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# SECTION EC

## ENGINE CONTROL SYSTEM

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| ISC SYSTEM  | P0507             | 2    | ×                  | <a href="#">EC-403</a>        |
| KNOCK SEN/CIRC-B1   | P0327             | 1    | —                  | <a href="#">EC-259</a>        |
| KNOCK SEN/CIRC-B1   | P0328             | 1    | —                  | <a href="#">EC-259</a>        |
| MAF SEN/CIRCUIT   | P0101             | 2    | ×                  | <a href="#">EC-136</a>        |
| MAF SEN/CIRCUIT   | P0102*3           | 1    | ×                  | <a href="#">EC-143</a>        |
| MAF SEN/CIRCUIT   | P0103*3           | 1    | ×                  | <a href="#">EC-143</a>        |
| MULTI CYL MISFIRE   | P0300             | 2    | ×                  | <a href="#">EC-252</a>        |
| <b>NO DTC IS DETECTED.<br/>FURTHER TESTING<br/>MAY BE REQUIRED.</b> | <b>P0000</b>      | 2    | —                  | —                             |
| P-N POS SW/CIRCUIT  | P1706             | 2    | ×                  | <a href="#">EC-520</a>        |
| PURG VOLUME CONT/V  | P0444             | 2    | ×                  | <a href="#">EC-325</a>        |
| PURG VOLUME CONT/V  | P0445             | 2    | ×                  | <a href="#">EC-325</a>        |
| PURG VOLUME CONT/V  | P1444             | 2    | ×                  | <a href="#">EC-469</a>        |
| THERMSTAT FNCTN   | P0128             | 2    | ×                  | <a href="#">EC-184</a>        |
| TOR CONV CLTCH S/V  | P1775             | 2    | ×                  | <a href="#">EC-527, AT-41</a> |
| TOR CONV CLTCH S/V  | P1776             | 2    | ×                  | <a href="#">EC-531</a>        |
| TP SEN/CIRCUIT  | P0121             | 2    | ×                  | <a href="#">EC-159</a>        |
| TP SEN/CIRCUIT  | P0122*3           | 1    | ×                  | <a href="#">EC-168</a>        |
| TP SEN/CIRCUIT  | P0123*3           | 1    | ×                  | <a href="#">EC-168</a>        |
| TW CATALYST SYS-B1  | P0420             | 2    | ×                  | <a href="#">EC-297</a>        |
| VC CUT/V BYPASS/V   | P1491             | 2    | ×                  | <a href="#">EC-510</a>        |
| VC/V BYPASS/V   | P1490             | 2    | ×                  | <a href="#">EC-504</a>        |
| VEH SPEED SEN/CIRC  | P0500             | 2    | ×                  | <a href="#">EC-388</a>        |

# INDEX FOR DTC

[KA24DE]

| Items<br>(CONSULT-II screen terms) | DTC*1 *2          | Trip | MIL lighting<br>up | Reference page         |
|------------------------------------|-------------------|------|--------------------|------------------------|
|                                    | CONSULT-II<br>GST |      |                    |                        |
| VENT CONTROL VALVE                 | P0447             | 2    | ×                  | <a href="#">EC-331</a> |
| VENT CONTROL VALVE                 | P1446             | 2    | ×                  | <a href="#">EC-479</a> |
| VENT CONTROL VALVE                 | P1448             | 2    | ×                  | <a href="#">EC-483</a> |

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

\*2: These numbers are prescribed by SAE J2012.

\*3: When the fail-safe operation occurs, the MIL illuminates.

## DTC No. Index

UBS007UI

x: Applicable —: Not applicable

| DTC*1 *2          | Items<br>(CONSULT-II screen terms)                                  | Trip | MIL lighting<br>up | Reference page         |
|-------------------|---|------|--------------------|------------------------|
| CONSULT-II<br>GST |   |      |                    |                        |
| —                 | Unable to access ECM  | —    | —                  | <a href="#">EC-72</a>  |
| <b>P0000</b>      | <b>NO DTC IS DETECTED.<br/>FURTHER TESTING<br/>MAY BE REQUIRED.</b> | —    | —                  | —                      |
| P0031             | HO2S1 HTR (B1)  | 2    | ×                  | <a href="#">EC-126</a> |
| P0032             | HO2S1 HTR (B1)  | 2    | ×                  | <a href="#">EC-126</a> |
| P0037             | HO2S2 HTR (B1)  | 2    | ×                  | <a href="#">EC-131</a> |
| P0038             | HO2S2 HTR (B1)  | 2    | ×                  | <a href="#">EC-131</a> |
| P0101             | MAF SEN/CIRCUIT   | 2    | ×                  | <a href="#">EC-136</a> |
| P0102*3           | MAF SEN/CIRCUIT   | 1    | ×                  | <a href="#">EC-143</a> |
| P0103*3           | MAF SEN/CIRCUIT   | 1    | ×                  | <a href="#">EC-143</a> |
| P0112*3           | IAT SEN/CIRCUIT   | 1    | ×                  | <a href="#">EC-149</a> |
| P0113*3           | IAT SEN/CIRCUIT   | 1    | ×                  | <a href="#">EC-149</a> |
| P0117*3           | ECT SEN/CIRCUIT   | 1    | ×                  | <a href="#">EC-154</a> |
| P0118*3           | ECT SEN/CIRCUIT   | 1    | ×                  | <a href="#">EC-154</a> |
| P0121             | TP SEN/CIRCUIT  | 2    | ×                  | <a href="#">EC-159</a> |
| P0122*3           | TP SEN/CIRCUIT  | 1    | ×                  | <a href="#">EC-168</a> |
| P0123*3           | TP SEN/CIRCUIT  | 1    | ×                  | <a href="#">EC-168</a> |
| P0125             | ECT SENSOR  | 2    | ×                  | <a href="#">EC-174</a> |
| P0127             | IAT SENSOR  | 2    | ×                  | <a href="#">EC-179</a> |
| P0128             | THERMSTAT FNCTN   | 2    | ×                  | <a href="#">EC-184</a> |
| P0132             | HO2S1 (B1)  | 2    | ×                  | <a href="#">EC-186</a> |
| P0133             | HO2S1 (B1)  | 2    | ×                  | <a href="#">EC-192</a> |
| P0134             | HO2S1 (B1)  | 2    | ×                  | <a href="#">EC-202</a> |
| P0138             | HO2S2 (B1)  | 2    | ×                  | <a href="#">EC-209</a> |
| P0139             | HO2S2 (B1)  | 2    | ×                  | <a href="#">EC-216</a> |
| P0171             | FUEL SYS-LEAN-B1  | 2    | ×                  | <a href="#">EC-225</a> |
| P0172             | FUEL SYS-RICH-B1  | 2    | ×                  | <a href="#">EC-232</a> |
| P0181             | FTT SENSOR  | 2    | ×                  | <a href="#">EC-239</a> |
| P0182             | FTT SEN/CIRCUIT   | 2    | ×                  | <a href="#">EC-244</a> |
| P0183             | FTT SEN/CIRCUIT   | 2    | ×                  | <a href="#">EC-244</a> |
| P0217             | ENG OVER TEMP   | 1    | ×                  | <a href="#">EC-248</a> |

# INDEX FOR DTC

[KA24DE]

| DTC*1 *2 | Items<br>(CONSULT-II screen terms) | Trip | MIL lighting<br>up | Reference page         |
|----------|------------------------------------|------|--------------------|------------------------|
| P0300    | MULTI CYL MISFIRE                  | 2    | ×                  | <a href="#">EC-252</a> |
| P0301    | CYL1 MISFIRE                       | 2    | ×                  | <a href="#">EC-252</a> |
| P0302    | CYL2 MISFIRE                       | 2    | ×                  | <a href="#">EC-252</a> |
| P0303    | CYL3 MISFIRE                       | 2    | ×                  | <a href="#">EC-252</a> |
| P0304    | CYL4 MISFIRE                       | 2    | ×                  | <a href="#">EC-252</a> |
| P0327    | KNOCK SEN/CIRC-B1                  | 1    | —                  | <a href="#">EC-259</a> |
| P0328    | KNOCK SEN/CIRC-B1                  | 1    | —                  | <a href="#">EC-259</a> |
| P0335    | CKP SEN/CIRCUIT                    | 2    | ×                  | <a href="#">EC-263</a> |
| P0340    | CMP SEN/CIRCUIT                    | 2    | ×                  | <a href="#">EC-268</a> |
| P0400    | EGR SYSTEM                         | 2    | ×                  | <a href="#">EC-275</a> |
| P0402    | EGRC-BPT VALVE                     | 2    | ×                  | <a href="#">EC-285</a> |
| P0405    | EGR TEMP SEN/CIRC                  | 2    | ×                  | <a href="#">EC-291</a> |
| P0406    | EGR TEMP SEN/CIRC                  | 2    | ×                  | <a href="#">EC-291</a> |
| P0420    | TW CATALYST SYS-B1                 | 2    | ×                  | <a href="#">EC-297</a> |
| P0441    | EVAP PURG FLOW/MON                 | 2    | ×                  | <a href="#">EC-302</a> |
| P0442    | EVAP SMALL LEAK                    | 2    | ×                  | <a href="#">EC-311</a> |
| P0444    | PURG VOLUME CONT/V                 | 2    | ×                  | <a href="#">EC-325</a> |
| P0445    | PURG VOLUME CONT/V                 | 2    | ×                  | <a href="#">EC-325</a> |
| P0447    | VENT CONTROL VALVE                 | 2    | ×                  | <a href="#">EC-331</a> |
| P0452    | EVAP SYS PRES SEN                  | 2    | ×                  | <a href="#">EC-337</a> |
| P0453    | EVAP SYS PRES SEN                  | 2    | ×                  | <a href="#">EC-344</a> |
| P0455    | EVAP GROSS LEAK                    | 2    | ×                  | <a href="#">EC-354</a> |
| P0456    | EVAP VERY SML LEAK                 | 2    | ×                  | <a href="#">EC-366</a> |
| P0460    | FUEL LEV SEN SLOSH                 | 2    | ×                  | <a href="#">EC-378</a> |
| P0461    | FUEL LEVEL SENSOR                  | 2    | ×                  | <a href="#">EC-382</a> |
| P0462    | FUEL LEVL SEN/CIRC                 | 2    | ×                  | <a href="#">EC-384</a> |
| P0463    | FUEL LEVL SEN/CIRC                 | 2    | ×                  | <a href="#">EC-384</a> |
| P0500    | VEH SPEED SEN/CIRC                 | 2    | ×                  | <a href="#">EC-388</a> |
| P0505    | ISC SYSTEM/CIRC                    | 2    | ×                  | <a href="#">EC-393</a> |
| P0506    | ISC SYSTEM                         | 2    | ×                  | <a href="#">EC-398</a> |
| P0507    | ISC SYSTEM                         | 2    | ×                  | <a href="#">EC-403</a> |
| P0510    | CLOSED TP SW/CIRC                  | 2    | ×                  | <a href="#">EC-408</a> |
| P0605    | ECM                                | 2    | ×                  | <a href="#">EC-415</a> |
| P1143    | HO2S1 (B1)                         | 2    | ×                  | <a href="#">EC-417</a> |
| P1144    | HO2S1 (B1)                         | 2    | ×                  | <a href="#">EC-422</a> |
| P1146    | HO2S2 (B1)                         | 2    | ×                  | <a href="#">EC-427</a> |
| P1147    | HO2S2 (B1)                         | 2    | ×                  | <a href="#">EC-434</a> |
| P1148    | CLOSED LOOP-B1                     | 1    | ×                  | <a href="#">EC-441</a> |
| P1217    | ENG OVER TEMP                      | 1    | ×                  | <a href="#">EC-443</a> |
| P1336    | CKP SENSOR (COG)                   | 2    | ×                  | <a href="#">EC-447</a> |
| P1400    | EGRC SOLENOID/V                    | 2    | ×                  | <a href="#">EC-452</a> |
| P1402    | EGR SYSTEM                         | 2    | ×                  | <a href="#">EC-458</a> |

# INDEX FOR DTC

[KA24DE]

| DTC*1 *2          | Items<br>(CONSULT-II screen terms) | Trip | MIL lighting<br>up | Reference page                | A  |
|-------------------|------------------------------------|------|--------------------|-------------------------------|----|
| CONSULT-II<br>GST |                                    |      |                    |                               |    |
| P1442             | EVAP SMALL LEAK                    | 2    | ×                  | <a href="#">EC-467</a>        | EC |
| P1444             | PURG VOLUME CONT/V                 | 2    | ×                  | <a href="#">EC-469</a>        |    |
| P1446             | VENT CONTROL VALVE                 | 2    | ×                  | <a href="#">EC-479</a>        |    |
| P1448             | VENT CONTROL VALVE                 | 2    | ×                  | <a href="#">EC-483</a>        | C  |
| P1456             | EVAP VERY SML LEAK                 | 2    | ×                  | <a href="#">EC-489</a>        |    |
| P1464             | FUEL LEVL SEN/CIRC                 | 2    | ×                  | <a href="#">EC-501</a>        | D  |
| P1490             | VC/V BYPASS/V                      | 2    | ×                  | <a href="#">EC-504</a>        |    |
| P1491             | VC CUT/V BYPASS/V                  | 2    | ×                  | <a href="#">EC-510</a>        |    |
| P1706             | P-N POS SW/CIRCUIT                 | 2    | ×                  | <a href="#">EC-520</a>        | E  |
| P1775             | TOR CONV CLTCH S/V                 | 2    | ×                  | <a href="#">EC-527, AT-41</a> |    |
| P1776             | TOR CONV CLTCH S/V                 | 2    | ×                  | <a href="#">EC-531</a>        | F  |

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

\*2: These numbers are prescribed by SAE J2012.

\*3: When the fail-safe operation occurs, the MIL illuminates.

A  
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**PRECAUTIONS**

PFP:00001

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

UBS00584

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, help to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and in the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness, and spiral cable.

The vehicle (except Crew Cab model) is 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 in a frontal collision. When the switch is turned to the OFF position, the passenger air bag is disabled and will not inflate in a frontal collision. 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.

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

**WARNING:**

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN 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 RS 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 harness connectors.**
- **The vehicle (except Crew Cab model) is 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 in a frontal collision. When the passenger air bag is switched ON, the passenger air bag is enabled and could inflate in a frontal 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**

UBS00585

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, "HARNES 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

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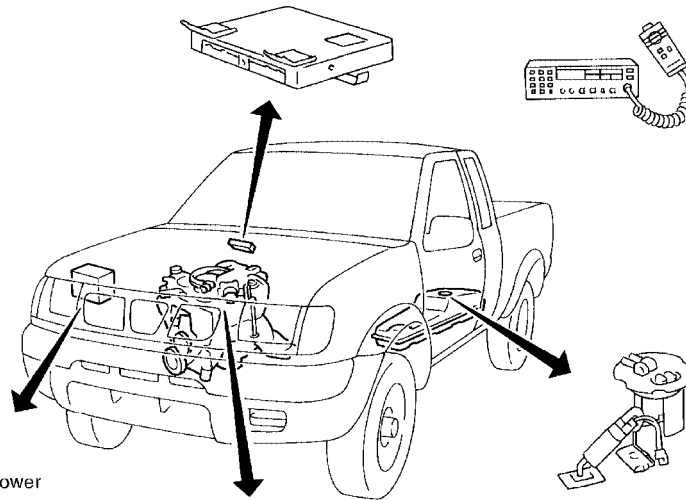
### ECM

- 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

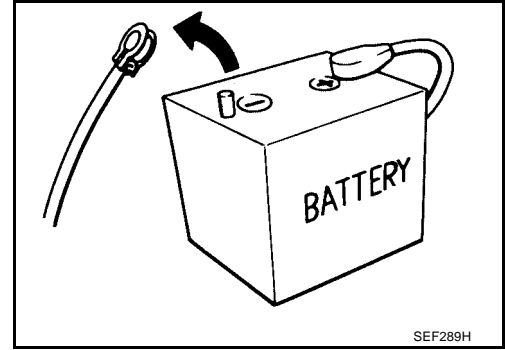
- Do not operate fuel pump when there is no fuel in lines.
- Tighten fuel hose clamps to the specified torque. (Refer to MA section.)

### 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 receiving 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.

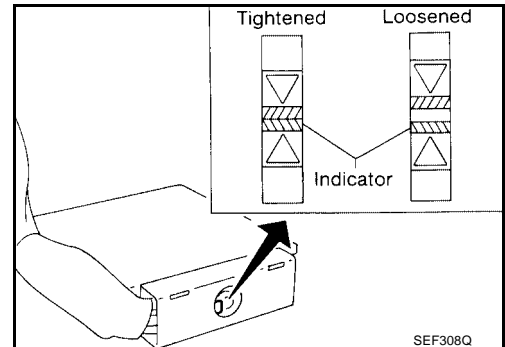
## Precautions

- 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.

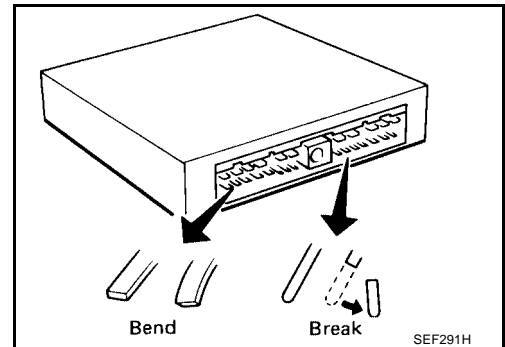


- When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.

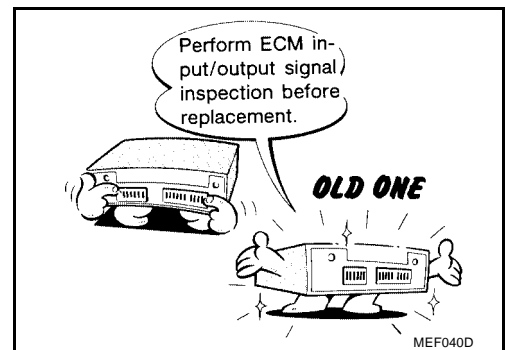
 : 3 - 5 N·m (0.3 - 0.5 kg·m, 26 - 43 in·lb)



- 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](#).

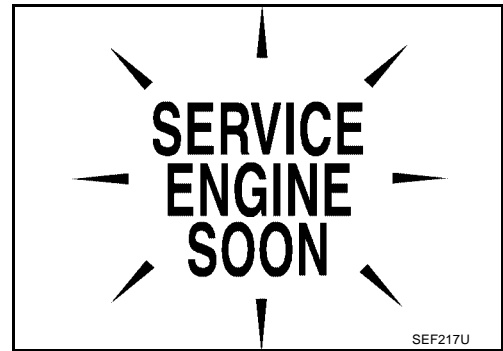




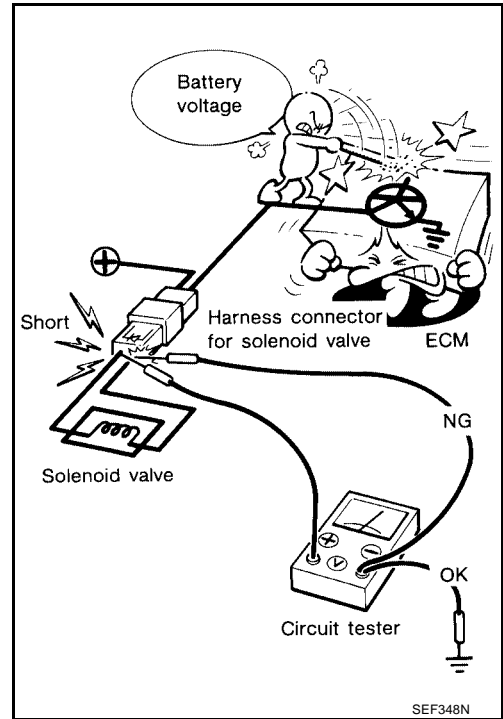
# PRECAUTIONS

[KA24DE]

- 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

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

[KA24DE]

PFP:00002

UBS00589

## PREPARATION

### Special Service Tools

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

| Tool number<br>(Kent-Moore No.)<br>Tool name            | Description   |
|---|---|
| KV10117100<br>(J36471-A)<br>Heated oxygen sensor wrench | Loosening or tightening heated oxygen sensor 1 with 22 mm (0.87 in) hexagon nut |
| KV10114400<br>(J-38365)<br>Heated oxygen sensor wrench  | Loosening or tightening heated oxygen sensor 2<br><b>a: 22 mm (0.87 in)</b>     |
| (J-45178)<br>TPS test connector                         | Used to test the throttle position sensor                                       |

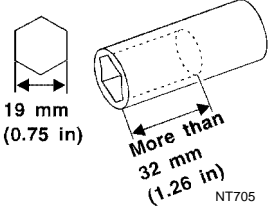
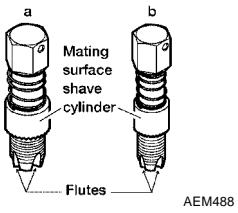

### Commercial Service Tools

UBS0058A

| Tool name  | Description   |
|--|---|
| Fuel filler cap adapter                          | Checking fuel tank vacuum relief valve opening pressure |
| Leak detector<br>i.e.: (J41416)                  | Locating the EVAP leak                                  |
| EVAP service port adapter<br>i.e.: (J41413-OBDD) | Applying positive pressure through EVAP service port    |

# PREPARATION

[KA24DE]

| Tool name   | Description   |
|---|---|
| <p>Socket wrench</p>   | <p>Removing and installing engine coolant temperature sensor</p>  |
| <p>Oxygen sensor thread cleaner<br/>i.e.: (J-43897-18)<br/>i.e.: (J-43897-12)</p>                          | <p>Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown in "Commercial Service tools".<br/>a: J-43897-18 18 mm diameter, for Zirconia Oxygen Sensor<br/>b: J-43897-12 12 mm diameter, for Titania Oxygen Sensor</p> |
| <p>Anti-seize lubricant<br/>i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)</p>  | <p>Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.</p>   |

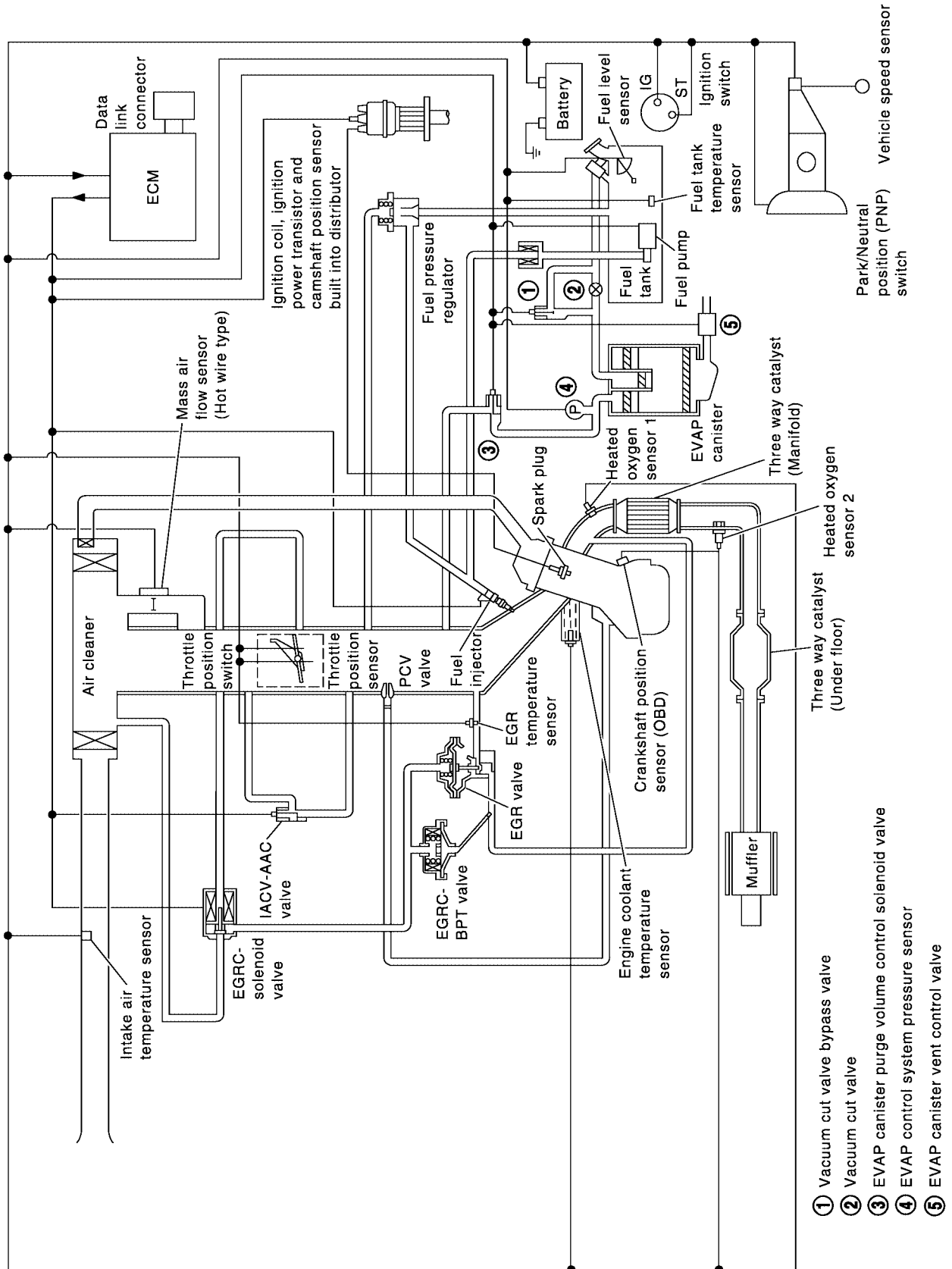
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## ENGINE CONTROL SYSTEM

PFP:23710

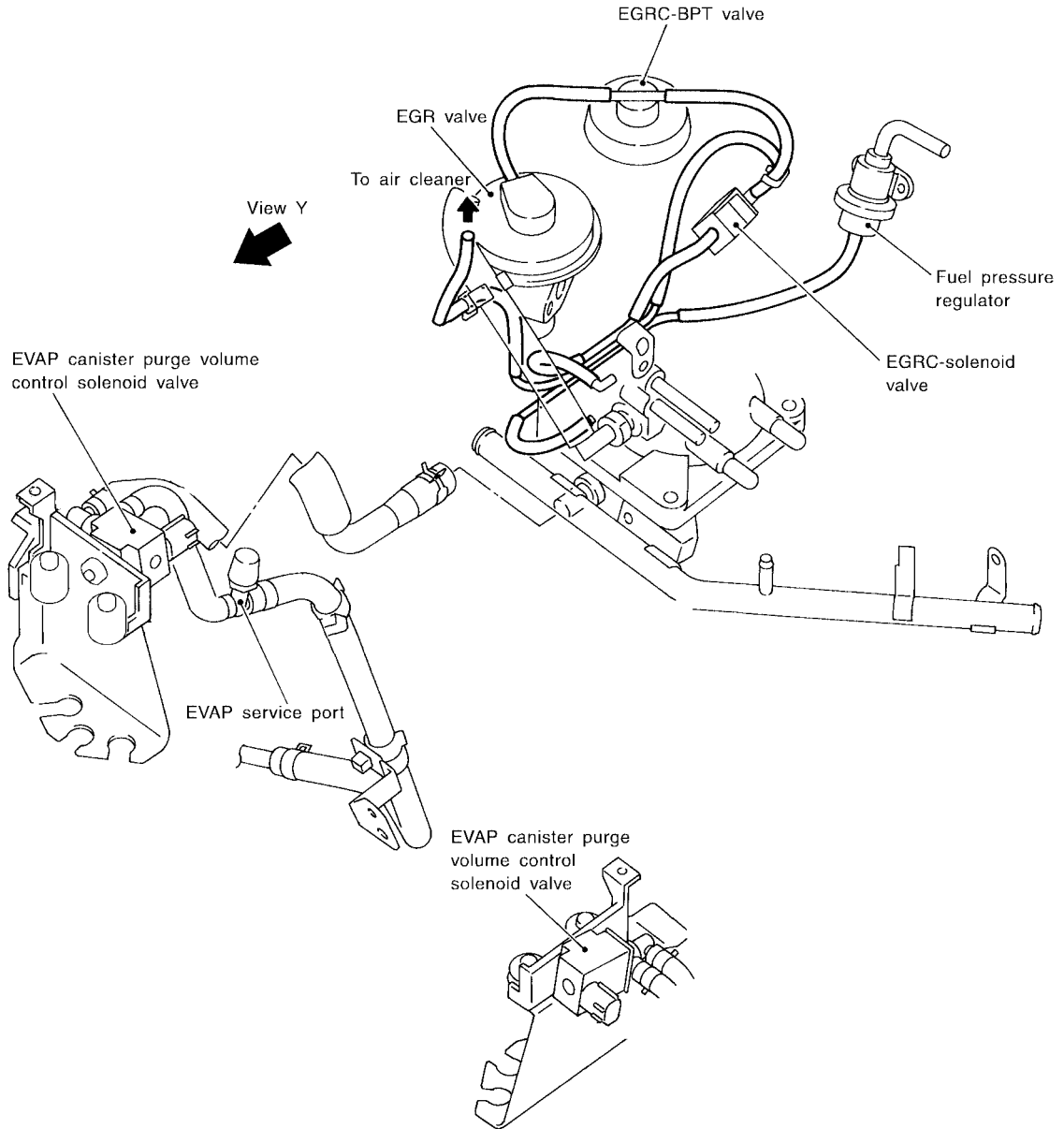
### System Diagram

UBS0058B



### Vacuum Hose Drawing

Refer to [EC-28, "System Diagram"](#) for vacuum control system.



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

View Y

## System Chart

| Input (Sensor)   | ECM Function  | Output (Actuator)   |
|--|---|---|
| <ul style="list-style-type: none"> <li>● Camshaft position sensor</li> <li>● Mass air flow sensor</li> <li>● Engine coolant temperature sensor</li> <li>● Heated oxygen sensor 1</li> <li>● Ignition switch</li> <li>● Throttle position sensor</li> <li>● PNP switch</li> <li>● Air conditioner switch</li> <li>● Knock sensor</li> <li>● EGR temperature sensor*1</li> <li>● Crankshaft position sensor (OBD)</li> <li>● EVAP control system pressure sensor*1</li> <li>● Fuel tank temperature sensor</li> <li>● Battery voltage</li> <li>● Power steering oil pressure switch</li> <li>● Vehicle speed sensor</li> <li>● Intake air temperature sensor</li> <li>● Heated oxygen sensor 2*2</li> <li>● Closed throttle position switch*3</li> </ul> | Fuel injection & mixture ratio control                      | Injectors   |
|  | 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                          | <ul style="list-style-type: none"> <li>● EVAP canister vent control valve</li> <li>● Vacuum cut valve bypass valve</li> </ul> |

\*1: These sensors are not used to control the engine system. They are used only for the on board diagnosis.

\*2: Under normal conditions, this sensor is not for engine control operation.

\*3: This switch will operate in place of the throttle position sensor to control EVAP parts if the sensor malfunctions.

## Multipoint Fuel Injection (MFI) System 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 | 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<br>Throttle valve idle 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                  |  |          |

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

## 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**

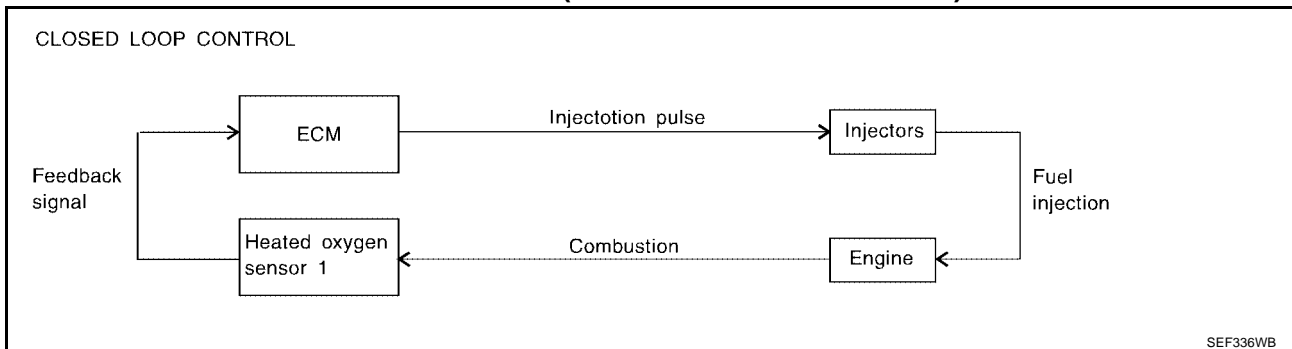
In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- 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 if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1, refer to [EC-192](#). 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 film) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.

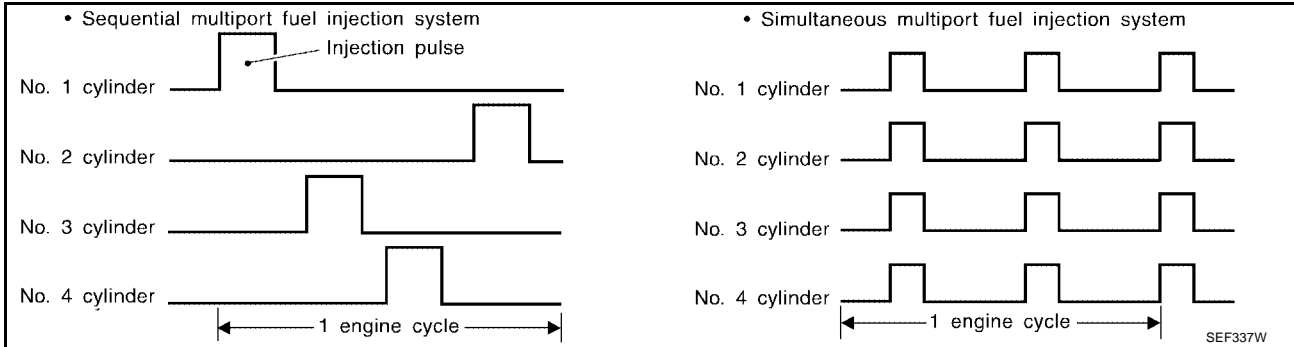
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

“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 INPUT/OUTPUT SIGNAL CHART

UBS0058F

| 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<br>Throttle valve idle position |                         |                  |
| Vehicle speed sensor              | Vehicle speed                                     |                         |                  |
| Ignition switch                   | Start signal                                      |                         |                  |
| Knock sensor                      | Engine knocking                                   |                         |                  |
| 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.

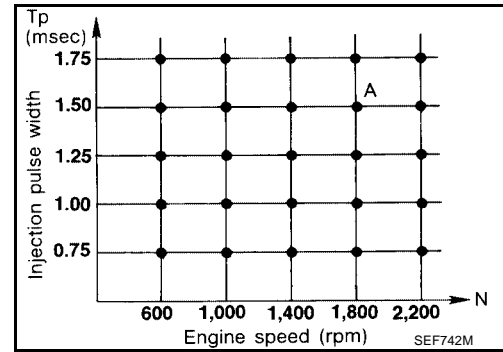
e.g., N: 1,800 rpm, Tp: 1.50 msec  
A°BTDC

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 INPUT/OUTPUT SIGNAL CHART

UBS0058G

| 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) INPUT/OUTPUT SIGNAL CHART

UBS0058H

| Sensor                   | Input Signal to ECM | ECM Function     | Actuator  |
|--------------------------|---------------------|------------------|-----------|
| Vehicle speed sensor     | Vehicle speed       | Fuel cut control | Injectors |
| 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 with no load, (for example, in Neutral and engine speed 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:**

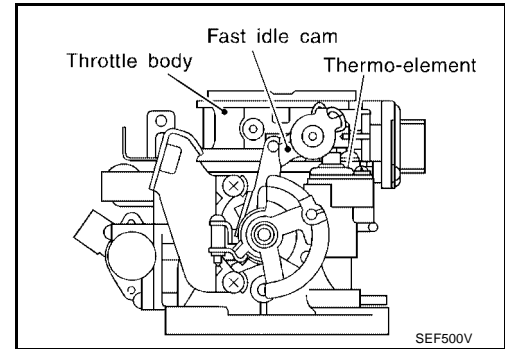
This function is different from deceleration control listed under [EC-30, "Multiport Fuel Injection \(MFI\) System"](#) .

**Fast Idle Cam (FIC)****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-73, "Basic Inspection"](#) .

UBS0058I



## BASIC SERVICE PROCEDURE

### Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment PREPARATION

- 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
- On models equipped with air conditioner, checks should be carried out while the air conditioner is "OFF".
- 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" position.
- When measuring "CO" percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
- Turn off headlamps, heater blower.
- Keep front wheels pointed straight ahead.

