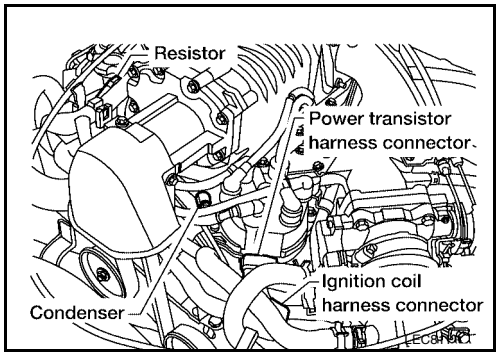
PBIB1431E

OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 4.

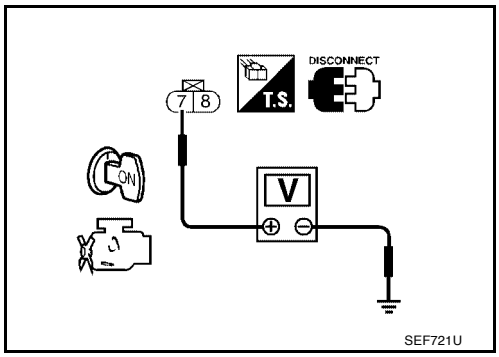
4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.



4. Check voltage between ignition coil terminal 7 and ground with CONSULT-II or tester.

   Voltage: Battery voltage



SEF721U

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E43, M65
- Harness connectors M59, F27
- Harness for open or short between ignition coil and ignition switch

>> Repair harness or connectors.

6. CHECK POWER TRANSISTOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect power transistor harness connector.
3. Check harness continuity between power transistor terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to power in harness or connectors.

7. CHECK INPUT SIGNAL CIRCUIT

1. Strip tape covering resistor.
2. Disconnect ECM harness connector.
3. Disconnect resistor harness connector.
4. Check harness continuity between ignition coil terminal 8 and resistor terminal 1, resistor terminal 2 and ECM terminal 2. Refer to Wiring Diagram.

Continuity should exist.

5. Also check for short to ground and short to power.

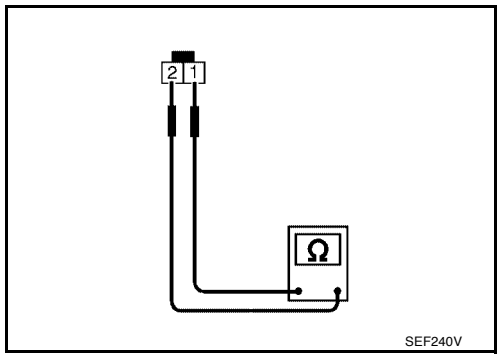
OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK RESISTOR

Check resistance between resistor terminals 1 and 2.

Resistance: Approximately 2.2 kΩ [at 25°C (77°F)]



OK or NG

OK >> GO TO 9.
NG >> Replace resistor.

9. CHECK POWER TRANSISTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 1 and power transistor terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

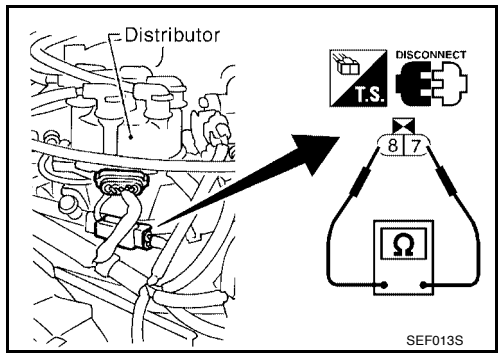
OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

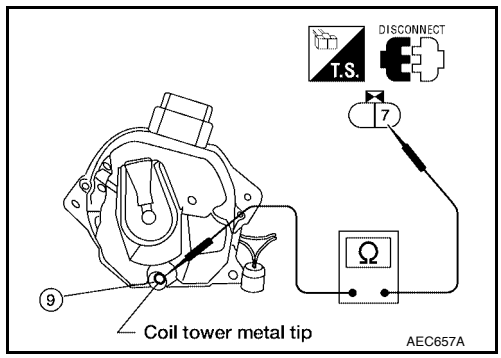
10. CHECK IGNITION COIL

1. Disconnect ignition coil harness connector.
2. Check resistance as shown in the figure.

Terminal	Resistance [at 20°C (68°F)]
7 - 8 (Primary coil)	Approx. 1.0Ω
7 - 9 (secondary coil)	Approx. 10 kΩ



For checking secondary coil, remove distributor cap and measure resistance between coil tower metal tip 9 and terminal 7.



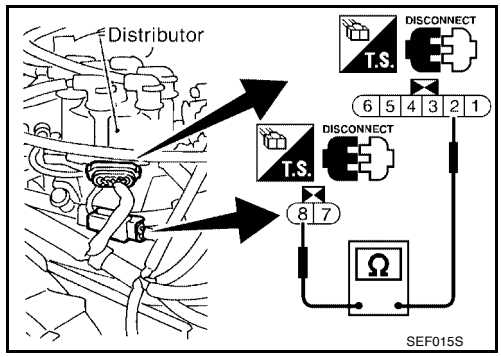
OK or NG

OK >> GO TO 11.
NG >> Replace distributor assembly.

11. CHECK POWER TRANSISTOR

1. Disconnect camshaft position sensor & power transistor harness connector and ignition coil harness connector.
2. Check power transistor resistance between terminals 2 and 8.

Terminals	Resistance	Result
2 and 8	Except 0Ω	OK
	0Ω	NG



OK or NG

OK >> GO TO 12.
NG >> Replace distributor assembly.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00E2L

DISTRIBUTOR

Refer to EM-80, "OUTER COMPONENT PARTS" .

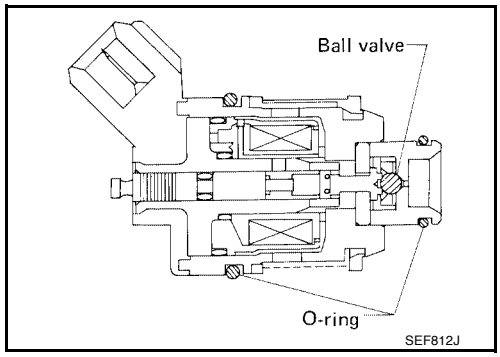
INJECTOR CIRCUIT

PFP:16600

Component Description

UBS00E2M

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 ball 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

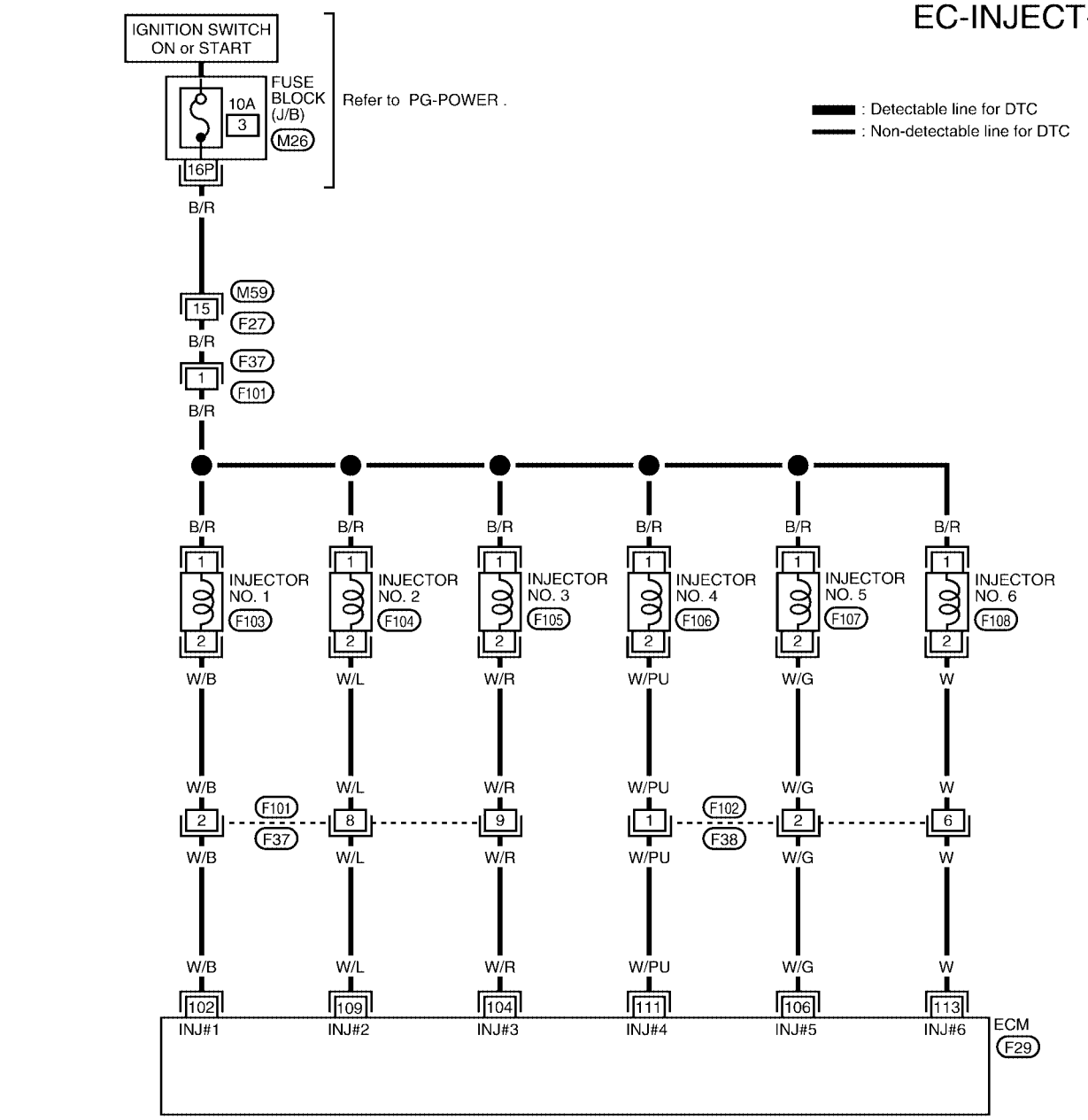
UBS00E2N

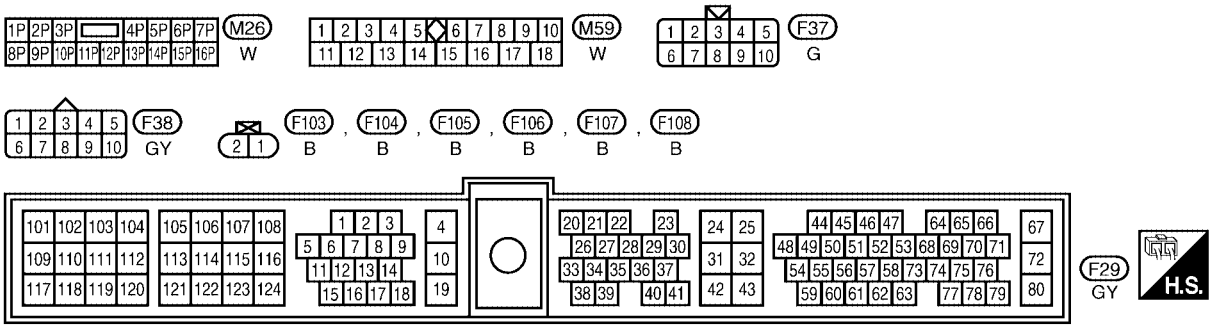
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE-B1 INJ PULSE-B2	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	2.4 - 3.7 msec
		2,000 rpm	1.9 - 3.3 msec
B/FUEL SCHDL	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.4 msec

Wiring Diagram

UBS00E2O



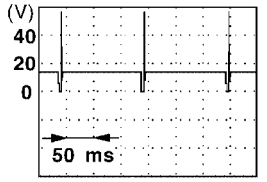
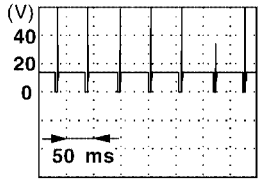


BBWA0515E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102 104 106 109 111 113	W/B W/R W/G W/L W/PU W	Injector No. 1 Injector No. 3 Injector No. 5 Injector No. 2 Injector No. 4 Injector No. 6	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  SEF007V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  SEF008V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00E2P

1. INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

Yes or No

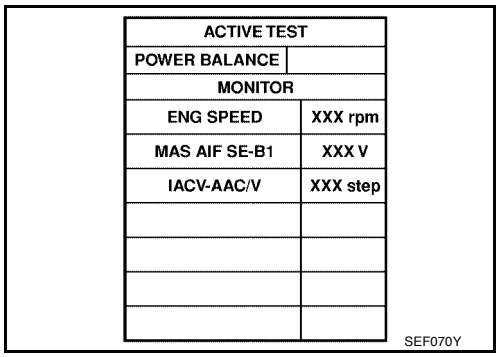
Yes >> GO TO 2.

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.

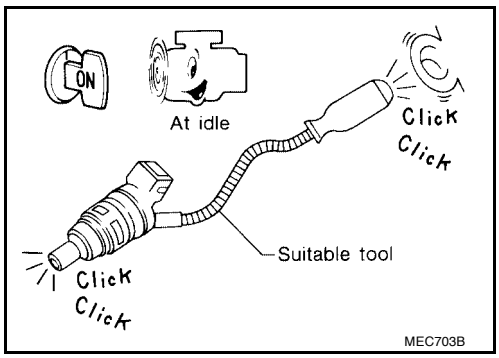


Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
   Clicking noise should be heard.

OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 3.



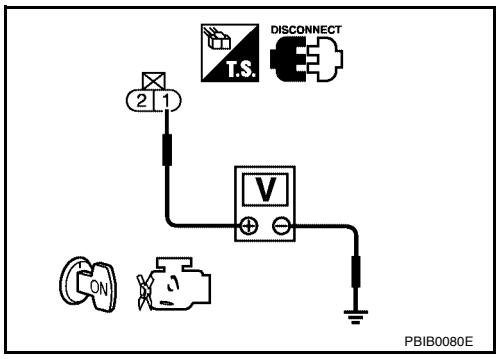
3. CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect injector harness connector.
3. Turn ignition switch ON.
4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness connectors F37, F101
- Fuse block (J/B) connector M26
- 10A fuse
- Harness for open or short between injector and fuse

>> Repair harness or connectors.

5. CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 102, 104, 106, 109, 111, 113. 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.

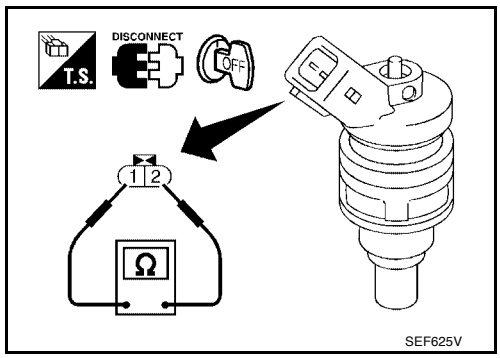
- Harness connectors F37, F101
- Harness connectors F38, F102
- Harness for open or short between ECM and injector

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 10.4 - 15.3Ω [at 10 - 60°C (50 - 140°F)]



OK or NG

OK >> GO TO 8.
NG >> Replace injector.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00E2Q

INJECTOR

Refer to EM-80, "OUTER COMPONENT PARTS" .

START SIGNAL

PFP:48750

CONSULT-II Reference Value in Data Monitor Mode

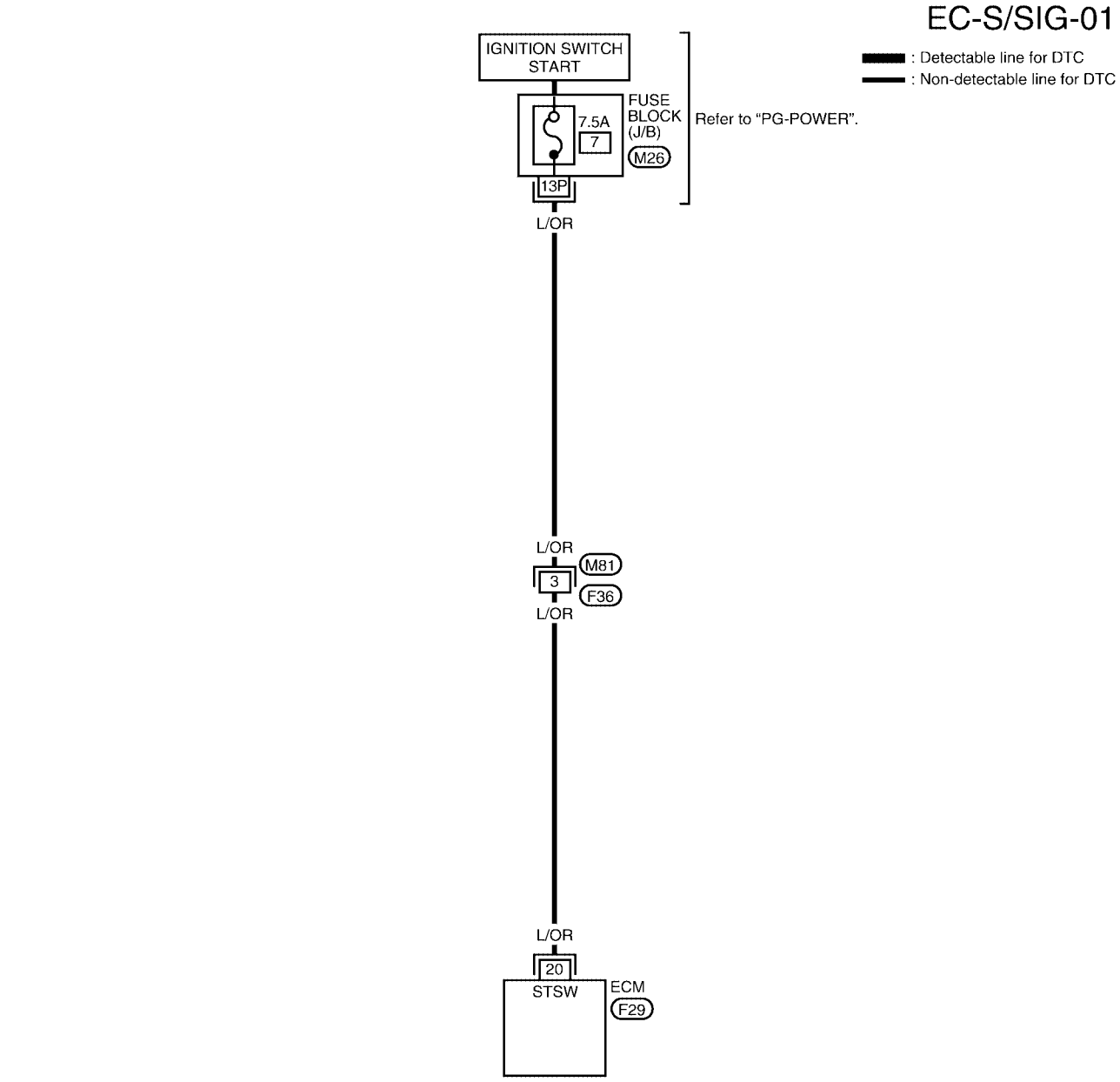
UBS00E2R

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON	OFF → ON → OFF

Wiring Diagram

UBS00E2S



BBWA1097E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
20	L/OR	Start signal	**[Ignition switch: ON]**	Approximately 0V
			[Ignition switch: START]	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00E2T

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

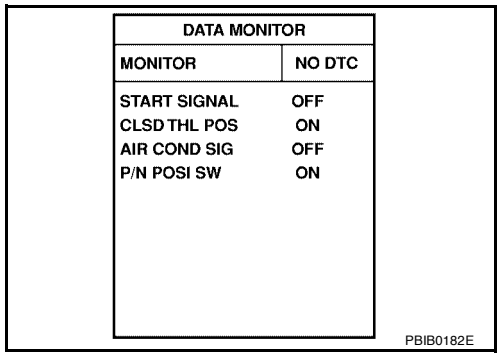
Yes >> GO TO 2.
No >> GO TO 3.

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 START	ON



OK or NG

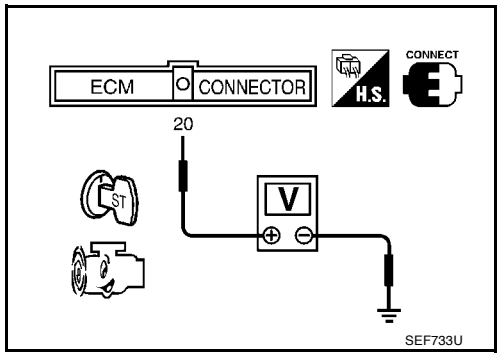
OK >> **INSPECTION END.**
NG >> GO TO 4.

3. CHECK OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 20 and ground under the following conditions.

Condition	Voltage
Ignition switch START	Battery voltage
Other positions	Approx. 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-9, "STARTING SYSTEM" .

5. CHECK FUSE

1. Turn ignition switch OFF.
2. Disconnect 7.5A fuse.
3. Check if 7.5A fuse is OK.

OK or NG

OK >> GO TO 6.
NG >> Replace 7.5A fuse.

6. CHECK START SIGNAL INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 20 and fuse block. 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 M81, F36
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

FUEL PUMP CIRCUIT

PFP:17042

Description

UBS00E2U

SYSTEM DESCRIPTION

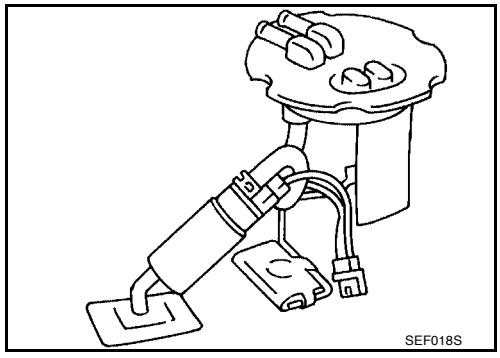
Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor	Engine speed	Fuel pump control	Fuel pump relay
Ignition switch	Start signal		

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 120° signal from the camshaft position sensor, it knows that the engine is rotating, and causes the pump to operate. If the 120° 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 5 seconds
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

UBS00E2V

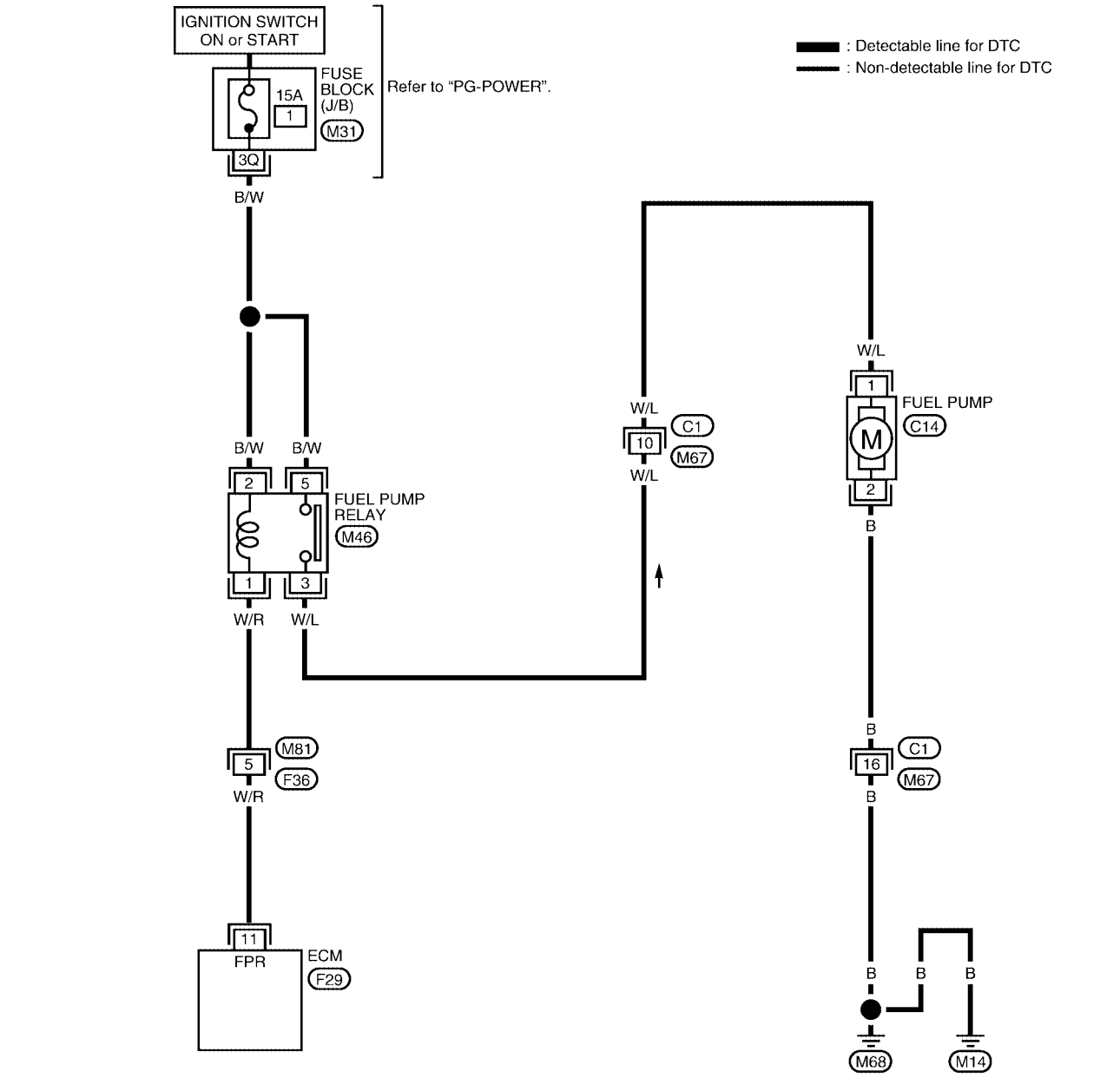
Specification data are reference values.

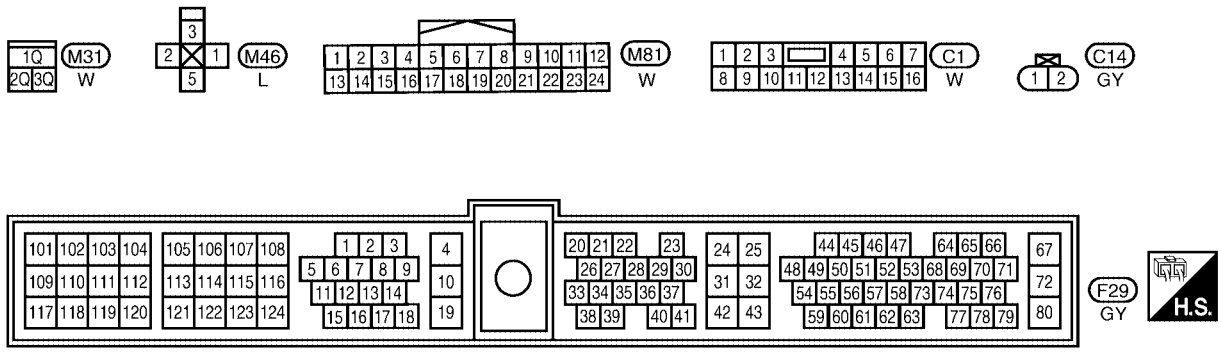
MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● Ignition switch is turned to ON. (Operates for 5 seconds.) ● Engine running or cranking	ON
	● Except as shown above	OFF

Wiring Diagram

UBS00E2W

EC-F/PUMP-01





BBWA1098E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

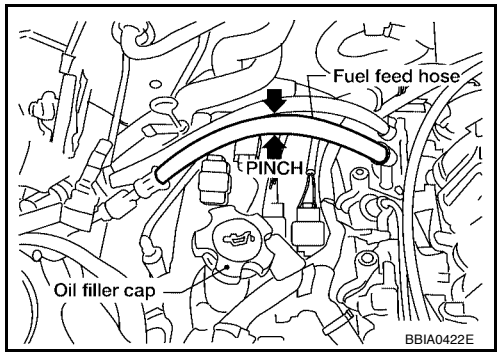
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	W/R	Fuel pump relay	**[Ignition switch: ON]** ● For a few seconds after turning ignition switch ON **[Engine is running]**	0 - 1V
			[Ignition switch: ON] ● More than a few seconds after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00E2X

1. CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with fingers.
   Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned ON.