A

EC

C

D

E

F

G

H

I

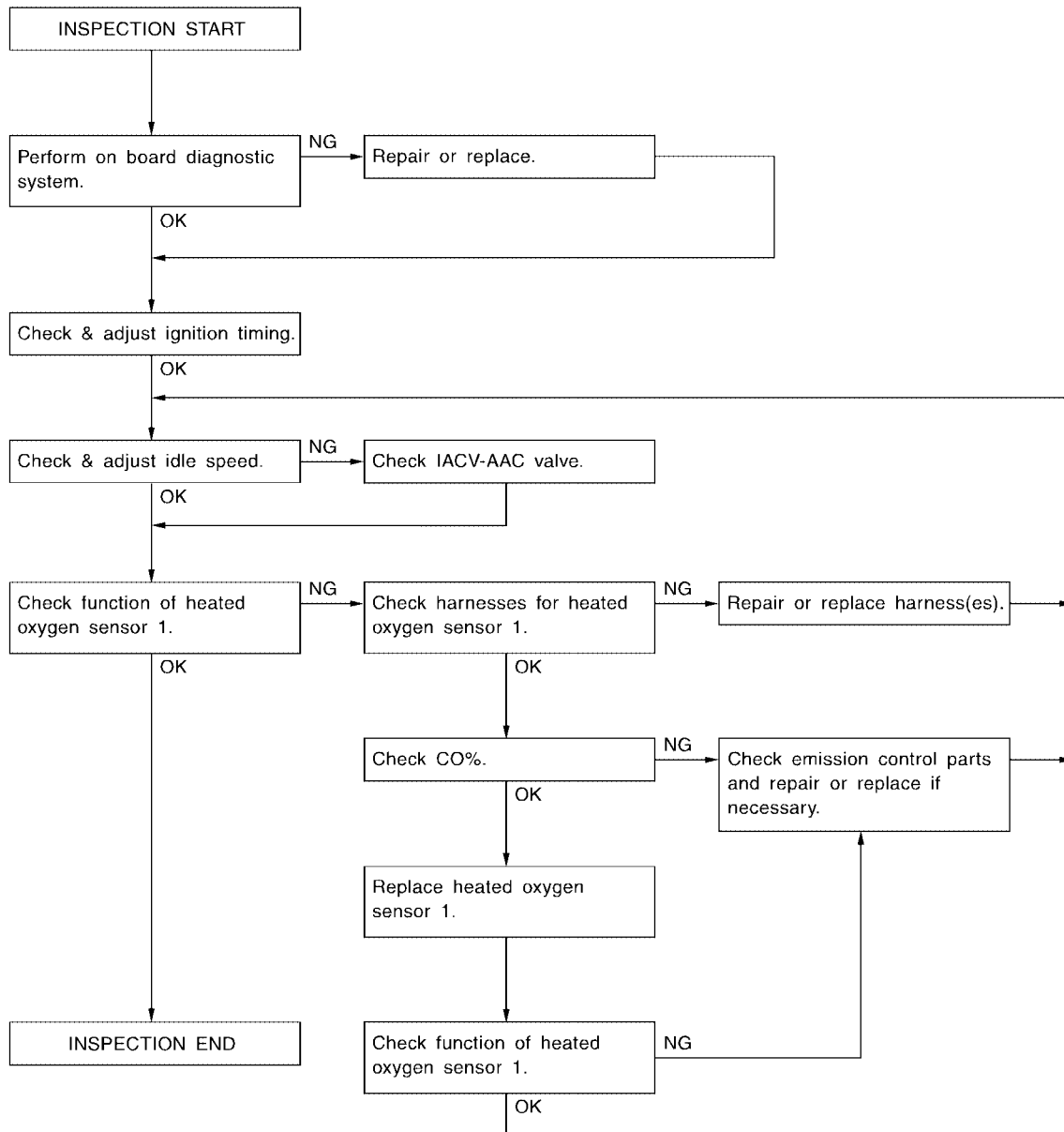
J

K

L

M

## 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.

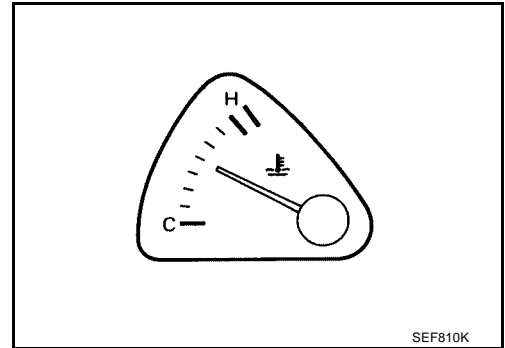
## INSPECTION PROCEDURE

### 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    >> 1. Repair or replace components as necessary.  
                   2. GO TO 2 (With CONSULT-II).  
                   3. GO TO 3 (Without CONSULT-II).

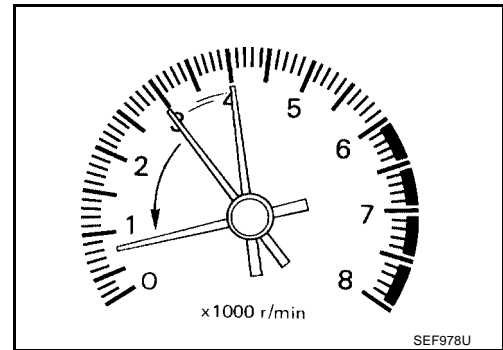


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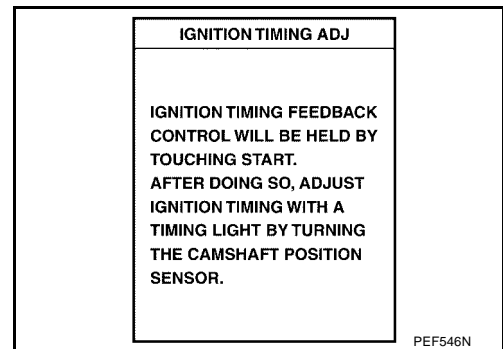
## 2. CHECK IGNITION TIMING

 **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.



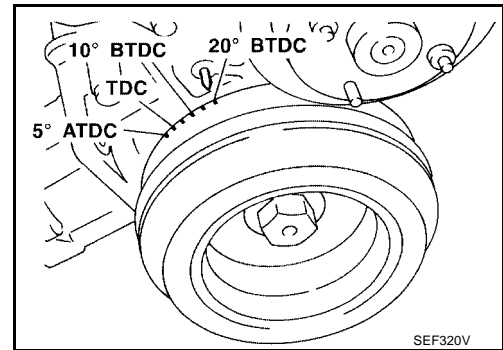
6. Check ignition timing with a timing light.

**M/T : 20°±2° BTDC**

**A/T : 20°±2° BTDC (in "P" or "N" position)**

OK or NG

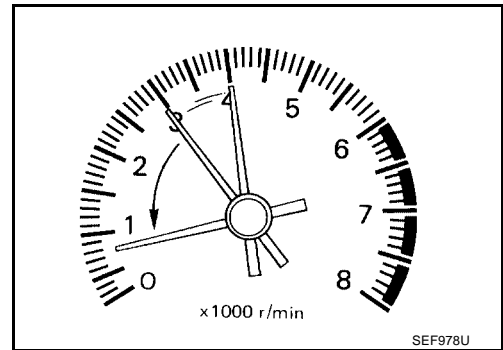
- OK >> GO TO 5.  
 NG >> GO TO 4.



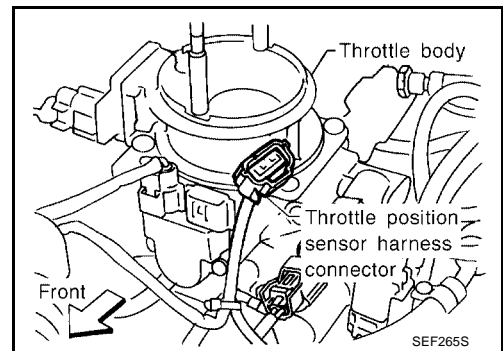
3. CHECK IGNITION TIMING

⊗ 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. Turn off 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.



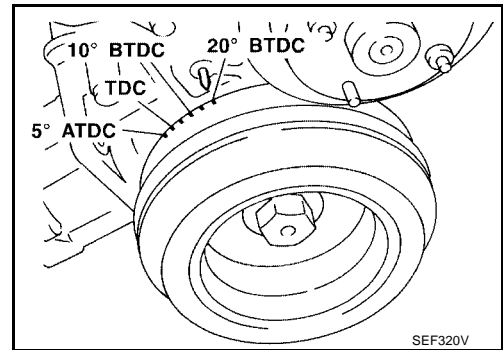
5. Check ignition timing with a timing light.

**M/T : 20°±2° BTDC**

**A/T : 20°±2° BTDC (in "P" or "N" position)**

OK or NG

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



A  
 EC  
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 M

**4. ADJUST IGNITION TIMING**

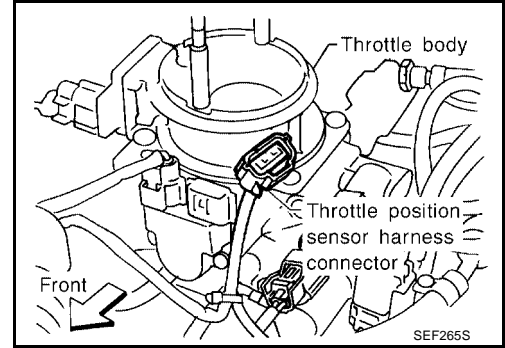
**With CONSULT-II**

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. Turn off engine and connect throttle position sensor harness connector to throttle position sensor.

Models with CONSULT-II>>GO TO 2.  
Models 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**  
**A/T : 750±50 rpm (in "P" or "N" position)**

**Without CONSULT-II**

1. Check idle speed.

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

|                     |          |
|---------------------|----------|
| IGNITION TIMING ADJ |          |
| CONDITION SETTING   |          |
| IGN/T FEEDBACK      | HOLD     |
| MONITOR             |          |
| ENG SPEED           | XXX rpm  |
| IGN TIMING          | XXX BTDC |
| CLSD THL POS        | ON       |
|                     |          |
|                     |          |
|                     |          |

OK or NG

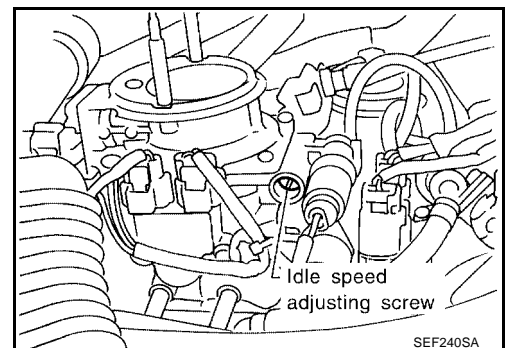
OK (With CONSULT-II)>>GO TO 7.  
OK (Without CONSULT-II)>>GO TO 8.  
NG >> GO TO 6.

**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**  
**A/T : 750±50 rpm (in "P" or "N" position)**

Models with CONSULT-II>>GO TO 7.  
Models without CONSULT-II>>GO TO 8.

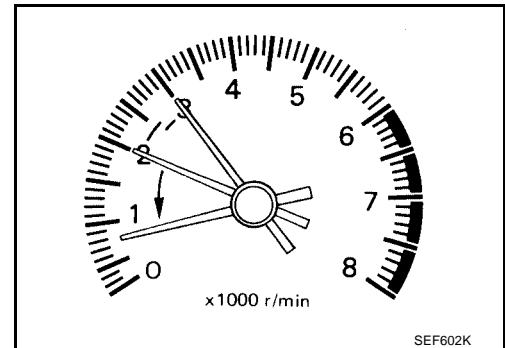




**7. CHECK TARGET IDLE SPEED**

**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.



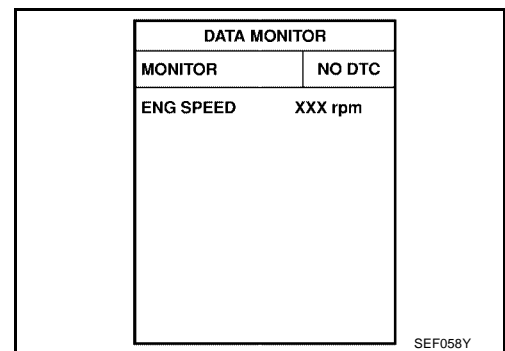
3. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

**M/T : 800±50 rpm**

**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**

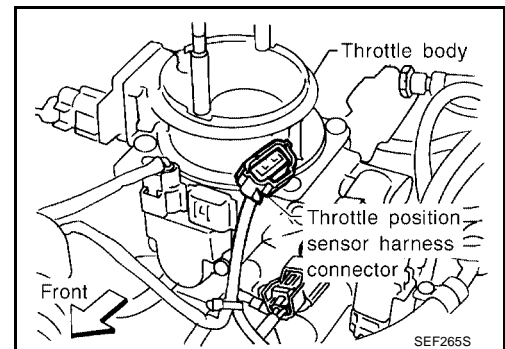
1. Turn off engine and connect throttle position sensor harness connector.
2. Start engine.
3. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed.
4. Check target idle speed.

**M/T : 800±50 rpm**

**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-398](#) , [EC-403](#) .
2. Check IACV-AAC valve harness and repair if necessary. Refer to [EC-393](#) .
3. Check ECM function by substituting another known good ECM. (ECM may be the cause of an incident, but this is rarely the 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 five times during 10 seconds.

**1 cycle: RICH → LEAN → RICH**

**2 cycles: RICH → LEAN → RICH → LEAN → RICH**

| DATA MONITOR    |         |
|-----------------|---------|
| MONITOR         | NO DTC  |
| ENG SPEED       | XXX rpm |
| HO2S1 MNTR (B1) | RICH    |

SEF820Y

### 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**

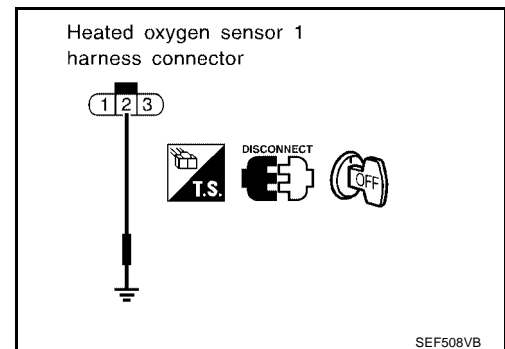
OK or NG

OK >> **INSPECTION END**

NG >> GO TO 11.

## 11. CHECK HEATED OXYGEN SENSOR 1 HARNESS

1. Turn off engine and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 harness connector.
4. Then connect harness connector terminal for heated oxygen sensor 1 to ground with a jumper wire.



5. Check for continuity between terminal 50 of ECM harness connector and body ground.

**Continuity exists...OK**

**Continuity does not exist...NG**

OK or NG

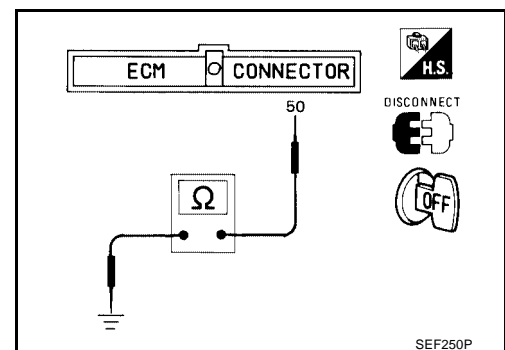
OK >> 1. Connect ECM harness connector to ECM.

2. Connect battery ground cable.

3. GO TO 13.

NG >> 1. Repair or replace harness.

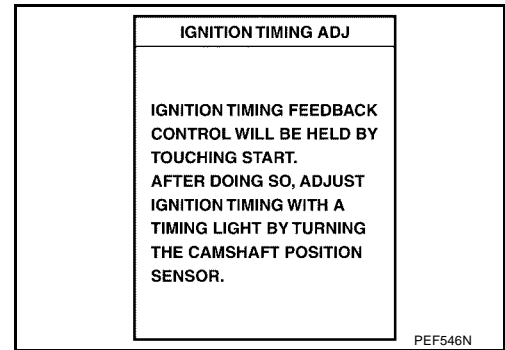
2. GO TO 12.



12. PREPARATION FOR IDLE SPEED ADJUSTING

 With CONSULT-II

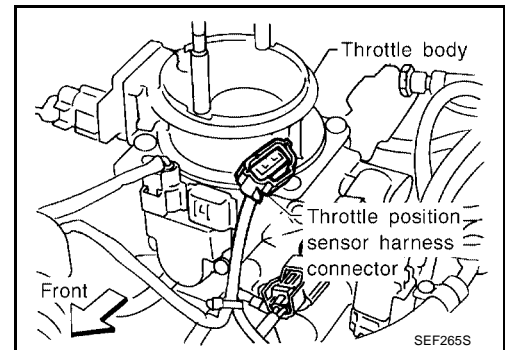
1. Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode.
2. Touch "START".



 Without CONSULT-II

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

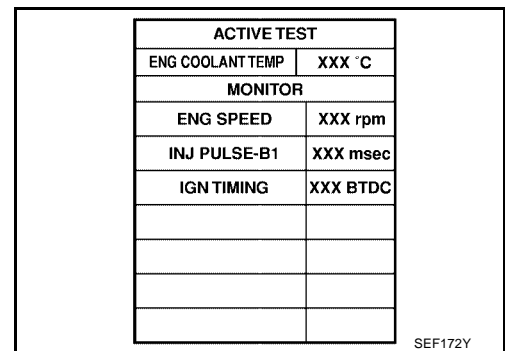
>> GO TO 6.



13. PREPARATION FOR "CO" % CHECK

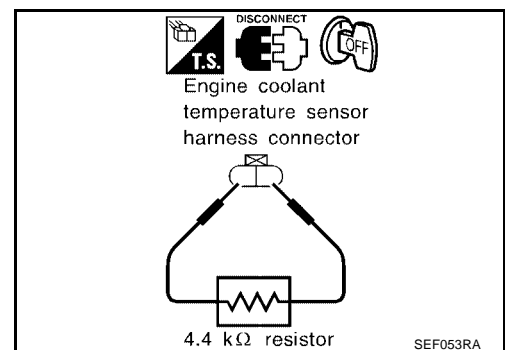
 With CONSULT-II

1. Select "ENGINE COOLANT TEMP" in "ACTIVE TEST" mode.
2. Set "COOLANT TEMP" to 5°C (41°F) by touching "Qu" and "Qd" and "UP", "DOWN".
1. Connect ECM harness connector to ECM.
2. Disconnect engine coolant temperature sensor harness connector.



3. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.
4. Connect battery ground cable.

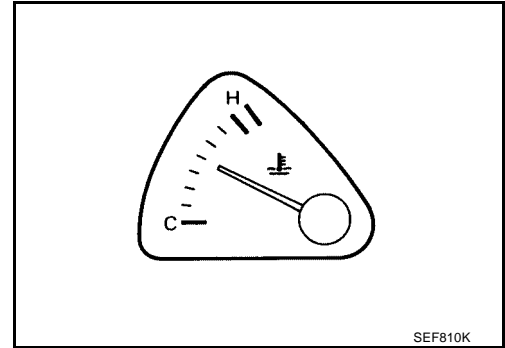
>> GO TO 14.



14. CHECK "CO" %

⊗ Without CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points to middle of gauge.  
(Be sure to start engine after setting "COOLANT TEMP" or installing a 4.4 kΩ resistor.)



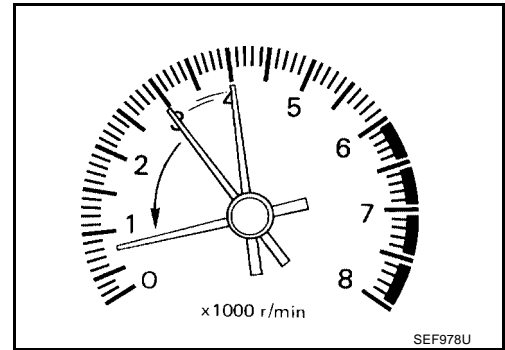
2. Rev engine two or three times under no-load, then run engine at idle speed.
3. Check "CO"%.

**Idle CO : 2.9 - 10.8% and engine runs smoothly.**

4. ⓘ With CONSULT-II  
After checking CO%, touch "BACK".

5. ⊗ Without CONSULT-II  
After checking CO%,

- Disconnect the resistor from terminals of engine coolant temperature sensor harness connector.
- 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. Replace heated oxygen sensor 1.
2. See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode.
3. 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 five times during 10 seconds.

**1 cycle: RICH → LEAN → RICH**

**2 cycles: RICH → LEAN → RICH → LEAN → RICH**

**Without CONSULT-II**

1. Stop engine.
2. Replace heated oxygen sensor 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 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. Connect heated oxygen sensor 1 harness connector to heated oxygen sensor 1.
2. Check fuel pressure regulator. Refer to [EC-47](#).
3. Check mass air flow sensor and its circuit.  
Refer to [EC-136](#), [EC-143](#).
4. Check injector and its circuit.  
Refer to [EC-542](#).  
Clean or replace if necessary.
5. Check engine coolant temperature sensor and its circuit. Refer to [EC-154](#), [EC-174](#).
6. Check ECM function by substituting another known-good ECM.  
(ECM may be the cause of an incident, but this is rarely the 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.

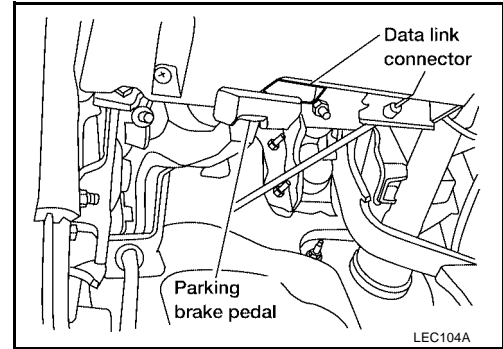
**Fuel Pressure Check  
FUEL PRESSURE RELEASE**

UBS0058N

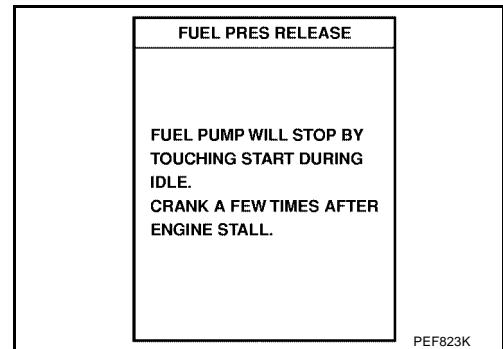
Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

**Ⓟ With CONSULT-II**

1. Start engine.
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.

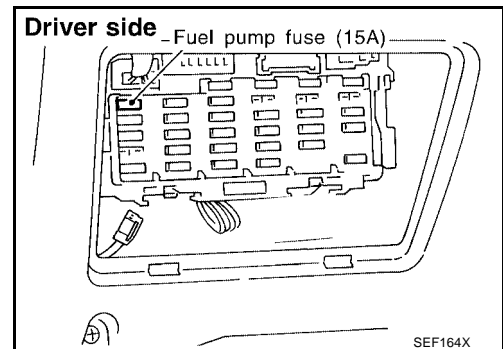


4. Turn ignition switch OFF.



**⊗ Without CONSULT-II**

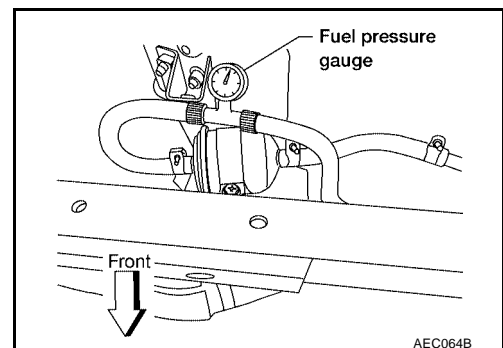
1. Remove fuse for fuel pump.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF and reconnect fuel pump fuse.



**FUEL PRESSURE CHECK**

- When reconnecting fuel line, always use new clamps.
- Make sure that clamp screw does not contact adjacent parts.
- Use a torque driver to tighten clamps.
- Use Pressure Gauge to check fuel pressure.
- Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.

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.



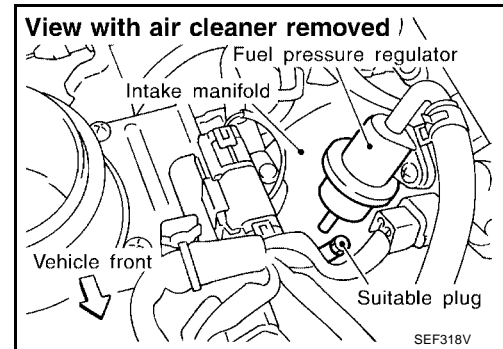
4. Start engine and check for fuel leakage.
5. Read the indication of fuel pressure gauge.

**At idle speed:**

**With vacuum hose connected**      **Approximately 235 kPa**  
**(2.4 kg/cm<sup>2</sup> , 34 psi)**

**With vacuum hose disconnected**      **Approximately 294 kPa**  
**(3.0 kg/cm<sup>2</sup> , 43 psi)**

If results are unsatisfactory, perform [EC-47, "Fuel Pressure Regulator Check"](#).

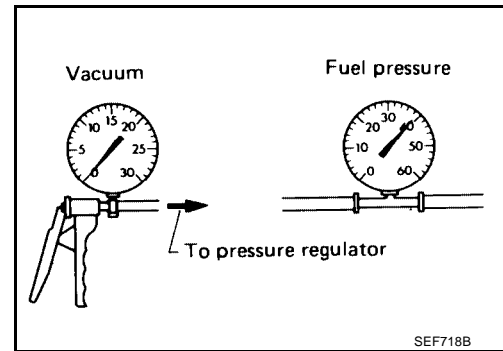


UBS0058P

### Fuel Pressure Regulator Check

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.**



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## ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

### Introduction

UBS0058Q

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.

X: Applicable —: Not applicable

|            | DTC | 1st trip DTC | Freeze Frame data | 1st trip Freeze Frame data | SRT code | Test value |
|------------|-----|--------------|-------------------|----------------------------|----------|------------|
| CONSULT-II | X   | X            | X                 | X                          | X        | —          |
| GST        | X   | X*1          | X                 | —                          | X        | X          |

\*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-72](#).)

### Two Trip Detection Logic

UBS0058R

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 - P0304 is being detected | X        | —           | —        | —           | —                   | —                   | X                   | —                   |
| Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected | —        | —           | X        | —           | —                   | X                   | —                   | —                   |
| One trip detection diagnoses (Refer to <a href="#">EC-17</a> .)                     | —        | X           | —        | —           | X                   | —                   | —                   | —                   |
| Fail-safe items (Refer to <a href="#">EC-72</a> .)                                  | —        | X           | —        | —           | X*1                 | —                   | —                   | —                   |
| Except above  | —        | —           | —        | X           | —                   | X                   | X                   | —                   |

\*1: Except “ECM”



# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[KA24DE]

UBS0058S

## Emission-related Diagnostic Information EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable —: Not applicable

| Items<br>(CONSULT-II screen terms)                                  | DTC*1*2           | SRT code | Test value/<br>Test limit<br>(GST only) | 1st trip DTC | Reference page         |
|---|-------------------|----------|---|--------------|------------------------|
|   | CONSULT-II<br>GST |          |   |              |                        |
| <b>NO DTC IS DETECTED.<br/>FURTHER TESTING<br/>MAY BE REQUIRED.</b> | <b>P0000</b>      | —        | —                                       | —            | —                      |
| HO2S1 HTR (B1)  | P0031             | X        | X                                       | X*5          | <a href="#">EC-126</a> |
| HO2S1 HTR (B1)  | P0032             | X        | X                                       | X*5          | <a href="#">EC-126</a> |
| HO2S2 HTR (B1)  | P0037             | X        | X                                       | X*5          | <a href="#">EC-131</a> |
| HO2S2 HTR (B1)  | P0038             | X        | X                                       | X*5          | <a href="#">EC-131</a> |
| MAF SEN/CIRCUIT   | P0101             | —        | —                                       | X            | <a href="#">EC-136</a> |
| MAF SEN/CIRCUIT   | P0102*3           | —        | —                                       | —            | <a href="#">EC-143</a> |
| MAF SEN/CIRCUIT   | P0103*3           | —        | —                                       | —            | <a href="#">EC-143</a> |
| IAT SEN/CIRCUIT   | P0112*3           | —        | —                                       | —            | <a href="#">EC-149</a> |
| IAT SEN/CIRCUIT   | P0113*3           | —        | —                                       | —            | <a href="#">EC-149</a> |
| ECT SEN/CIRCUIT   | P0117*3           | —        | —                                       | —            | <a href="#">EC-154</a> |
| ECT SEN/CIRCUIT   | P0118*3           | —        | —                                       | —            | <a href="#">EC-154</a> |
| TP SEN/CIRCUIT  | P0121             | —        | —                                       | X            | <a href="#">EC-159</a> |
| TP SEN/CIRCUIT  | P0122*3           | —        | —                                       | —            | <a href="#">EC-168</a> |
| TP SEN/CIRCUIT  | P0123*3           | —        | —                                       | —            | <a href="#">EC-168</a> |
| ECT SENSOR  | P0125             | —        | —                                       | X            | <a href="#">EC-174</a> |
| IAT SENSOR  | P0127             | —        | —                                       | X            | <a href="#">EC-179</a> |
| THERMSTAT FNCTN   | P0128             | —        | —                                       | X            | <a href="#">EC-184</a> |
| HO2S1 (B1)  | P0132             | X        | X                                       | X*5          | <a href="#">EC-186</a> |
| HO2S1 (B1)  | P0133             | X        | X                                       | X*5          | <a href="#">EC-192</a> |
| HO2S1 (B1)  | P0134             | X        | X                                       | X*5          | <a href="#">EC-202</a> |
| HO2S2 (B1)  | P0138             | X        | X                                       | X*5          | <a href="#">EC-209</a> |
| HO2S2 (B1)  | P0139             | X        | X                                       | X*5          | <a href="#">EC-216</a> |
| FUEL SYS-LEAN-B1  | P0171             | —        | —                                       | X            | <a href="#">EC-225</a> |
| FUEL SYS-RICH-B1  | P0172             | —        | —                                       | X            | <a href="#">EC-232</a> |
| FTT SENSOR  | P0181             | —        | —                                       | X            | <a href="#">EC-239</a> |
| FTT SEN/CIRCUIT   | P0182             | —        | —                                       | X            | <a href="#">EC-244</a> |
| FTT SEN/CIRCUIT   | P0183             | —        | —                                       | X            | <a href="#">EC-244</a> |
| ENG OVER TEMP   | P0217             | —        | —                                       | X            | <a href="#">EC-248</a> |
| MULTI CYL MISFIRE   | P0300             | —        | —                                       | X            | <a href="#">EC-252</a> |
| CYL1 MISFIRE  | P0301             | —        | —                                       | X            | <a href="#">EC-252</a> |
| CYL2 MISFIRE  | P0302             | —        | —                                       | X            | <a href="#">EC-252</a> |
| CYL3 MISFIRE  | P0303             | —        | —                                       | X            | <a href="#">EC-252</a> |
| CYL4 MISFIRE  | P0304             | —        | —                                       | X            | <a href="#">EC-252</a> |
| KNOCK SEN/CIRC-B1   | P0327             | —        | —                                       | —            | <a href="#">EC-259</a> |
| KNOCK SEN/CIRC-B1   | P0328             | —        | —                                       | —            | <a href="#">EC-259</a> |
| CKP SEN/CIRCUIT   | P0335             | —        | —                                       | X            | <a href="#">EC-263</a> |
| CMP SEN/CIRCUIT   | P0340             | —        | —                                       | X            | <a href="#">EC-268</a> |
| EGR SYSTEM  | P0400             | X        | X                                       | X*5          | <a href="#">EC-275</a> |

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[KA24DE]

| Items<br>(CONSULT-II screen terms) | DTC*1*2           | SRT code | Test value/<br>Test limit<br>(GST only) | 1st trip DTC | Reference page                |
|------------------------------------|-------------------|----------|---|--------------|-------------------------------|
|                                    | CONSULT-II<br>GST |          |   |              |                               |
| EGRC-BPT VALVE                     | P0402             | X        | X                                       | X*5          | <a href="#">EC-285</a>        |
| EGR TEMP SEN/CIRC                  | P0405             | —        | —                                       | X            | <a href="#">EC-291</a>        |
| EGR TEMP SEN/CIRC                  | P0406             | —        | —                                       | X            | <a href="#">EC-291</a>        |
| TW CATALYST SYS-B1                 | P0420             | X        | X                                       | X*5          | <a href="#">EC-297</a>        |
| EVAP PURG FLOW/MON                 | P0441             | X        | X                                       | X*5          | <a href="#">EC-302</a>        |
| EVAP SMALL LEAK                    | P0442             | X        | X                                       | X*5          | <a href="#">EC-311</a>        |
| PURG VOLUME CONT/V                 | P0444             | —        | —                                       | X            | <a href="#">EC-325</a>        |
| PURG VOLUME CONT/V                 | P0445             | —        | —                                       | X            | <a href="#">EC-325</a>        |
| VENT CONTROL VALVE                 | P0447             | —        | —                                       | X            | <a href="#">EC-331</a>        |
| EVAP SYS PRES SEN                  | P0452             | —        | —                                       | X            | <a href="#">EC-337</a>        |
| EVAP SYS PRES SEN                  | P0453             | —        | —                                       | X            | <a href="#">EC-344</a>        |
| EVAP GROSS LEAK                    | P0455             | X        | X                                       | X*5          | <a href="#">EC-354</a>        |
| EVAP VERY SML LEAK                 | P0456             | X*4      | X                                       | X*5          | <a href="#">EC-366</a>        |
| FUEL LEV SEN SLOSH                 | P0460             | —        | —                                       | X            | <a href="#">EC-378</a>        |
| FUEL LEVEL SENSOR                  | P0461             | —        | —                                       | X            | <a href="#">EC-382</a>        |
| FUEL LEVL SEN/CIRC                 | P0462             | —        | —                                       | X            | <a href="#">EC-384</a>        |
| FUEL LEVL SEN/CIRC                 | P0463             | —        | —                                       | X            | <a href="#">EC-384</a>        |
| VEH SPEED SEN/CIRC                 | P0500             | —        | —                                       | X            | <a href="#">EC-388</a>        |
| ISC SYSTEM/CIRC                    | P0505             | —        | —                                       | X            | <a href="#">EC-393</a>        |
| ISC SYSTEM                         | P0506             | —        | —                                       | X            | <a href="#">EC-398</a>        |
| ISC SYSTEM                         | P0507             | —        | —                                       | X            | <a href="#">EC-403</a>        |
| CLOSED TP SW/CIRC                  | P0510             | —        | —                                       | X            | <a href="#">EC-408</a>        |
| ECM                                | P0605             | —        | —                                       | X            | <a href="#">EC-415</a>        |
| HO2S1 (B1)                         | P1143             | X        | X                                       | X*5          | <a href="#">EC-417</a>        |
| HO2S1 (B1)                         | P1144             | X        | X                                       | X*5          | <a href="#">EC-422</a>        |
| HO2S2 (B1)                         | P1146             | X        | X                                       | X*5          | <a href="#">EC-427</a>        |
| HO2S2 (B1)                         | P1147             | X        | X                                       | X*5          | <a href="#">EC-434</a>        |
| CLOSED LOOP-B1                     | P1148             | —        | —                                       | X            | <a href="#">EC-441</a>        |
| ENG OVER TEMP                      | P1217             | —        | —                                       | X            | <a href="#">EC-443</a>        |
| CKP SENSOR (COG)                   | P1336             | —        | —                                       | X            | <a href="#">EC-447</a>        |
| EGRC SOLENOID/V                    | P1400             | —        | —                                       | X            | <a href="#">EC-452</a>        |
| EGR SYSTEM                         | P1402             | X        | X                                       | X*5          | <a href="#">EC-458</a>        |
| EVAP SMALL LEAK                    | P1442             | X        | X                                       | X*5          | <a href="#">EC-467</a>        |
| PURG VOLUME CONT/V                 | P1444             | —        | —                                       | X            | <a href="#">EC-469</a>        |
| VENT CONTROL VALVE                 | P1446             | —        | —                                       | X            | <a href="#">EC-479</a>        |
| VENT CONTROL VALVE                 | P1448             | —        | —                                       | X            | <a href="#">EC-483</a>        |
| EVAP VERY SML LEAK                 | P1456             | X*4      | X                                       | X*5          | <a href="#">EC-489</a>        |
| FUEL LEVEL SEN/CIRC                | P1464             | —        | —                                       | X            | <a href="#">EC-501</a>        |
| VC/V BYPASS/V                      | P1490             | —        | —                                       | X            | <a href="#">EC-504</a>        |
| VC CUT/V BYPASS/V                  | P1491             | —        | —                                       | X            | <a href="#">EC-510</a>        |
| P-N POS SW/CIRCUIT                 | P1706             | —        | —                                       | X            | <a href="#">EC-520</a>        |
| TOR CONV CLTCH S/V                 | P1775             | —        | —                                       | X            | <a href="#">EC-527, AT-41</a> |
| TOR CONV CLTCH S/V                 | P1776             | —        | —                                       | X            | <a href="#">EC-531</a>        |

- \*1: 1st trip DTC No. is the same as DTC No.
- \*2: These numbers are prescribed by SAE J2012.
- \*3: When the fail-safe operation occurs, the MIL illuminates.
- \*4: SRT code will not be set if the self-diagnostic result is NG.
- \*5: These are 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 [EC-60, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#).

For malfunctions in which 1st trip DTCs are displayed, refer to [EC-49, "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-68, "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, P1775, 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          |   | 1st trip DTC display | SELF DIAG RESULTS          |    |
|             | DTC RESULTS                |   |                      | DTC RESULTS                |    |
|             | CKP SEN/CIRCUIT<br>[P0335] | 0 |                      | CKP SEN/CIRCUIT<br>[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<br>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-60, "HOW TO ERASE EMIS-SION-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 "incomplete", use the information in this service manual to set the SRT to "complete".

In most cases, the ECM will automatically complete its self-diagnosis cycle during normal usage and the SRT status will indicate "complete" for each application system. Once set as "complete", the SRT status remains "complete" 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 "incomplete" for these items.

### **NOTE:**

The SRT will also indicate "incomplete" 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 "complete" for all test items, the inspector will continue with the emissions test. However, if the SRT indicates "incomplete" 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 "complete" for all test items. Therefore, it is important to check SRT ("complete") 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".

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[KA24DE]

| SRT item<br>(CONSULT-II indication) | Performance<br>Priority * | Required self-diagnostic items to set the SRT to "CMPLT" | Corresponding DTC<br>No. |    |
|-------------------------------------|---------------------------|--|--------------------------|----|
| CATALYST                            | 2                         | Three way catalyst function                              | P0420                    | A  |
| EVAP SYSTEM                         | 1                         | EVAP control system                                      | P0442,P1442              | EC |
|                                     | 2                         | EVAP control system                                      | P0456, P1456             |    |
|                                     | 2                         | EVAP control system purge flow monitoring                | P0441                    | C  |
| HO2S                                | 2                         | Heated oxygen sensor 1                                   | P0132                    |    |
|                                     |                           | Heated oxygen sensor 1                                   | P0133                    |    |
|                                     |                           | Heated oxygen sensor 1                                   | P0134                    | D  |
|                                     |                           | Heated oxygen sensor 1                                   | P1143                    |    |
|                                     |                           | Heated oxygen sensor 1                                   | P1144                    |    |
|                                     |                           | Heated oxygen sensor 2                                   | P0138                    | E  |
|                                     |                           | Heated oxygen sensor 2                                   | P0139                    |    |
|                                     |                           | Heated oxygen sensor 2                                   | P1147                    | F  |
|                                     |                           | Heated oxygen sensor 2                                   | P1146                    |    |
| HO2S HTR                            | 2                         | Heated oxygen sensor 1 heater                            | P0031, P0032             |    |
|                                     |                           | Heated oxygen sensor 2 heater                            | P0037, P0038             | G  |
| EGR SYSTEM                          | 3                         | EGR function   | P0400                    |    |
|                                     |                           | EGRC-BPT valve function                                  | P0402                    | H  |
|                                     | 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.