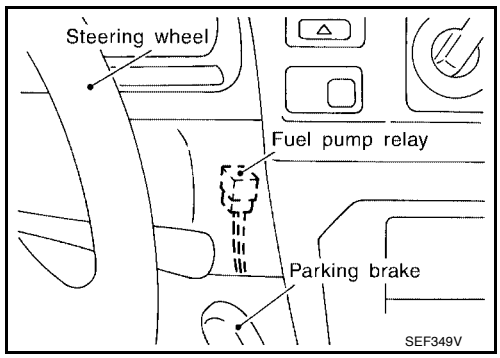


OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 2.

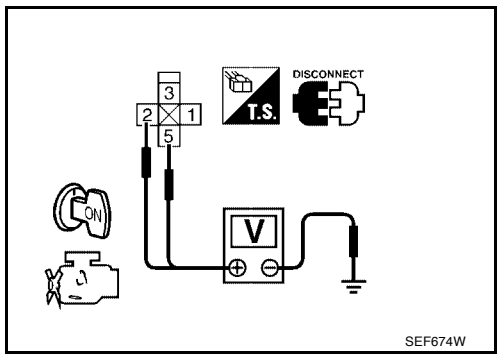
2. CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel pump relay.
3. Turn ignition switch ON.



4. Check voltage between fuel pump relay terminals 2, 5 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.

- Fuse block (J/B) connector M31
- 15A fuse
- Harness for open or short between fuse and fuel pump relay

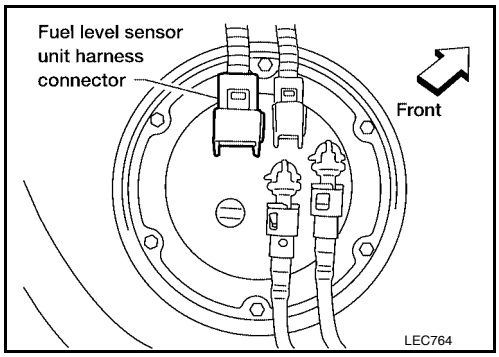
>> Repair harness or connectors.

4. CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.
3. Check harness continuity between fuel pump terminal 2 and ground, fuel pump terminal 1 and fuel pump relay terminal 3. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M67, C1
- Harness for open or short between fuel pump and ground
- Harness for open or short between fuel pump and fuel pump relay

>> 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 11 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.

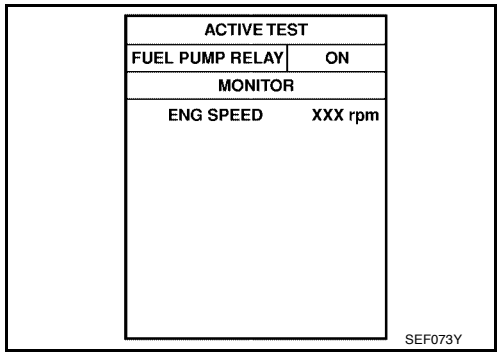
- Harness connectors M81, F36
- Harness for open or short between ECM and fuel pump relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK FUEL PUMP RELAY

With CONSULT-II

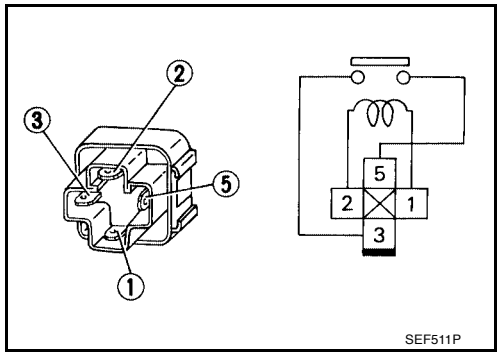
1. Reconnect fuel pump relay, fuel pump harness connector and ECM harness connector.
2. Turn ignition switch ON.
3. Turn fuel pump relay “ON” and “OFF” in “ACTIVE TEST” mode with CONSULT-II and check operating sound.



Without CONSULT-II

Check continuity between fuel pump relay terminals 3 and 5.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No



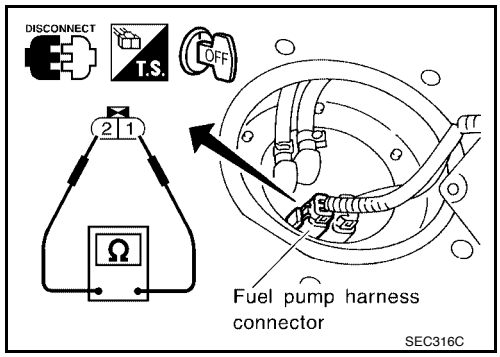
OK or NG

OK >> GO TO 9.
NG >> Replace fuel pump relay.

9. CHECK FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]



OK or NG

OK >> GO TO 10.
NG >> Replace fuel pump.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

Removal and Installation

UBS00E2Y

FUEL PUMP

Refer to FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY" .

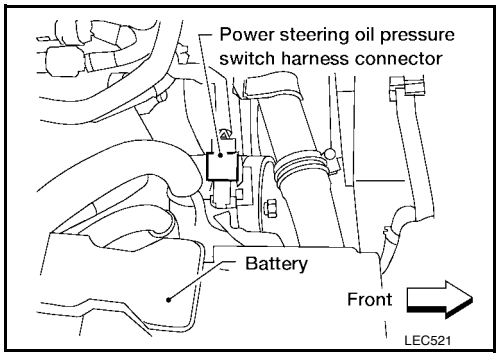
POWER STEERING OIL PRESSURE SWITCH

PFP:49761

Component Description

UBS00E2Z

The power steering oil pressure switch is attached to the power steering high-pressure tube and detects a power steering load.
When a power steering load is detected, it signals the ECM. The ECM adjusts the IACV-AAC valve to increase the idle speed and adjust for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

UBS00E30

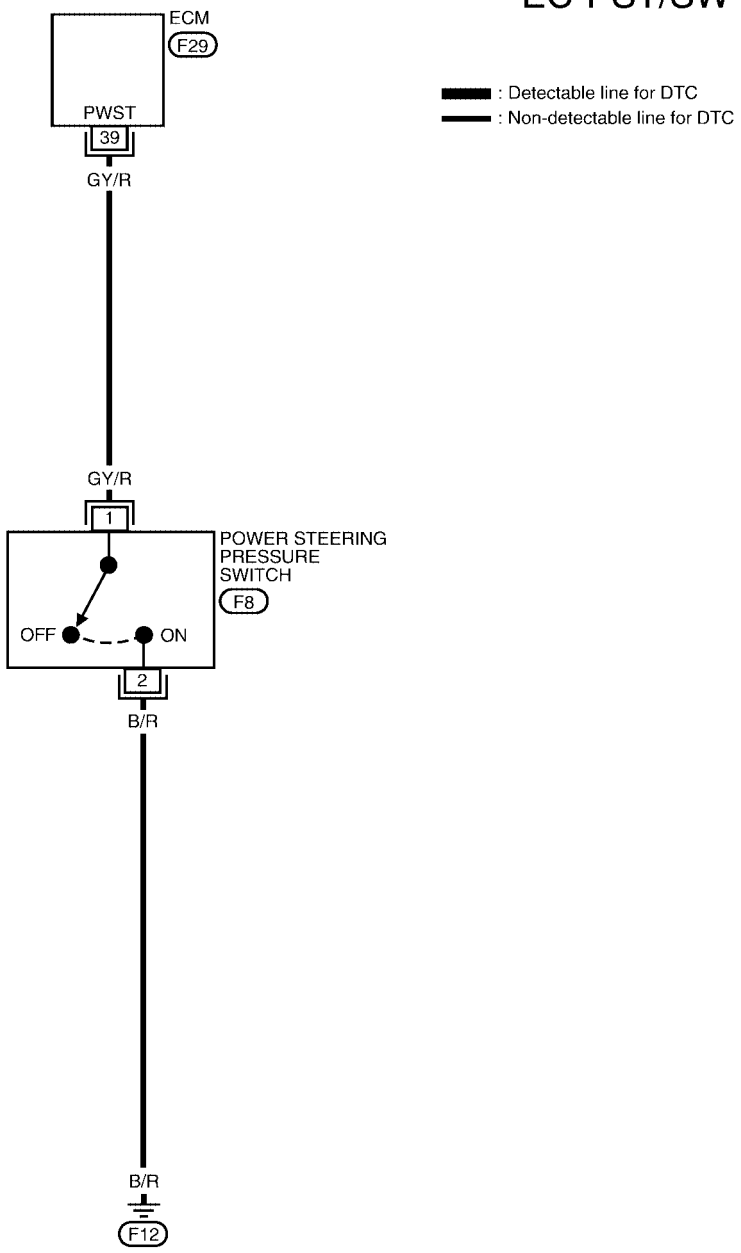
Specification data are reference values.

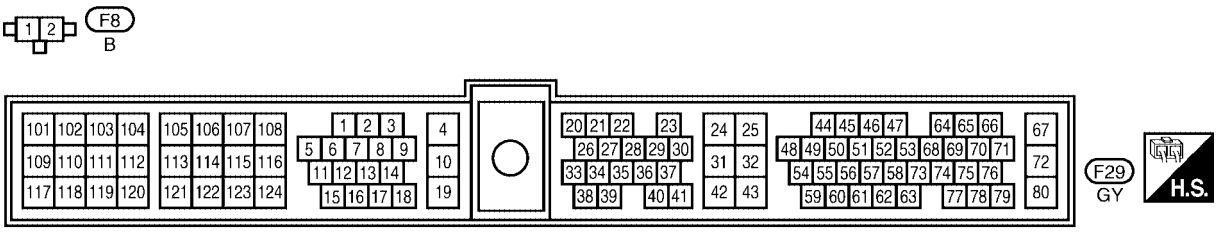
MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (forward direction)	OFF
		The steering wheel is turned.	ON

Wiring Diagram

UBS00E31

EC-PST/SW-01





BBWA0500E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
39	GY/R	Power steering oil pressure switch	**[Engine is running]** ● Steering wheel is being turned	Approximately 0V
			[Engine is running] ● Steering wheel is not being turned	Approximately 5V

Diagnostic Procedure

UBS00E32

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

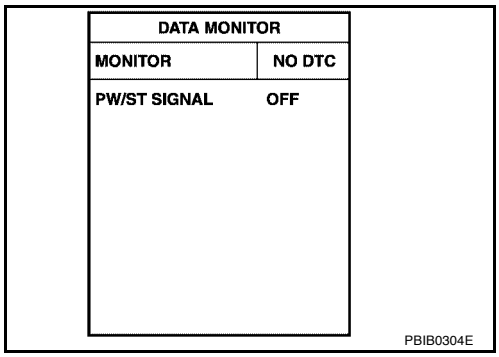
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Check “PW/ST SIGNAL” in “DATA MONITOR” mode with CONSULT-II.

Condition	PW/ST SIGNAL
Steering is in neutral position	OFF
Steering is turned	ON



OK or NG

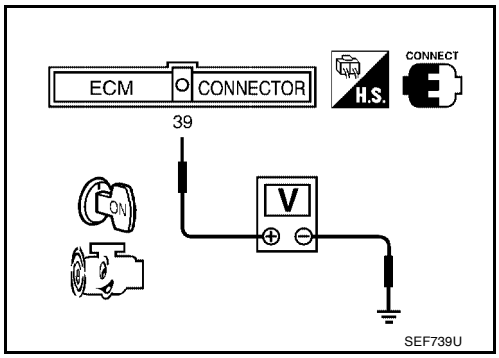
OK >> **INSPECTION END**.
NG >> GO TO 4.

3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 39 and ground.

Condition	Voltage [V]
Steering is neutral position	Approx. 5
Steering is turned to full position	Approx. 0



OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 4.

4. CHECK POWER STEERING OIL PRESSURE SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

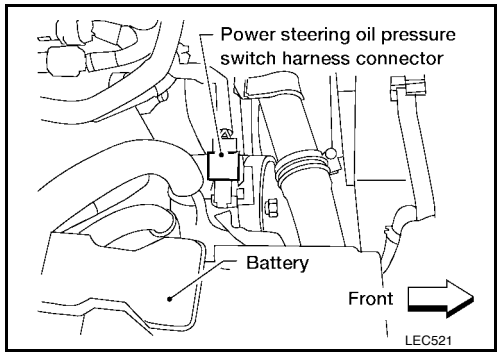
1. Turn ignition switch OFF.
2. Disconnect power steering oil pressure switch harness connector.
3. Check harness continuity between power steering oil pressure switch terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to power in harness or connectors.