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

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## SRT Set Timing

SRT is set as “complete” after self-diagnosis has been performed one or more times. Completion of SRT will occur if 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<br>OFF – ON –<br>OFF | Ignition<br>OFF – ON –<br>OFF | Ignition<br>OFF – ON –<br>OFF | Ignition<br>OFF – ON –<br>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     | “complete”                    | “complete”                    | “complete”                    | “complete”                    |
|                       | Case 2 | P0400          | OK (1)                        | – (1)                         | – (1)                         | – (1)                         |
|                       |        | P0402          | – (0)                         | – (0)                         | OK (1)                        | – (1)                         |
|                       |        | P1402          | OK (1)                        | OK (2)                        | – (2)                         | – (2)                         |
|                       |        | SRT of EGR     | “incomplete”                  | “incomplete”                  | “complete”                    | “complete”                    |
| 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     | “incomplete”                  | “incomplete”                  | “incomplete”                  | “complete”                    |

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 “complete”.

→ Case 1 above

When all SRT related self-diagnoses show OK results through several different cycles, the SRT will indicate “complete” 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 “complete”.

→ Case 3 above

The previous table shows that the minimum number of cycles for setting SRT as “incomplete” 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;

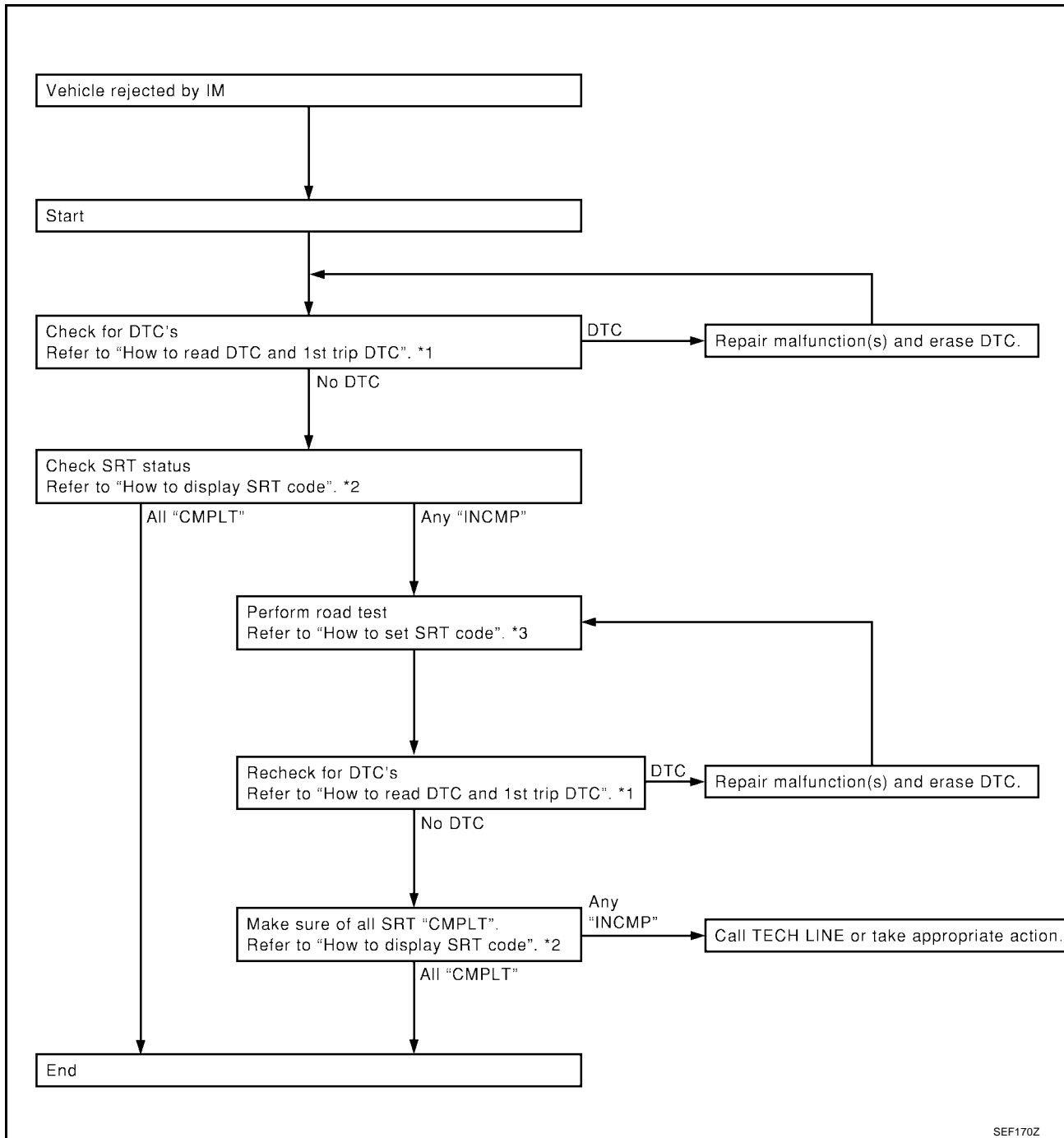
- The SRT will indicate “complete” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “complete” of the SRT only with OK self-diagnosis result.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to “complete” of SRT, the self-diagnosis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

### NOTE:

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

## SRT Service Procedure

If a vehicle has been rejected for the State emissions inspection due to one or more SRT items indicating "incomplete", review the following flowchart diagnostic sequence.



\*1 [EC-51](#)

\*2 [EC-55](#)

\*3 [EC-56](#)

### How to Display SRT Code

1. **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.
2. **With GST**  
 Selecting Mode 1 with GST (Generic Scan Tool)

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.

| SRT STATUS  |       |
|-------------|-------|
| CATALYST    | CMPLT |
| EVAP SYSTEM | INCMP |
| HO2S HTR    | CMPLT |
| HO2S        | CMPLT |
| EGR SYSTEM  | INCMP |

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## 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-52, "SRT Item"](#).

### **Without CONSULT-II**

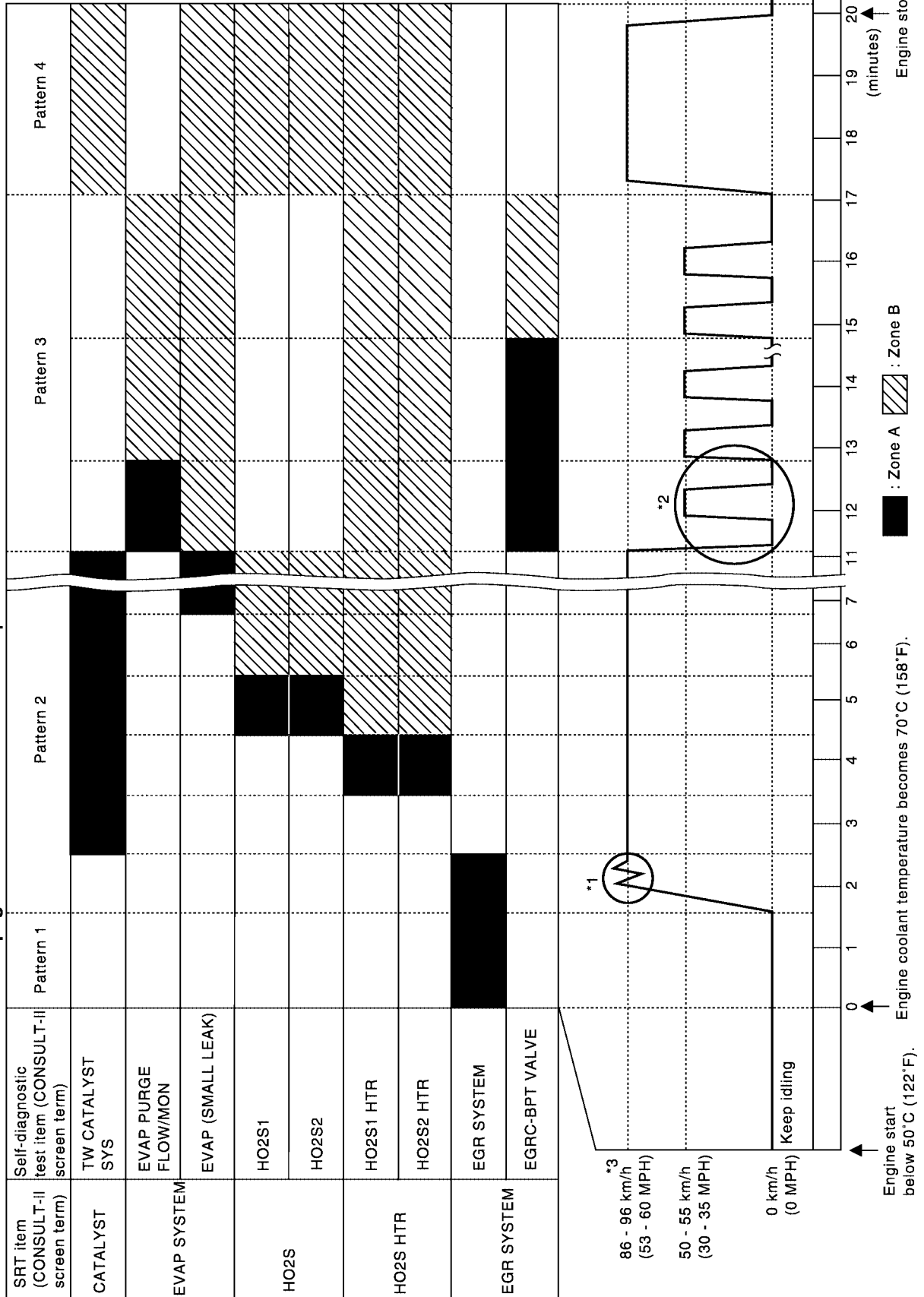
The most efficient driving pattern in which SRT codes can be properly set is explained on [EC-57, "Driving Pattern"](#). The driving pattern should be performed one or more times to set all SRT codes.



## Driving Pattern

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

### Driving pattern



PBIB1400E

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

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- 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.

- Decelerate vehicle to 0 km/h (0 MPH) and let engine idle.
- Repeat driving pattern shown below at least 10 times.  
- **During acceleration, hold the accelerator pedal as steady as possible.**
- Repeat steps 1 and 2 until the EGR system SRT is set.

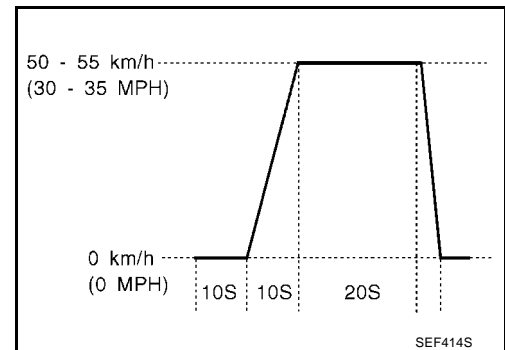
\*3: Checking the vehicle speed with GST is advised.

### 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  | 24 (15)  | 24 (15)                       | 24 (15)  |

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[KA24DE]

|            |         |         |         |
|------------|---------|---------|---------|
| 2nd to 3rd | 40 (25) | 29 (18) | 40 (25) |
| 3rd to 4th | 58 (36) | 48 (30) | 64 (40) |
| 4th to 5th | 64 (40) | 63 (39) | 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)<br>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.

Items for which these data (test value and test limit) are displayed are the same as SRT code items (9 test items).

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

X: Applicable —: Not applicable

| SRT item    | Self-diagnostic test item                 | Test value (GST display) |     | Test limit | Application |
|-------------|---|--------------------------|-----|------------|-------------|
|             |   | TID                      | CID |            |             |
| CATALYST    | Three way catalyst function               | 01H                      | 01H | Max.       | X           |
|             |   | 02H                      | 81H | Min.       | X           |
| EVAP SYSTEM | EVAP control system (Small leak)          | 05H                      | 03H | Max.       | X           |
|             | EVAP control system purge flow monitoring | 06H                      | 83H | Min.       | X           |
| HO2S        | Heated oxygen sensor 1                    | 09H                      | 04H | Max.       | X           |
|             |   | 0AH                      | 84H | Min.       | X           |
|             |   | 0BH                      | 04H | Max.       | X           |
|             |   | 0CH                      | 04H | Max.       | X           |
|             | Heated oxygen sensor 2                    | 0DH                      | 04H | Max.       | X           |
|             |   | 19H                      | 86H | Min.       | X           |
|             |   | 1AH                      | 86H | Min.       | X           |
|             |   | 1BH                      | 06H | Max.       | X           |
| HO2S HTR    | Heated oxygen sensor 1 heater             | 1CH                      | 06H | Max.       | X           |
|             |   | 29H                      | 08H | Max.       | X           |
|             | Heated oxygen sensor 2 heater             | 2AH                      | 88H | Min.       | X           |
|             |   | 2DH                      | 0AH | Max.       | X           |
|             |   | 2EH                      | 8AH | Min.       | X           |

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[KA24DE]

| SRT item   | Self-diagnostic test item | Test value (GST display) |     | Test limit | Application |
|------------|---------------------------|--------------------------|-----|------------|-------------|
|            |                           | TID                      | CID |            |             |
| EGR SYSTEM | EGR function              | 31H                      | 8CH | Min.       | X           |
|            |                           | 32H                      | 8CH | Min.       | X           |
|            |                           | 33H                      | 8CH | Min.       | X           |
|            |                           | 34H                      | 8CH | Min.       | X           |
|            |                           | 35H                      | 0CH | Max.       | X           |
|            | EGRC-BPT valve function   | 36H                      | 0CH | Max.       | X           |
|            |                           | 37H                      | 8CH | Min.       | X           |

## 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.

**SELECT SYSTEM**

ENGINE

**SELECT DIAG MODE**

WORK SUPPORT

SELF-DIAG RESULTS

DATA MONITOR

DATA MONITOR (SPEC)

ACTIVE TEST

DTC & SRT CONFIRMATION

ECM PART NUMBER

**SELF DIAG RESULTS**

| DTC RESULTS                | TIME |
|----------------------------|------|
| MAF SEN/CIRCUIT<br>[P0101] | 0    |
|                            |      |
|                            |      |

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 after approx. 24 hours.
- The following data are cleared when the ECM memory is erased.
  1. Diagnostic trouble codes
  2. 1st trip diagnostic trouble codes
  3. Freeze frame data
  4. 1st trip freeze frame data
  5. System readiness test (SRT) codes
  6. Test values
  7. Others

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

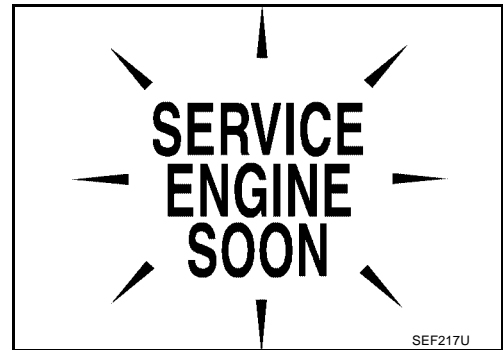
## Malfunction Indicator Lamp (MIL)

UBS0058T

### 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-566, "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<br> | BULB CHECK          | This function checks the MIL bulb for damage (blown, open circuit, etc.).<br>If the MIL does not come on, check MIL circuit.  |
|                      | Engine stopped<br>                   |                     |   |
|                      | Engine running<br>                   | 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.<br>The following malfunctions will light up or blink the MIL in the 1st trip. <ul style="list-style-type: none"> <li>● "Misfire (Possible three way catalyst damage)"</li> <li>● "One trip detection diagnoses"</li> </ul> |

### 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-566, "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

UBS0058U

#### 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-48, "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)  |

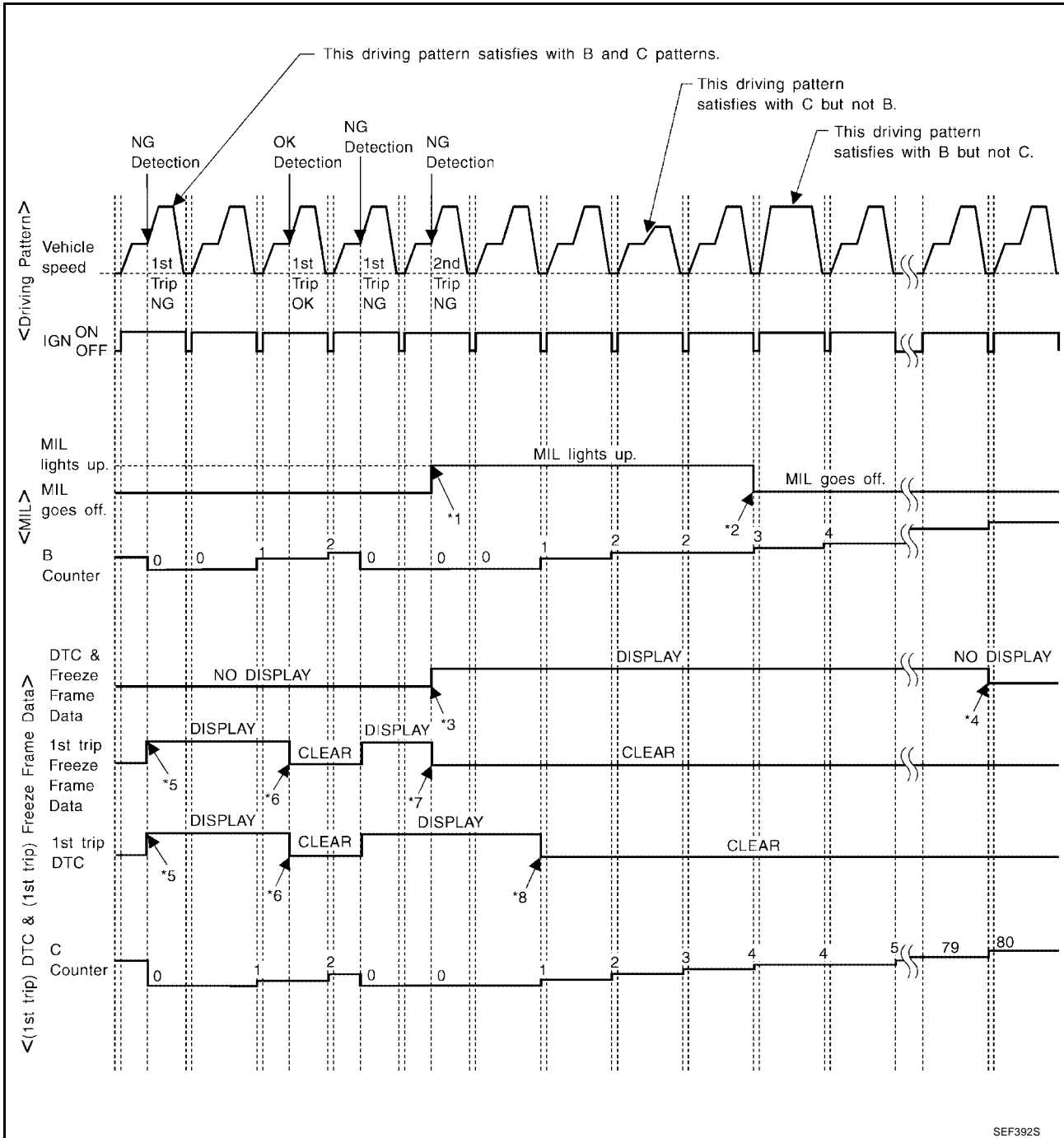
For details about patterns "B" and "C" under "Fuel Injection System" and "Misfire", see [EC-64](#).

For details about patterns "A" and "B" under "Other", see [EC-66](#).

\*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 “MIS-FIRE” <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)  $\pm 375$  rpm

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

Engine coolant temperature (T) condition:

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

Example:

If the stored freeze frame data is as follows:

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

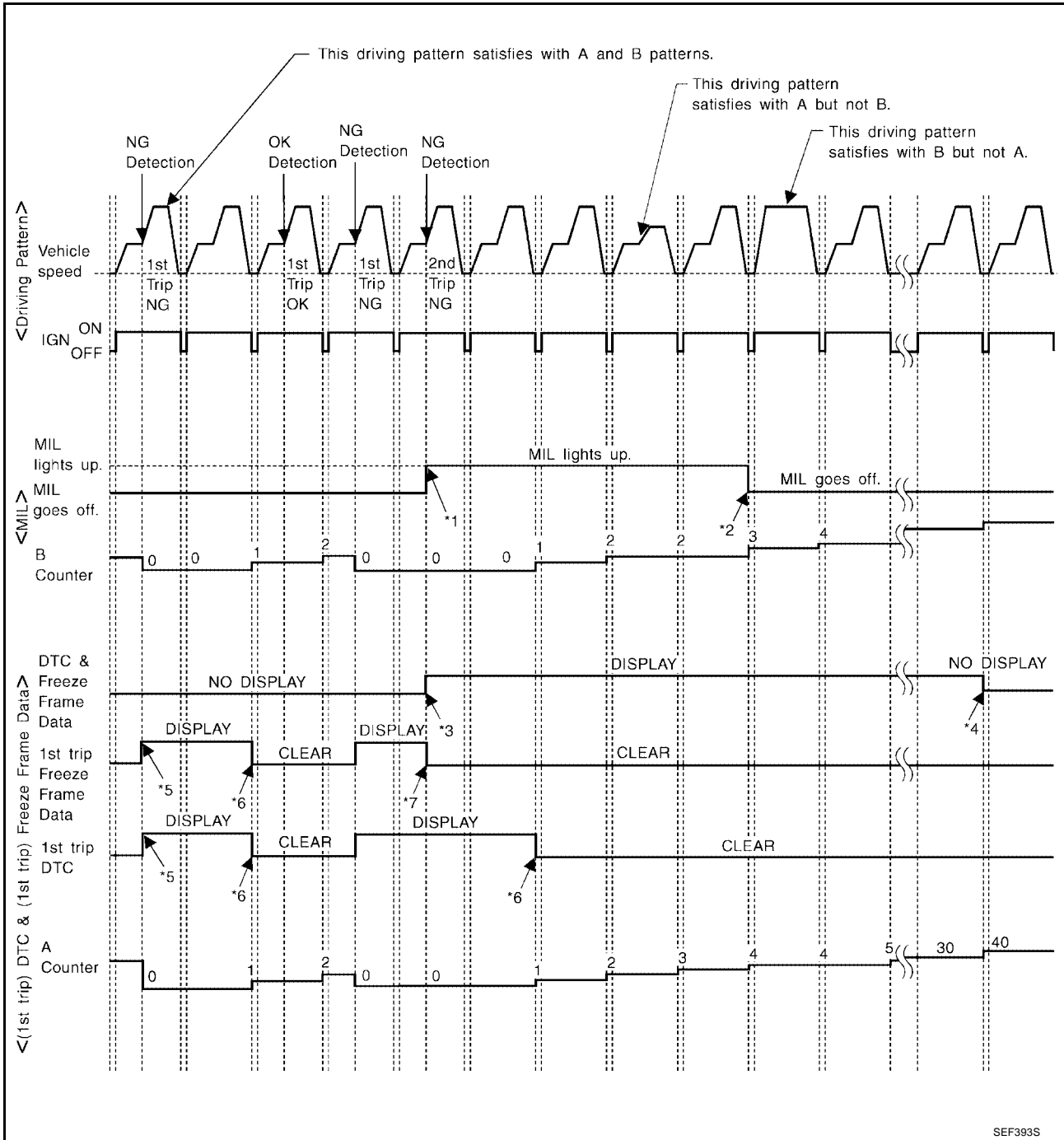
To be satisfied with driving pattern C, the vehicle should run under the following conditions:

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

- The C counter will be cleared when the malfunction is detected regardless of (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.)

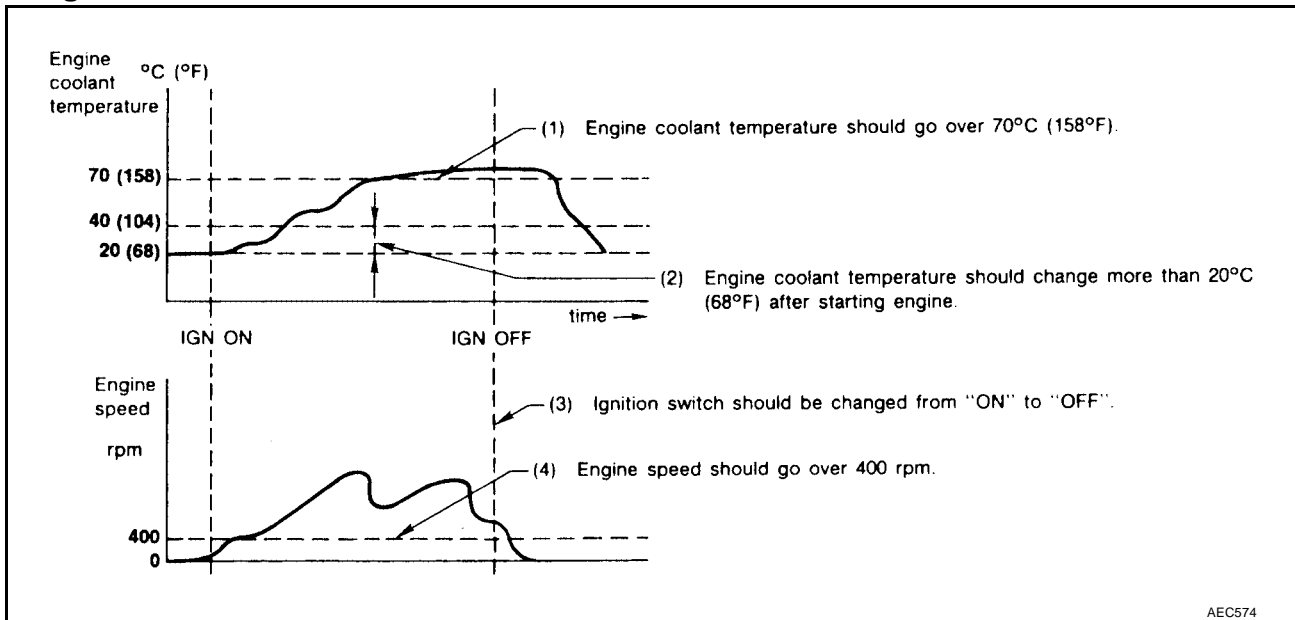
\*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

\*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:

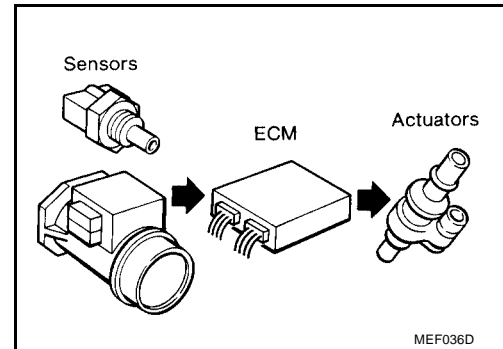
All components and systems should be monitored at least once by the OBD system.

- 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").

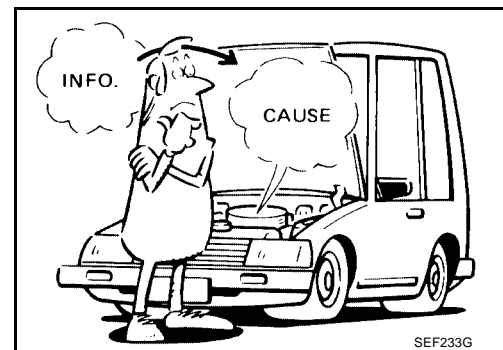
## TROUBLE DIAGNOSIS

Trouble Diagnosis Introduction  
INTRODUCTION

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



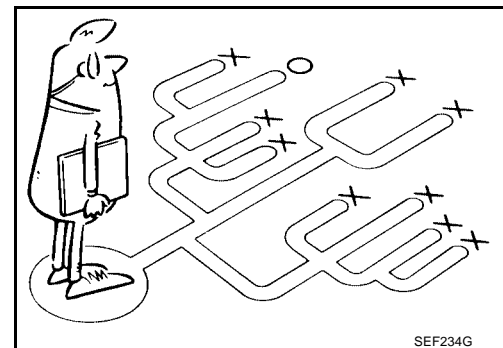
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



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-68](#).

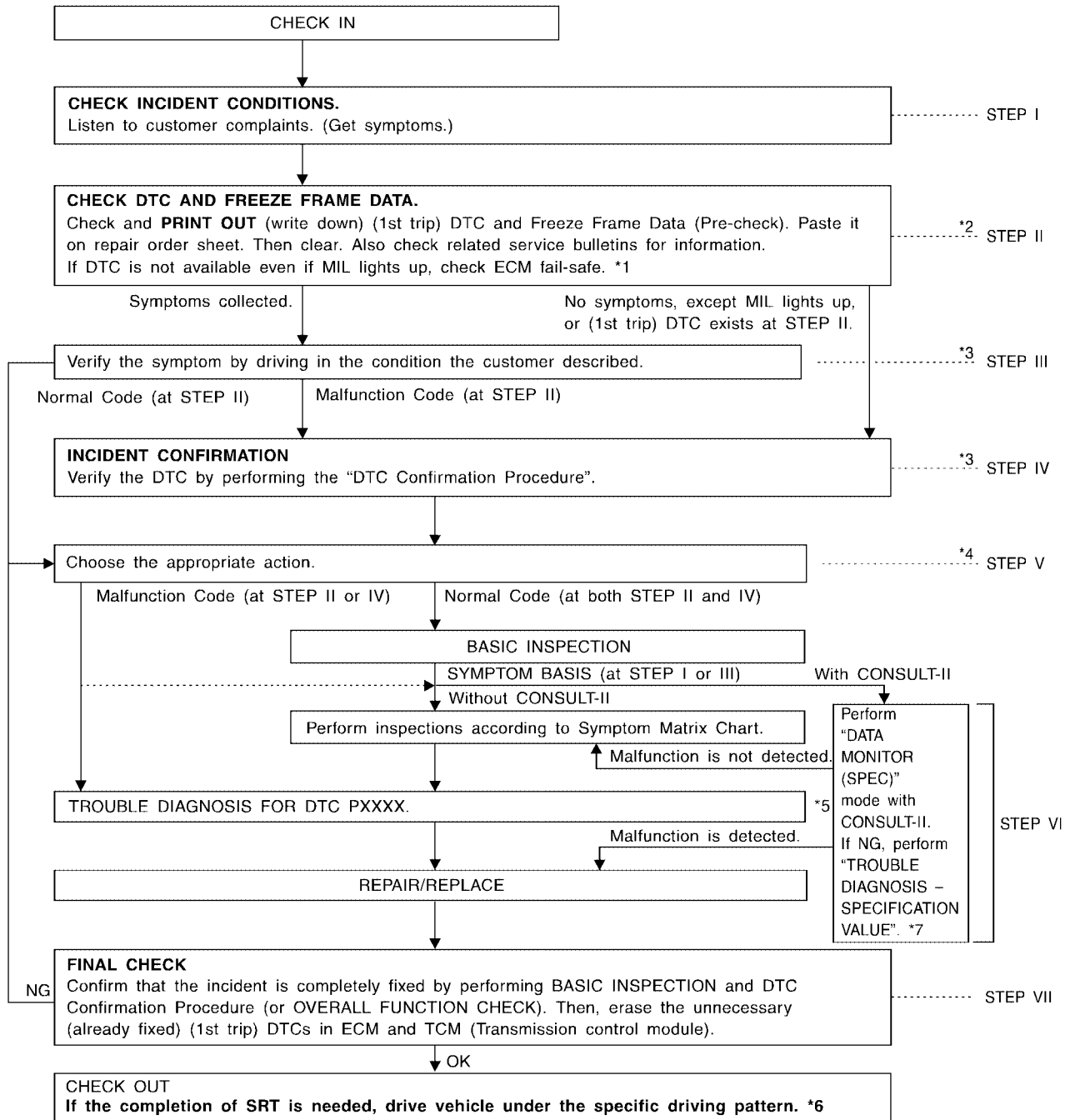
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A "Diagnostic 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-72, "Fail-safe Chart"](#)

\*2: If time data of "SELF-DIAG RESULTS" is other than "0" or "1" 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 CIRCUIT FOR ECM"](#).