5. CHECK POWER STEERING OIL PRESSURE SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 39 and power steering oil pressure switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

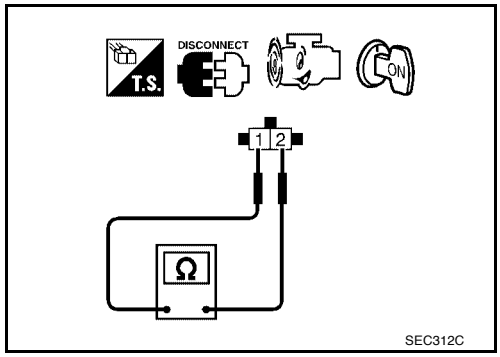
6. CHECK POWER STEERING OIL PRESSURE SWITCH

1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between power steering oil pressure switch terminals 1 and 2.

Conditions	Continuity
Steering wheel is being fully turned	Yes
Steering wheel is not being turned	No

OK or NG

OK >> GO TO 7.
NG >> Replace power steering oil pressure switch.



7. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**.

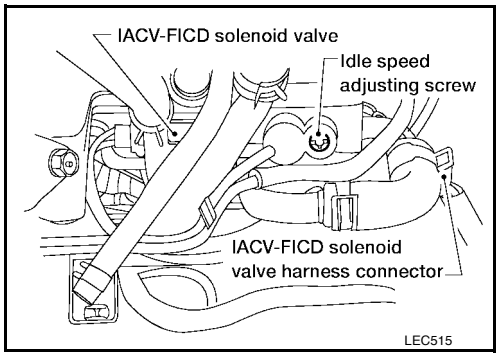
IACV-FICD SOLENOID VALVE

PFP:23781

Component Description

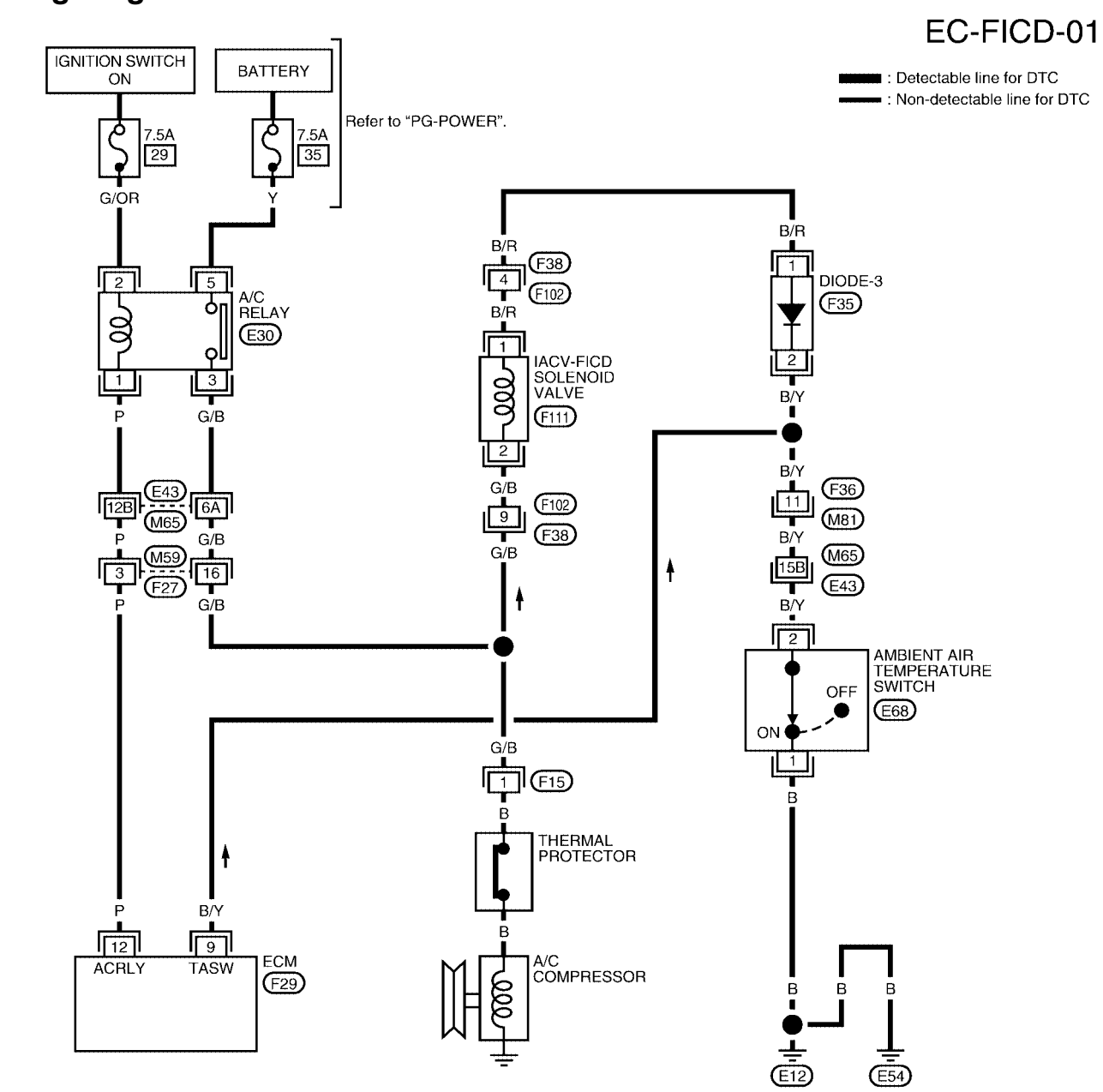
UBS00E33

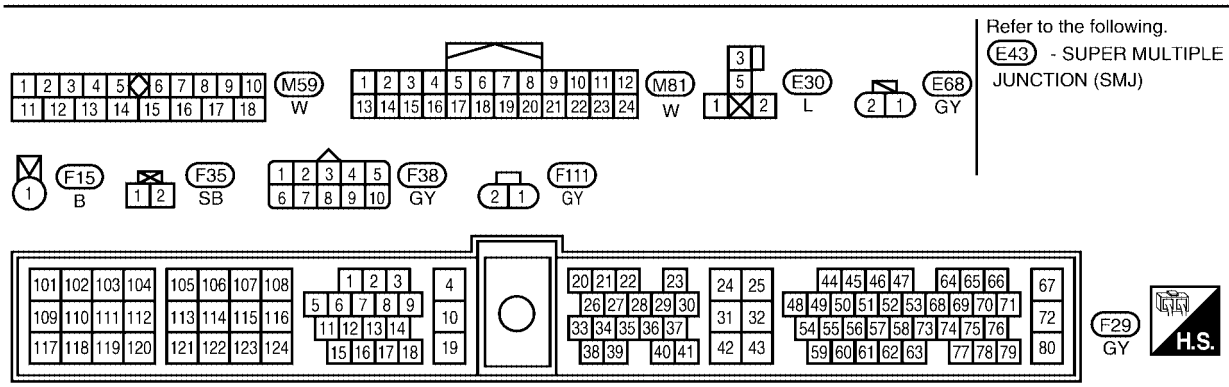
When the air conditioner is on, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load.



Wiring Diagram

UBS00E34





Refer to the following.
E43 - SUPER MULTIPLE JUNCTION (SMJ)

BBWA1106E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	B/Y	Ambient air temperature switch	**[Engine is running]** ● Idle speed ● Ambient air temperature is above 25°C (77°F) ● Air conditioner is operating	0V
			[Engine is running] ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Idle speed ● Ambient air temperature is below 19°C (66°F) ● Air conditioner is not operating	Approximately 5V
12	P	Air conditioner relay	**[Engine is running]** ● Both A/C switch and blower switch are ON*	0 - 1V
			[Engine is running] ● A/C switch is OFF	BATTERY VOLTAGE (11 - 14V)

*: Any mode except OFF, ambient air temperature is above 25°C (77°F).

Diagnostic Procedure

UBS00E35

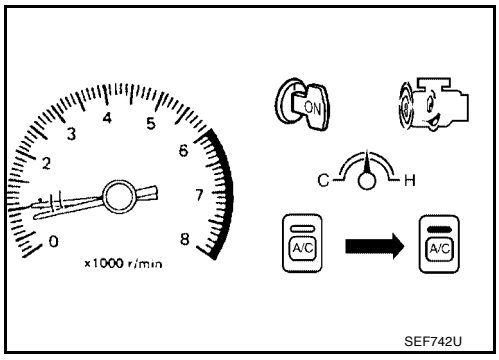
1. CHECK OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

   M/T: 750±50 rpm (in Neutral position)
   A/T: 750±50 rpm (in P or N position)

   If NG, adjust idle speed.
3. Turn air conditioner switch and blower fan switch ON.
4. Recheck idle speed.

   M/T: 850 rpm or more (in Neutral position)
   A/T: 850 rpm or more (in P or N position)



SEF742U

OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 2.

2. CHECK AIR CONDITIONER FUNCTION

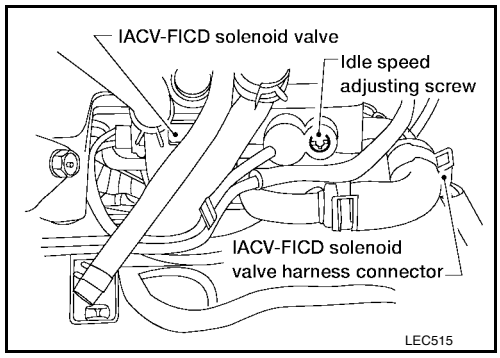
Check if air conditioner compressor functions normally.

OK or NG

OK >> GO TO 3.
NG >> Refer to MTC-22, "Symptom Table" .

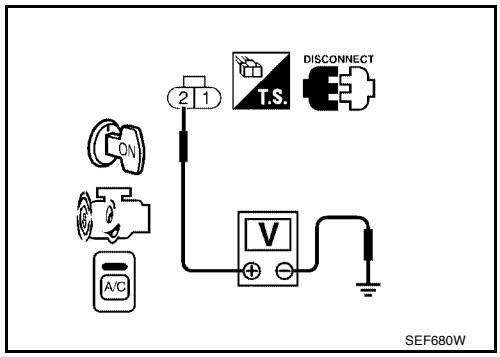
3. CHECK IACV-FICD SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn air conditioner switch and blower fan switch OFF.
2. Stop engine.
3. Disconnect IACV-FICD solenoid valve harness connector.
4. Start engine, then turn air conditioner switch and blower fan switch ON.



5. Check voltage between IACV-FICD solenoid valve terminal 2 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 F38, F102
- Harness connectors E43, M65
- Harness connectors M59, F27
- Harness for open or short between IACV-FICD solenoid valve and A/C relay

>> Repair harness or connectors.

5. CHECK IACV-FICD SOLENOID VALVE GROUND CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ambient air temperature switch harness connector.
3. Check harness continuity between ambient air temperature switch terminal 1 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to power in harness or connectors.

6. CHECK IACV-FICD SOLENOID VALVE GROUND CIRCUIT-II

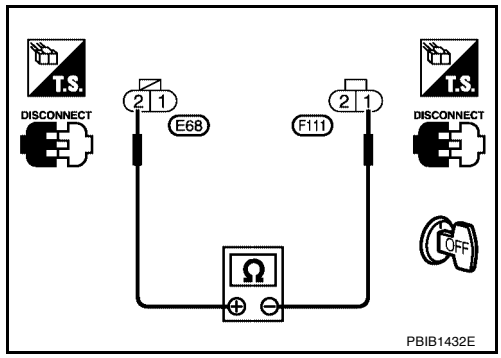
1. Check harness continuity between ambient air temperature switch terminal 2 and IACV-FICD solenoid valve terminal 1.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

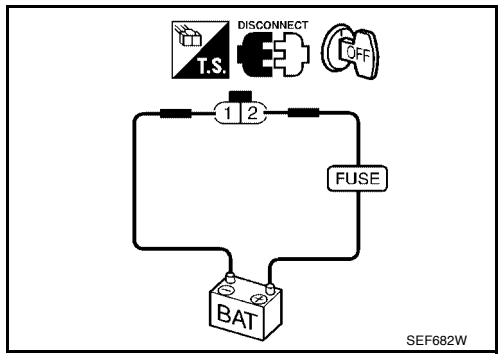
Check the following.

- Harness connectors F38, F102
- Harness connectors F36, M81
- Harness connectors M65, E43
- Diode-3
- Harness for open or short between IACV-FICD solenoid valve and ambient air temperature switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK IACV-FICD SOLENOID VALVE

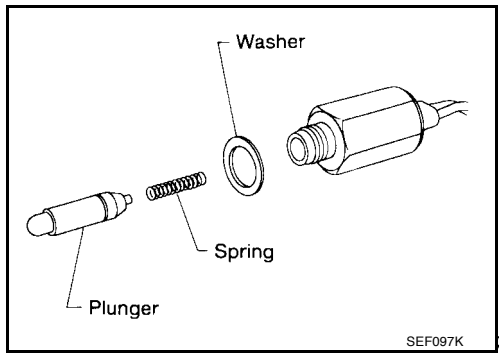
1. Disconnect IACV-FICD solenoid valve harness connector.
2. Check for clicking sound when applying 12V direct current to terminals.
3. Check plunger for seizing or sticking.



4. Check for broken spring.

OK or NG

OK >> GO TO 9.
NG >> Replace IACV-FICD solenoid valve.