\*5: If the malfunctioning part cannot be found, refer to [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

\*6: [EC-57, "Driving Pattern"](#)

\*7: [EC-116, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE"](#)

# TROUBLE DIAGNOSIS

[KA24DE]

## Description for Work Flow

| STEP     | DESCRIPTION  |
|----------|--|
| STEP I   | Get detailed information about the conditions and the environment when the incident/symptom occurred using the "DIAGNOSTIC WORK SHEET", <a href="#">EC-70</a> .  |
| STEP II  | Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the freeze frame data. (Refer to <a href="#">EC-60</a> , " <a href="#">HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION</a> " .) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV.<br>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 <a href="#">EC-83</a> .)<br>Also check related service bulletins for information.  |
| STEP III | Try to confirm the symptom and under what conditions the incident occurs.<br>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.<br>If the incident cannot be verified, perform "INCIDENT SIMULATION TESTS" in <a href="#">GI-25</a> , " <a href="#">How to Perform Efficient Diagnosis for an Electrical Incident</a> " .<br>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.<br>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.<br>If the incident cannot be verified, perform "INCIDENT SIMULATION TESTS" in <a href="#">GI-25</a> , " <a href="#">How to Perform Efficient Diagnosis for an Electrical Incident</a> " .<br>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.<br>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.<br>If the malfunction code is indicated, proceed to Trouble Diagnosis for DTC PXXXX.<br>If the normal code is indicated, proceed to the Basic Inspection. (Refer to <a href="#">EC-73</a> .) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the "TROUBLE DIAGNOSIS — SPECIFICATION VALUE", <a href="#">EC-116</a> . (If malfunction is detected, proceed to "REPAIR/REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to <a href="#">EC-83</a> .)  |
| 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".<br>Gently shake the related connectors, components or wiring harness with CONSULT-II set in "DATA MONITOR (AUTO TRIG)" mode.<br>Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to <a href="#">EC-91</a> , " <a href="#">ECM Terminals and Reference Value</a> " , <a href="#">EC-112</a> , " <a href="#">CONSULT-II Reference Value in Data Monitor Mode</a> " .<br>The "Diagnostic Procedure" in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to "Circuit Inspection" in <a href="#">GI-25</a> , " <a href="#">How to Perform Efficient Diagnosis for an Electrical Incident</a> " .<br>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.<br>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.<br>Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM. (Refer to <a href="#">EC-60</a> , " <a href="#">HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION</a> " .)   |

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

## 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-70, "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   |                                       | <input type="checkbox"/> Vehicle ran out of fuel causing misfire<br><input type="checkbox"/> Fuel filler cap was left off or incorrectly screwed on.  |   |  |       |  |       |  |       |     |       |  |       |     |    |  |    |     |
| Symptoms                   | <input type="checkbox"/> Startability | <input type="checkbox"/> Impossible to start <input type="checkbox"/> No combustion <input type="checkbox"/> Partial combustion<br><input type="checkbox"/> Partial combustion affected by throttle position<br><input type="checkbox"/> Partial combustion NOT affected by throttle position<br><input type="checkbox"/> Possible but hard to start <input type="checkbox"/> Others [                                    ]   |   |  |       |  |       |  |       |     |       |  |       |     |    |  |    |     |
|                            | <input type="checkbox"/> Idling       | <input type="checkbox"/> No fast idle <input type="checkbox"/> Unstable <input type="checkbox"/> High idle <input type="checkbox"/> Low idle<br><input type="checkbox"/> Others [                                    ]  |   |  |       |  |       |  |       |     |       |  |       |     |    |  |    |     |
|                            | <input type="checkbox"/> Driveability | <input type="checkbox"/> Stumble <input type="checkbox"/> Surge <input type="checkbox"/> Knock <input type="checkbox"/> Lack of power<br><input type="checkbox"/> Intake backfire <input type="checkbox"/> Exhaust backfire<br><input type="checkbox"/> Others [                                    ]   |   |  |       |  |       |  |       |     |       |  |       |     |    |  |    |     |
|                            | <input type="checkbox"/> Engine stall | <input type="checkbox"/> At the time of start <input type="checkbox"/> While idling<br><input type="checkbox"/> While accelerating <input type="checkbox"/> While decelerating<br><input type="checkbox"/> Just after stopping <input type="checkbox"/> While loading   |   |  |       |  |       |  |       |     |       |  |       |     |    |  |    |     |
| Incident occurrence        |                                       | <input type="checkbox"/> Just after delivery <input type="checkbox"/> Recently<br><input type="checkbox"/> In the morning <input type="checkbox"/> At night <input type="checkbox"/> In the daytime   |   |  |       |  |       |  |       |     |       |  |       |     |    |  |    |     |
| Frequency                  |                                       | <input type="checkbox"/> All the time <input type="checkbox"/> Under certain conditions <input type="checkbox"/> Sometimes  |   |  |       |  |       |  |       |     |       |  |       |     |    |  |    |     |
| Weather conditions         |                                       | <input type="checkbox"/> Not affected   |   |  |       |  |       |  |       |     |       |  |       |     |    |  |    |     |
|                            |                                       | Weather   | <input type="checkbox"/> Fine <input type="checkbox"/> Raining <input type="checkbox"/> Snowing <input type="checkbox"/> Others [                                    ]        |  |       |  |       |  |       |     |       |  |       |     |    |  |    |     |
|                            |                                       | Temperature   | <input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold <input type="checkbox"/> Humid                      °F |  |       |  |       |  |       |     |       |  |       |     |    |  |    |     |
| Engine conditions          |                                       | <input type="checkbox"/> Cold <input type="checkbox"/> During warm-up <input type="checkbox"/> After warm-up<br><br>Engine speed <table style="margin-left: 40px; border: none;"> <tr> <td style="border-bottom: 1px solid black; width: 150px;"></td> <td style="width: 20px;">0</td> <td style="width: 100px;"></td> <td style="width: 20px;">2,000</td> <td style="width: 100px;"></td> <td style="width: 20px;">4,000</td> <td style="width: 100px;"></td> <td style="width: 20px;">6,000</td> <td style="width: 100px;"></td> <td style="width: 20px;">8,000</td> <td style="width: 20px;">rpm</td> </tr> </table>   |   |  | 0     |  | 2,000 |  | 4,000 |     | 6,000 |  | 8,000 | rpm |    |  |    |     |
|                            | 0                                     |   | 2,000   |  | 4,000 |  | 6,000 |  | 8,000 | rpm |       |  |       |     |    |  |    |     |
| Road conditions            |                                       | <input type="checkbox"/> In town <input type="checkbox"/> In suburbs <input type="checkbox"/> Highway <input type="checkbox"/> Off road (up/down)   |   |  |       |  |       |  |       |     |       |  |       |     |    |  |    |     |
| Driving conditions         |                                       | <input type="checkbox"/> Not affected<br><input type="checkbox"/> At starting <input type="checkbox"/> While idling <input type="checkbox"/> At racing<br><input type="checkbox"/> While accelerating <input type="checkbox"/> While cruising<br><input type="checkbox"/> While decelerating <input type="checkbox"/> While turning (RH/LH)<br><br>Vehicle speed <table style="margin-left: 40px; border: none;"> <tr> <td style="border-bottom: 1px solid black; width: 150px;"></td> <td style="width: 20px;">0</td> <td style="width: 50px;"></td> <td style="width: 20px;">10</td> <td style="width: 50px;"></td> <td style="width: 20px;">20</td> <td style="width: 50px;"></td> <td style="width: 20px;">30</td> <td style="width: 50px;"></td> <td style="width: 20px;">40</td> <td style="width: 50px;"></td> <td style="width: 20px;">50</td> <td style="width: 50px;"></td> <td style="width: 20px;">60</td> <td style="width: 20px;">MPH</td> </tr> </table> |   |  | 0     |  | 10    |  | 20    |     | 30    |  | 40    |     | 50 |  | 60 | MPH |
|                            | 0                                     |   | 10  |  | 20    |  | 30    |  | 40    |     | 50    |  | 60    | MPH |    |  |    |     |
| Malfunction indicator lamp |                                       | <input type="checkbox"/> Turned on <input type="checkbox"/> Not turned on   |   |  |       |  |       |  |       |     |       |  |       |     |    |  |    |     |

# TROUBLE DIAGNOSIS

[KA24DE]

UBS0058X

## DTC Inspection Priority Chart

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  | EC |
|  | ● 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   |    |
| 2  | ● P1400 EGRC-solenoid valve   | F  |
|  | ● P1706 PNP switch  |    |
|  | ● P0031, P0032 HO2S1 heater   | G  |
|  | ● 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   |    |
| ● P1490, P1491 Vacuum cut valve bypass valve |   |    |
| ● P1775, P1776 TCC solenoid valve            |   |    |
| 3  | ● P0171, P0172 Fuel injection system function                           | L  |
|  | ● P0300 - P0304 Misfire   |    |
|  | ● P0400, P1402 EGR function   |    |
|  | ● P0402 EGRC-BPT valve  |    |
|  | ● P0420 Three way catalyst function                                     |    |
|  | ● P0442, P0455, P0456, P1456 EVAP control system                        |    |
|  | ● P0505, P0506, P507 ISC system   |    |
|  | ● P1148 Closed loop control   |    |
|  | M   |    |

# TROUBLE DIAGNOSIS

[KA24DE]

UBS0058Y

## Fail-safe Chart

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.                 | Detected items  | Engine operating condition in fail-safe mode  |   |                         |  |                     |   |                |  |                 |  |           |   |                |           |
|-------------------------|---|---|---|-------------------------|--|---------------------|---|----------------|--|-----------------|--|-----------|---|----------------|-----------|
| CONSULT-II<br>GST       |   |   |   |                         |  |                     |   |                |  |                 |  |           |   |                |           |
| P0102<br>P0103          | Mass air flow sensor circuit  | Engine speed will not rise more than 2,400 rpm due to the fuel cut.   |   |                         |  |                     |   |                |  |                 |  |           |   |                |           |
| P0112<br>P0113          | Intake air temperature sensor   | The ECM functions on the assumption that the intake air temperature is 25°C (77°F).   |   |                         |  |                     |   |                |  |                 |  |           |   |                |           |
| P0117<br>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.<br>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)<br>(Depends on the time)        |                         |  |                     |   |                |  |                 |  |           |   |                |           |
| P0122<br>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   | <p><b>ECM fail-safe activating condition</b><br/>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.</p> <p><b>Engine control with fail-safe</b><br/>When ECM fail-safe is operating, fuel injection, ignition timing, fuel pump operation and IACV-AAC valve operation are controlled under certain limitations.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">ECM fail-safe operation</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><b>Engine speed</b></td> <td style="text-align: center;"><b>Engine speed will not rise more than 3,000 rpm</b></td> </tr> <tr> <td style="text-align: center;">Fuel injection</td> <td style="text-align: center;">Simultaneous multiport fuel injection system</td> </tr> <tr> <td style="text-align: center;">Ignition timing</td> <td style="text-align: center;">Ignition timing is fixed at the preset valve</td> </tr> <tr> <td style="text-align: center;">Fuel pump</td> <td style="text-align: center;">Fuel pump relay is "ON" when engine is running and "OFF" when engine stalls</td> </tr> <tr> <td style="text-align: center;">IACV-AAC valve</td> <td style="text-align: center;">Full open</td> </tr> </tbody> </table> <p>Replace ECM, if ECM fail-safe condition is confirmed.</p> |   | ECM fail-safe operation |  | <b>Engine speed</b> | <b>Engine speed will not rise more than 3,000 rpm</b> | 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 |
| ECM fail-safe operation |   |   |   |                         |  |                     |   |                |  |                 |  |           |   |                |           |
| <b>Engine speed</b>     | <b>Engine speed will not rise more than 3,000 rpm</b>                       |   |   |                         |  |                     |   |                |  |                 |  |           |   |                |           |
| 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   |   |   |                         |  |                     |   |                |  |                 |  |           |   |                |           |



## Basic Inspection

### Precaution:

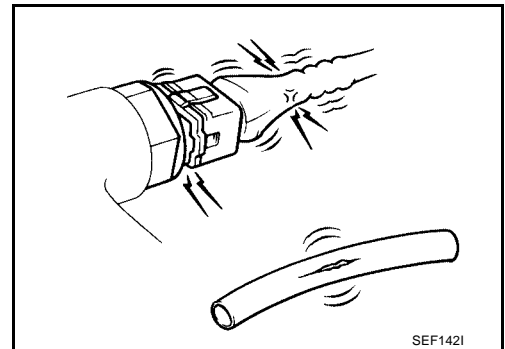
Perform Basic Inspection without electrical or mechanical loads applied;

- 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

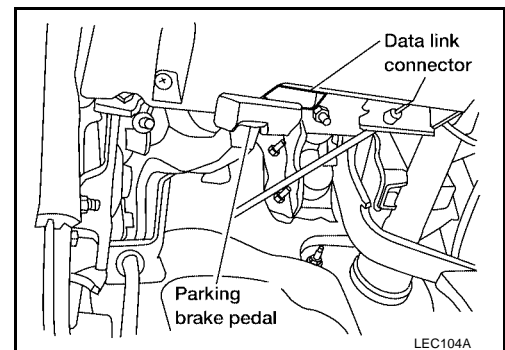
With CONSULT-II>>GO TO 2.  
With GST>>GO TO 4.



### 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, "CONSULT-II INSPECTION PROCEDURE"](#).

>> GO TO 3.



### 3. CHECK FI CAM FUNCTION

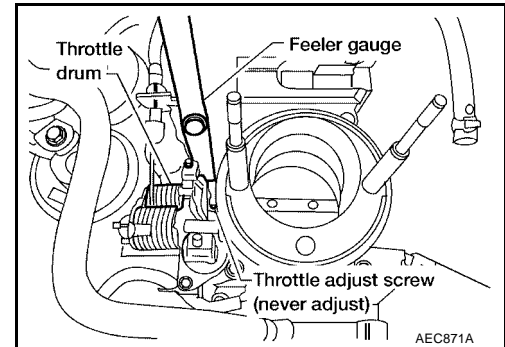
#### With CONSULT-II

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

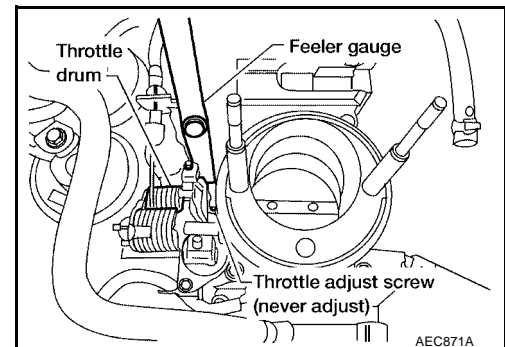
#### With GST

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.

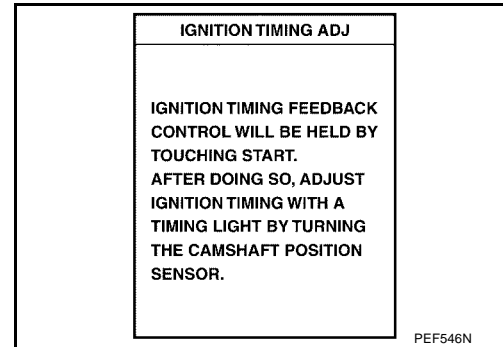
- NG >> 1. Replace throttle body assembly. Refer to [EM-13, "OUTER COMPONENT PARTS"](#) .
2. GO TO 12.



**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.

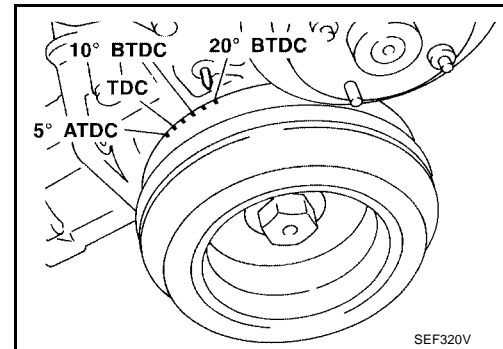
**Ignition timing 20°±2° BTDC (in "P" or "N" position)**

OK or NG

OK >> GO TO 6.

NG >> 1. Adjust ignition timing by turning distributor. Refer to [EC-35, "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.

**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-35, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment"](#) .

2. GO TO 7.

|                   |         |
|-------------------|---------|
| IACV-AAC/V ADJ    |         |
| ADJ MONITOR       |         |
| ENG SPEED         | 700 rpm |
| CONDITION SETTING |         |
| IACV-ACC/V        | FIXED   |
| MONITOR           |         |
| COOLAN TEMP/S     | XXX °C  |
| CLSD THL POS      | XXX N   |

SEF714Z

## 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.

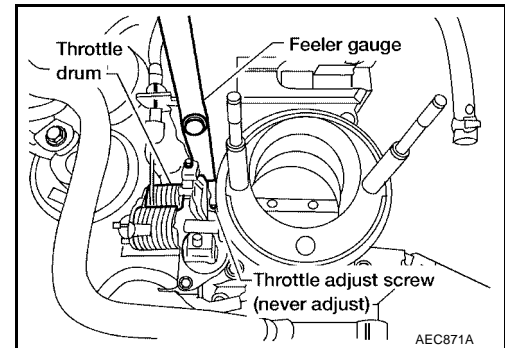
| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |
| CLSD THL/P SW | ON      |

SEF197Y

- 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.

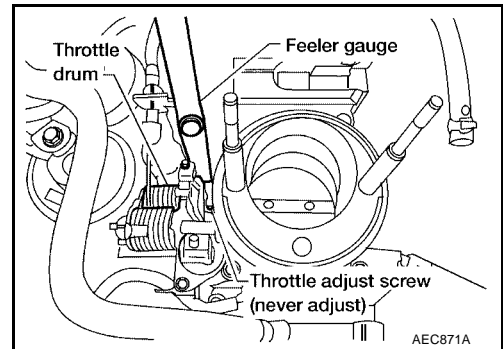


8. ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-1

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.

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |
| CLSD THL/P SW | ON      |

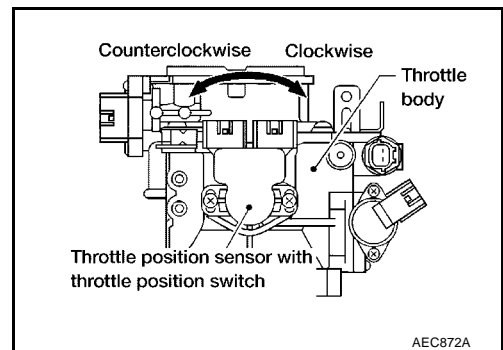
SEF197Y

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".

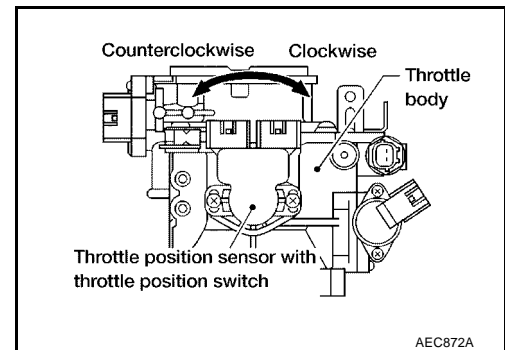
>> GO TO 10.



## 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.

**800±50 rpm (in "P" or "N" position)**

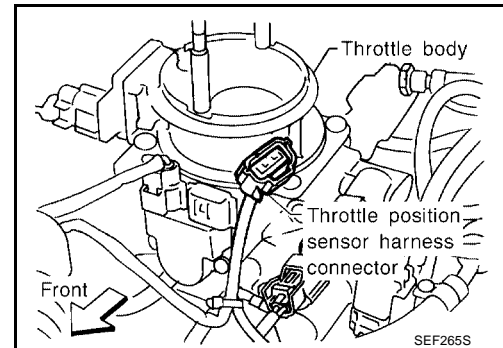
### OK or NG

- OK >> **INSPECTION END**
- NG >> Adjust idle speed. Refer to [EC-35, "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.

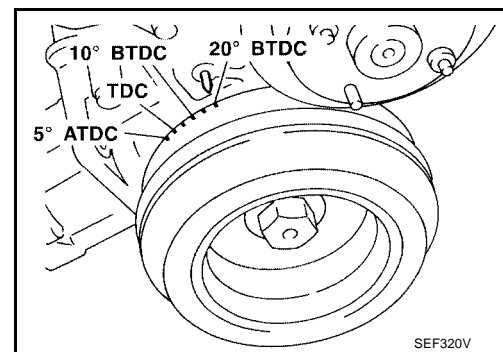
**Ignition timing :  $20^{\circ} \pm 2^{\circ}$  BTDC (in "P" or "N" position)**

#### OK or NG

OK >> GO TO 13.

NG >> 1. Adjust ignition timing by turning distributor. Refer to [EC-35, "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.

**$750 \pm 50$  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-35, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment"](#).

2. GO TO 14.

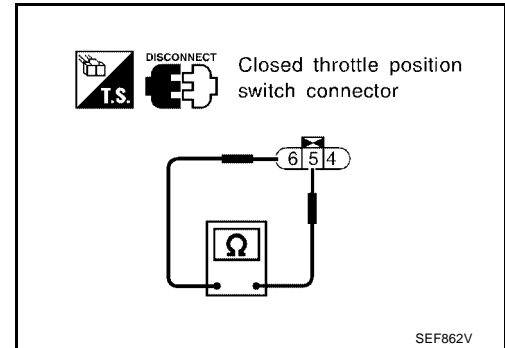
## 14. CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION (CHECK THROTTLE POSITION SENSOR IDLE POSITION)

⊗ Without CONSULT-II

### NOTE:

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

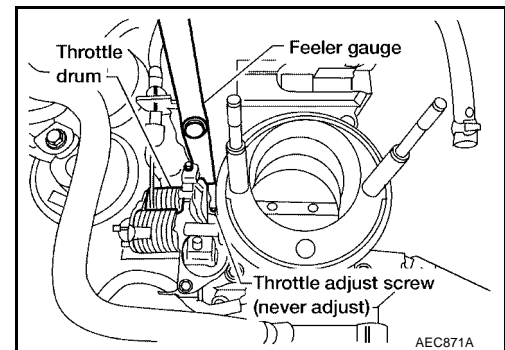
1. Warm up engine to normal operating temperature.
2. Check FI cam. Refer to procedure 4.
3. Stop engine.
4. Disconnect closed throttle position switch harness connector.
5. Connect the tester probe to closed throttle position switch terminals 5 and 6.
6. Check harness continuity under the following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



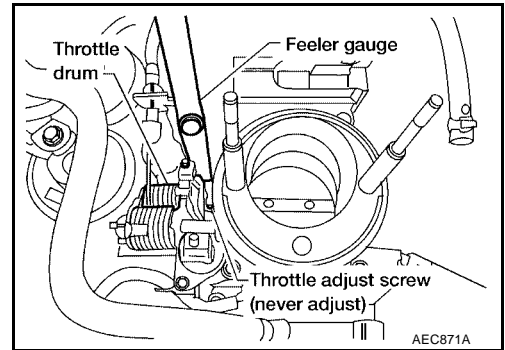


15. ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-1

⊗ Without CONSULT-II

NOTE:

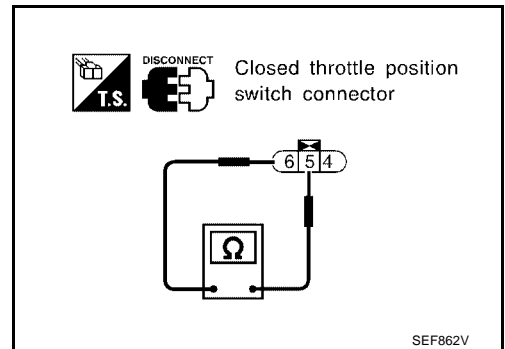
- Never adjust throttle adjust screw (TAS).
  - Do not touch throttle drum when checking "continuity". Doing so may cause an incorrect adjustment.
1. Warm engine up to normal operating temperature.
  2. Check FI cam. Refer to procedure 4.
  3. Stop engine.
  4. Loosen throttle position sensor fixing 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.

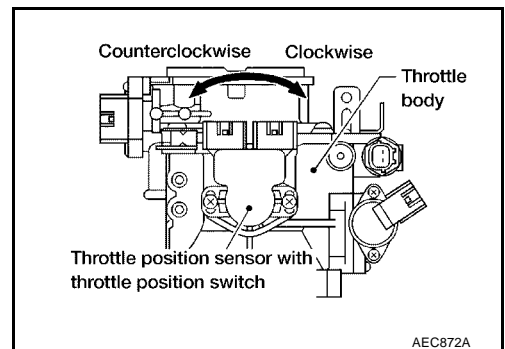


16. ADJUSTMENT THROTTLE POSITION SENSOR IDLE POSITION-2

⊗ Without CONSULT-II

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

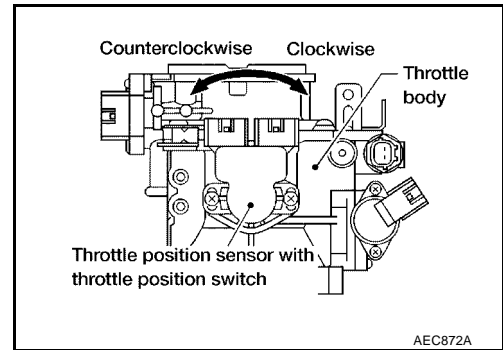
>> GO TO 17.



**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**

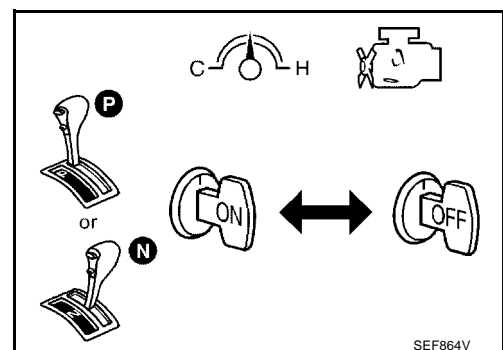
⊗ **Without CONSULT-II**

**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, 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.

**800±50 rpm (in "P" or "N" position)**

OK or NG

OK >> GO TO 21.

NG >> 1. Adjust target idle speed. Refer to [EC-35, "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-60, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#).

>> INSPECTION END

**Symptom Matrix Chart  
SYSTEM — ENGINE CONTROL SYSTEM**

UBS00590

|                       |                                       | 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              | <a href="#">EC-551</a>   |
|                       | Fuel pressure regulator system        | 3                                | 3            | 4                            | 4                      | 4                               | 4                  | 4                  | 4                | 4                      |                                  | 4                          |                           |                | <a href="#">EC-47</a>  |
|                       | Injector circuit                      | 1                                | 1            | 2                            | 3                      | 2                               |                    | 2                  | 2                |                        |                                  | 2                          |                           |                | <a href="#">EC-542</a>   |
|                       | Evaporative emission system           | 3                                | 3            | 4                            | 4                      | 4                               | 4                  | 4                  | 4                | 4                      |                                  | 4                          |                           |                | <a href="#">EC-567</a>   |
| Air                   | Positive crankcase ventilation system | 3                                | 3            | 4                            | 4                      | 4                               | 4                  | 4                  | 4                | 4                      |                                  | 4                          | 1                         |                | <a href="#">EC-583</a>   |
|                       | Incorrect idle speed adjustment       | 3                                | 3            |                              |                        |                                 | 1                  | 1                  | 1                | 1                      |                                  | 1                          |                           |                | <a href="#">EC-73</a>  |
|                       | IACV-AAC valve circuit                | 1                                | 1            | 2                            | 3                      | 3                               | 2                  | 2                  | 2                | 2                      |                                  | 2                          |                           | 2              | <a href="#">EC-393</a> ,<br><a href="#">EC-398</a> ,<br><a href="#">EC-403</a> |
|                       | IACV-FICD solenoid valve circuit      | 2                                | 2            | 3                            | 3                      | 3                               | 3                  | 3                  | 3                | 3                      |                                  | 3                          |                           |                | <a href="#">EC-561</a>   |

# TROUBLE DIAGNOSIS

[KA24DE]

|                                      |                                      | SYMPTOM                          |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           | Reference<br>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                          |                           |                   | <a href="#">EC-73</a>  |
|                                      | Ignition circuit                     | 1                                | 1            | 2                            | 2                      | 2                               |                    | 2                  | 2                |                        |                                  | 2                          |                           |                   | <a href="#">EC-535</a>   |
| EGR                                  | EGRC-solenoid valve circuit          |                                  | 2            | 2                            | 3                      | 3                               |                    |                    |                  |                        |                                  | 3                          |                           |                   | <a href="#">EC-452</a>   |
|                                      | EGR system                           | 2                                | 1            | 2                            | 3                      | 3                               | 3                  | 2                  | 2                | 3                      |                                  | 3                          |                           |                   | <a href="#">EC-275</a> ,<br><a href="#">EC-285</a> ,<br><a href="#">EC-458</a> |
| Main power supply and ground circuit |                                      | 2                                | 2            | 3                            | 3                      | 3                               |                    | 3                  | 3                |                        | 2                                | 3                          |                           | 2                 | <a href="#">EC-121</a>   |
| Air conditioner circuit              |                                      | 2                                | 2            | 3                            | 3                      | 3                               | 3                  | 3                  | 3                | 3                      |                                  | 3                          |                           | 2                 | <a href="#">MTC-3</a>  |

1 - 6: The numbers refer to the order of inspection.  
(continued on next page)

|                                  |  | SYMPTOM                          |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           | Reference<br>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 |  | 2                                | 2            | 3                            | 3                      | 3                               |                    | 3                  | 3                |                        |                                  | 3                          |                           |                   | <a href="#">EC-268</a>   |
| Mass air flow sensor circuit     |  | 1                                | 1            | 2                            | 2                      | 2                               |                    | 2                  | 2                |                        |                                  | 2                          |                           |                   | <a href="#">EC-136</a> ,<br><a href="#">EC-143</a>   |
| Heated oxygen sensor 1 circuit   |  |                                  | 1            | 2                            | 3                      | 2                               |                    | 2                  | 2                |                        |                                  | 2                          |                           |                   | <a href="#">EC-186</a> ,<br><a href="#">EC-192</a> ,<br><a href="#">EC-202</a> ,<br><a href="#">EC-417</a> ,<br><a href="#">EC-422</a> |

# TROUBLE DIAGNOSIS

[KA24DE]

|   | SYMPTOM                          |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                             | Reference<br>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 coolant temperature sensor circuit     | 1                                | 1            | 2                            | 3                      | 2                               | 3                  | 2                  | 2                | 3                      |                                  | 2                          |                           |                             | <a href="#">EC-154</a> ,<br><a href="#">EC-174</a> |
| Throttle position sensor circuit              |                                  | 1            | 2                            |                        | 2                               | 2                  | 2                  | 2                | 2                      |                                  | 2                          |                           |                             | <a href="#">EC-159</a> ,<br><a href="#">EC-168</a> |
| Incorrect throttle position sensor adjustment |                                  | 3            | 1                            |                        | 1                               | 1                  | 1                  | 1                | 1                      |                                  | 1                          |                           |                             | <a href="#">EC-37</a>                              |
| Vehicle speed sensor circuit                  |                                  | 2            | 3                            |                        | 3                               |                    |                    |                  |                        |                                  | 3                          |                           |                             | <a href="#">EC-388</a>                             |
| Knock sensor circuit                          |                                  |              | 2                            |                        |                                 |                    |                    |                  |                        |                                  | 3                          |                           |                             | <a href="#">EC-259</a>                             |
| ECM   | 2                                | 2            | 3                            | 3                      | 3                               | 3                  | 3                  | 3                | 3                      | 3                                | 3                          |                           |                             | <a href="#">EC-72</a> ,<br><a href="#">EC-415</a>  |
| Start signal circuit                          | 2                                |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                             | <a href="#">EC-547</a>                             |
| PNP switch circuit                            |                                  |              | 3                            |                        | 3                               |                    | 3                  | 3                |                        |                                  | 3                          |                           |                             | <a href="#">EC-520</a>                             |
| Power steering oil pressure switch circuit    |                                  | 2            |                              |                        |                                 |                    | 3                  | 3                |                        |                                  |                            |                           |                             | <a href="#">EC-557</a>                             |

1 - 6: The numbers refer to the order of inspection.  
(continued on next page)

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# TROUBLE DIAGNOSIS

[KA24DE]

## SYSTEM — ENGINE MECHANICAL & OTHER

|                       |  | SYMPTOM                          |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           | Reference<br>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            |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                   | <a href="#">FL-3</a>        |  |
|                       | Fuel piping  |                                  |              | 5                            | 5                      | 5                               |                    | 5                  | 5                |                        |                                  | 5                          |                           |                   |                             |  |
|                       | Vapor lock   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                   |                             |  |
|                       | Valve deposit  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                   |                             |  |
|                       | Poor fuel (Heavy weight gasoline, Low octane)                    | 5                                |              | 5                            | 5                      | 5                               |                    | 5                  | 5                |                        |                                  | 5                          |                           |                   | —                           |  |
| Air                   | Air duct   |                                  | 5            | 5                            |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                   |                             |  |
|                       | Air cleaner  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                   |                             |  |
|                       | Air leakage from air duct (Mass air flow sensor — throttle body) |                                  |              |                              | 5                      | 5                               |                    | 5                  | 5                | 5                      |                                  |                            | 5                         |                   |                             |  |
|                       | Throttle body, Throttle wire                                     | 5                                |              |                              |                        | 5                               |                    | 5                  |                  |                        | 5                                |                            |                           |                   |                             |  |
|                       | Air leakage from intake manifold/Collector/Gasket                |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                   | —                           |  |
| Crank-<br>ing         | Battery  | 1                                | 1            | 1                            |                        | 1                               |                    | 1                  | 1                |                        |                                  | 1                          |                           | 1                 | <a href="#">SC-4</a>        |  |
|                       | Alternator circuit   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                   | <a href="#">SC-26</a>       |  |
|                       | Starter circuit  | 3                                |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                   | <a href="#">SC-9</a>        |  |
|                       | Flywheel/Drive plate   | 6                                |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                   | <a href="#">EM-48</a>       |  |
|                       | PNP switch   | 4                                |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                   | —                           |  |

1 - 6: The numbers refer to the order of inspection.  
(continued on next page)

# TROUBLE DIAGNOSIS

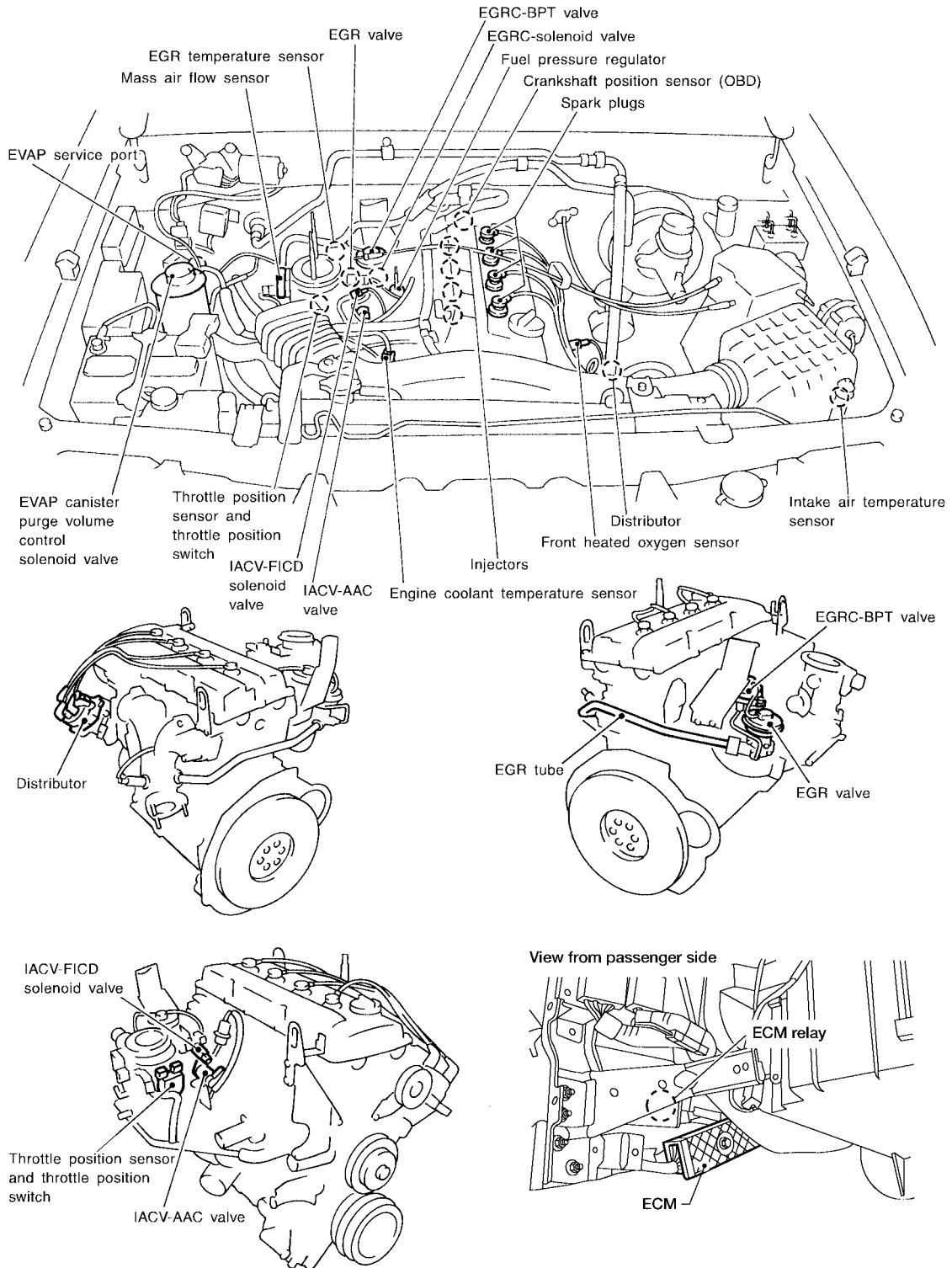
[KA24DE]

|                       |  | SYMPTOM                          |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           | Reference<br>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                          |                           |   | <a href="#">EM-32</a> ,<br><a href="#">EM-48</a> |
|                       | Cylinder head gasket                                 |                                  |              |                              |                        |                                 |                    |                    |                  |                        | 4                                |                            | 3                         |   |  |
|                       | Cylinder block                                       |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |   |  |
|                       | Piston   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            | 4                         |   |  |
|                       | Piston ring  | 6                                | 6            | 6                            | 6                      | 6                               |                    | 6                  | 6                |                        |                                  | 6                          |                           |   |  |
|                       | Connecting rod                                       |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |   |  |
|                       | Bearing  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |   |  |
|                       | Crankshaft   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |   |  |
| Valve mechanism       | Timing chain   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |   | <a href="#">EM-19</a> ,<br><a href="#">EM-32</a> |
|                       | Camshaft   | 5                                | 5            | 5                            | 5                      | 5                               |                    | 5                  | 5                |                        |                                  | 5                          |                           |   |  |
|                       | Intake valve   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            | 3                         |   |  |
|                       | Exhaust valve  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |   |  |
| Exhaust               | Exhaust manifold/Tube/Muffler/Gasket                 | 5                                | 5            | 5                            | 5                      | 5                               |                    | 5                  | 5                |                        |                                  | 5                          |                           | <a href="#">EX-3</a>                            |  |
|                       | Three way catalyst                                   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |   |  |
| Lubrication           | Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery | 5                                | 5            | 5                            | 5                      | 5                               |                    | 5                  | 5                |                        |                                  | 5                          |                           | <a href="#">MA-20</a> ,<br><a href="#">LU-8</a> |  |
|                       | Oil level (Low)/Filthy oil                           |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |   |  |
| Cooling               | Radiator/Hose/Radiator filler cap                    |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |   | <a href="#">CO-7</a><br><br><a href="#">CO-8</a> |
|                       | Thermostat   |                                  |              |                              |                        |                                 |                    |                    |                  | 5                      |                                  |                            |                           |   |  |
|                       | Water pump   | 5                                | 5            | 5                            | 5                      | 5                               |                    | 5                  | 5                |                        | 4                                | 5                          |                           |   |  |
|                       | Water gallery  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |   |  |
|                       | Coolant level (low)/Contaminated coolant             |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |   |  |

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

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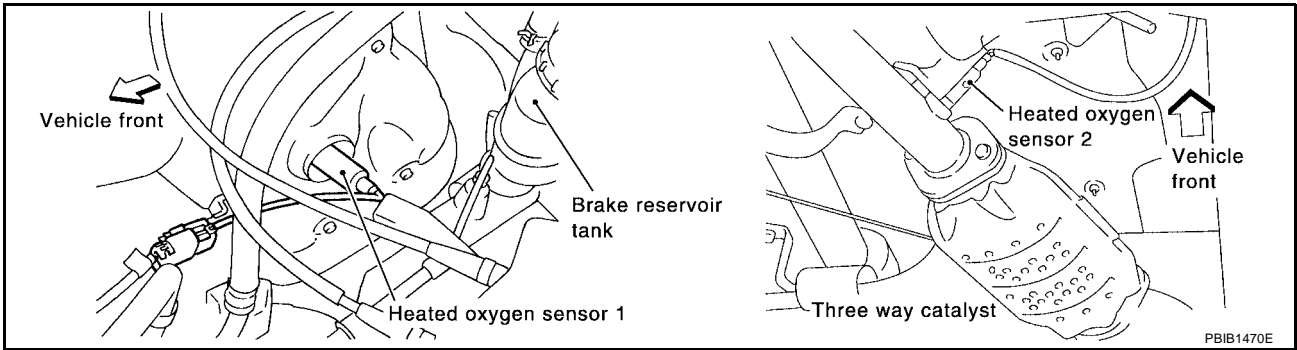
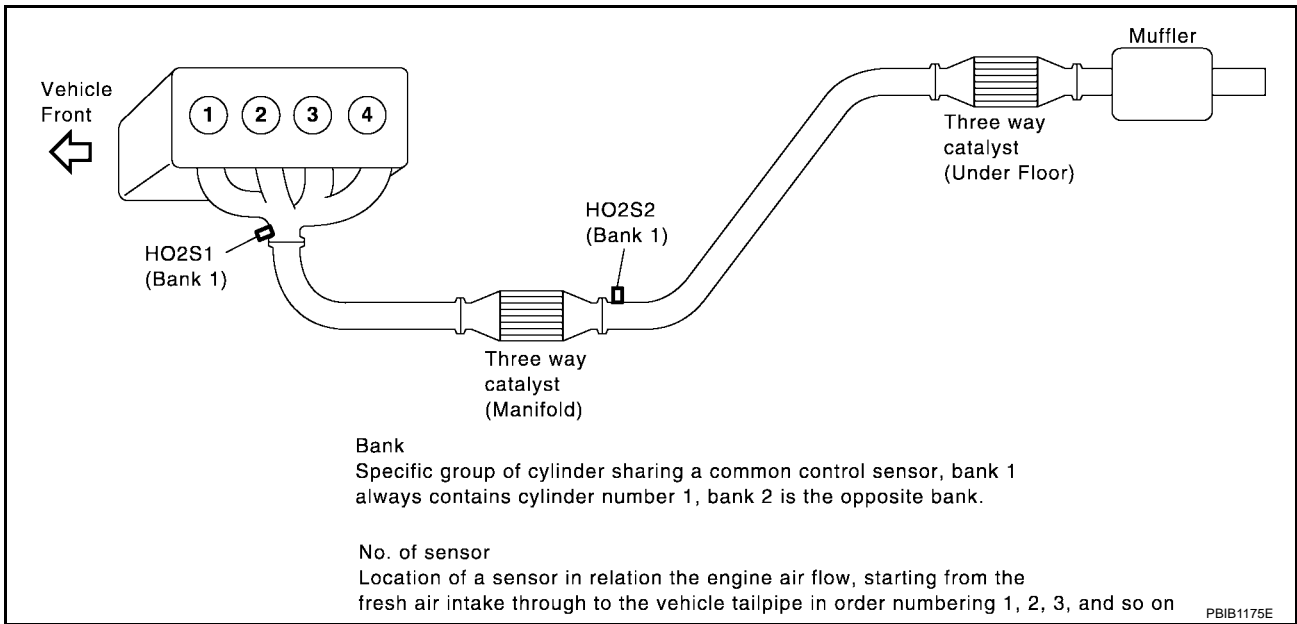
### Engine Control Component Parts Location