9. CHECK INTERMITTENT INCIDENT

Refer to EC-1305, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

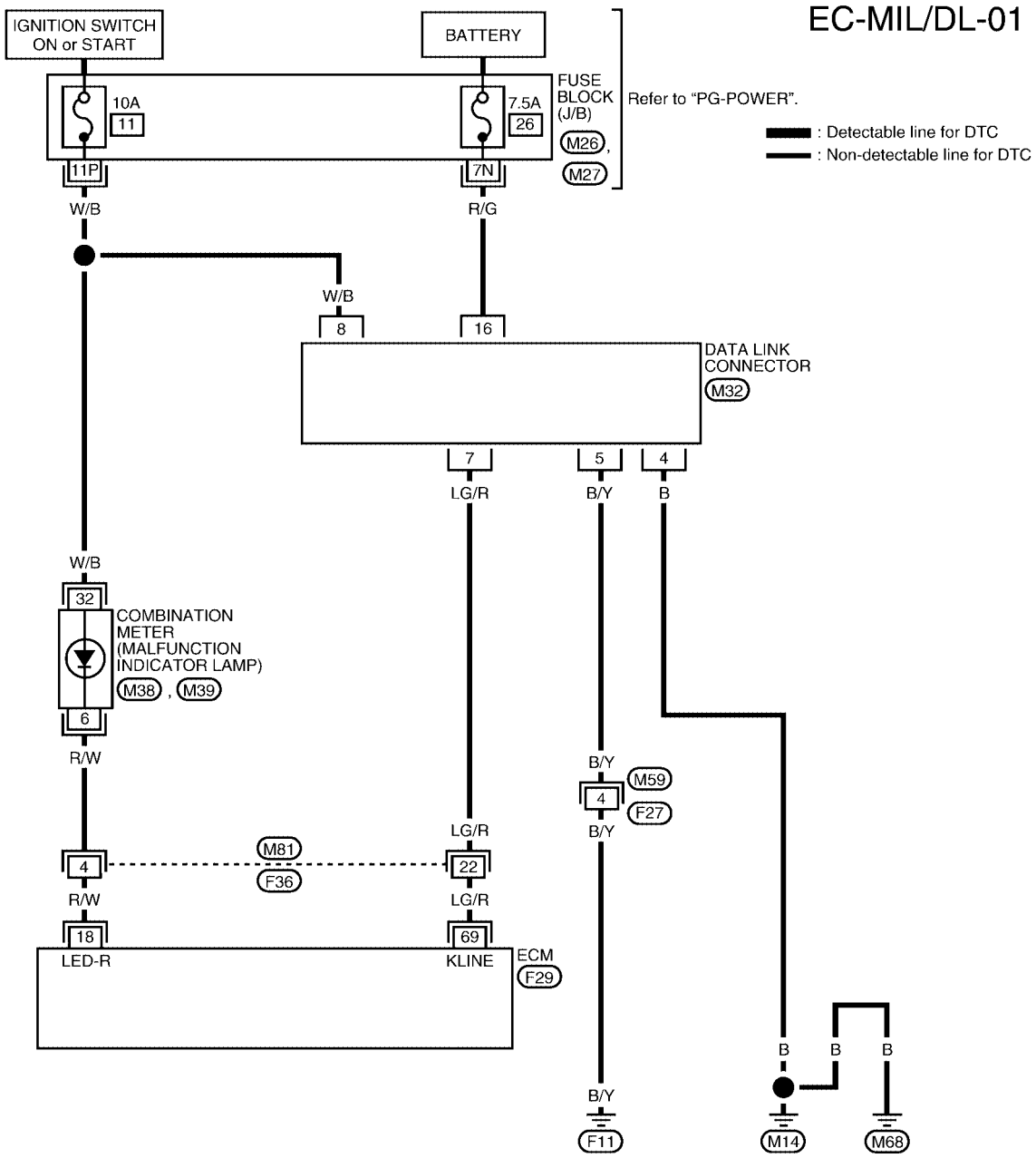
>> **INSPECTION END**.

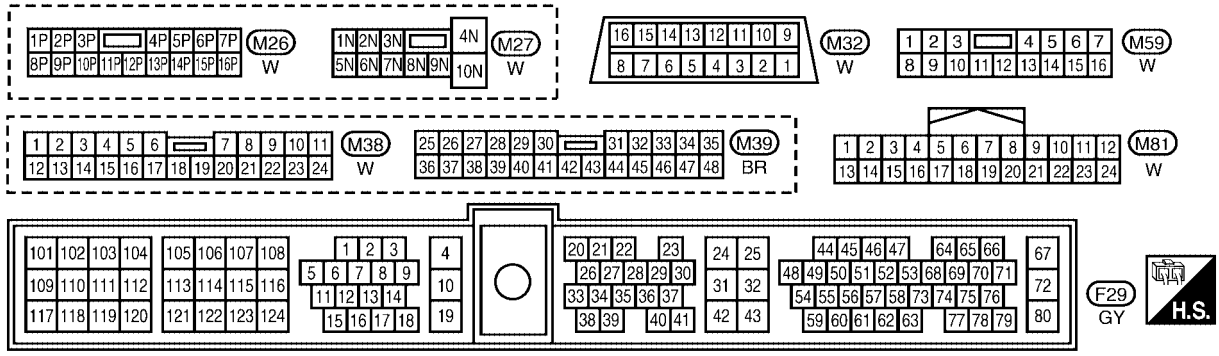
MIL AND DATA LINK CONNECTOR

PFP:24814

Wiring Diagram

UBS00E36





BBWA1100E

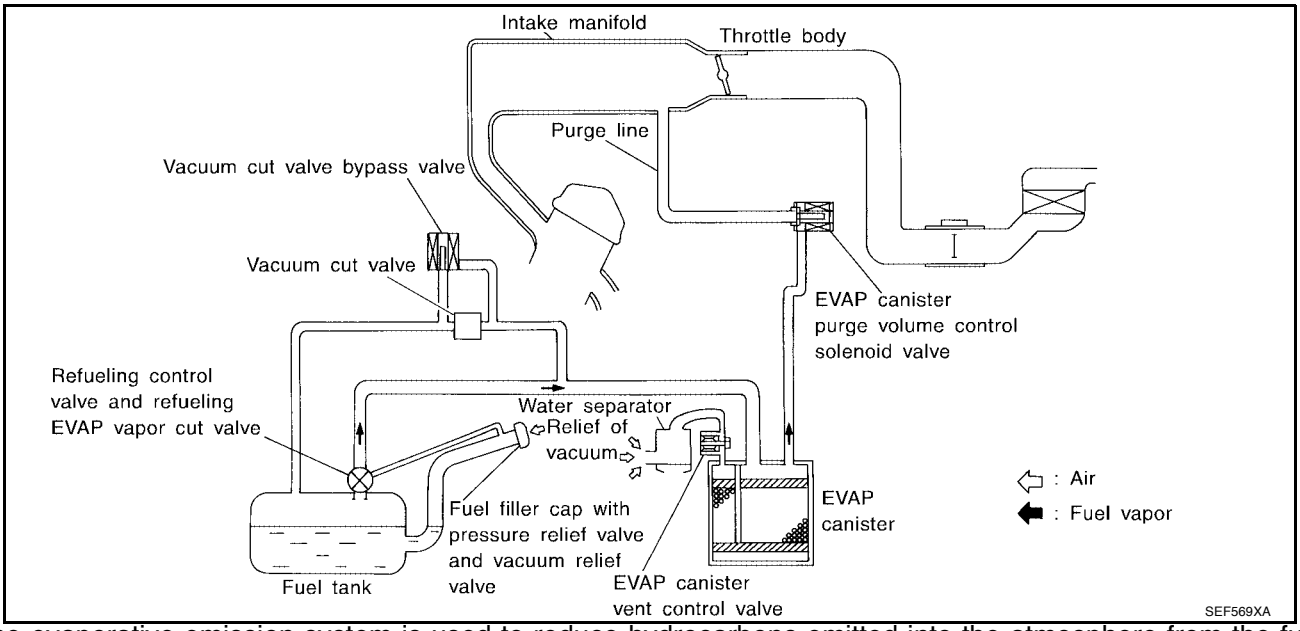
EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description

UBS00E37

SYSTEM DESCRIPTION



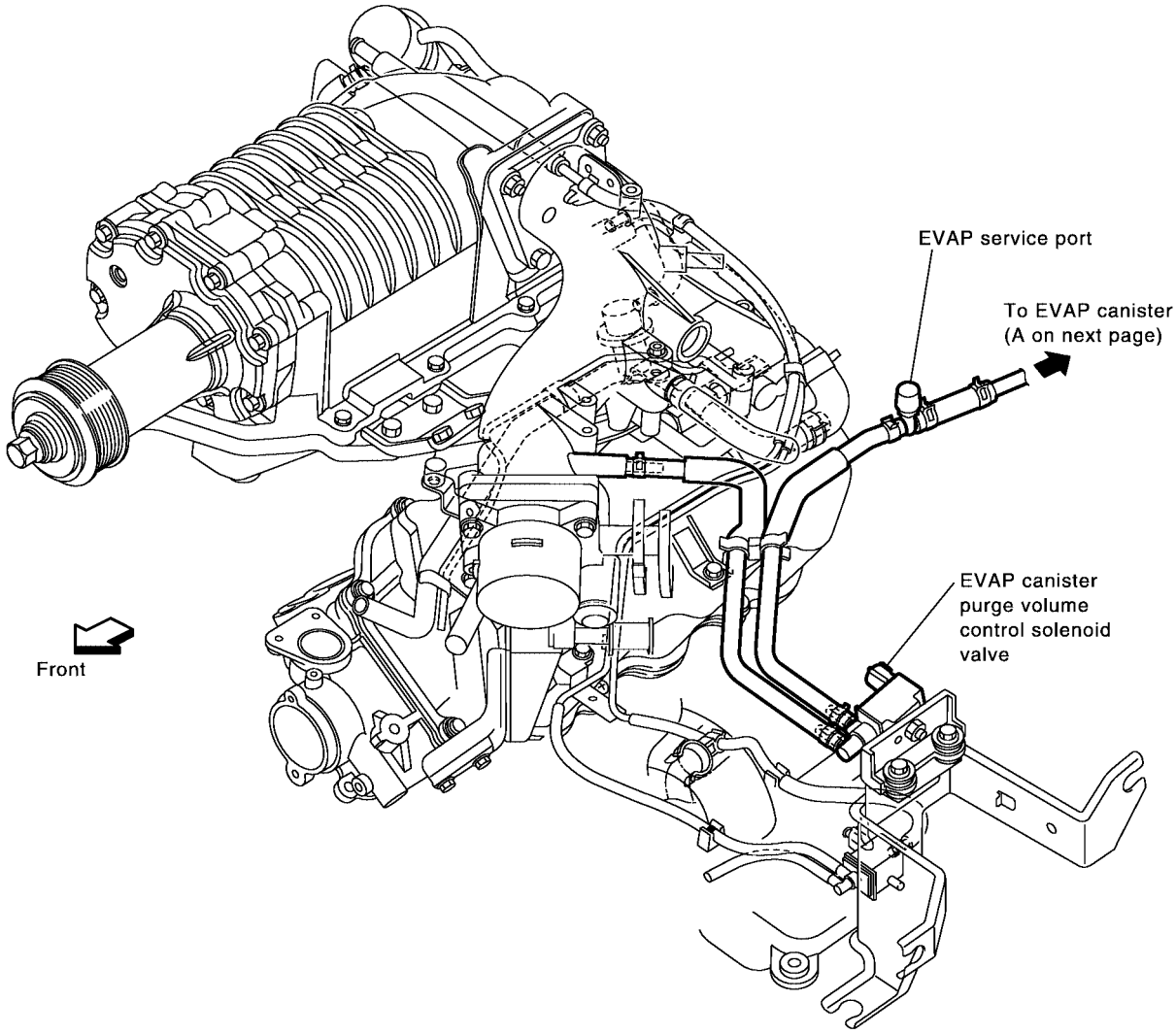
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

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.

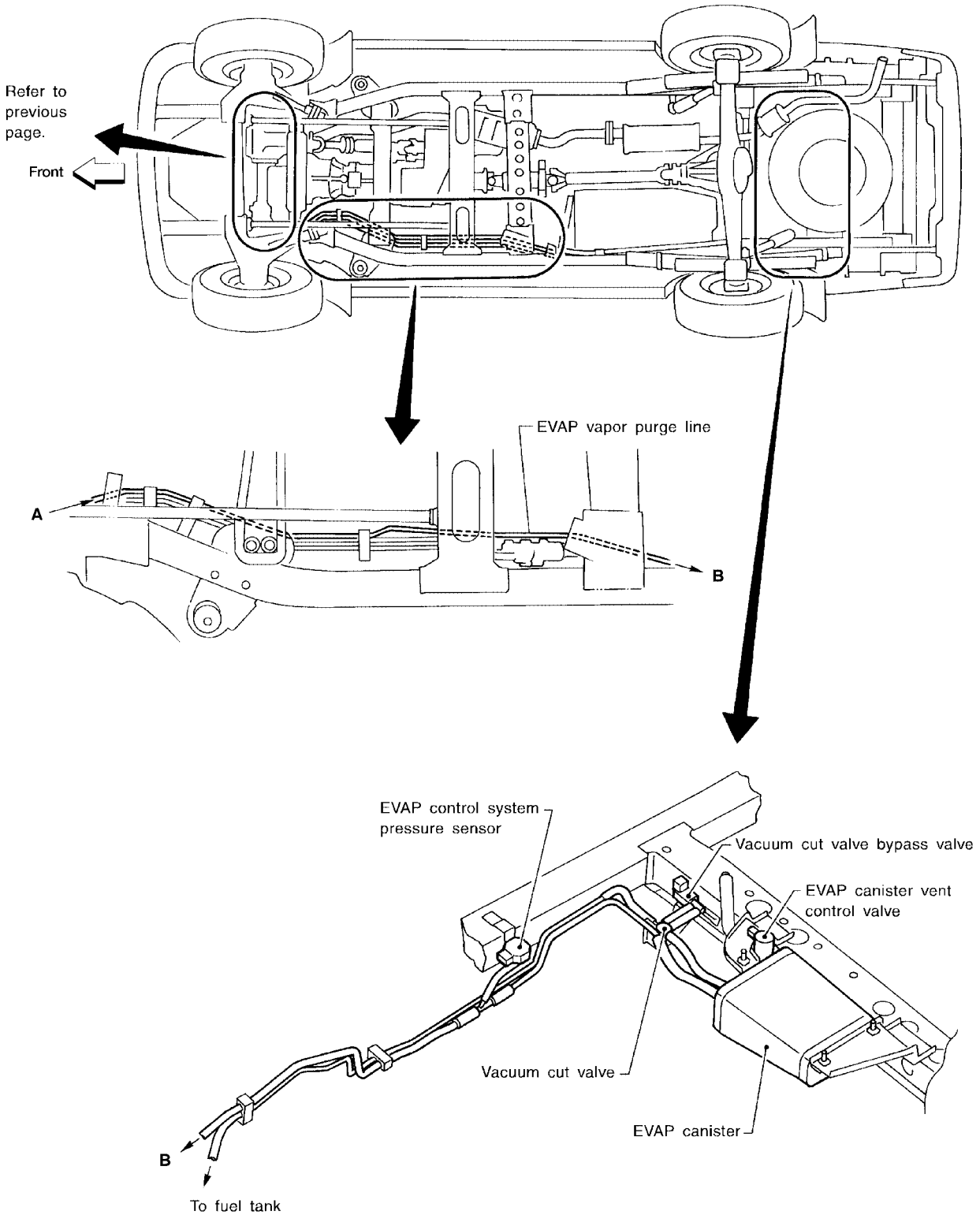
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

EVAPORATIVE EMISSION LINE DRAWING



NOTE:
Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

PBIB1463E


Refer to previous page.
Front
EVAP vapor purge line
A
B
EVAP control system pressure sensor
Vacuum cut valve bypass valve
EVAP canister vent control valve
Vacuum cut valve
EVAP canister
B
To fuel tank
AEC886A

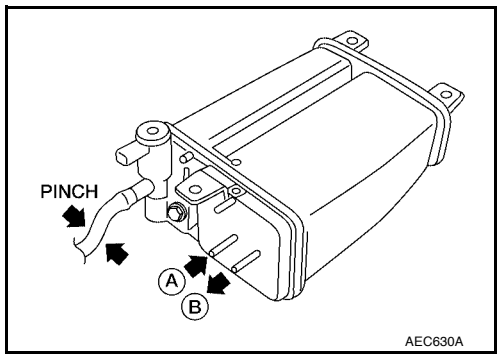
Component Inspection

UBS00E38

EVAP CANISTER

Check EVAP canister as follows:

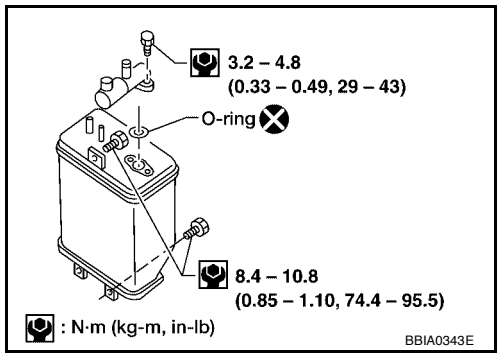
1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B** .



Tightening Torque

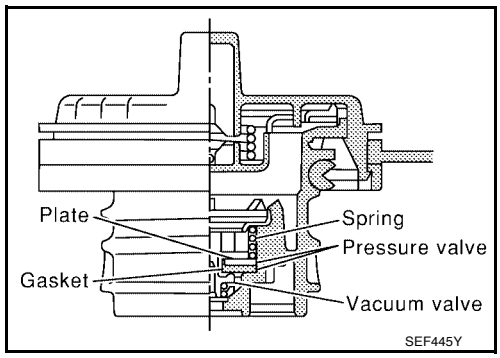
Tighten EVAP canister as shown in the figure.

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.

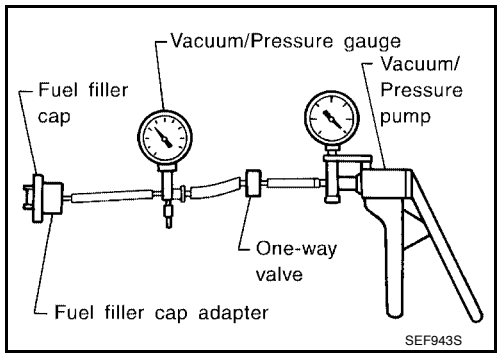


2. Check valve opening pressure and vacuum.

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:

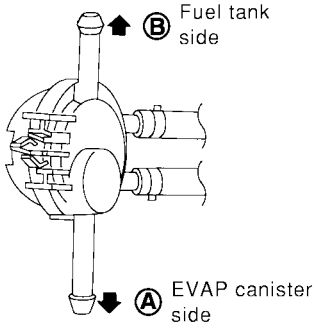
Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come ON

VACUUM CUT VALVE AND VACUUM CUT VALVE BYPASS VALVE

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.

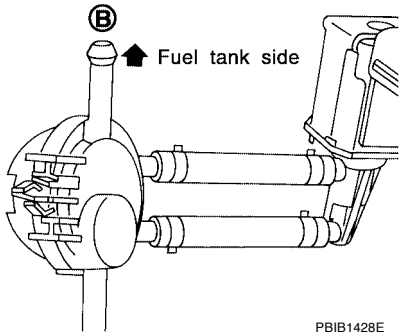


ACTIVE TEST	
VC/V BYPASS/V	OFF
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	LEAN
HO2S1 MNTR (B2)	LEAN
THRTL POS SEN	XXX V

SEF017Z

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.



PBIB1428E

EVAPORATIVE EMISSION (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.
   If OK, inspection end. If NG, go to following step.

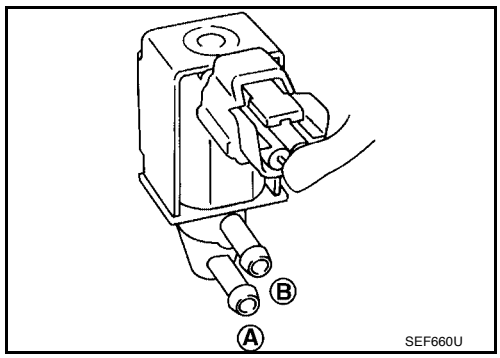
ACTIVE TEST	
PURG VOL CONT/V	0.0%
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
A/F ALPHA-B2	XXX %
HO2S1 MNTR (B1)	RICH
HO2S1 MNTR (B2)	RICH
THRTL POS SEN	XXX V

SEF985Y

3. Check air passage continuity.

Condition PURG VOL CONT/V value	Air passage continuity between A and B
100.0%	Yes
0.0%	No

If NG, replace the EVAP canister purge volume control solenoid valve.

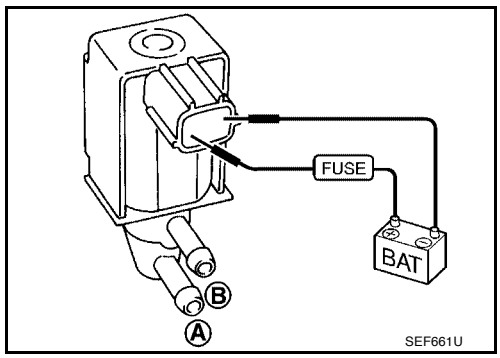


Without CONSULT-II

1. Check air passage continuity.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No

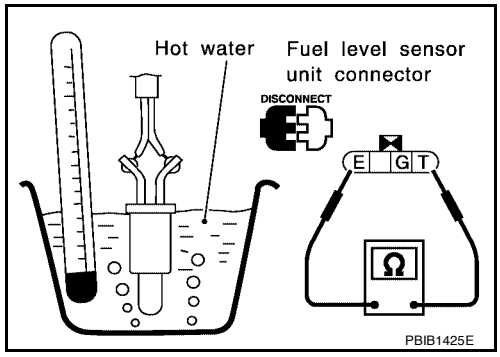
2. If NG, replace the EVAP canister purge volume control solenoid valve.



FUEL TANK TEMPERATURE SENSOR

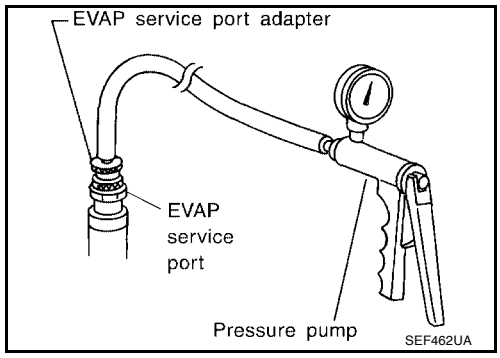
1. Remove fuel level sensor unit.
2. Check resistance fuel level sensor unit terminals T and E by heating with hot water or heat gun as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90



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

UBS00E39

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.**

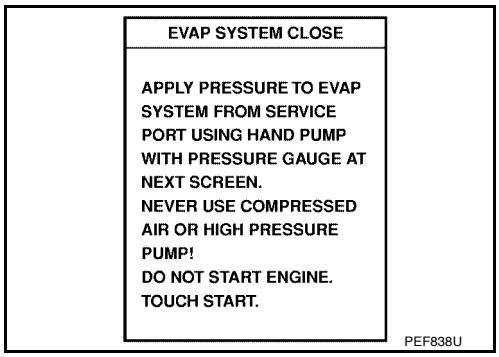
NOTE:

- Do not start engine.

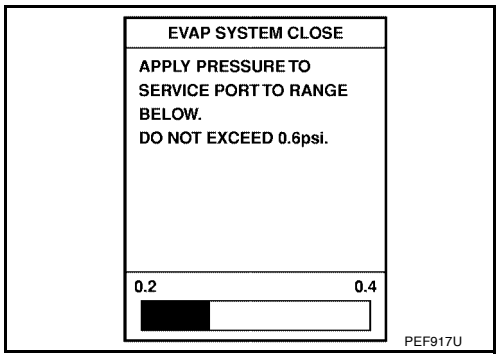
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

WITH CONSULT-II

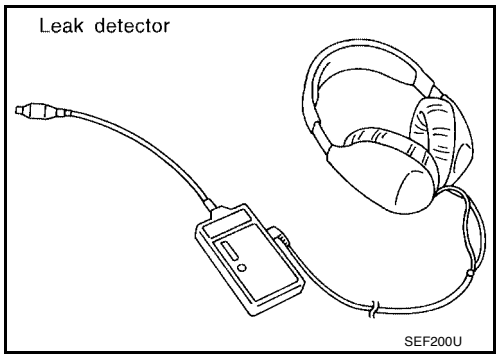
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose to the EVAP service port adapter.
3. Turn ignition switch ON.
4. Select the “EVAP SYSTEM CLOSE” of “WORK SUPPORT MODE” with CONSULT-II.
5. Touch “START”. A bar graph (Pressure indicating 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.

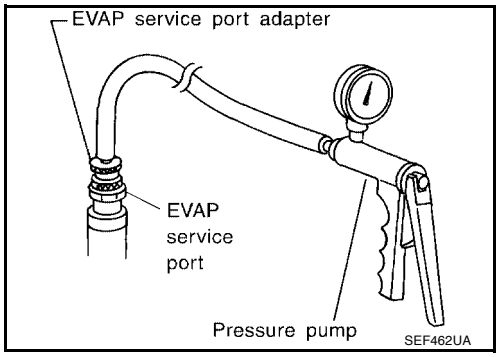


8. Locate the leak using a leak detector. Refer to EC-1751, "EVAPORATIVE EMISSION LINE DRAWING" .

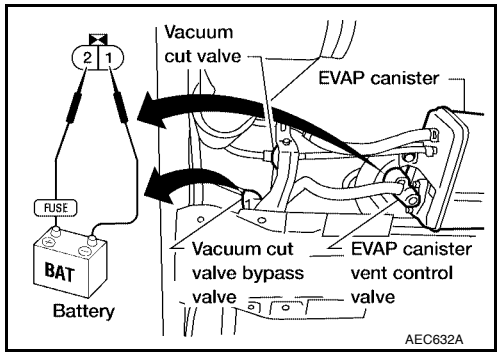


WITHOUT CONSULT-II

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 EC-1751, "EVAPORATIVE EMISSION LINE DRAWING" .