# TROUBLE DIAGNOSIS

[KA24DE]



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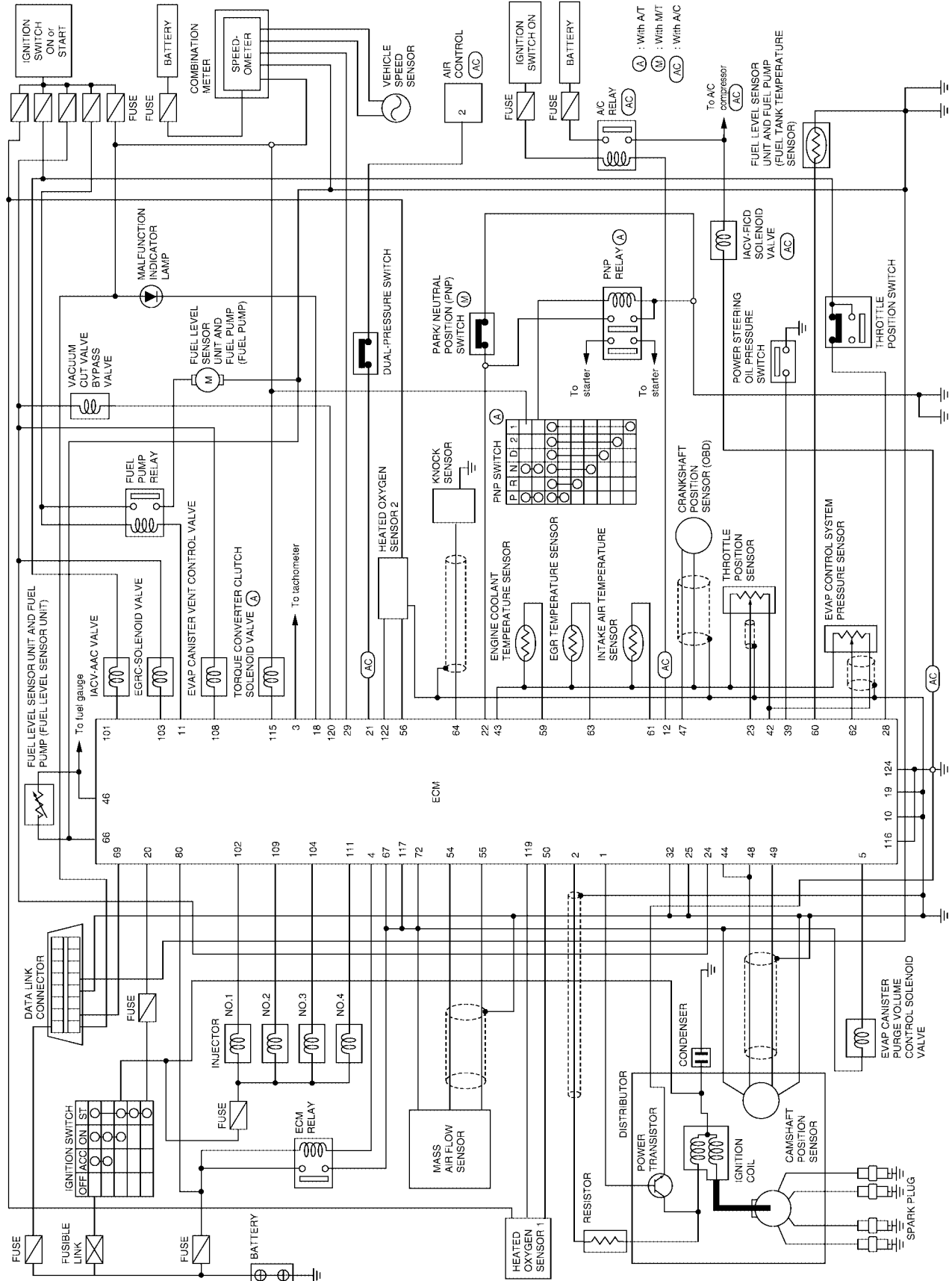
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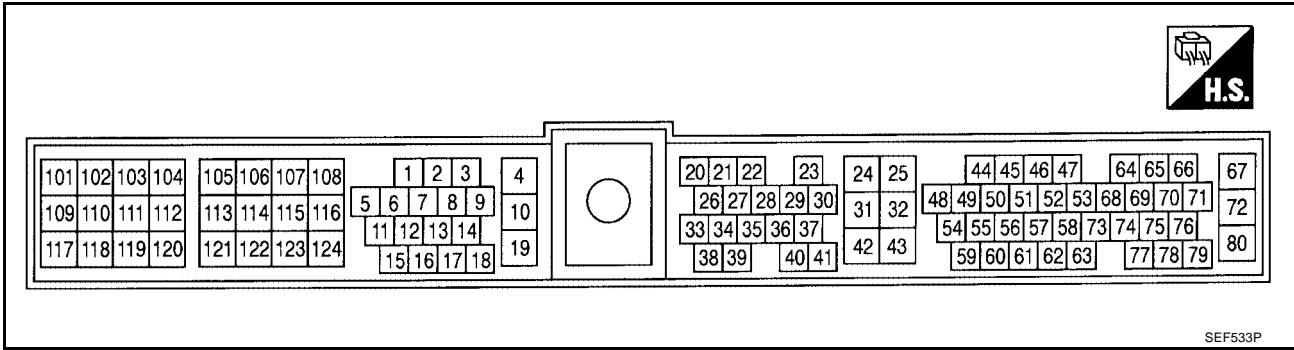
M

### Circuit Diagram



ECM Harness Connector Terminal Layout

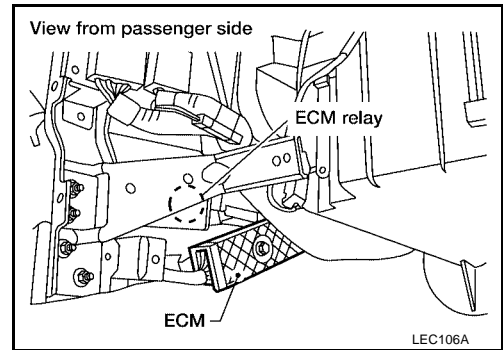
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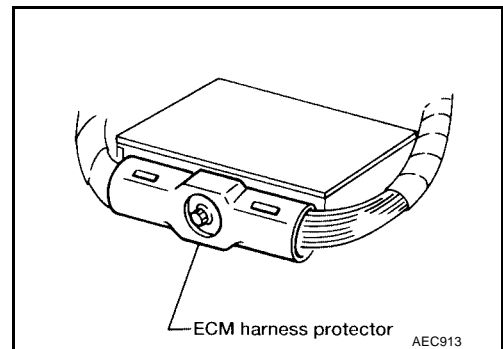
ECM Terminals and Reference Value  
PREPARATION

UBS00593

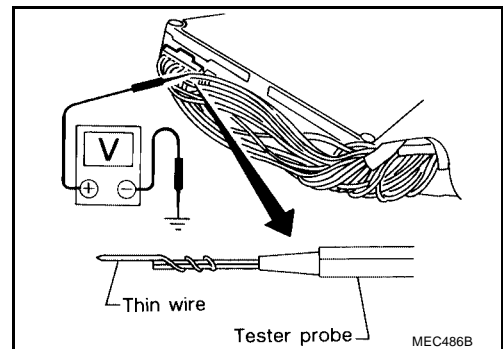
1. ECM is located behind the instrument lower cover. For this inspection:
  - Remove instrument lower cover.



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



ECM INSPECTION TABLE

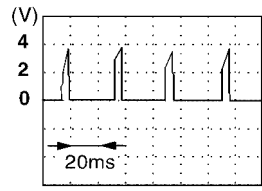
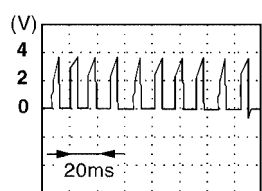
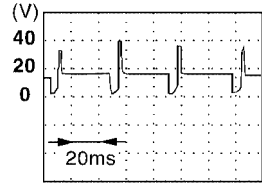
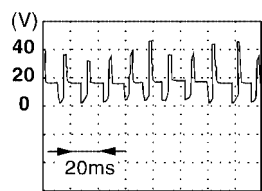
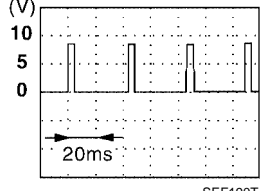
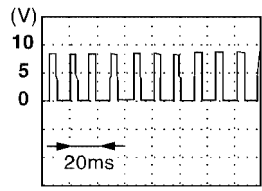
Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

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

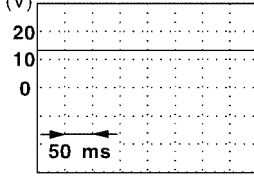
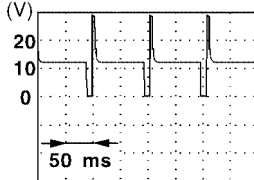
# TROUBLE DIAGNOSIS

[KA24DE]

| TER-MINAL NO. | WIRE COLOR | ITEM            | CONDITION   | DATA (DC Voltage)  |
|---------------|------------|-----------------|---|--|
| 1             | PU/W       | Ignition signal | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul> | 0 - 0.5V★<br><br><small>SEF186T</small>   |
|               |            |                 | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>               | 0.2 - 1.0V★<br><br><small>SEF187T</small> |
| 2             | B          | Ignition check  | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul> | 12 - 14V★<br><br><small>SEF188T</small>  |
|               |            |                 | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>               | 12 - 13V★<br><br><small>SEF189T</small> |
| 3             | P/L        | Tachometer      | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul> | 0 - 1V★<br><br><small>SEF190T</small>   |
|               |            |                 | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>               | 0.5 - 2V★<br><br><small>SEF191T</small> |

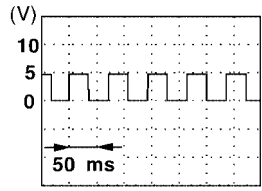
# TROUBLE DIAGNOSIS

[KA24DE]

| TER-MINAL NO. | WIRE COLOR | ITEM  | CONDITION   | DATA (DC Voltage)   |             |
|---------------|------------|---|---|---|-------------|
| 4             | LG/R       | ECM relay (Self shut-off)                         | <b>[Engine is running]</b><br><b>[Ignition switch OFF]</b><br><ul style="list-style-type: none"> <li>● For a few seconds after turning ignition switch OFF</li> </ul>                                     | 0 - 1V  | A           |
|               |            |   | <b>[Ignition switch OFF]</b><br><ul style="list-style-type: none"> <li>● More than a few seconds after turning ignition switch OFF</li> </ul>   | BATTERY VOLTAGE<br>(11 - 14V)   | EC          |
| 5             | R/Y        | EVAP canister purge volume control solenoid valve | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> </ul>  | BATTERY VOLTAGE<br>(11 - 14V)★<br><small>(V)</small><br><br><small>SEF109V</small> | D           |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm (More than 200 seconds after starting engine)</li> </ul>   | 12 - 13V★<br><small>(V)</small><br><br><small>SEF110V</small>                      | E<br>F<br>G |
| 10            | B/R        | ECM ground  | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> </ul>  | Engine ground   | H           |
| 11            | W/R        | Fuel pump relay                                   | <b>[Ignition switch ON]</b><br><ul style="list-style-type: none"> <li>● For 5 seconds after turning ignition switch ON.</li> </ul>  | 0 - 1V  | I           |
|               |            |   | <b>[Engine is running]</b><br><b>[Ignition switch ON]</b><br><ul style="list-style-type: none"> <li>● More than 5 seconds after turning ignition switch ON</li> </ul>                                     | BATTERY VOLTAGE<br>(11 - 14V)   | J           |
| 12            | P          | Air conditioner relay                             | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Both A/C switch and blower switch are ON*</li> <li>*: Any mode except "OFF", ambient air temperature above 10°C (50°F).</li> </ul> | Approximately 0V  | K           |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● A/C switch is OFF</li> </ul>   | BATTERY VOLTAGE<br>(11 - 14V)   | L           |
| 18            | R/W        | Malfunction indicator lamp                        | <b>[Ignition switch ON]</b>   | 0 - 1V  | M           |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> </ul>  | BATTERY VOLTAGE<br>(11 - 14V)   |             |
| 19            | B/R        | ECM ground  | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> </ul>  | Engine ground   |             |
| 20            | L/OR       | Start signal                                      | <b>[Ignition switch ON]</b>   | Approximately 0V  |             |
|               |            |   | <b>[Ignition switch START]</b>  | BATTERY VOLTAGE<br>(11 - 14V)   |             |

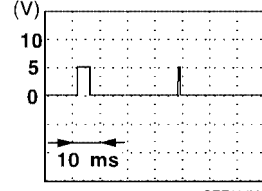
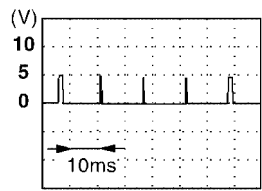
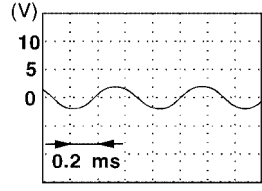
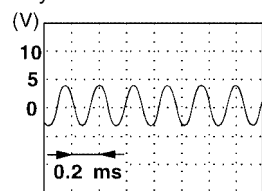
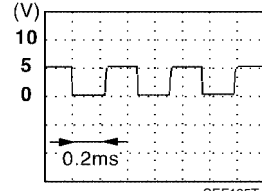
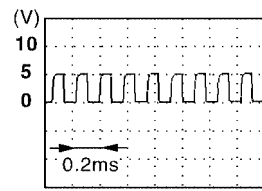
# TROUBLE DIAGNOSIS

[KA24DE]

| TER-MINAL NO. | WIRE COLOR | ITEM                                       | CONDITION  | DATA (DC Voltage)  |
|---------------|------------|--|--|--|
| 21            | G/R        | Air conditioner dual-pressure switch       | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Both air conditioner switch and blower switch are ON (Compressor operates)</li> </ul>      | Approximately 0V   |
|               |            |  | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Air conditioner switch is OFF</li> </ul>   | BATTERY VOLTAGE<br>(11 - 14V)  |
| 22            | L/B        | Park/neutral position (PNP) switch         | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"> <li>● Gear position is "N" or "P"</li> </ul>  | Approximately 0V   |
|               |            |  | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"> <li>● Except the above gear position</li> </ul>   | Approximately 5V   |
| 23            | L          | Throttle position sensor                   | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Accelerator pedal fully released</li> </ul>                  | 0.2 - 0.8V   |
|               |            |  | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"> <li>● Engine stopped</li> <li>● Accelerator pedal fully depressed</li> </ul>                    | 3.5 - 4.5V   |
| 24            | W/G        | Ignition switch                            | <b>[Ignition switch OFF]</b>   | 0V   |
|               |            |  | <b>[Ignition switch ON]</b>  | BATTERY VOLTAGE<br>(11 - 14V)  |
| 25            | B/Y        | ECM ground                                 | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>  | Engine ground  |
| 28            | BR/W       | Throttle position switch (Closed position) | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Accelerator pedal released</li> </ul>                        | BATTERY VOLTAGE<br>(11 - 14V)  |
|               |            |  | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"> <li>● Engine stopped</li> <li>● Accelerator pedal depressed</li> </ul>                          | Approximately 0V   |
| 29            | G/B        | Vehicle speed sensor                       | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Lift up the vehicle</li> <li>● In 2nd gear position</li> <li>● 40 km/h (25 MPH)</li> </ul> | 1 - 4V★<br> |
| 32            | B/Y        | ECM ground                                 | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>  | Engine ground  |
| 39            | GY/R       | Power steering oil pressure switch         | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Steering wheel is fully turned</li> </ul>  | Approximately 0V   |
|               |            |  | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Steering wheel is not turned</li> </ul>  | Approximately 5V   |
| 42            | BR         | Sensors' power supply                      | <b>[Ignition switch ON]</b>  | Approximately 5V   |
| 43            | B/W        | Sensors' ground                            | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>  | Approximately 0V   |

# TROUBLE DIAGNOSIS

[KA24DE]

| TER-MINAL NO. | WIRE COLOR | ITEM  | CONDITION   | DATA (DC Voltage)  |
|---------------|------------|---|---|--|
| 44<br>48      | PU<br>PU   | Camshaft position sensor (Reference signal) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul> | <p>0.2 - 0.5V★</p>                  |
|               |            |   | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>               | <p>0 - 0.5V★</p>                    |
| 46            | OR/B       | Fuel level sensor                           | <b>[Ignition switch ON]</b>   | <p>Approximately 0 - 4.8V</p> <p>Output voltage varies with fuel level.</p>  |
| 47            | L          | Crankshaft position sensor (OBD)            | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul> | <p>Approximately 0V★</p>           |
|               |            |   | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>               | <p>Approximately 0V★</p>          |
| 49            | LG         | Camshaft position sensor (Position signal)  | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul> | <p>Approximately 2.6V★</p>        |
|               |            |   | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>               | <p>Approximately 2.5 - 2.6V★</p>  |
| 50            | B          | Heated oxygen sensor 1                      | <b>[Engine is running]</b>  | <p>0 - Approximately 1.0V</p> <p>(Periodically change)</p>   |

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# TROUBLE DIAGNOSIS

[KA24DE]

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



# TROUBLE DIAGNOSIS

[KA24DE]

| TER-MINAL NO.            | WIRE COLOR                | ITEM   | CONDITION   | DATA (DC Voltage)                                |
|--------------------------|---------------------------|--|---|--|
| 101                      | OR/L                      | IACV-AAC valve   | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>                                    | 10.5 - 11.5V★<br>(V)<br>SEF645U                  |
|                          |                           |  | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul>                     | 1 - 13V★<br>(V)<br>SEF646U                       |
| 102<br>104<br>109<br>111 | W/B<br>W/R<br>W/L<br>W/PU | Injector No. 1<br>Injector No. 3<br>Injector No. 2<br>Injector No. 4 | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>                                    | BATTERY VOLTAGE<br>(11 - 14V)★<br>(V)<br>SEF204T |
|                          |                           |  | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul>                     | BATTERY VOLTAGE<br>(11 - 14V)★<br>(V)<br>SEF205T |
| 103                      | G/W                       | EGRC-solenoid valve  | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>                                    | BATTERY VOLTAGE<br>(11 - 14V)                    |
|                          |                           |  | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Revving engine from idle to 3,000 rpm quickly</li> </ul> | 0 - 1V   |
| 108                      | R/G                       | EVAP canister vent control valve                                     | <b>[Ignition switch ON]</b>   | BATTERY VOLTAGE<br>(11 - 14V)                    |
| 115                      | L/Y                       | Torque converter clutch solenoid valve (A/T models only)             | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>   | Approximately 1V                                 |
|                          |                           |  | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul>                     | BATTERY VOLTAGE<br>(11 - 14V)                    |
| 116                      | B/R                       | ECM ground   | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>   | Engine ground                                    |
| 117                      | B/P                       | Current return   | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>   | BATTERY VOLTAGE<br>(11 - 14V)                    |

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# TROUBLE DIAGNOSIS

**[KA24DE]**

| TER-MINAL NO. | WIRE COLOR | ITEM                          | CONDITION  | DATA (DC Voltage)             |
|---------------|------------|-------------------------------|--|-------------------------------|
| 119           | BR/Y       | Heated oxygen sensor heater 1 | <b>[Engine is running]</b><br>● Engine speed is below 3,600 rpm.   | Approximately 0.4V            |
|               |            |                               | <b>[Engine is running]</b><br>● Engine speed is above 3,600 rpm.   | BATTERY VOLTAGE<br>(11 - 14V) |
| 120           | P/B        | Vacuum cut valve bypass valve | <b>[Ignition switch ON]</b>  | BATTERY VOLTAGE<br>(11 - 14V) |
| 122           | R/B        | Heated oxygen sensor heater 2 | <b>[Engine is running]</b><br>● Engine speed is below 4,000 rpm after the following conditions are met.<br>● Engine: after warming up<br>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load. | Approximately 0.4V            |
|               |            |                               | <b>[Ignition switch ON]</b><br>● Engine is not running   | BATTERY VOLTAGE<br>(11 - 14V) |
| 124           | B/R        | ECM ground                    | <b>[Engine is running]</b><br>● Idle speed   | Engine ground                 |

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

## CONSULT-II Function FUNCTION

| Diagnostic test mode    | Function  |
|-------------------------|---|
| Work support            | This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.         |
| Self-diagnostic results | Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly. *1     |
| Data monitor            | Input/Output data in the ECM can be read.   |
| Data monitor (SPEC)     | Input/Output of the specification for 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 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.   |

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

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

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# TROUBLE DIAGNOSIS

[KA24DE]

## 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<br>INPUT | Camshaft position sensor  |                      | X                       | X                   | X             | X                    |             |                        |                   |
|   | Mass air flow sensor  |                      | X                       |                     | X             | X                    |             |                        |                   |
|   | Engine coolant temperature sensor                                 |                      | X                       | X                   | X             | X                    | X           |                        |                   |
|   | Heated oxygen sensor 1  |                      | X                       |                     | X             | X                    |             | X                      | X                 |
|   | Heated oxygen sensor 2  |                      | X                       |                     | X             | X                    |             | X                      | X                 |
|   | Vehicle speed sensor  |                      | X                       | X                   | X             | X                    |             |                        |                   |
|   | Throttle position sensor  | X                    | X                       |                     | X             | X                    |             |                        |                   |
|   | Fuel tank temperature sensor                                      |                      | X                       |                     | X             | X                    | X           |                        |                   |
|   | EVAP control system pressure sensor                               |                      | X                       |                     | X             | X                    |             |                        |                   |
|   | EGR temperature sensor  |                      | X                       |                     | X             | X                    |             |                        |                   |
|   | Intake air temperature sensor                                     |                      | X                       |                     | X             | X                    |             |                        |                   |
|   | Crankshaft position sensor (OBD)                                  |                      | X                       |                     |               |                      |             |                        |                   |
|   | Knock sensor  |                      | X                       |                     |               |                      |             |                        |                   |
|   | Fuel level sensor   |                      | X                       |                     | X             | X                    |             |                        |                   |
|   | Ignition switch (start signal)                                    |                      |                         |                     | X             |                      |             |                        |                   |
|   | Closed throttle position switch                                   |                      | X                       |                     | X             |                      |             |                        |                   |
|   | Closed throttle position switch (throttle position sensor signal) |                      |                         |                     | X             |                      |             |                        |                   |
|   | Air conditioner switch  |                      |                         |                     | X             |                      |             |                        |                   |
|   | Park/Neutral position (PNP) switch                                |                      | X                       |                     | X             |                      |             |                        |                   |
|   | Power steering oil pressure switch                                |                      |                         |                     | X             |                      |             |                        |                   |
| Air conditioner pressure switch         |   |                      |                         | X                   |               |                      |             |                        |                   |
| Battery voltage                         |   |                      |                         | X                   |               |                      |             |                        |                   |
| Ambient air temperature switch          |   |                      |                         | X                   | X             |                      |             |                        |                   |

# TROUBLE DIAGNOSIS

[KA24DE]

| 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   |                      |                         |                     | X             | X                    | X           |                        |                   |
|                                       | Power transistor (Ignition timing)                | X                    |                         |                     | X             | X                    | X           |                        |                   |
|                                       | IACV-AAC valve                                    | X                    | X                       |                     | X             | X                    | X           |                        |                   |
|                                       | EVAP canister purge volume control solenoid valve |                      | X                       |                     | X             | X                    | X           |                        | X                 |
|                                       | Air conditioner relay                             |                      |                         |                     | X             | X                    |             |                        |                   |
|                                       | Fuel pump relay                                   | X                    |                         |                     | X             | X                    | X           |                        |                   |
|                                       | EGRC-solenoid valve                               |                      | X                       |                     | X             | X                    | X           |                        |                   |
|                                       | Heated oxygen sensor 1 heater                     |                      | X                       |                     | X             | X                    |             | X                      |                   |
|                                       | Heated oxygen sensor 2 heater                     |                      | X                       |                     | X             | X                    |             | X                      |                   |
|                                       | Torque converter clutch solenoid valve            |                      | X                       |                     | X             | X                    |             |                        | X                 |
|                                       | EVAP canister vent control valve                  |                      | X                       |                     | X             | X                    | X           |                        |                   |
|                                       | Vacuum cut valve bypass valve                     |                      | X                       |                     | X             | X                    | X           |                        | X                 |
|                                       | Calculated load value                             |                      |                         | X                   | X             | X                    |             |                        |                   |

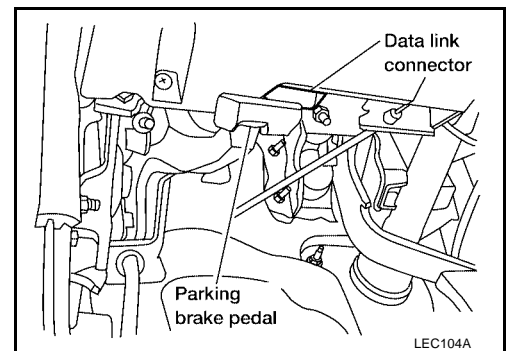
X: Applicable

\*1: This item includes 1st trip DTCs.

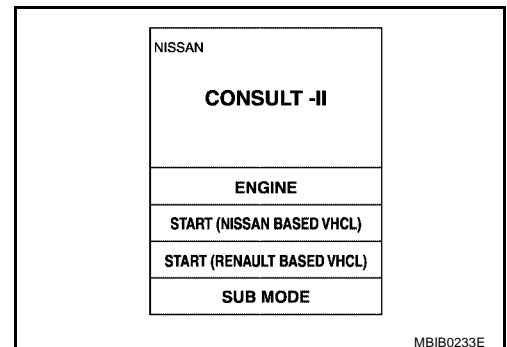
\*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to [EC-51](#).

## CONSULT-II INSPECTION PROCEDURE

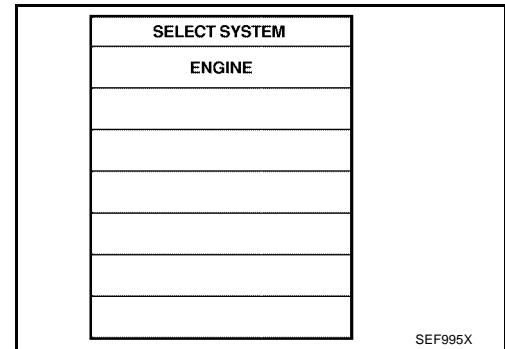
1. Turn ignition switch OFF.
2. Connect "CONSULT-II" and CONSULT-II CONVERTER to data link connector which is located behind the fuse box cover.
3. Turn ignition switch ON.



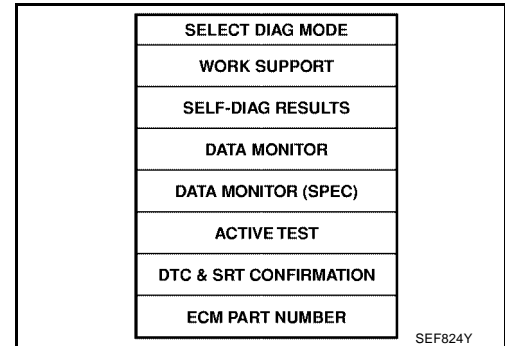
4. Touch "START(NISSAN BASED VHCL)".



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 | <ul style="list-style-type: none"> <li>FOLLOW THE BASIC INSPECTION IN THE SERVICE MANUAL</li> </ul>  | When adjusting the idle throttle position                     |
| IGNITION TIMING ADJ        | <ul style="list-style-type: none"> <li>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.</li> </ul> | When adjusting initial ignition timing                        |
| FUEL PRESSURE RELEASE      | <ul style="list-style-type: none"> <li>FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.</li> </ul>  | When releasing fuel pressure from fuel line                   |
| SELF-LEARNING CONT         | <ul style="list-style-type: none"> <li>THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.</li> </ul>  | When releasing the coefficient of self-learning control value |

# TROUBLE DIAGNOSIS

[KA24DE]

| WORK ITEM            | CONDITION  | USAGE   |
|----------------------|--|---|
| EVAP SYSTEM CLOSE    | <p>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.</p> <ul style="list-style-type: none"> <li>● BATTERY VOLTAGE IS SUFFICIENT.</li> <li>● IGN SW "ON"</li> <li>● ENGINE NOT RUNNING</li> <li>● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F).</li> <li>● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM</li> <li>● TANK FUEL TEMP. IS MORE THAN 0°C (32°F).</li> <li>● WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE"</li> </ul> <p>WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITIONS ABOVE, CONSULT-II WILL DISCONTINUE AND DISPLAY INSTRUCTIONS.</p> <p><b>NOTE:</b><br/> <b>WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN WHEN USING A CHARGED BATTERY.</b></p> | 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-17, "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 <a href="#">EC-17, "INDEX FOR DTC"</a> .)  |
| FUEL SYS-B1                   | <ul style="list-style-type: none"> <li>● "Fuel injection system status" at the moment a malfunction is detected is displayed.</li> <li>● One mode in the following is displayed.<br/> "MODE 2": Open loop due to detected system malfunction<br/> "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment)<br/> "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control<br/> "MODE 5": Open loop - has not yet satisfied condition to go to closed loop</li> </ul> |
| CAL/LD VALUE [%]              | ● The calculated load value at the moment a malfunction is detected is displayed.   |
| COOLANT TEMP [°C] or [°F]     | ● The engine coolant temperature at the moment a malfunction is detected is displayed.  |
| S-FUEL TRIM-B1 [%]            | <ul style="list-style-type: none"> <li>● "Short-term fuel trim" at the moment a malfunction is detected is displayed.</li> <li>● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.</li> </ul>  |
| L-FUEL TRIM-B1 [%]            | <ul style="list-style-type: none"> <li>● "Long-term fuel trim" at the moment a malfunction is detected is displayed.</li> <li>● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.</li> </ul>   |
| 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.  |

# TROUBLE DIAGNOSIS

[KA24DE]

| Freeze frame data item*    | Description  |
|----------------------------|--|
| B/FUEL SCHDL [msec]        | <ul style="list-style-type: none"> <li>The base fuel schedule at the moment a malfunction is detected is displayed.</li> </ul>     |
| INT/A TEMP SE [°C] or [°F] | <ul style="list-style-type: none"> <li>The intake air temperature at the moment a malfunction is detected is displayed.</li> </ul> |

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

## DATA MONITOR MODE

### Monitored Item

| Monitored item [Unit]         | ECM INPUT SIGNALS | MAIN SIGNALS | Description  | Remarks   |
|-------------------------------|-------------------|--------------|--|---|
| ENG SPEED [rpm]               |                   | ×            | <ul style="list-style-type: none"> <li>Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor.</li> </ul>   | <ul style="list-style-type: none"> <li>Accuracy becomes poor if engine speed drops below the idle rpm.</li> <li>If the signal is interrupted while the engine is running, an abnormal value may be indicated.</li> </ul>  |
| MAS A/F SE-B1 [V]             | ×                 | ×            | <ul style="list-style-type: none"> <li>The signal voltage of the mass air flow sensor is displayed.</li> </ul>   | <ul style="list-style-type: none"> <li>When the engine is stopped, a certain value is indicated.</li> </ul>   |
| B/FUEL SCHDL [msec]           |                   | ×            | <ul style="list-style-type: none"> <li>"Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.</li> </ul>   |   |
| A/F ALPHA-B1 [%]              |                   | ×            | <ul style="list-style-type: none"> <li>Indicates the mean value of the air-fuel ratio feedback correction factor per cycle.</li> </ul>   | <ul style="list-style-type: none"> <li>When the engine is stopped, a certain value is indicated.</li> <li>This data also includes the data for the air-fuel ratio learning control.</li> </ul>  |
| COOLAN TEMP/S [°C] or [°F]    | ×                 | ×            | <ul style="list-style-type: none"> <li>The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.</li> </ul>   | <ul style="list-style-type: none"> <li>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.</li> </ul>  |
| HO2S1 (B1) [V]                | ×                 | ×            | <ul style="list-style-type: none"> <li>The signal voltage of the heated oxygen sensor 1 is displayed.</li> </ul>   |   |
| HO2S2 (B1) [V]                | ×                 | ×            | <ul style="list-style-type: none"> <li>The signal voltage of the heated oxygen sensor 2 is displayed.</li> </ul>   |   |
| HO2S1 MNTR (B1) [RICH/LEAN]   | ×                 |              | <ul style="list-style-type: none"> <li>Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control:<br/>RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture.<br/>LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture.</li> </ul> | <ul style="list-style-type: none"> <li>After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins.</li> <li>When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.</li> </ul> |
| HO2S2 MNTR (B1) [RICH/LEAN]   | ×                 |              | <ul style="list-style-type: none"> <li>Display of heated oxygen sensor 2 signal:<br/>RICH ... means the amount of oxygen after three way catalyst is relatively small.<br/>LEAN ... means the amount of oxygen after three way catalyst is relatively large.</li> </ul>  | <ul style="list-style-type: none"> <li>When the engine is stopped, a certain value is indicated.</li> </ul>   |
| VHCL SPEED SE [km/h] or [mph] | ×                 | ×            | <ul style="list-style-type: none"> <li>The vehicle speed computed from the vehicle speed sensor signal is displayed.</li> </ul>  |   |
| BATTERY VOLT [V]              | ×                 | ×            | <ul style="list-style-type: none"> <li>The power supply voltage of ECM is displayed.</li> </ul>  |   |
| THRTL POS SEN [V]             | ×                 | ×            | <ul style="list-style-type: none"> <li>The throttle position sensor signal voltage is displayed.</li> </ul>  |   |



# TROUBLE DIAGNOSIS

[KA24DE]

| Monitored item [Unit]      | ECM INPUT SIGNALS | MAIN SIGNALS | Description   | Remarks   |    |
|----------------------------|-------------------|--------------|---|---|----|
| FUEL T/TMP SE [°C] or [°F] | ×                 |              | <ul style="list-style-type: none"> <li>The fuel temperature judged from the fuel tank temperature sensor signal voltage is displayed.</li> </ul>  |   | EC |
| INT/A TEMP SE [°C] or [°F] | ×                 | ×            | <ul style="list-style-type: none"> <li>The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.</li> </ul>                                      |   | C  |
| EGR TEMP SEN [V]           | ×                 | ×            | <ul style="list-style-type: none"> <li>The signal voltage of the EGR temperature sensor is displayed.</li> </ul>  |   | D  |
| EVAP SYS PRES [V]          | ×                 |              | <ul style="list-style-type: none"> <li>The signal voltage of EVAP control system pressure sensor is displayed.</li> </ul>   |   | E  |
| FUEL LEVEL SE [V]          | ×                 |              | <ul style="list-style-type: none"> <li>The signal voltage of the fuel level sensor is displayed.</li> </ul>   |   | F  |
| START SIGNAL [ON/OFF]      | ×                 | ×            | <ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition from the starter signal.</li> </ul>   | <ul style="list-style-type: none"> <li>After starting the engine, [OFF] is displayed regardless of the starter signal.</li> </ul> | F  |
| CLSD THL POS [ON/OFF]      | ×                 | ×            | <ul style="list-style-type: none"> <li>Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal.</li> </ul>  |   | G  |
| CLSD THL/P SW [ON/OFF]     | ×                 |              | <ul style="list-style-type: none"> <li>Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.</li> </ul>   |   | H  |
| AIR COND SIG [ON/OFF]      | ×                 | ×            | <ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioning signal.</li> </ul>  |   | I  |
| P/N POSI SW [ON/OFF]       | ×                 | ×            | <ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition from the PNP switch signal.</li> </ul>  |   | J  |
| PW/ST SIGNAL [ON/OFF]      | ×                 | ×            | <ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure switch signal.</li> </ul>                 |   | K  |
| IGNITION SW [ON/OFF]       | ×                 |              | <ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition from ignition switch.</li> </ul>  |   | L  |
| INJ PULSE-B1 [msec]        |                   | ×            | <ul style="list-style-type: none"> <li>Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.</li> </ul>  | <ul style="list-style-type: none"> <li>When the engine is stopped, a certain computed value is indicated.</li> </ul>              | L  |
| IGN TIMING [BTDC]          |                   | ×            | <ul style="list-style-type: none"> <li>Indicates the ignition timing computed by ECM according to the input signals.</li> </ul>   |   | M  |
| CAL/LD VALUE [%]           |                   |              | <ul style="list-style-type: none"> <li>“Calculated load value” indicates the value of the current airflow divided by peak airflow.</li> </ul>   |   |    |
| ABSOL TH-P/S [%]           |                   |              | <ul style="list-style-type: none"> <li>“Absolute throttle position sensor” indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor.</li> </ul> |   |    |
| MASS AIRFLOW [g·m/s]       |                   |              | <ul style="list-style-type: none"> <li>Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor.</li> </ul>   |   |    |
| IACV-AAC/V [%]             |                   | ×            | <ul style="list-style-type: none"> <li>Indicates the IACV-AAC valve control value computed by ECM according to the input signals.</li> </ul>  |   |    |