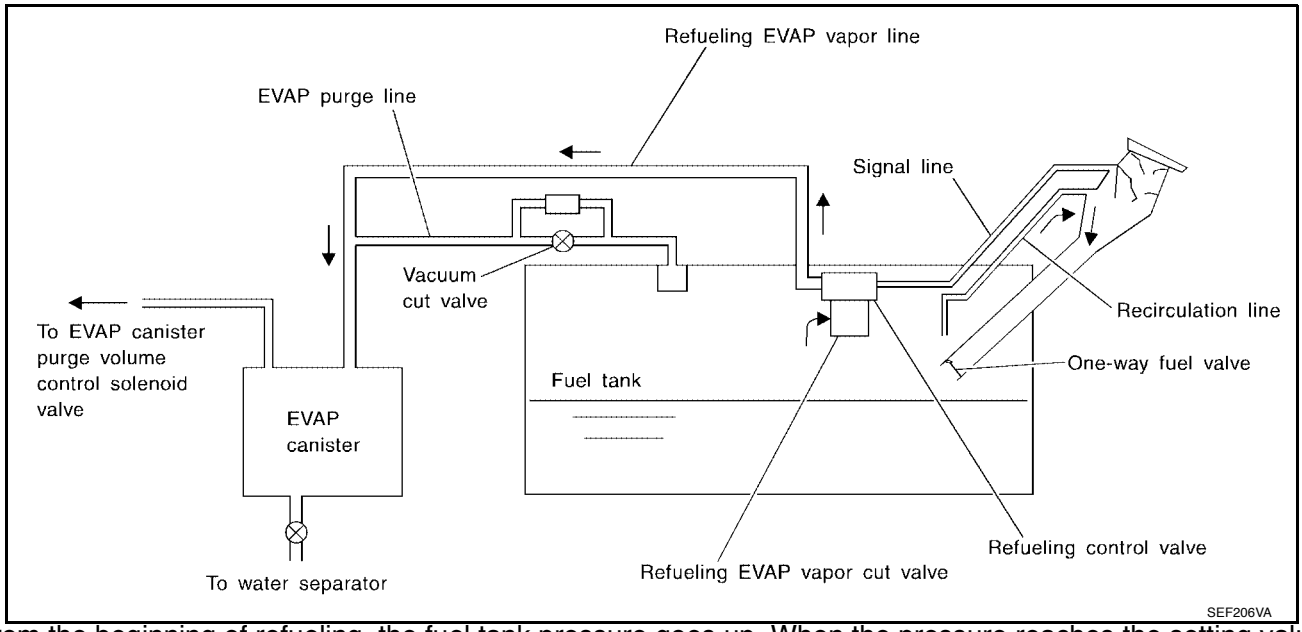


ON BOARD REFUELING VAPOR RECOVERY (ORVR)

PFP:00032

System Description

UBS00E3A



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 EC-1227, "FUEL PRESSURE RELEASE" .**
  - **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

UBS00E3B

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

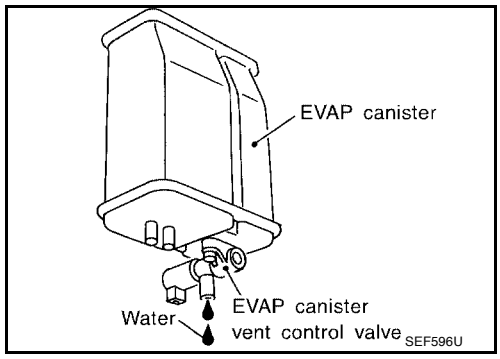
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

- Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No (With CONSULT-II)>>GO TO 6.
No (Without CONSULT-II)>>GO TO 7.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. CHECK WATER SEPARATOR

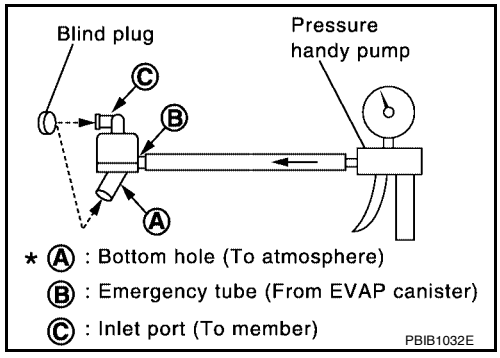
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

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

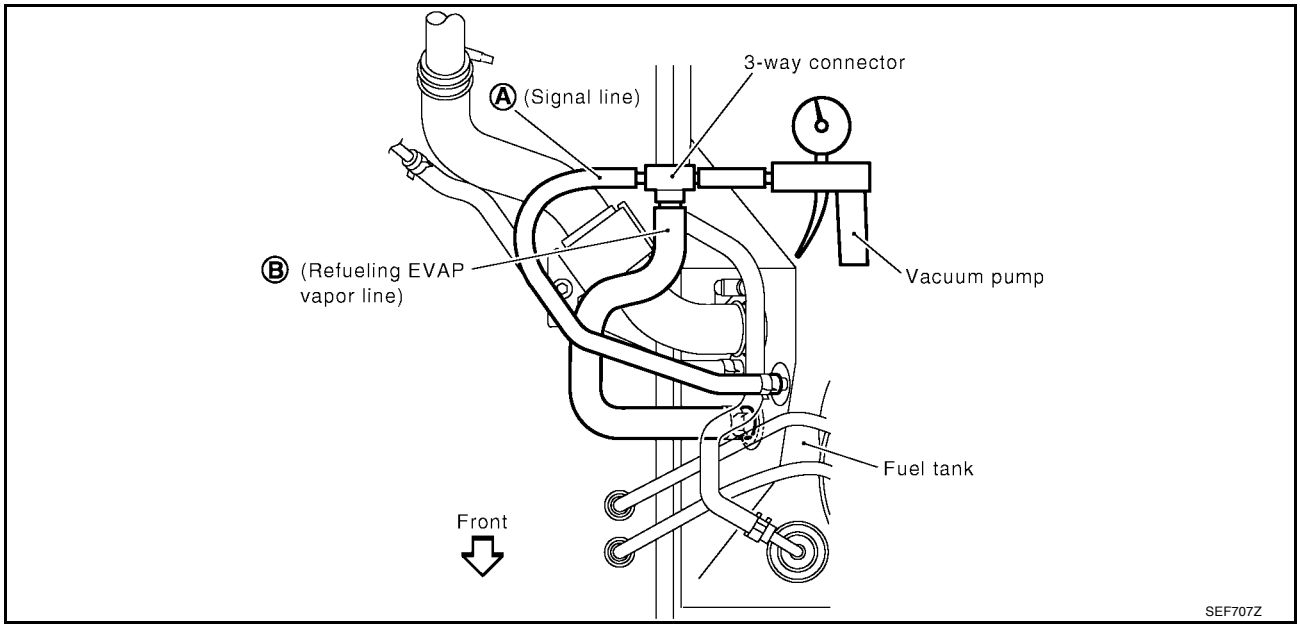
With CONSULT-II

1. Remove fuel tank. Refer to FL-3, "FUEL TANK" .
2. Drain fuel from the tank as follows:

- Remove fuel feed hose located on the fuel level sensor unit retainer.
- Connect a spare fuel hose, one side to fuel level sensor unit retainer where the hose was removed and the other side to a fuel container.
- 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.

- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel level sensor unit retainer with fuel level sensor unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



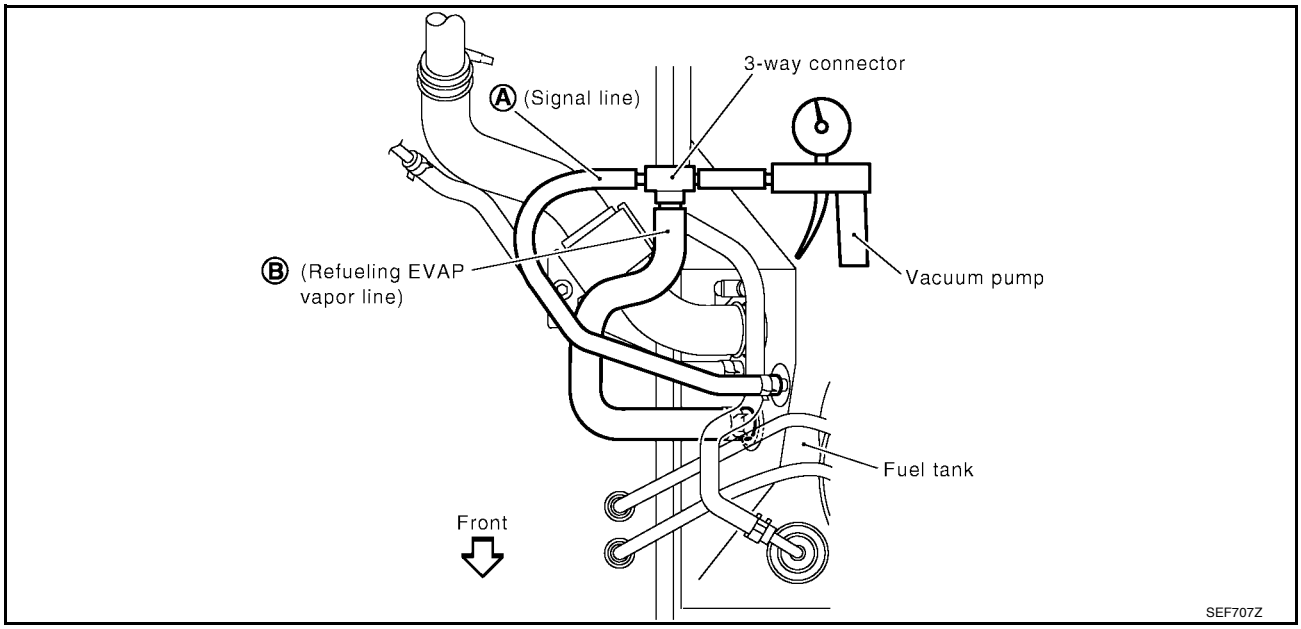
OK or NG

OK >> GO TO 8.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

7. CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT-II

1. Remove fuel tank. Refer to FL-3, "FUEL TANK" .
2. Drain fuel from the tank as follows:
- Remove fuel level sensor unit retainer.
- 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.
- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel level sensor unit retainer with fuel level sensor unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.

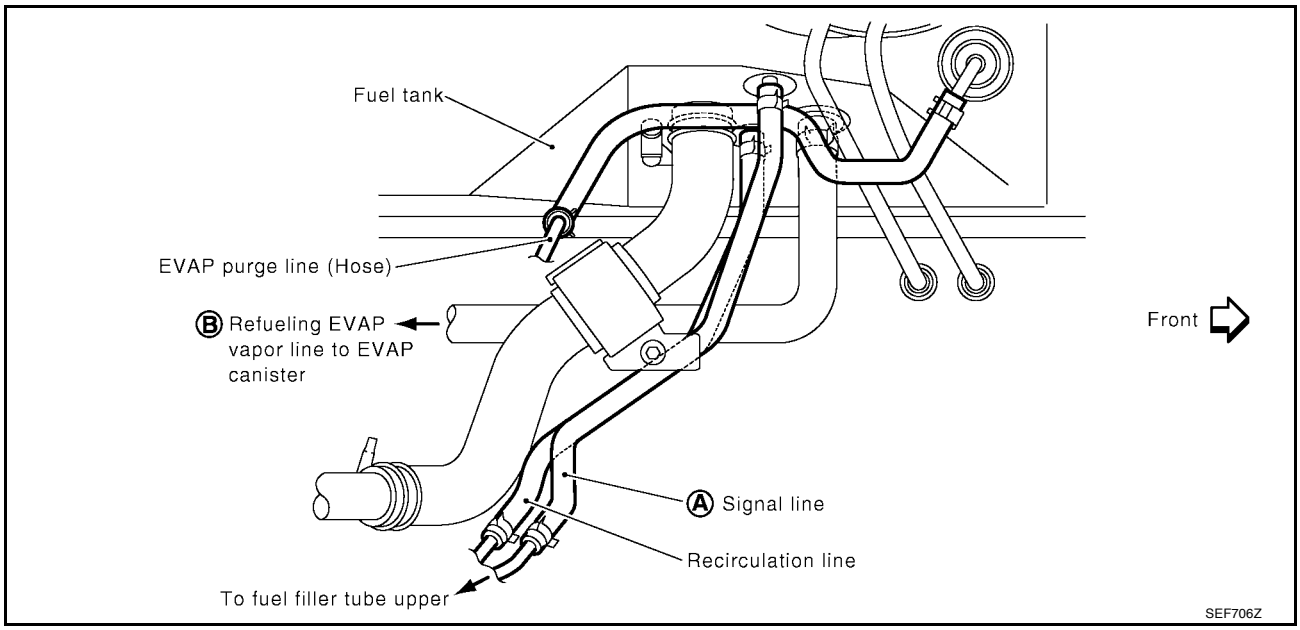


OK or NG

OK >> GO TO 8.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

8. CHECK 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.



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

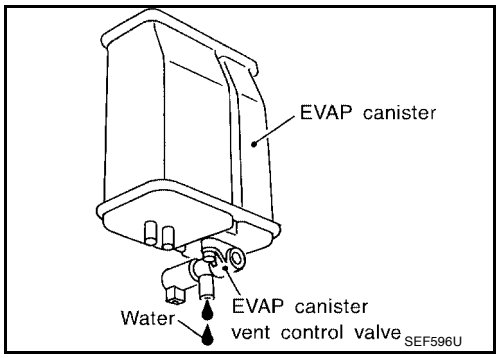
OK >> GO TO 2.
NG >> GO TO 3.

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

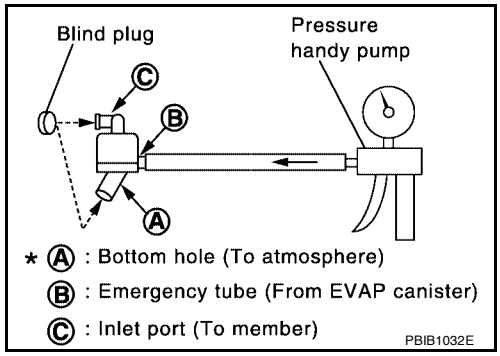
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.