# TROUBLE DIAGNOSIS

[KA24DE]

| Monitored item [Unit]                | ECM<br>INPUT<br>SIG-<br>NALS | MAIN<br>SIG-<br>NALS | Description   | Remarks   |
|--------------------------------------|------------------------------|----------------------|---|---|
| PURG VOL C/V [%]                     |                              |                      | <ul style="list-style-type: none"> <li>● Indicates the EVAP canister purge volume control value computed by the ECM according to the input signals.</li> <li>● The opening becomes larger as the value increases.</li> </ul>                                  |   |
| AIR COND RLY<br>[ON/OFF]             |                              | ×                    | <ul style="list-style-type: none"> <li>● Indicates the air conditioner relay control condition determined by ECM according to the input signals.</li> </ul>   |   |
| EGRC SOL/V<br>[ON/OFF]<br>(FLOW/CUT) |                              | ×                    | <ul style="list-style-type: none"> <li>● Indicates the control condition of the EGRC-solenoid valve determined by ECM according to the input signals.</li> <li>● ON ... EGR valve is operational</li> <li>● OFF ... EGR valve operation is cut-off</li> </ul> |   |
| TCC SOL/V                            |                              |                      | <ul style="list-style-type: none"> <li>● Indicates [ON/OFF] condition of torque converter clutch solenoid valve determined by ECM according to the input signals.</li> </ul>  |   |
| FUEL PUMP RLY<br>[ON/OFF]            |                              | ×                    | <ul style="list-style-type: none"> <li>● Indicates the fuel pump relay control condition determined by ECM according to the input signals.</li> </ul>   |   |
| VC/V BYPASS/V<br>[ON/OFF]            |                              |                      | <ul style="list-style-type: none"> <li>● The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated.</li> <li>● ON ... Open</li> <li>● OFF ... Closed</li> </ul>                               |   |
| VENT CONT/V<br>[ON/OFF]              |                              |                      | <ul style="list-style-type: none"> <li>● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated.</li> <li>● ON ... Closed</li> <li>● OFF ... Open</li> </ul>                            |   |
| HO2S1 HTR (B1)<br>[ON/OFF]           |                              |                      | <ul style="list-style-type: none"> <li>● Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals.</li> </ul>   |   |
| HO2S2 HTR (B1)<br>[ON/OFF]           |                              |                      | <ul style="list-style-type: none"> <li>● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.</li> </ul>   |   |
| VOLTAGE [V]                          |                              |                      | <ul style="list-style-type: none"> <li>● Voltage measured by the voltage probe.</li> </ul>  |   |
| Frequency<br>[msec] or [Hz] or [%]   |                              |                      | <ul style="list-style-type: none"> <li>● Pulse width, frequency or duty cycle measured by the pulse probe.</li> </ul>   | <ul style="list-style-type: none"> <li>● Only “#” is displayed if item is unable to be measured.</li> <li>● Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.</li> </ul> |

**NOTE:**

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

# TROUBLE DIAGNOSIS

[KA24DE]

## DATA MONITOR (SPEC) MODE

### Monitored Item

| Monitored item [Unit] | ECM INPUT SIGNALS | MAIN SIGNALS | Description  | Remarks   |
|-----------------------|-------------------|--------------|--|---|
| ENG SPEED [rpm]       | ×                 | ×            | <ul style="list-style-type: none"> <li>Indicates the engine speed computed from the REF signal (180° signal) of the camshaft position sensor.</li> </ul>                       |   |
| MAS A/F SE-B1 [V]     | ×                 | ×            | <ul style="list-style-type: none"> <li>The signal voltage of the mass air flow sensor specification is displayed.</li> </ul>   | <ul style="list-style-type: none"> <li>When engine is running specification range is indicated.</li> </ul>  |
| B/FUEL SCHDL [msec]   |                   |              | <ul style="list-style-type: none"> <li>"Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.</li> </ul> | <ul style="list-style-type: none"> <li>When engine is running specification range is indicated.</li> </ul>  |
| A/F ALPHA-B1 [%]      |                   | ×            | <ul style="list-style-type: none"> <li>The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.</li> </ul>                                      | <ul style="list-style-type: none"> <li>When engine is running specification range is indicated.</li> <li>This data also includes the data for the air-fuel ratio learning control.</li> </ul> |

**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     | <ul style="list-style-type: none"> <li>Engine: Return to the original trouble condition</li> <li>Change the amount of fuel injection using CONSULT-II.</li> </ul>   | If trouble symptom disappears, see CHECK ITEM.         | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>Fuel injectors</li> <li>Heated oxygen sensor 1</li> </ul>  |
| IGNITION TIMING    | <ul style="list-style-type: none"> <li>Engine: Return to the original trouble condition</li> <li>Timing light: Set</li> <li>Retard the ignition timing using CONSULT-II.</li> </ul>   | If trouble symptom disappears, see CHECK ITEM.         | <ul style="list-style-type: none"> <li>Adjust initial ignition timing</li> </ul>   |
| IACV-AAC/V OPENING | <ul style="list-style-type: none"> <li>Engine: After warming up, idle the engine.</li> <li>Change the IACV-AAC valve opening percent using CONSULT-II.</li> </ul>   | Engine speed changes according to the opening percent. | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>IACV-AAC valve</li> </ul>  |
| POWER BALANCE      | <ul style="list-style-type: none"> <li>Engine: After warming up, idle the engine.</li> <li>Air conditioner switch "OFF"</li> <li>Shift lever "N"</li> <li>Cut off each injector signal one at a time using CONSULT-II.</li> </ul> | Engine runs rough or dies.                             | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>Compression</li> <li>Injectors</li> <li>Power transistor</li> <li>Spark plugs</li> <li>Ignition coils</li> </ul> |
| ENG COOLANT TEMP   | <ul style="list-style-type: none"> <li>Engine: Return to the original trouble condition</li> <li>Change the engine coolant temperature indication using CONSULT-II.</li> </ul>  | If trouble symptom disappears, see CHECK ITEM.         | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>Engine coolant temperature sensor</li> <li>Fuel injectors</li> </ul>   |
| FUEL PUMP RELAY    | <ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> <li>Turn the fuel pump relay "ON" and "OFF" using CONSULT-II and listen to operating sound.</li> </ul>   | Fuel pump relay makes the operating sound.             | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>Fuel pump relay</li> </ul>   |

# TROUBLE DIAGNOSIS

**[KA24DE]**

| TEST ITEM           | CONDITION  | JUDGEMENT  | CHECK ITEM (REMEDY)  |
|---------------------|--|--|--|
| EGRC SOLENOID VALVE | <ul style="list-style-type: none"> <li>● Ignition switch: ON</li> <li>● Turn EGRC-solenoid valve "ON" and "OFF" using CONSULT-II and listen to operating sound.</li> </ul>                                       | EGRC-solenoid valve makes an operating sound.          | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● EGRC-solenoid valve</li> </ul>                               |
| PURG VOL CONT/V     | <ul style="list-style-type: none"> <li>● Engine: After warming up, run engine at 1,500 rpm.</li> <li>● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.</li> </ul> | Engine speed changes according to the opening percent. | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● EVAP canister purge volume control solenoid valve</li> </ul> |
| FUEL T/TEMP SEN     | <ul style="list-style-type: none"> <li>● Change the fuel tank temperature using CONSULT-II.</li> </ul>   |  |  |
| VENT CONTROL/V      | <ul style="list-style-type: none"> <li>● Ignition switch: ON (Engine stopped)</li> <li>● Turn solenoid valve "ON" and "OFF" using CONSULT-II and listen to operating sound.</li> </ul>                           | Solenoid valve makes an operating sound.               | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Solenoid valve</li> </ul>                                    |
| VC/V BYPASS/V       | <ul style="list-style-type: none"> <li>● Ignition switch: ON (Engine stopped)</li> <li>● Turn solenoid valve "ON" and "OFF" using CONSULT-II and listen to operating sound.</li> </ul>                           | Solenoid valve makes an operating sound.               | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Solenoid valve</li> </ul>                                    |

## DTC & SRT CONFIRMATION MODE

### SRT STATUS Mode

For details, refer to [EC-52. "SYSTEM READINESS TEST \(SRT\) CODE"](#).

### SRT Work Support Mode

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

### DTC Work Support Mode

| TEST MODE   | TEST ITEM                 | CONDITION   | REFERENCE PAGE                                  |
|-------------|---------------------------|---|---|
| EVAP SYSTEM | PURG FLOW P0441           | Refer to corresponding trouble diagnosis for DTC. | <a href="#">EC-302</a>                          |
|             | EVAP SML LEAK P0442/P1442 |   | <a href="#">EC-311</a> , <a href="#">EC-467</a> |
|             | EVAP V/S LEAK P0456/P1456 |   | <a href="#">EC-366</a> , <a href="#">EC-489</a> |
|             | PURG VOL CN/V P1444       |   | <a href="#">EC-469</a>                          |
|             | VC CUT/V BP/V P1491       |   | <a href="#">EC-510</a>                          |
| HO2S1       | HO2S1 (B1) P0133          |   | <a href="#">EC-192</a>                          |
|             | HO2S1 (B1) P0134          |   | <a href="#">EC-202</a>                          |
|             | HO2S1 (B1) P1143          |   | <a href="#">EC-417</a>                          |
|             | HO2S1 (B1) P1144          |   | <a href="#">EC-422</a>                          |
| HO2S2       | HO2S2 (B1) P0139          |   | <a href="#">EC-216</a>                          |
|             | HO2S2 (B1) P1146          | <a href="#">EC-427</a>                            |   |
|             | HO2S2 (B1) P1147          | <a href="#">EC-434</a>                            |   |
| EGR SYSTEM  | EGR SYSTEM P0400          | <a href="#">EC-275</a>                            |   |
|             | EGRC-BPT/LV P0402         | <a href="#">EC-285</a>                            |   |
|             | EGR SYSTEM P1402          | <a href="#">EC-458</a>                            |   |

## 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

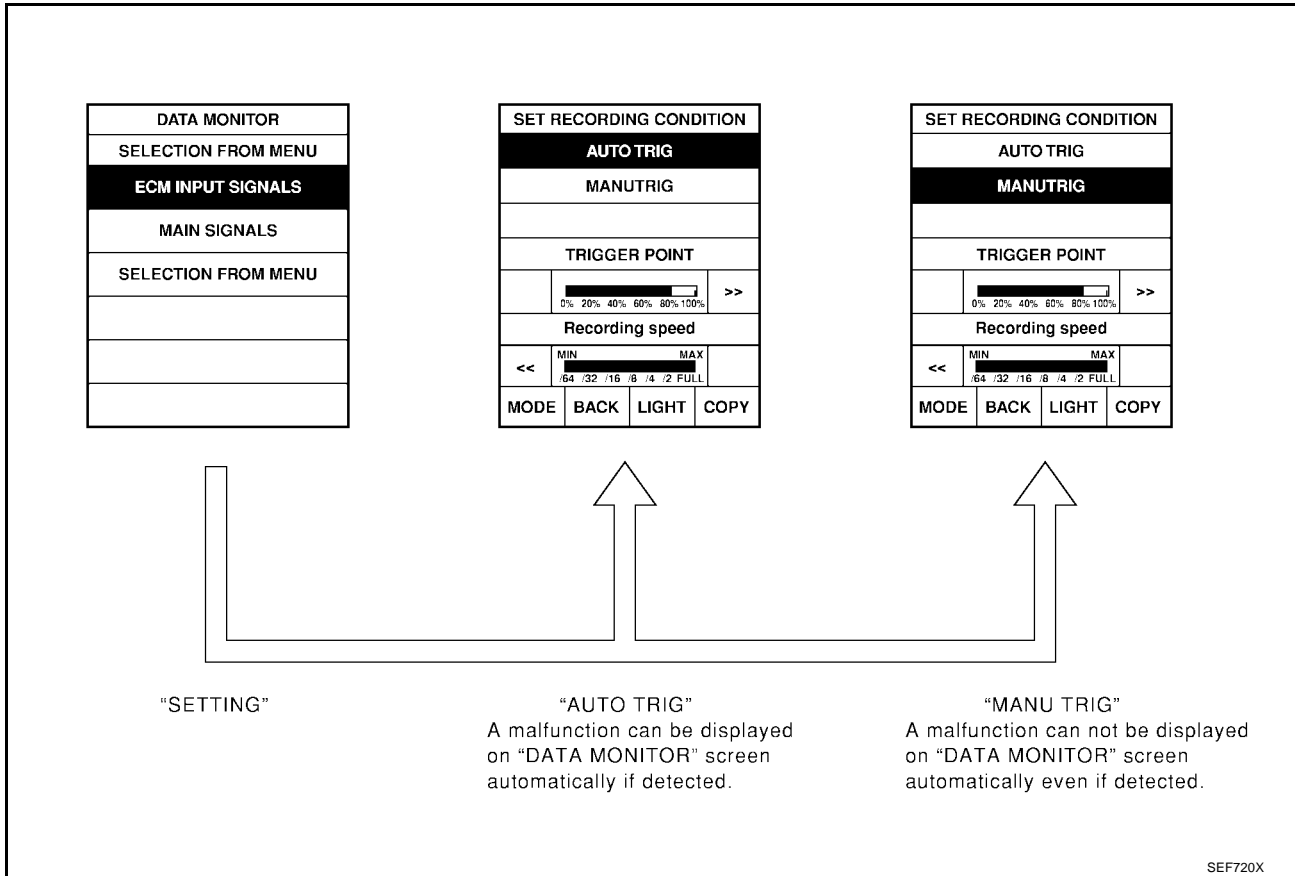
# TROUBLE DIAGNOSIS

[KA24DE]

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.



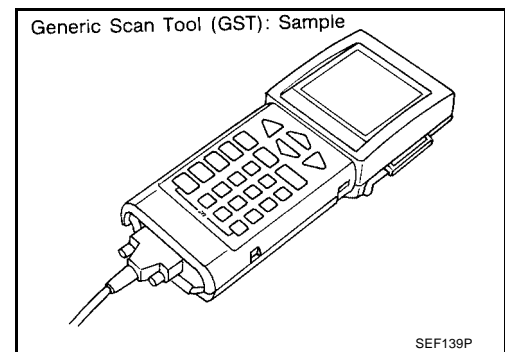
## Generic Scan Tool (GST) DESCRIPTION

UBS00595

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 <a href="#">EC-52, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA"</a> . |
| MODE 3               | DTCs            | This mode gains access to emission-related power train trouble codes which were stored by ECM.  |

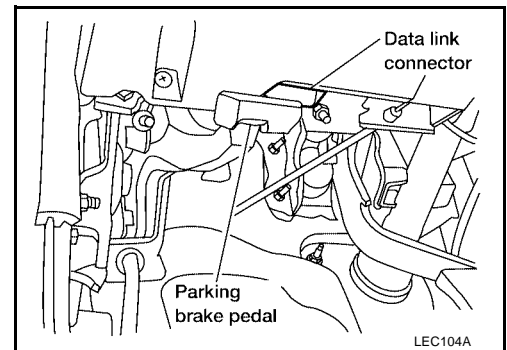
# TROUBLE DIAGNOSIS

[KA24DE]

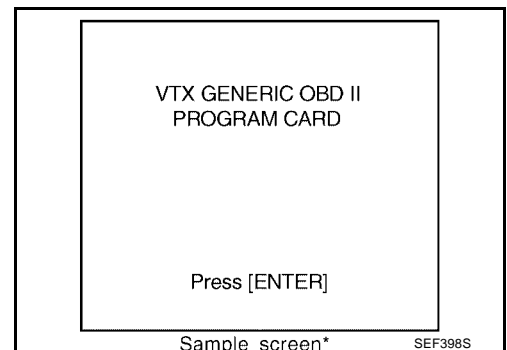
| Diagnostic test mode |                  | Function  |
|----------------------|------------------|---|
| MODE 4               | CLEAR DIAG INFO  | This mode can clear all emission-related diagnostic information. This includes: <ul style="list-style-type: none"> <li>● Clear number of diagnostic trouble codes (MODE 1)</li> <li>● Clear diagnostic trouble codes (MODE 3)</li> <li>● Clear trouble code for freeze frame data (MODE 1)</li> <li>● Clear freeze frame data (MODE 2)</li> <li>● Reset status of system monitoring test (MODE 1)</li> <li>● Clear on board monitoring test results (MODE 6 and 7)</li> </ul> |
| 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.  |

## GST INSPECTION PROCEDURE

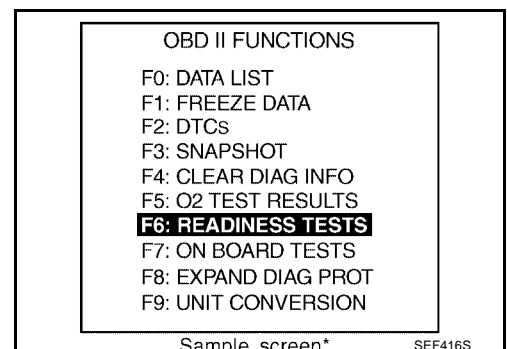
1. Turn ignition switch OFF.
2. Connect "GST" to data link connector which is located under LH dash panel near the fuse box cover.
3. Turn ignition switch ON.



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



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



# TROUBLE DIAGNOSIS

[KA24DE]

UBS00596

## CONSULT-II Reference Value in Data Monitor Mode

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       | <ul style="list-style-type: none"> <li>● Tachometer: Connect</li> <li>● Run engine and compare the CONSULT-II value with tachometer indication.</li> </ul>   |  | Almost the same speed as the tachometer indication.         |
| MAS A/F SE-B1   | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: "OFF"</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul>                                   | Idle   | 0.9 - 1.8V  |
|                 |  | 2,500 rpm  | 1.9 - 2.3V  |
| COOLAN TEMP/S   | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> </ul>   |  | More than 70°C (158°F)                                      |
| HO2S1 (B1)      | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> </ul>   | Maintaining engine speed at 2,000 rpm                  | 0 - 0.3V ↔ Approx. 0.6 - 1.0V                               |
| HO2S1 MNTR (B1) |  |  | LEAN ↔ RICH<br>Changes more than 5 times during 10 seconds. |
| HO2S2 (B1)      | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● After keeping engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load</li> </ul> | Revving engine from idle up to 3,000 rpm quickly       | 0 - 0.3V ↔ Approx. 0.6 - 1.0V                               |
| HO2S2 MNTR (B1) |  |  |   |
| VHCL SPEED SE   | <ul style="list-style-type: none"> <li>● Turn drive wheels and compare the CONSULT-II value with speedometer indication.</li> </ul>  |  | Almost the same speed as the speedometer indication         |
| BATTERY VOLT    | <ul style="list-style-type: none"> <li>● Ignition switch: ON (Engine stopped)</li> </ul>   |  | 11 - 14V  |
| THRTL POS SEN   | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Ignition switch: ON (Engine stopped)</li> </ul>   | Throttle valve fully closed                            | 0.2 - 0.8V  |
|                 |  | Throttle valve fully opened                            | 3.5 - 4.5V  |
| EGR TEMP SEN    | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> </ul>   |  | Less than 4.5V  |
| START SIGNAL    | <ul style="list-style-type: none"> <li>● Ignition switch: ON → START → ON</li> </ul>   |  | OFF → ON → OFF  |
| CLSD THL/P SW   | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Ignition switch: ON (Engine stopped)</li> </ul>   | Throttle valve: Idle position                          | ON  |
|                 |  | Throttle valve: Slightly open                          | OFF   |
| CLSD THL POS    | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Ignition switch: ON (Engine stopped)</li> </ul>   | Throttle valve: Idle position                          | ON  |
|                 |  | Throttle valve: Slightly open                          | OFF   |
| AIR COND SIG    | <ul style="list-style-type: none"> <li>● Engine: After warming up, idle the engine</li> </ul>  | A/C switch: OFF  | OFF   |
|                 |  | A/C switch: ON (Compressor operates.)                  | ON  |
| P/N POSI SW     | <ul style="list-style-type: none"> <li>● Ignition switch: ON</li> </ul>  | Shift lever: "P" or "N"                                | ON  |
|                 |  | Except above   | OFF   |
| PW/ST SIGNAL    | <ul style="list-style-type: none"> <li>● Engine: After warming up, idle the engine</li> </ul>  | Steering wheel in neutral position (forward direction) | OFF   |
|                 |  | The steering wheel is turned                           | ON  |
| IGNITION SW     | <ul style="list-style-type: none"> <li>● Ignition switch: ON → OFF → ON</li> </ul>   |  | ON → OFF → ON   |
| INJ PULSE-B1    | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul>                                     | Idle   | 2.5 - 3.3 msec  |
|                 |  | 2,000 rpm  | 2.4 - 3.2 msec  |



# TROUBLE DIAGNOSIS

[KA24DE]

| MONITOR ITEM   | CONDITION   | SPECIFICATION  |
|----------------|---|--|
| B/FUEL SCHDL   | ● Engine: After warming up<br>● Air conditioner switch: OFF   | Idle<br>0.8 - 1.2 msec   |
|                | ● Shift lever: "N"<br>● No-load   | 2,000 rpm<br>0.8 - 1.2 msec  |
| IGN TIMING     | ● Engine: After warming up<br>● Air conditioner switch: OFF   | Idle<br>Approx. 20° BTDC   |
|                | ● Shift lever: "N"<br>● No-load   | 2,000 rpm<br>More than 25° BTDC  |
| IACV-AAC/V     | ● Engine: After warming up<br>● Air conditioner switch: OFF   | Idle<br>Approx. 30%  |
|                | ● Shift lever: "N"<br>● No-load   | 2,000 rpm<br>—   |
| PURG VOL C/V   | ● Engine: After warming up<br>● Air conditioner switch: OFF   | Idle<br>0%   |
|                | ● No-load   | 2,000 rpm (More than 200 seconds after starting engine)<br>—               |
| A/F ALPHA-B1   | ● Engine: After warming up  | Maintaining engine speed at 2,000 rpm<br>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)<br>● Engine running and cranking   | ON   |
|                | ● Except as shown above   | OFF  |
| EGRC SOL/V     | ● Engine: After warming up<br>● Air conditioner switch: OFF   | Idle<br>ON (Cut)   |
|                | ● Shift lever: "N"<br>● No-load   | Engine speed: Revving engine from idle to 3,000 rpm quickly.<br>OFF (Flow) |
| 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.<br>● Engine: After warming up<br>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under on load | ON   |
|                | ● Ignition switch: ON (Engine stopped)  | OFF  |
|                | ● Ignition switch: ON   | OFF  |
| VC/V BYPASS/V  | ● Ignition switch: ON   | OFF  |
| CAL/LD VALUE   | ● Engine: After warming up<br>● Air conditioner switch: OFF   | Idle<br>9.5 - 34.0%  |
|                | ● Shift lever: "N"<br>● No-load   | 2,500 rpm<br>13.9 - 24.9%  |
| ABSOL TH.P/S   | ● Engine: After warming up, engine stopped<br>● Ignition switch: ON   | Throttle valve: fully closed<br>0.0%                                       |
|                |   | Throttle valve: fully opened<br>Approx. 80%                                |
| MASS AIRFLOW   | ● Engine: After warming up<br>● Air conditioner switch: OFF   | Idle<br>0.9 - 5.8 g-m/s  |
|                | ● Shift lever: "N"<br>● No-load   | 2,500 rpm<br>7.5 - 13.2 g-m/s  |

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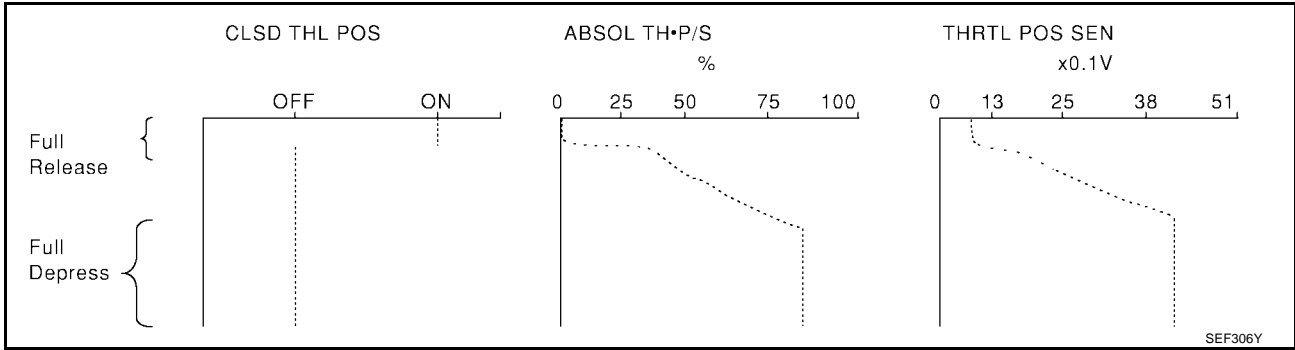
**Major Sensor Reference Graph in Data Monitor Mode**

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.

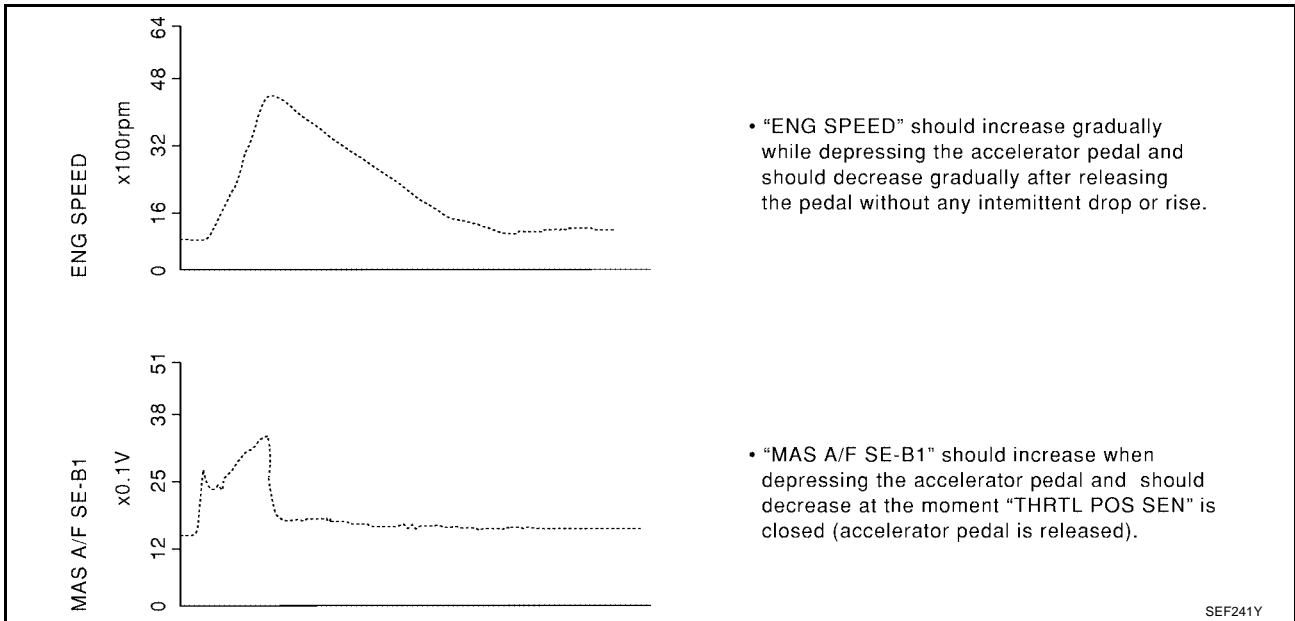
The signal of "THRTL POS SEN" and "ABSOL TH·P/S" should rise gradually without any intermittent drop or rise after "CLSD THL POS" is changed from "ON" to "OFF".



**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.



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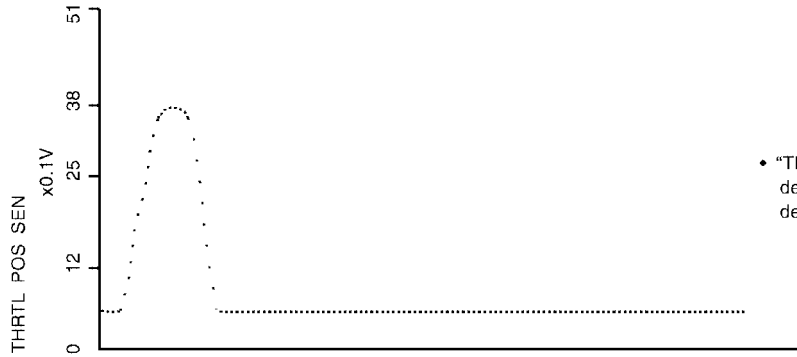
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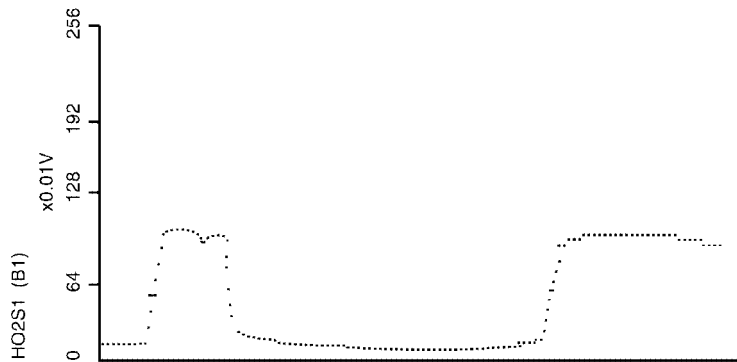
M



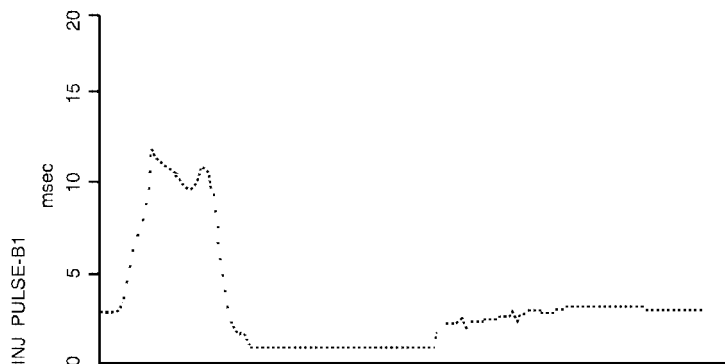
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "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.

## TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

### Description

UBS00598

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

UBS00599

- 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.

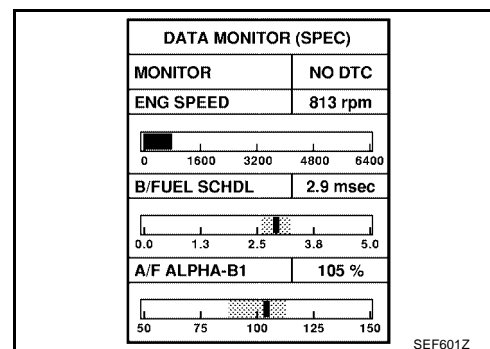
### Inspection Procedure

UBS0059A

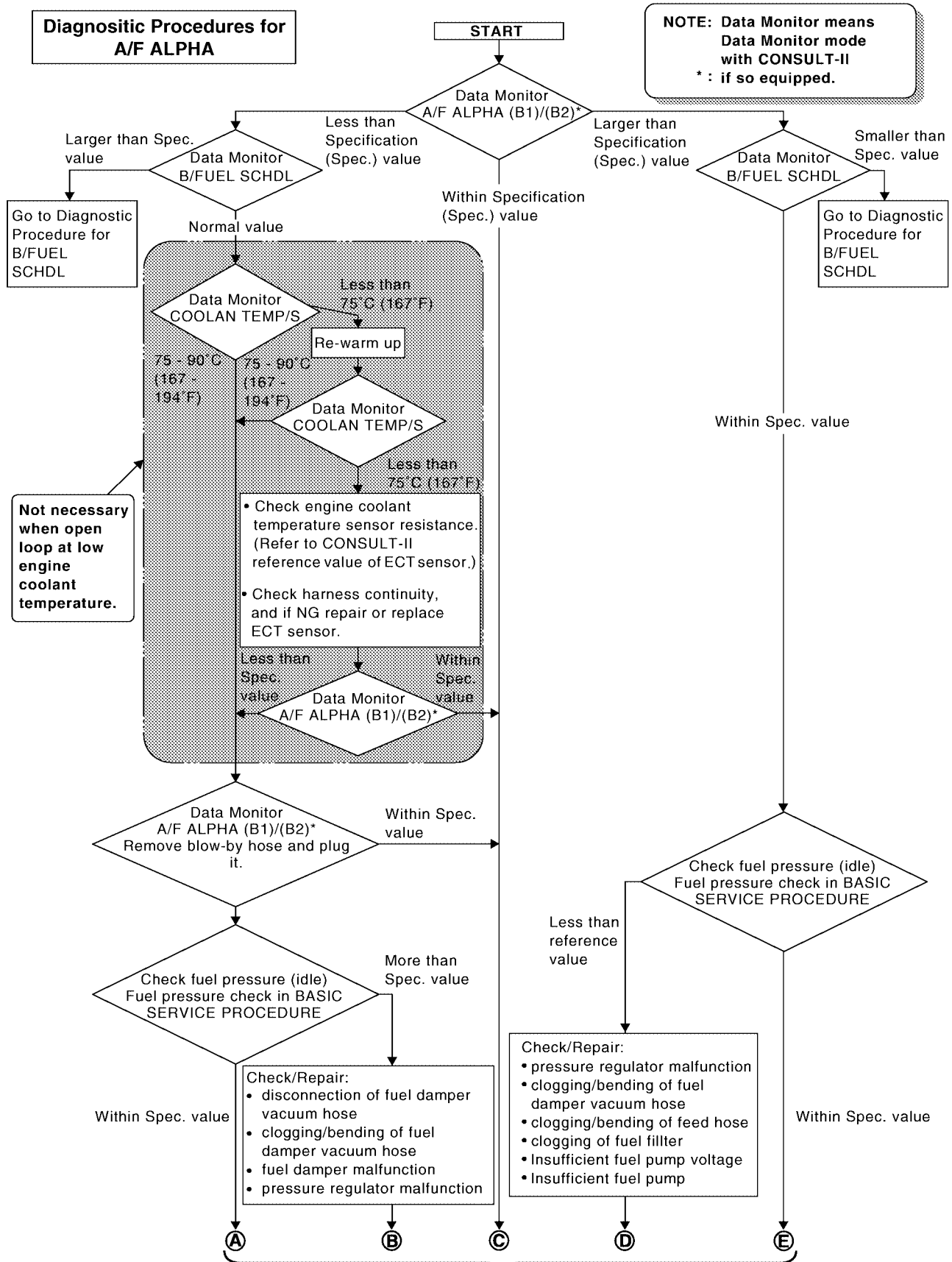
#### NOTE:

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

1. Perform [EC-73, "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"](#) .

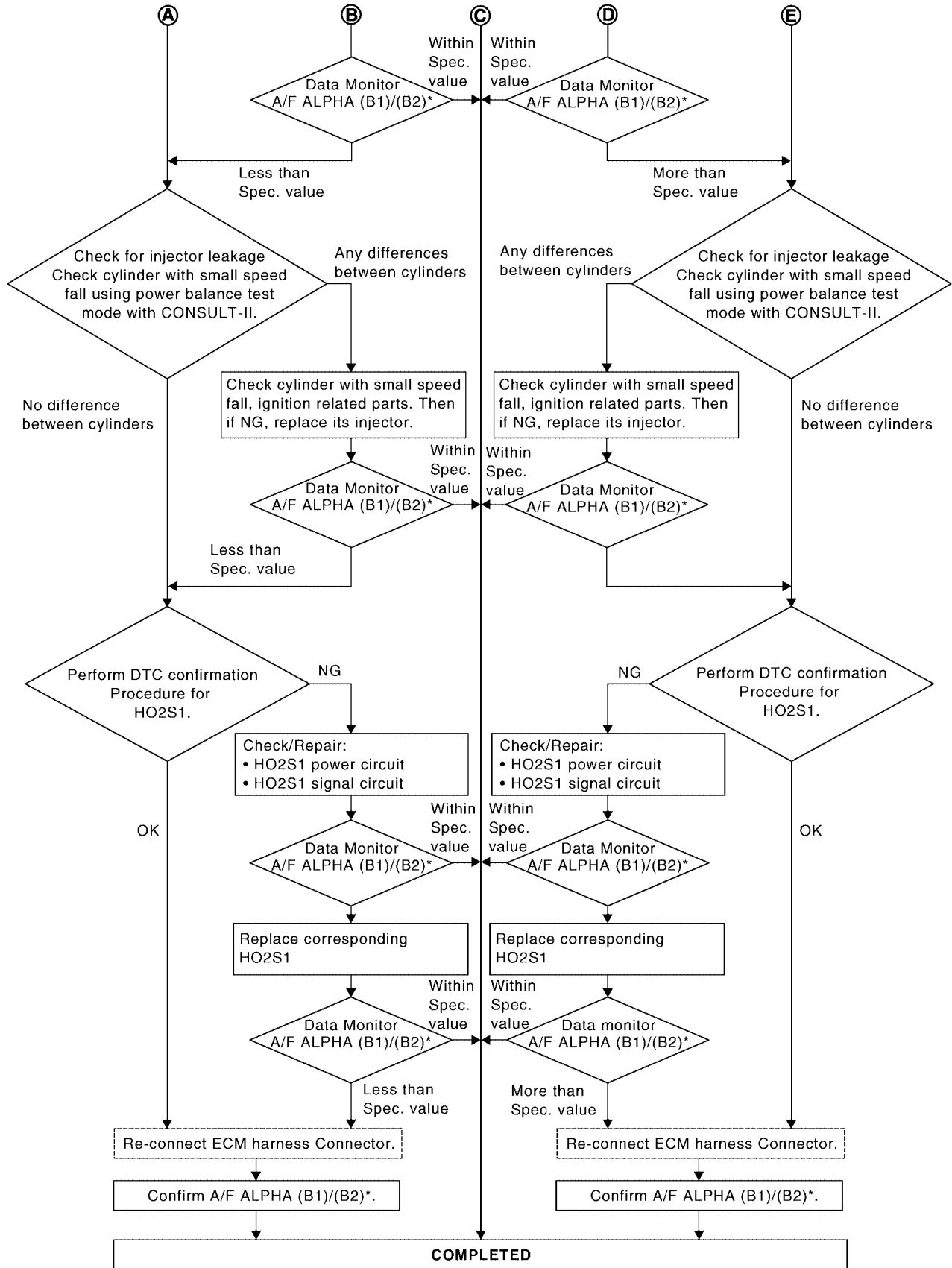


## Diagnostic Procedure

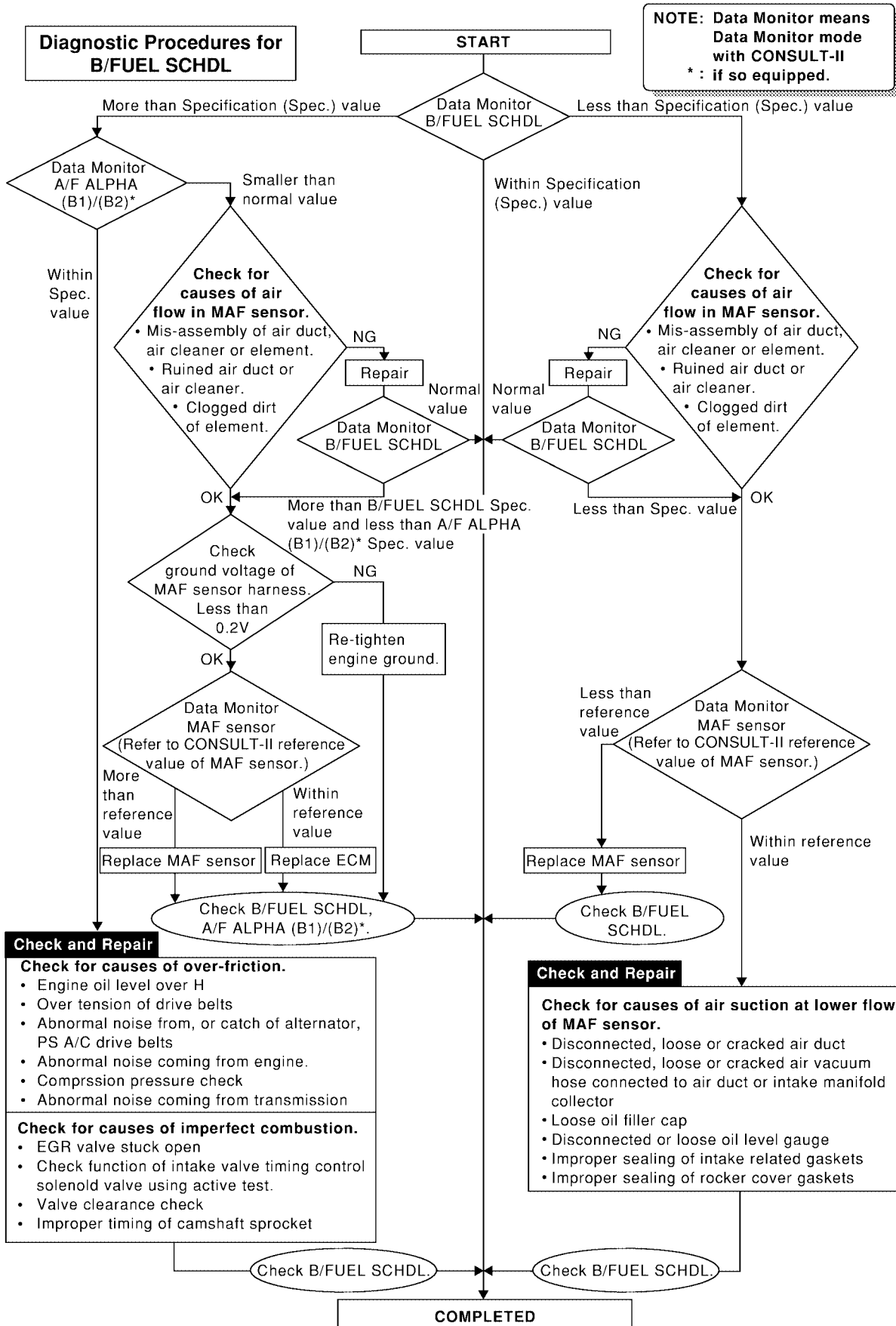


(Go to next page.)

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SEF768Z



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**TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT**

PFP:00006

**Description**

UBS0059C

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**

UBS0059D

**1. INSPECTION START**

Erase (1st trip) DTCs. Refer to [EC-60, "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 CIRCUIT FOR ECM

[KA24DE]

## POWER SUPPLY CIRCUIT FOR ECM

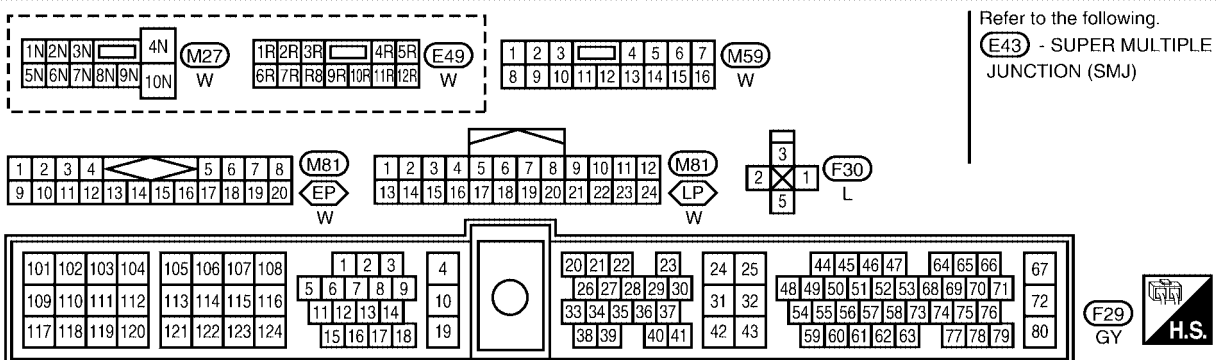
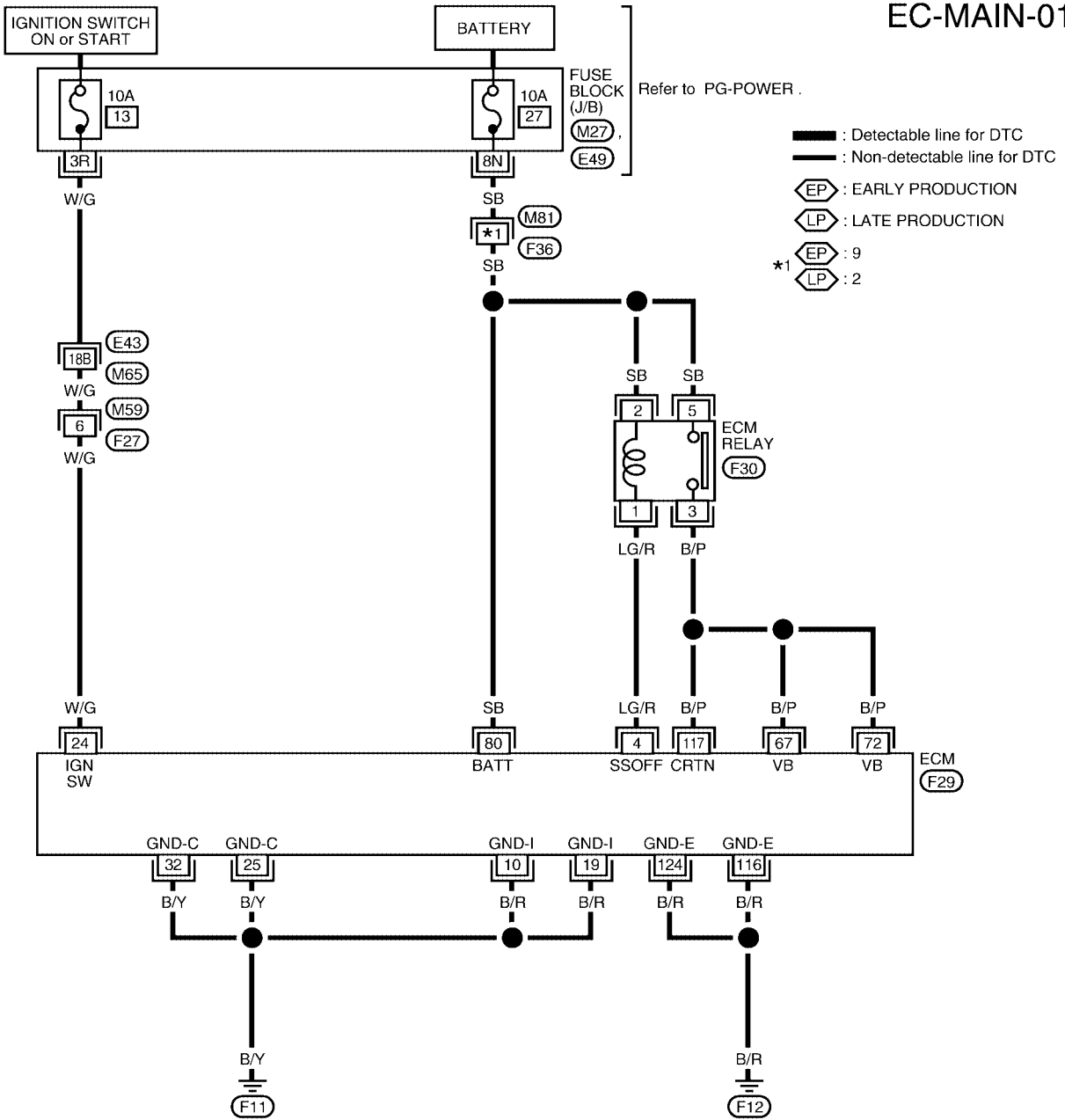
PF-P:24110

### Wiring Diagram

UBS0059E

EC-MAIN-01

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# POWER SUPPLY CIRCUIT FOR ECM

[KA24DE]

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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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 COLO R | ITEM                      | CONDITION   | DATA (DC Voltage)          |
|---------------|-------------|---------------------------|---|----------------------------|
| 4             | LG/R        | ECM relay (Self shut-off) | [Engine is running]<br>[Ignition switch OFF]<br>● For a few seconds after turning ignition switch OFF | 0 - 1V                     |
|               |             |                           | [Ignition switch OFF]<br>● A few seconds passed after turning ignition switch OFF                     | BATTERY VOLTAGE (11 - 14V) |
| 10            | B/R         | ECM ground                | [Engine is running]<br>● Idle speed   | Engine ground              |
| 19            | B/R         | ECM ground                | [Engine is running]<br>● 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]<br>● Idle speed   | Engine ground              |
| 32            | B/Y         | ECM ground                | [Engine is running]<br>● 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]<br>● Idle speed   | Engine ground              |
| 117           | B/P         | Current return            | [Engine is running]<br>● Idle speed   | BATTERY VOLTAGE (11 - 14V) |
| 124           | B/R         | ECM ground                | [Engine is running]<br>● Idle speed   | Engine ground              |

## Diagnostic Procedure

UBS0059G

### 1. INSPECTION START

Start engine.

**Is engine running?**

Yes or No

Yes >> GO TO 4.

No >> GO TO 2.

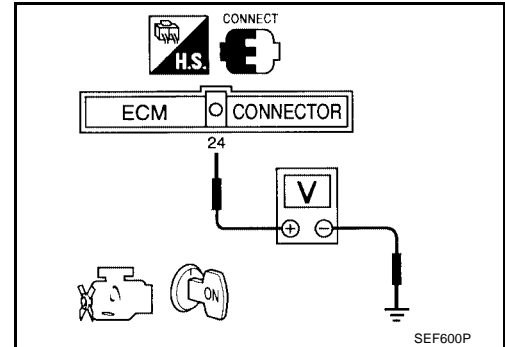
**2. CHECK POWER SUPPLY-I**

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 12.
- 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 harness or connectors.

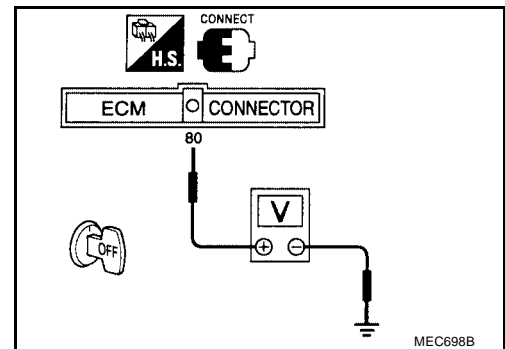
**4. CHECK POWER SUPPLY-II**

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 6.
- NG >> GO TO 5.



**5. 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 fuse

>> Repair harness or connectors.

**6. 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.

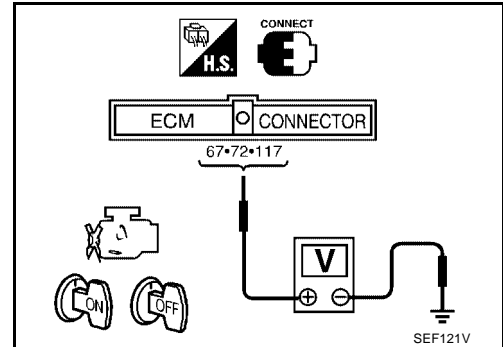
**Voltage** : After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.

OK or NG

OK >> GO TO 12.

NG (Battery voltage does not exist.)>>GO TO 7.

NG (Battery voltage exists for more than a few seconds.)>>GO TO 11.



**7. 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.

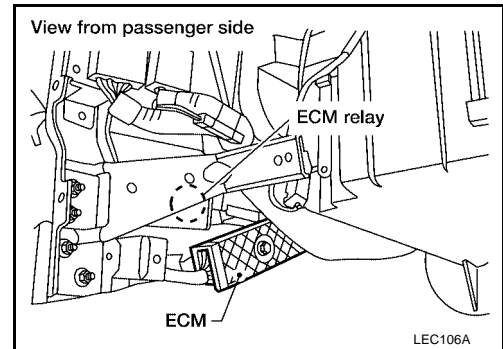
**Continuity should exist.**

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

OK or NG

OK >> GO TO 8

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



**8. CHECK VOLTAGE BETWEEN ECM RELAY AND GROUND**

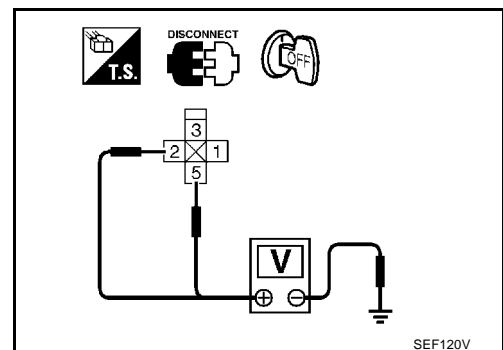
Check voltage between ECM relay terminals 2, 5 and ground with CONSULT-II or tester.

**Voltage** : Battery voltage

OK or NG

OK >> GO TO 10.

NG >> GO TO 9.



**9. DETECT MALFUNCTIONING PART**

Check the following.

- Harness for open or short between ECM relay and harness connector F36

>> Repair harness or connectors.

**10. 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 11.

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

**11. CHECK ECM RELAY**

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

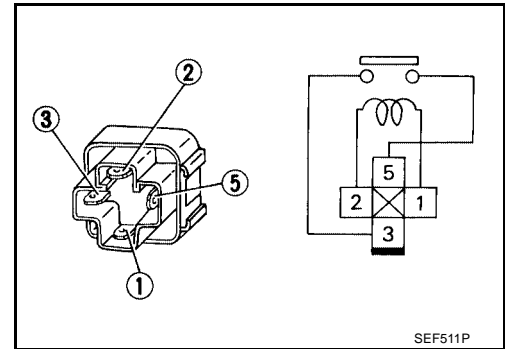
**12V (1 - 2) applied : Continuity exists.**

**No voltage applied : No continuity**

OK or NG

OK >> GO TO 12.

NG >> Replace ECM relay.



**12. 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 engine ground.  
Refer to Wiring Diagram.

**Continuity should exist.**

4. Also check harness for short to power.

OK or NG

OK >> GO TO 13.

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

**13. CHECK INTERMITTENT INCIDENT**

Perform [EC-120. "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

**>> INSPECTION END.**

# DTC P0031, P0032 HO2S1 HEATER

[KA24DE]

## DTC P0031, P0032 HO2S1 HEATER

PF:22690

### Description SYSTEM DESCRIPTION

UBS0059H

| 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

UBS0059I

Specification data are reference values.

| MONITOR ITEM   | CONDITION   | SPECIFICATION |
|----------------|---|---------------|
| HO2S1 HTR (B1) | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Engine speed: Below 3,600 rpm</li> </ul> | ON            |
|                | <ul style="list-style-type: none"> <li>● Engine speed: Above 3,600 rpm</li> </ul>                                     | OFF           |

### On Board Diagnosis Logic

UBS0059K

| 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.<br>(An excessively low voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)  | <ul style="list-style-type: none"> <li>● Harness or connectors<br/>(The heated oxygen sensor 1 heater circuit is open or shorted.)</li> <li>● Heater oxygen sensor 1 heater</li> </ul> |
| 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.<br>(An excessively high voltage signal is sent to ECM through the heated oxygen sensor 1 heater.) | <ul style="list-style-type: none"> <li>● Harness or connectors<br/>(The heated oxygen sensor 1 heater circuit is shorted.)</li> <li>● Heater oxygen sensor 1 heater</li> </ul>         |

**DTC Confirmation Procedure****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-129, "Diagnostic Procedure"](#)

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

**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-129, "Diagnostic Procedure"](#) .
- **When using GST, “DTC Confirmation Procedure” should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

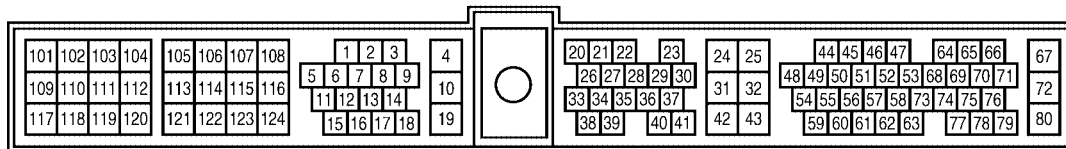
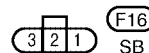
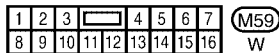
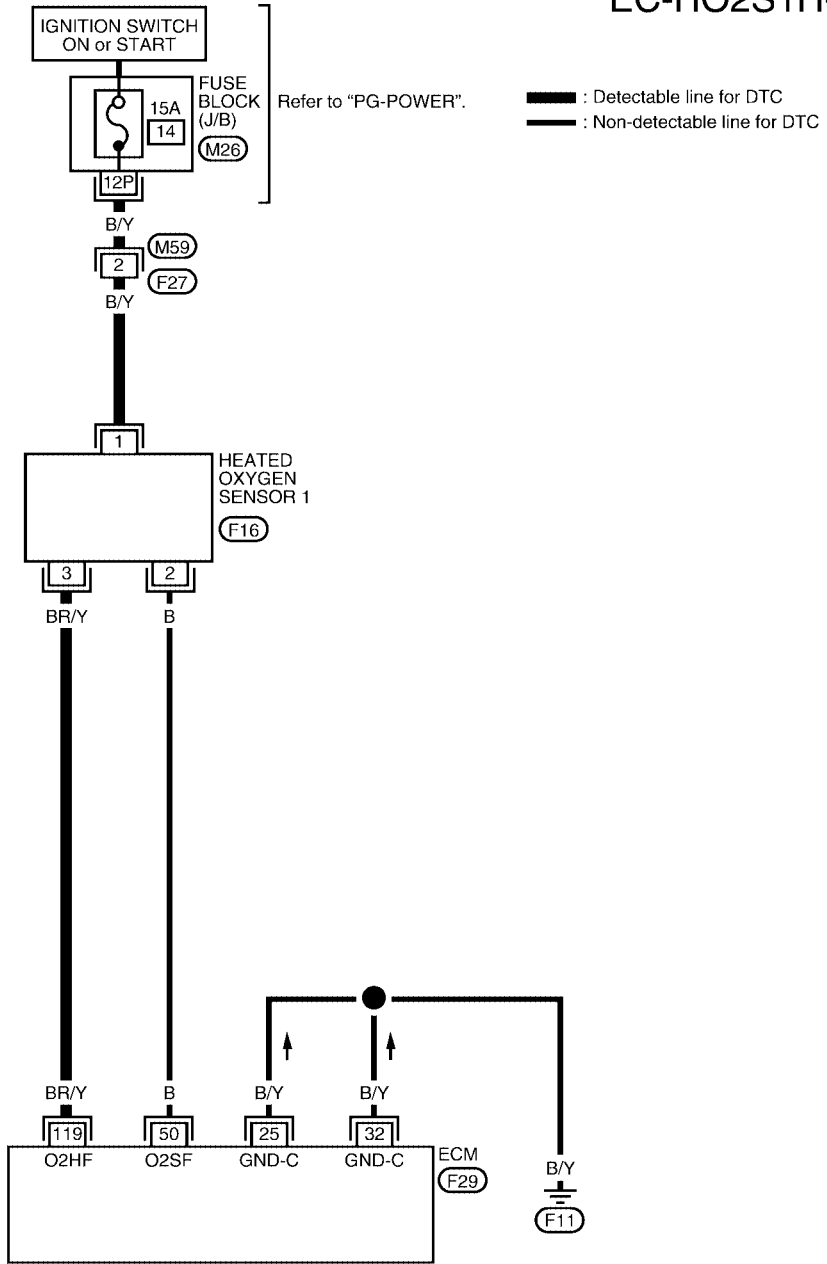
# DTC P0031, P0032 HO2S1 HEATER

[KA24DE]

UBS0059M

## Wiring Diagram

EC-HO2S1H-01



BBWA0436E



# DTC P0031, P0032 HO2S1 HEATER

[KA24DE]

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

**CAUTION:**

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

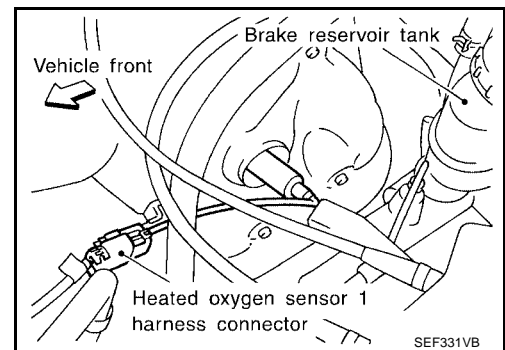
| TER-MINAL NO. | WIRE COLO R | ITEM                          | CONDITION   | DATA (DC Voltage)             |
|---------------|-------------|-------------------------------|---|-------------------------------|
| 119           | BR/Y        | Heated oxygen sensor 1 heater | [Engine is running]<br>● Engine speed is below 3,600 rpm. | Approximately 0.4V            |
|               |             |                               | [Engine is running]<br>● Engine speed is above 3,600 rpm. | BATTERY VOLTAGE<br>(11 - 14V) |

## Diagnostic Procedure

UBS0059N

### 1. CHECK POWER SUPPLY

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

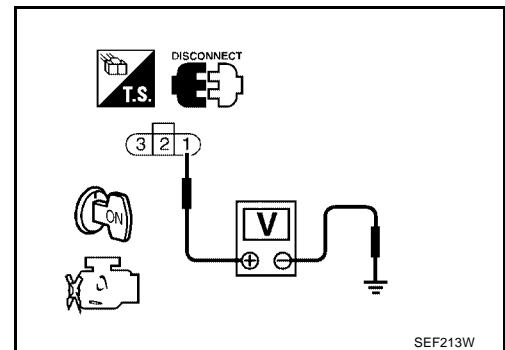


4. Check voltage between terminal 1 and ground with CONSULT-II or tester.

**Voltage : Battery voltage**

OK or NG

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



### 2. 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 15A fuse

>> Repair harness or connectors.

### 3. 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 4.

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

### 4. CHECK HEATED OXYGEN SENSOR 1 HEATER

Check resistance between terminals 3 and 1.

**Resistance : 2.3 - 4.3  $\Omega$  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 5.

NG >> Replace heated oxygen sensor 1.

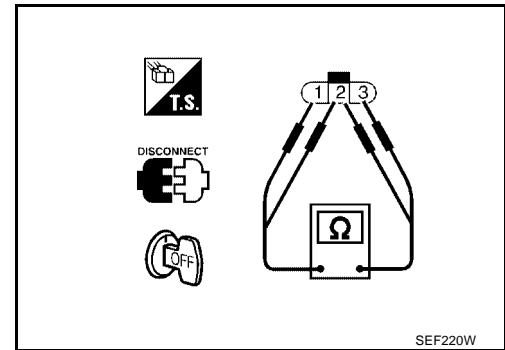
### 5. CHECK INTERMITTENT INCIDENT

Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 1

Refer to [EM-13, "OUTER COMPONENT PARTS"](#) .



# DTC P0037, P0038 HO2S2 HEATER

[KA24DE]

## DTC P0037, P0038 HO2S2 HEATER

PF:226A0

### Description SYSTEM DESCRIPTION

UBS00590

| 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                           |
| <ul style="list-style-type: none"> <li>Below 3,600 rpm after the following conditions are met.</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load</li> </ul> | ON                            |

### CONSULT-II Reference Value in Data Monitor Mode

UBS0059P

Specification data are reference values.

| MONITOR ITEM   | CONDITION   | SPECIFICATION |
|----------------|---|---------------|
| HO2S2 HTR (B1) | <ul style="list-style-type: none"> <li>Engine speed: Below 4,000 rpm after the following conditions are met.</li> <li>Engine: After warming up</li> <li>Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load</li> </ul> | ON            |
|                | <ul style="list-style-type: none"> <li>Engine speed: Above 4,000 rpm</li> </ul>   | OFF           |

### On Board Diagnosis Logic

UBS0059R

| 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.)  | <ul style="list-style-type: none"> <li>Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.)</li> <li>Heater oxygen sensor 2 heater</li> </ul> |
| 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.) | <ul style="list-style-type: none"> <li>Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.)</li> <li>Heater oxygen sensor 2 heater</li> </ul>         |

**DTC Confirmation Procedure****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 one minute under no load.
5. Let engine idle for one minute.
6. If 1st trip DTC is detected, go to [EC-134, "Diagnostic Procedure"](#)

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

SEF174Y

**WITH GST**

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Turn ignition switch "OFF" and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
7. Let engine idle for one minute.
8. Select "MODE 3" with GST.
9. If DTC is detected, go to [EC-134, "Diagnostic Procedure"](#).

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

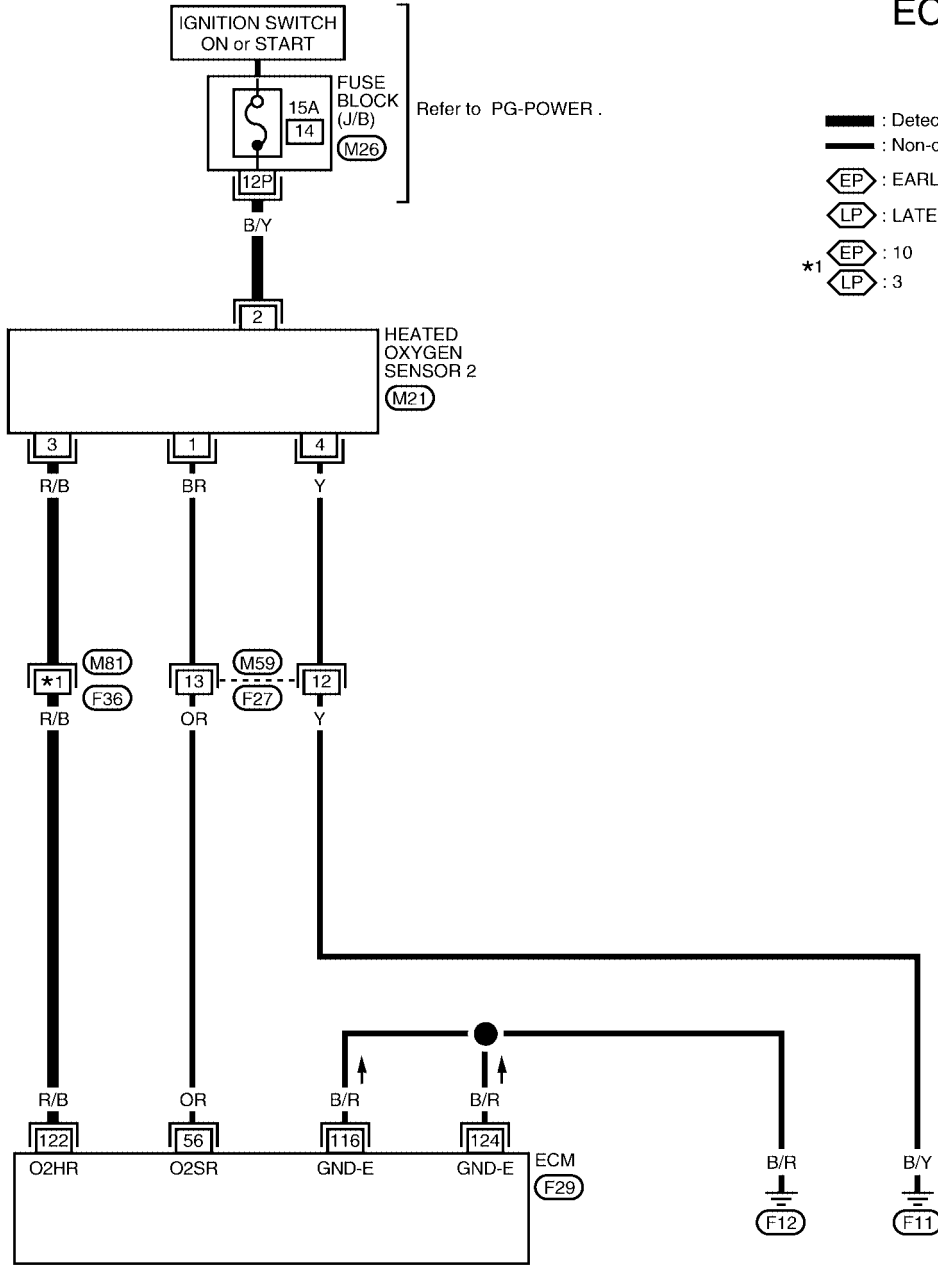
# DTC P0037, P0038 HO2S2 HEATER

[KA24DE]

UBS0059T

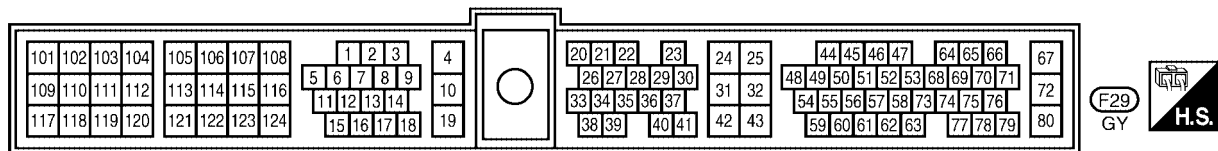
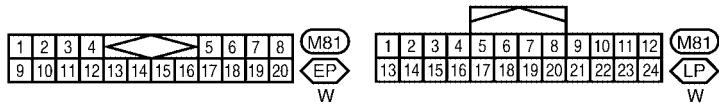
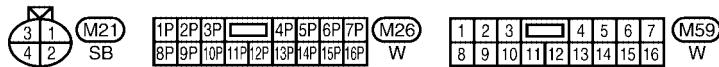
## Wiring Diagram

EC-HO2S2H-01



- : Detectable line for DTC
  - : Non-detectable line for DTC
  - : EARLY PRODUCTION
  - : LATE PRODUCTION
  - : 10
  - : 3
- \*1

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



WBWA0009E

# DTC P0037, P0038 HO2S2 HEATER

[KA24DE]

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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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)          |
|---------------|------------|-------------------------------|--|----------------------------|
| 122           | R/B        | Heated oxygen sensor 2 heater | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● <b>Warm-up condition</b></li> <li>● Engine speed: Below 3,600 rpm after the following conditions are met.</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load</li> </ul> | 0 - 1.0V                   |
|               |            |                               | <b>[Ignition switch "ON"]</b> <ul style="list-style-type: none"> <li>● Engine stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is above 3,600 rpm.</li> </ul>   | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

UBS0059U

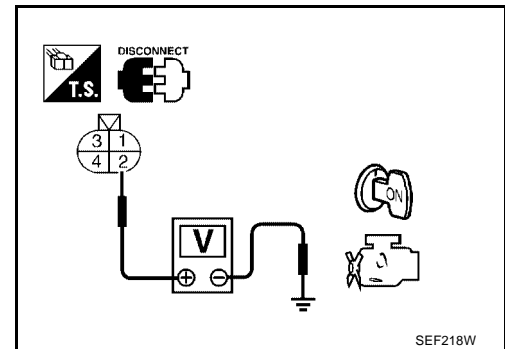
### 1. CHECK POWER SUPPLY

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

**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 M26
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 and 15A fuse

>> Repair harness or connectors.

### 3. 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 5.
- NG >> GO TO 4.

### 4. 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.

### 5. CHECK HEATED OXYGEN SENSOR 2 HEATER

Check the following.

1. Check resistance between terminals 2 and 3.

**Resistance : 2.3 - 4.3Ω at 25°C (77°F)**

2. Check continuity.

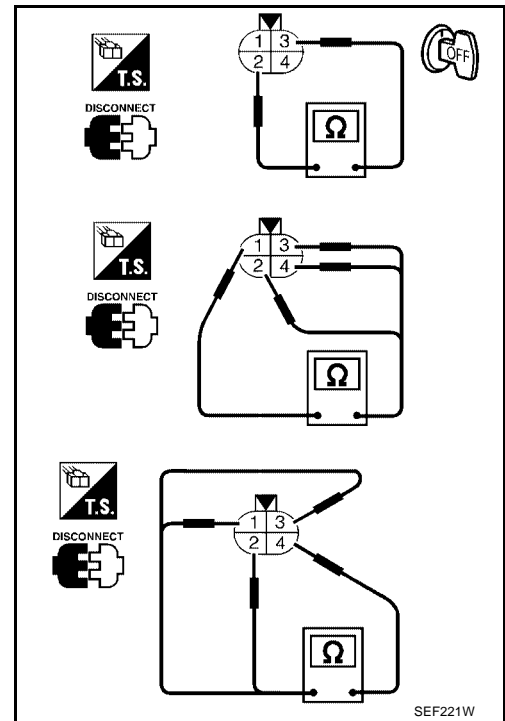
| Terminal No.  | Continuity |
|---------------|------------|
| 1 and 2, 3, 4 | No         |
| 4 and 1, 2, 3 |            |

**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 6.
- NG >> Replace heated oxygen sensor 2.



### 6. CHECK INTERMITTENT INCIDENT

Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

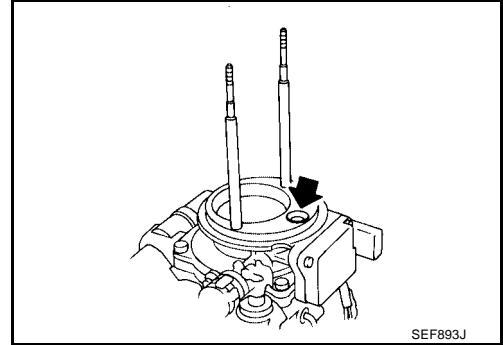
### Removal and Installation HEATED OXYGEN SENSOR 2

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

**DTC P0101 MAF SENSOR**

**Component Description**

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot wire that is supplied with electric current from the ECM. The temperature of the hot wire is controlled by the ECM 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 ECM must supply more 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.



**CONSULT-II Reference Value in Data Monitor Mode**

Specification data are reference values.

| MONITOR ITEM  | CONDITION  |           | SPECIFICATION    |
|---------------|--|-----------|------------------|
| MAS A/F SE-B1 | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 0.9 - 1.8V       |
|               |  | 2,500 rpm | 1.9 - 2.3V       |
| CAL/LD VALUE  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 9.5 - 34.0%      |
|               |  | 2,500 rpm | 13.9 - 24.9%     |
| MASS AIRFLOW  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 0.9 - 5.8 g-m/s  |
|               |  | 2,500 rpm | 7.5 - 13.2 g-m/s |

**On Board Diagnosis Logic**

This self-diagnosis has the one trip detection logic.

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Mass air flow sensor</li> </ul>                             |
|         |  | B)                      | A low voltage from the sensor is sent to ECM under heavy load driving condition.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Intake air leaks</li> <li>● Mass air flow sensor</li> </ul> |



## DTC Confirmation Procedure

Perform "PROCEDURE FOR MALFUNCTION A" first. If the 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 DTC is detected, go to [EC-140, "Diagnostic Procedure"](#).

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

SEF174Y

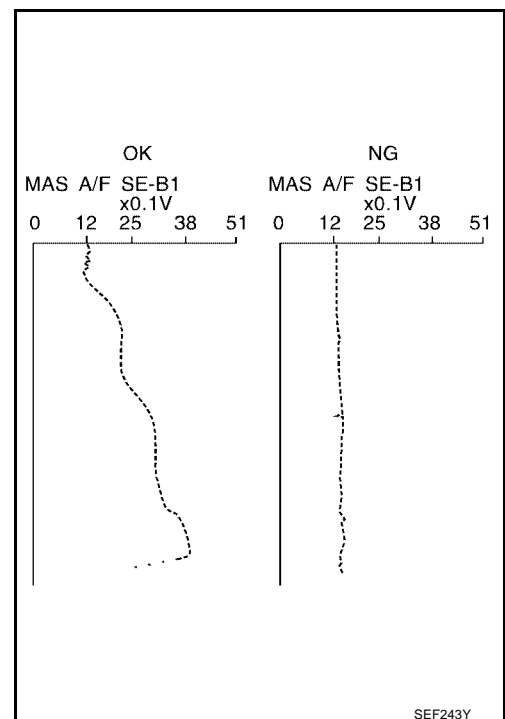
**With GST**

Follow the procedure "With CONSULT-II".