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

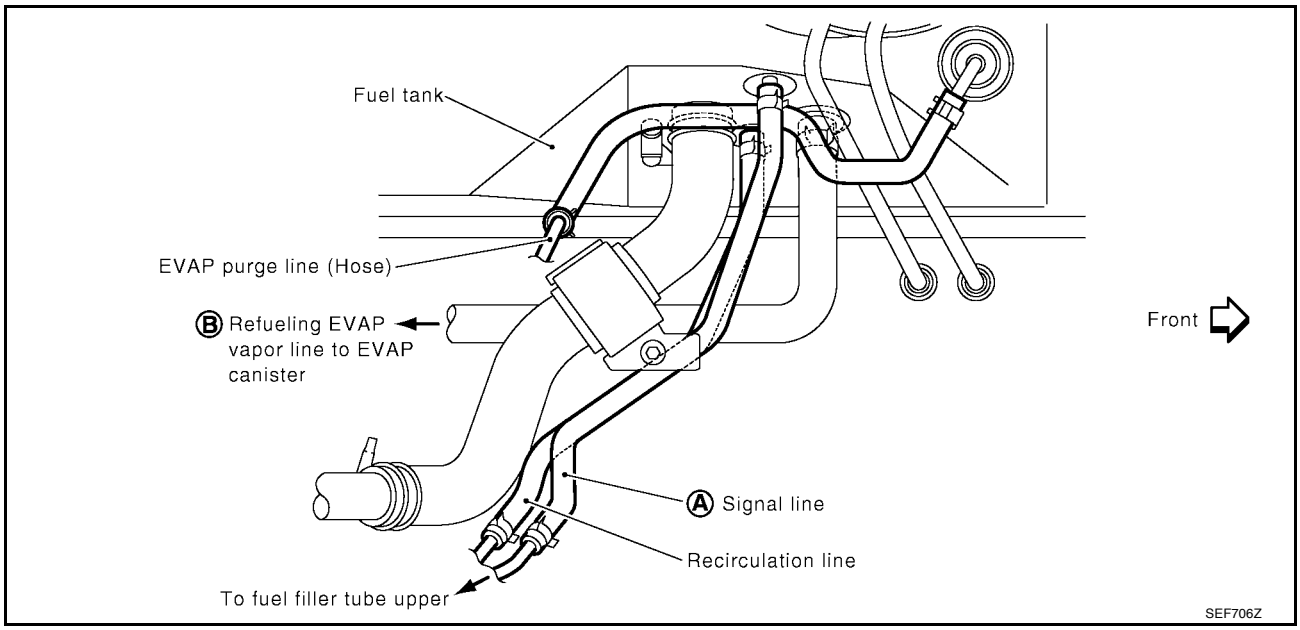
Check signal line and recirculation line for clogging, dents and cracks.

OK or NG

OK >> GO TO 8.
NG >> Replace filler neck tube.

8. CHECK REFUELING CONTROL VALVE

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.



OK or NG

OK (With CONSULT-II)>>GO TO 9.
OK (Without CONSULT-II)>>GO TO 10.
NG >> Replace refueling control valve with fuel tank.

9. CHECK REFUELING EVAP VAPOR CUT VALVE

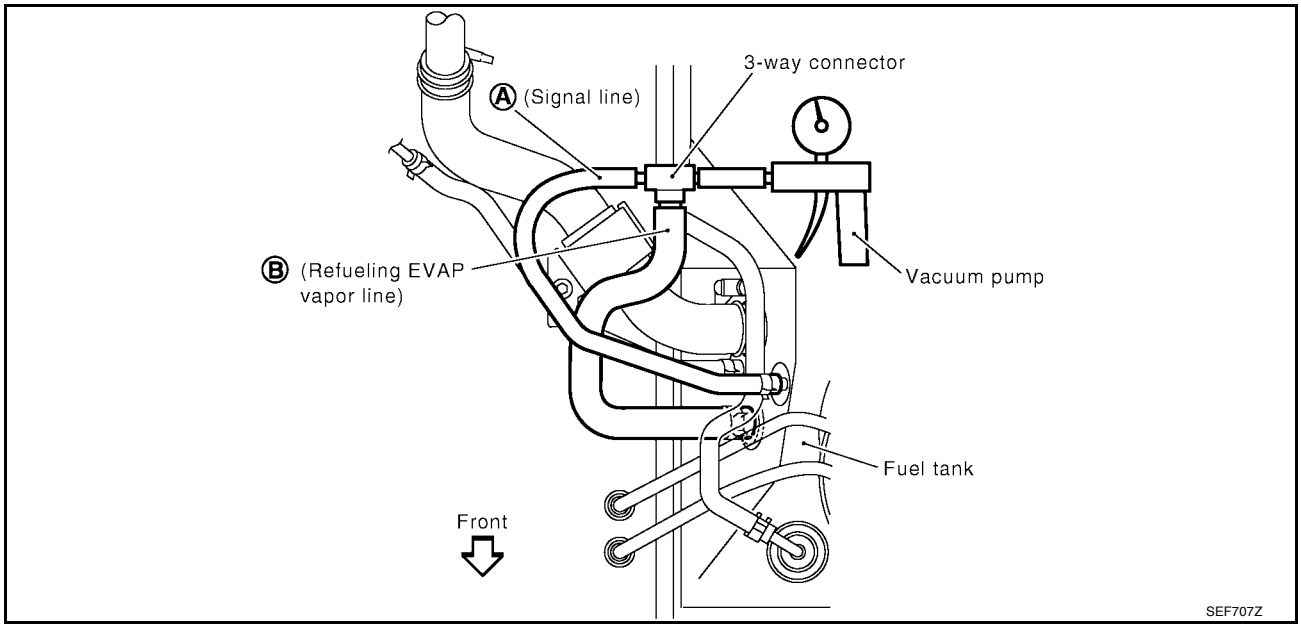
With CONSULT-II

1. Remove fuel tank. Refer to FL-3, "FUEL TANK" .
2. Drain fuel from the tank as follows:

- Remove fuel feed hose located on the fuel level sensor unit retainer.
- Connect a spare fuel hose, one side to fuel level sensor unit retainer where the hose was removed and the other side to a fuel container.
- 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.

- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel level sensor unit retainer with fuel level sensor unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



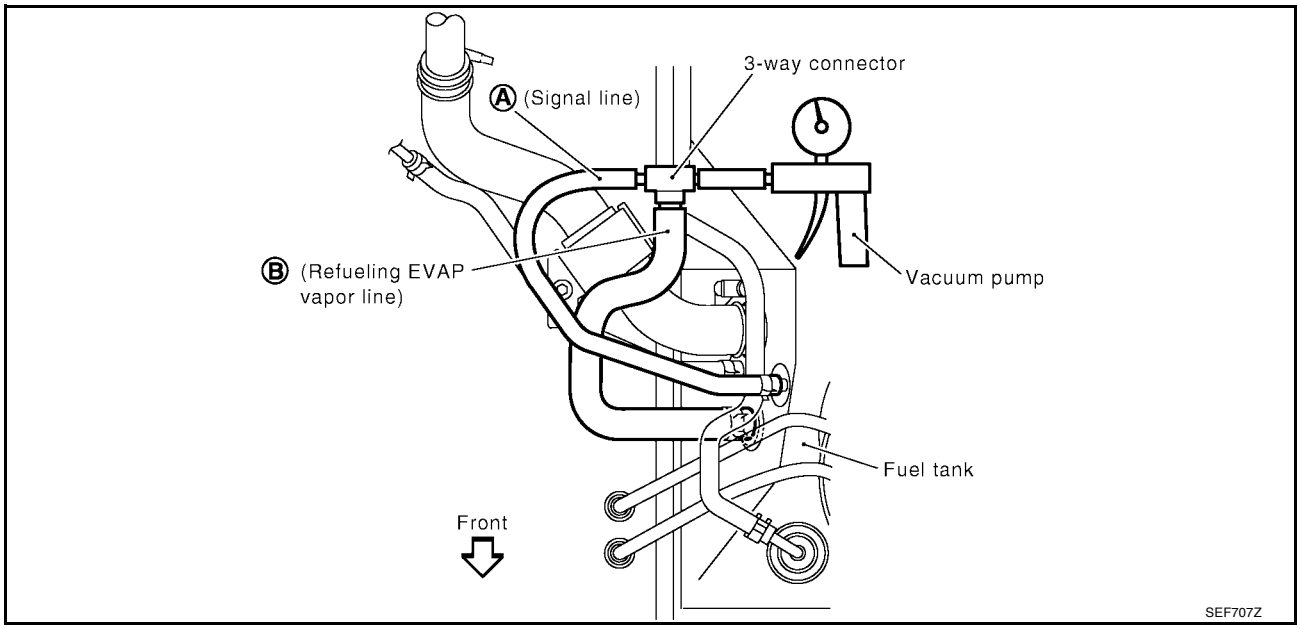
OK or NG

OK >> GO TO 11.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

10. CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT-II

1. Remove fuel tank. Refer to FL-3, "FUEL TANK" .
2. Drain fuel from the tank as follows:
- Remove fuel level sensor unit retainer.
- 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.
- Connect vacuum pump to hose ends A and B using a suitable 3-way connector.
- Remove fuel level sensor unit retainer with fuel level sensor unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends A and B [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



OK or NG

OK >> GO TO 11.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

11. 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 12.
NG >> Replace fuel filler tube.

12. CHECK ONE-WAY FUEL VALVE-I

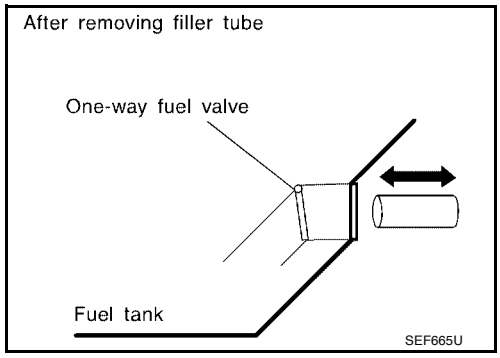
Check one-way valve for clogging.

OK or NG

OK >> GO TO 13.
NG >> Repair or replace one-way fuel valve with fuel tank.

13. 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.

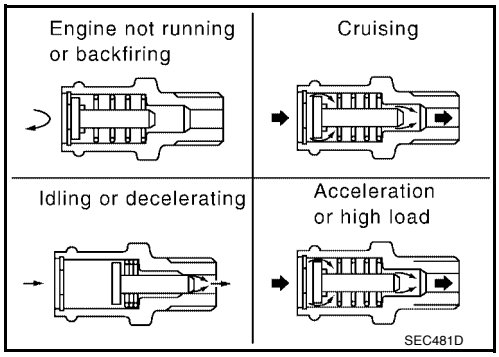
POSITIVE CRANKCASE VENTILATION

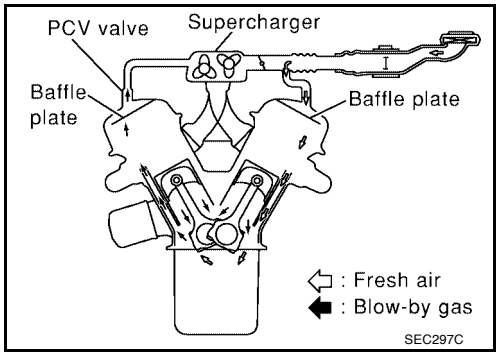
PFP:11810

Description

UBS00E3C

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.
This system returns blow-by gas to the intake manifold.



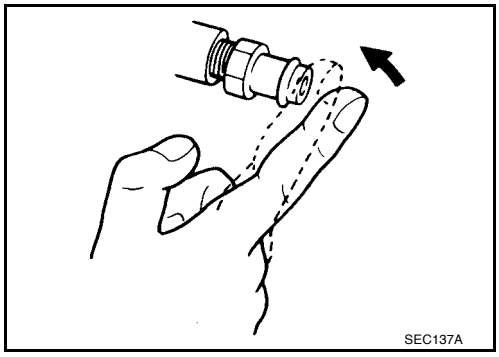


Component Inspection

UBS00E3D

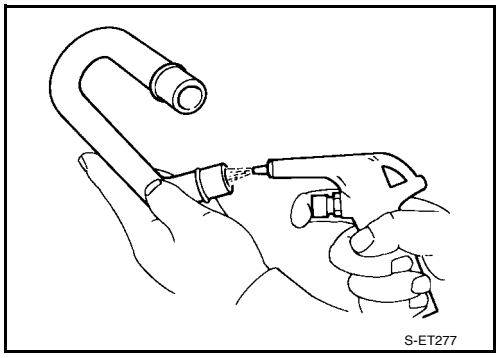
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

With engine running at idle, remove PCV valve from rocker cover; 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

UBS00E3E

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

UBS00E3F

Base idle speed*1	A/T	No load*4 (in P or N position)	700±50 rpm
	M/T	No load*4 (in Neutral position)	
Target idle speed*2	A/T	No load*4 (in P or N position)	750±50 rpm
	M/T	No load*4 (in Neutral position)	
Air conditioner: ON	A/T	In P or N position	850 rpm or more
	M/T	In Neutral position	
Ignition timing*3	A/T	In P or N position	10±5° BTDC
	M/T	In Neutral position	
Throttle position sensor idle position			0.15 - 0.85V

*1: Throttle position sensor harness connector disconnected or using CONSULT-II “WORK SUPPORT” mode
*2: Throttle position sensor harness connector connected
*3: Throttle position sensor harness connector disconnected
*4: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Coil

UBS00E3G

Primary voltage	12V
Primary resistance [at 20°C (68°F)]	Approximately 1.0Ω
Secondary resistance [at 20°C (68°F)]	Approximately 10 kΩ

Mass Air Flow Sensor

UBS00E3H

Supply voltage	Battery voltage (11 - 14)V
Output voltage at idle	1.0 - 1.7*V
Mass air flow (Using CONSULT-II or GST)	3.3 - 4.8 g·m/sec at idle* 12.0 - 14.9 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.

Engine Coolant Temperature Sensor

UBS00E3I

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Heated Oxygen Sensor 1 Heater

UBS00E3J

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Fuel Pump

UBS00E3K

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω

IACV-AAC Valve

UBS00E3L

Resistance [at 20°C (68°F)]	Approximately 10.0Ω

Injector

UBS00E3M

Resistance [at 10 - 60°C (50 - 140°F)]	10.4 - 15.3Ω

Throttle Position Sensor

UBS00E3N

Throttle valve conditions	Voltage (at normal operating temperature, engine off, ignition switch ON)
Completely closed	0.15 - 0.85V
Completely open	3.5 - 4.7V

Calculated Load Value

UBS00E3O

	Calculated load value% (Using CONSULT or GST)
At idle	18.0 - 26.0
At 2,500 rpm	18.0 - 21.0

Intake Air Temperature Sensor

UBS00E3P

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
80 (176)	0.27 - 0.38

Heated Oxygen Sensor 2 Heater

UBS00E3Q

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Crankshaft Position Sensor (OBD)

UBS00E3R

Resistance [at 20°C (68°F)]	512 - 632Ω

Fuel Tank Temperature Sensor

UBS00E3S

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90