### 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-140, "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-140, "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. |

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| VHCL SPEED SE | XXX km/h |
| THRTL POS SEN | XXX V    |

SEF175Y

8. If DTC is detected, go to [EC-140, "Diagnostic Procedure"](#) .

## Overall Function Check

UBS006EF

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 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-140, "Diagnostic Procedure"](#) .

|              |                   |
|--------------|-------------------|
| CALC LOAD    | 20%               |
| COOLANT TEMP | 95°C              |
| SHORT FT #1  | 2%                |
| LONG FT #1   | 0%                |
| SHORT FT #2  | 4%                |
| LONG FT #2   | 0%                |
| ENGINE SPD   | 2637RPM           |
| VEHICLE SPD  | 0MPH              |
| IGN ADVANCE  | 41.0°             |
| INTAKE AIR   | 41°C              |
| <b>MAF</b>   | <b>14.1gm/sec</b> |
| THROTTLE POS | 3%                |

SEF534P

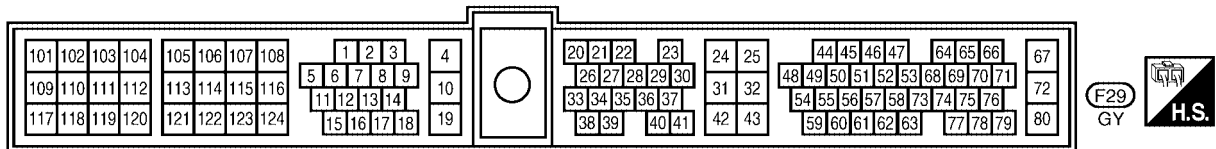
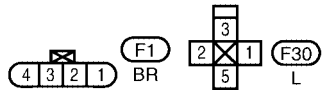
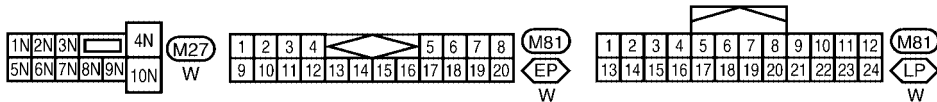
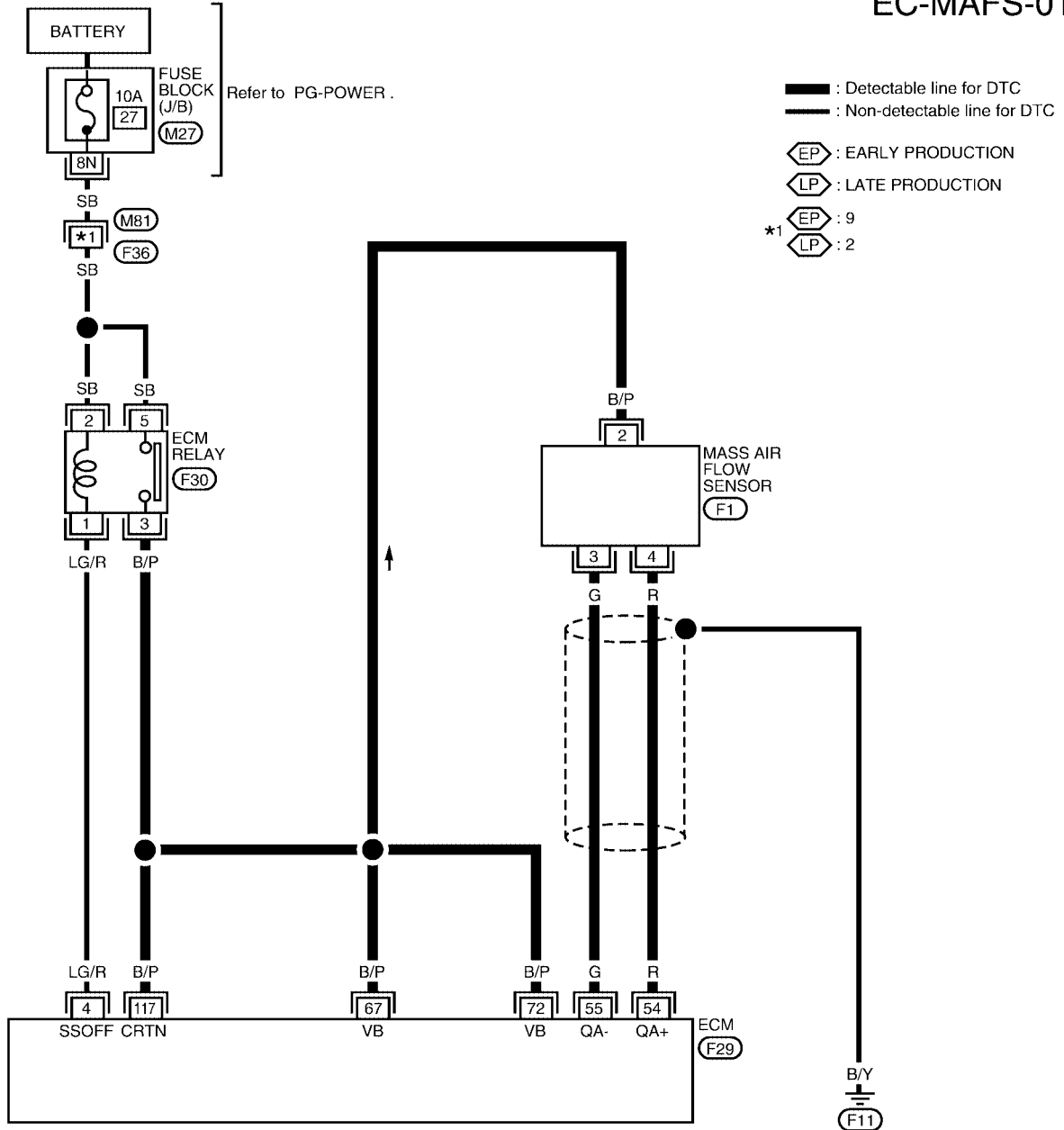
# DTC P0101 MAF SENSOR

[KA24DE]

UBS006EG

## Wiring Diagram

EC-MAFS-01



WBWA0010E

# DTC P0101 MAF SENSOR

[KA24DE]

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

## CAUTION:

Do not use ECM ground terminals when measuring input/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 COLO R | ITEM                        | CONDITION   | DATA (DC Voltage) |
|---------------|-------------|-----------------------------|---|-------------------|
| 54            | R           | Mass air flow sensor        | [Engine is running]<br>● Warm-up condition<br>● Idle speed                | 0.9 - 1.8V        |
|               |             |                             | [Engine is running]<br>● Warm-up condition<br>● Engine speed is 2,500 rpm | 1.9 - 2.3V        |
| 55            | G           | Mass air flow sensor ground | [Engine is running]<br>● Warm-up condition<br>● Idle speed                | Approximately 0V  |

## Diagnostic Procedure

UBS006EH

### 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 to collector

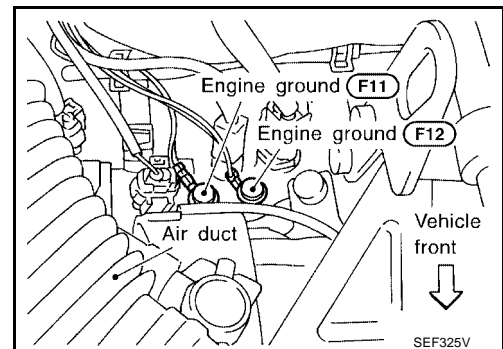
OK or NG

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

### 3. RETIGHTEN GROUND SCREWS

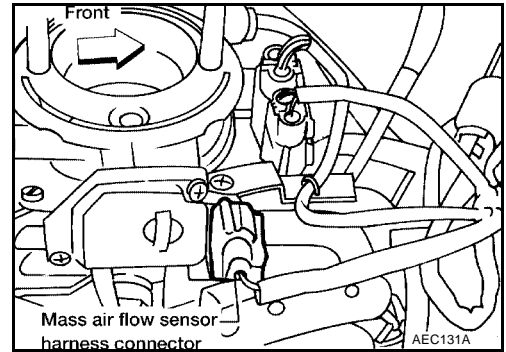
1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

>> GO TO 4.



#### 4. CHECK POWER SUPPLY

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

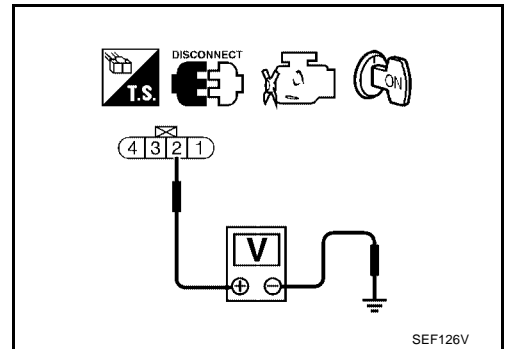


3. Check voltage between terminal 2 and ground with CONSULT-II or tester.

**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 mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair harness or connectors.

#### 6. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 3 and ECM terminal 55. 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 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 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.

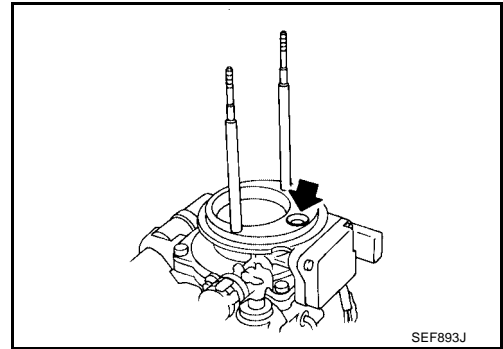
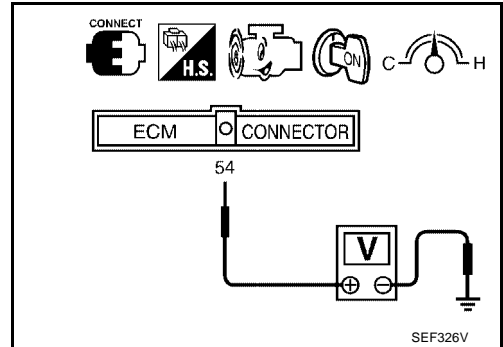
| Condition  | Voltage V                |
|--|--------------------------|
| Ignition switch "ON" (Engine stopped.)                           | Less than 1.0            |
| Idle (Engine is warmed-up to normal operating temperature.)      | 0.9 - 1.85               |
| 2,500 rpm (Engine is warmed-up to normal operating temperature.) | 1.9 - 2.3                |
| Idle to about 4,000 rpm*   | 1.3 - 1.7 to Approx. 3.0 |

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

5. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Repeat above check.
6. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.

**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.**

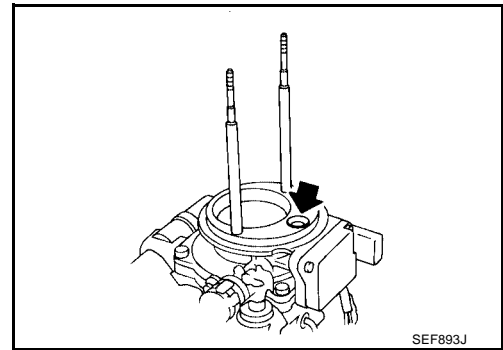
DTC P0102, P0103 MAF SENSOR

PF2:22680

Component Description

UBS006E1

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot wire that is supplied with electric current from the ECM. The temperature of the hot wire is controlled by the ECM 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 ECM must supply more 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.



CONSULT-II Reference Value in Data Monitor Mode

UBS006EJ

Specification data are reference values.

| MONITOR ITEM  | CONDITION  |           | SPECIFICATION    |
|---------------|--|-----------|------------------|
| MAS A/F SE-B1 | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 0.9 - 1.8V       |
|               |  | 2,500 rpm | 1.9 - 2.3V       |
| CAL/LD VALUE  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 9.5 - 34.0%      |
|               |  | 2,500 rpm | 13.9 - 24.9%     |
| MASS AIRFLOW  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 0.9 - 5.8 g-m/s  |
|               |  | 2,500 rpm | 7.5 - 13.2 g-m/s |

On Board Diagnosis Logic

UBS006EL

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.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Intake air leaks</li> <li>● Mass air flow sensor</li> </ul> |
| P0103   | Mass air flow sensor circuit high input | An excessively high voltage from the sensor is sent to ECM. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Mass air flow sensor</li> </ul>                             |

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                        |
|------------------------------|---|
| Mass air flow sensor circuit | Engine speed will not rise more than 2,400 rpm due to the fuel cut. |

## DTC Confirmation Procedure

**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-146, "Diagnostic Procedure"](#) .

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

 **With GST**

Follow the procedure “With CONSULT-II”.

### 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-146, "Diagnostic Procedure"](#) 7. 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-146, "Diagnostic Procedure"](#) .

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

 **With GST**

Follow the procedure “With CONSULT-II”.



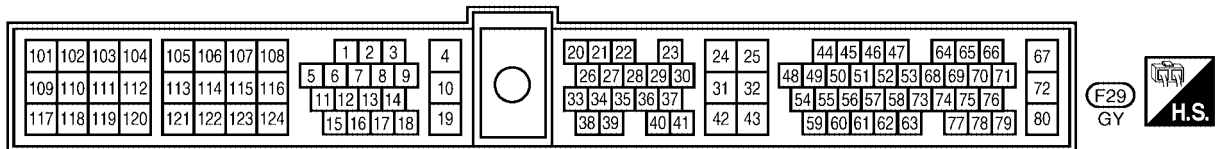
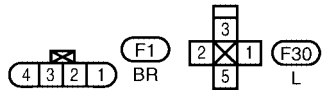
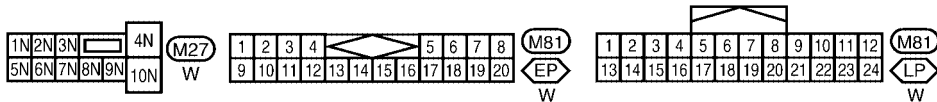
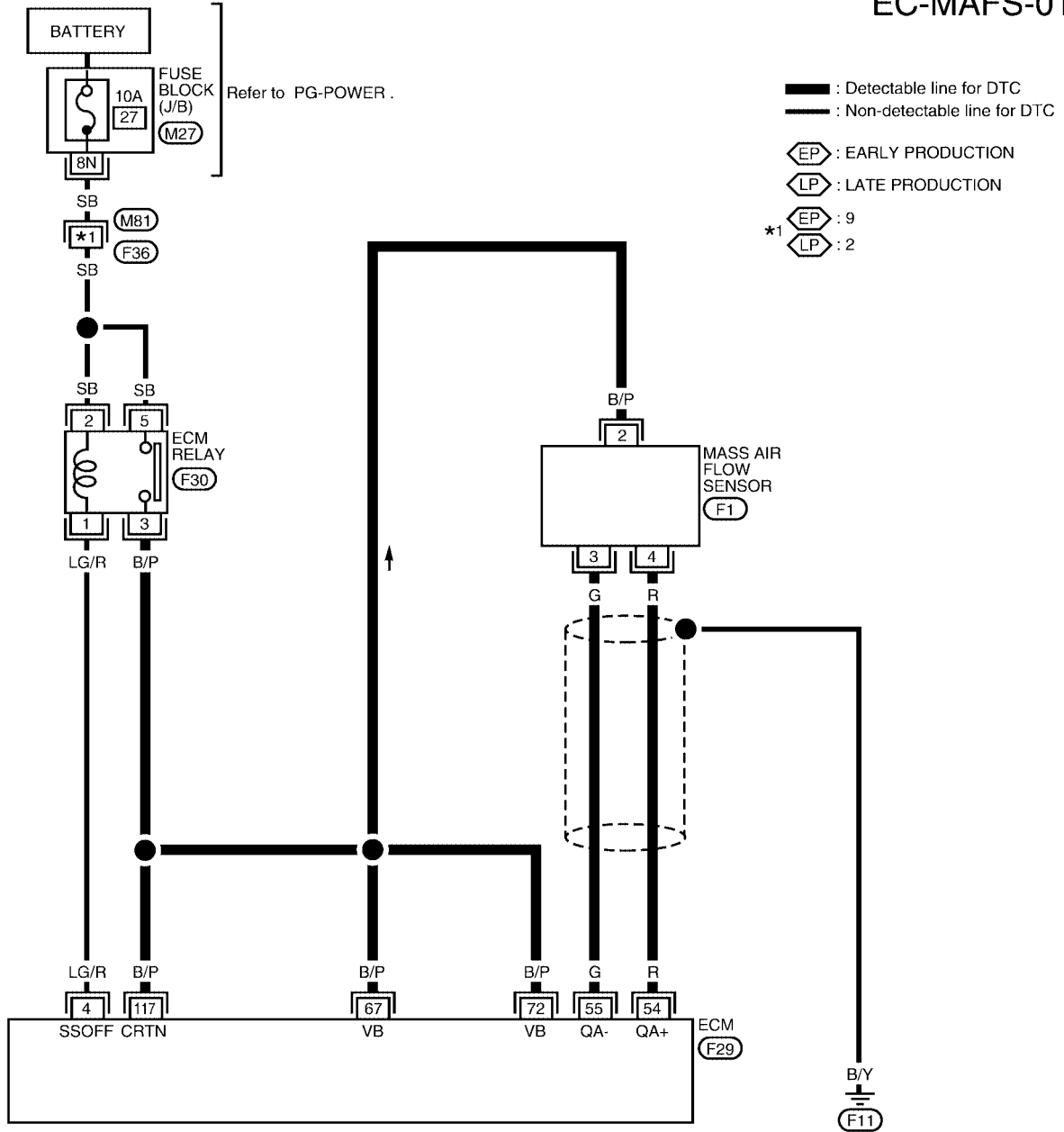
# DTC P0102, P0103 MAF SENSOR

[KA24DE]

UBS006EO

## Wiring Diagram

EC-MAFS-01



WBWA0010E

# DTC P0102, P0103 MAF SENSOR

[KA24DE]

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

## CAUTION:

Do not use ECM ground terminals when measuring input/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) |
|---------------|------------|-----------------------------|---|-------------------|
| 54            | R          | Mass air flow sensor        | [Engine is running]<br>● Warm-up condition<br>● Idle speed                | 0.9 - 1.8V        |
|               |            |                             | [Engine is running]<br>● Warm-up condition<br>● Engine speed is 2,500 rpm | 1.9 - 2.3V        |
| 55            | G          | Mass air flow sensor ground | [Engine is running]<br>● Warm-up condition<br>● Idle speed                | Approximately 0V  |

## Diagnostic Procedure

UBS006EP

### 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 to collector

OK or NG

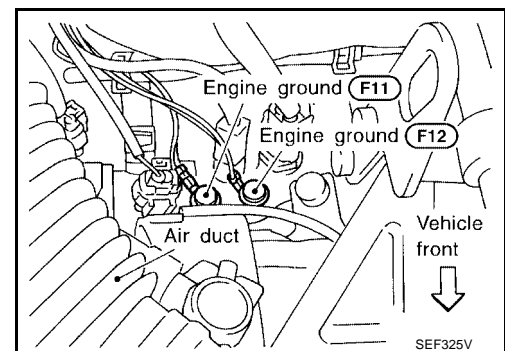
OK >> GO TO 3.

NG >> Reconnect the parts.

### 3. RETIGHTEN GROUND SCREWS

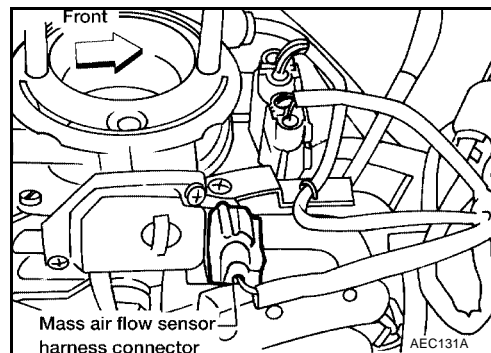
1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

>> GO TO 4.



## 4. CHECK POWER SUPPLY

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

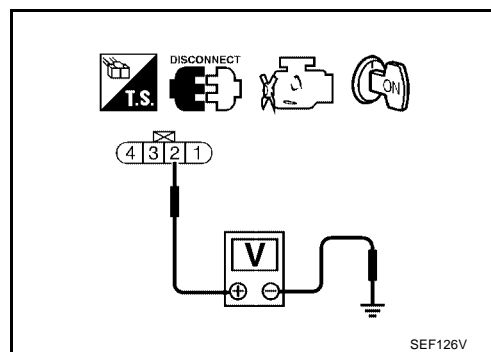


3. Check voltage between terminal 2 and ground with CONSULT-II or tester.

**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 mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair harness or connectors.

## 6. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 3 and ECM terminal 55. 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 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 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.

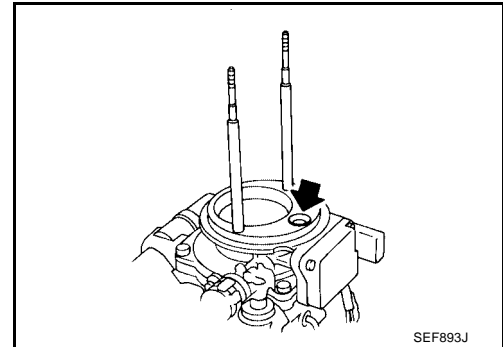
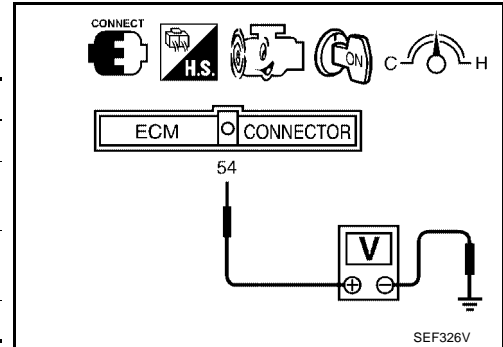
| Condition  | Voltage V                |
|--|--------------------------|
| Ignition switch "ON" (Engine stopped.)                           | Less than 1.0            |
| Idle (Engine is warmed-up to normal operating temperature.)      | 0.9 - 1.85               |
| 2,500 rpm (Engine is warmed-up to normal operating temperature.) | 1.9 - 2.3                |
| Idle to about 4,000 rpm*   | 1.3 - 1.7 to Approx. 3.0 |

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

5. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Repeat above check.
6. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.

OK or NG

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



**9. CHECK INTERMITTENT INCIDENT**

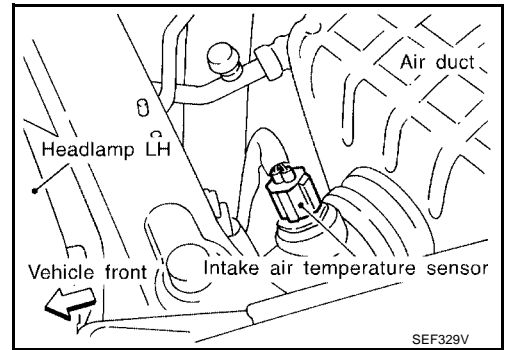
Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

DTC P0112, P0113 IAT SENSOR

Component Description

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.

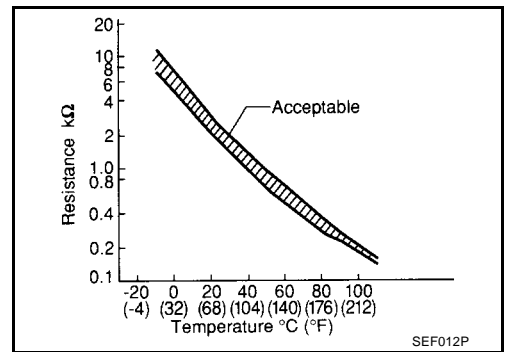


The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

<Reference data>

| Intake air temperature<br>°C (°F) | Voltage*<br>V | Resistance<br>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 ECM terminals, such as the ground.

On Board Diagnosis 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.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Intake air temperature sensor</li> </ul> |
| 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****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.

**④ 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-152. "Diagnostic Procedure"](#)

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

**④ WITH GST**

Follow the procedure "WITH CONSULT-II".

# DTC P0112, P0113 IAT SENSOR

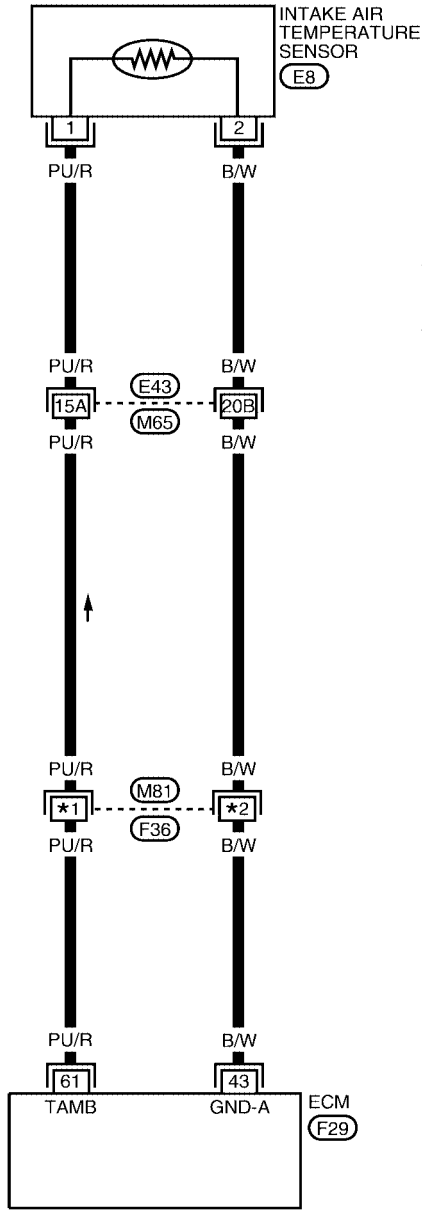
[KA24DE]

UBS006ET

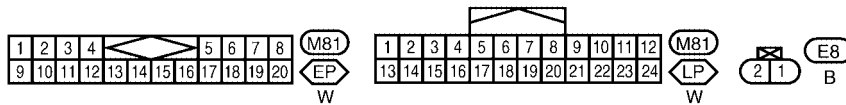
## Wiring Diagram

EC-IATS-01

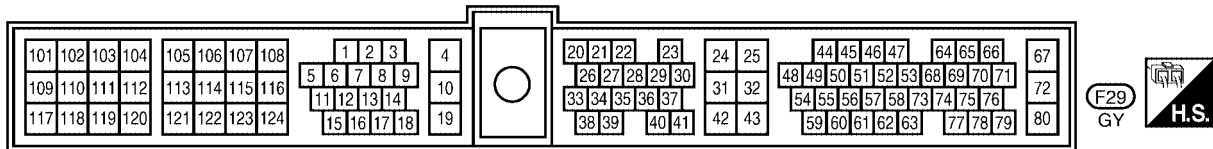
A  
EC  
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M



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- \*1 EP : 19
- LP : 22
- \*2 EP : 1
- LP : 4



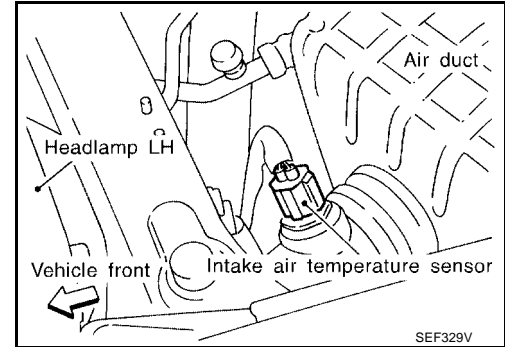
Refer to the following.  
E43 - SUPER MULTIPLE JUNCTION (SMJ)



WBWA0011E

**Diagnostic Procedure****1. CHECK POWER SUPPLY**

1. Turn ignition switch OFF.
2. Disconnect intake air temperature sensor harness connector.
3. Turn ignition switch ON.

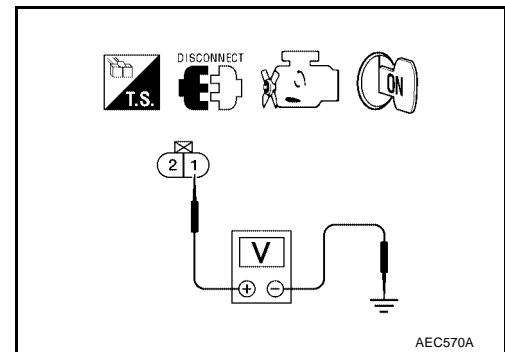


4. Check voltage between terminal 1 and ground with CONSULT-II or tester.

**Voltage : Approximately 5V**

OK or NG

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

**2. DETECT MALFUNCTIONING PART**

Check the following.

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

>> Repair harness or connectors.

**3. CHECK GROUND CIRCUIT**

1. Turn ignition switch OFF.
2. Check harness continuity between intake air temperature sensor terminal 2 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

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



**4. DETECT MALFUNCTIONING PART**

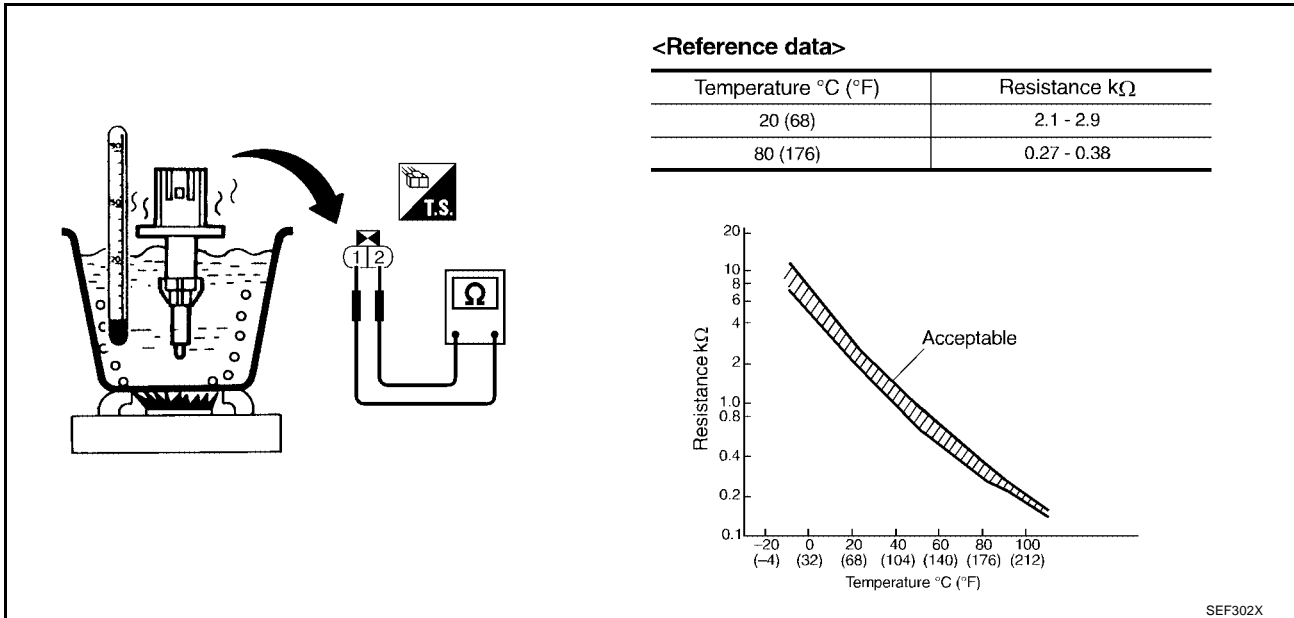
Check the following.

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

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

**5. CHECK INTAKE AIR TEMPERATURE SENSOR**

Check resistance as shown in the figure.



OK or NG

- OK >> GO TO 6.
- NG >> Replace intake air temperature sensor.

**6. CHECK INTERMITTENT INCIDENT**

Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

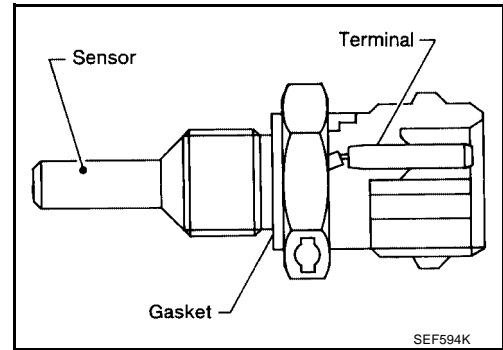
## DTC P0117, P0118 ECT SENSOR

PFP:22630

### Component Description

UBS005AC

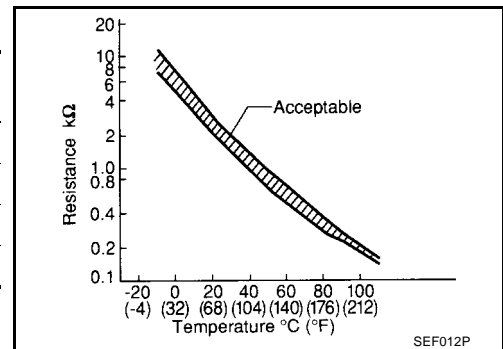
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



### <Reference data>

| Engine coolant temperature<br>°C (°F) | Voltage*<br>V | Resistance<br>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 ECM terminals, such as the ground.**

### CONSULT-II Reference Value in Data Monitor Mode

UBS005AD

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

### On Board Diagnosis Logic

UBS005AE

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.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Engine coolant temperature sensor</li> </ul> |
| 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.<br>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)<br>(Depends on the time)        |

## DTC Confirmation Procedure

**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-157, "Diagnostic Procedure"](#) .

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

**WITH GST**

Follow the procedure "With CONSULT-II".

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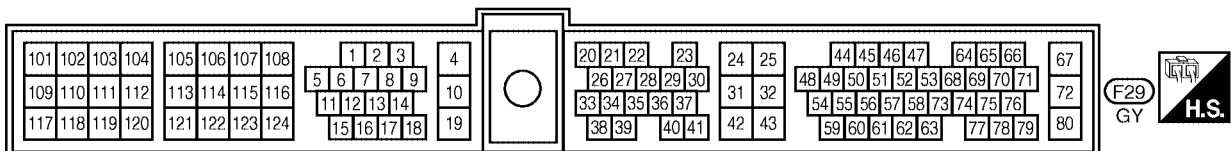
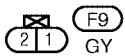
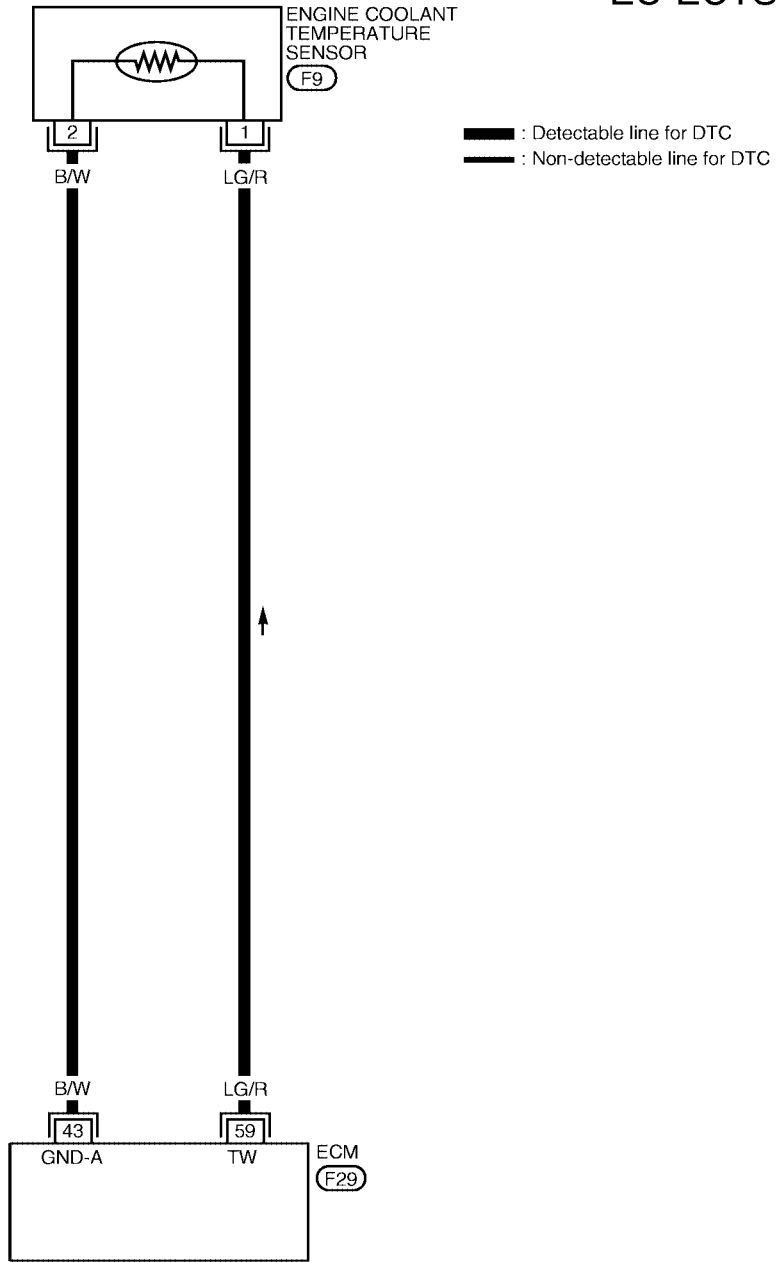
# DTC P0117, P0118 ECT SENSOR

[KA24DE]

UBS005AG

## Wiring Diagram

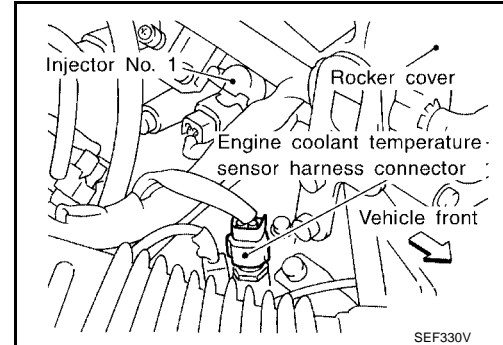
EC-ECTS-01



AEC984A

**Diagnostic Procedure****1. CHECK POWER SUPPLY**

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

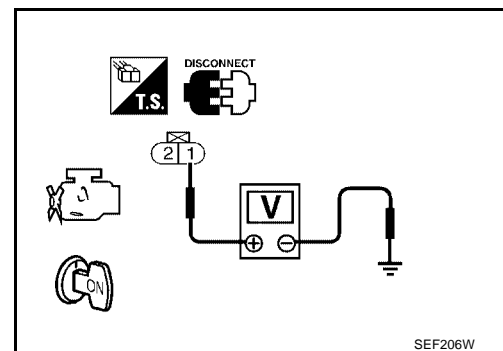


4. Check voltage between engine coolant temperature sensor terminal 1 and ground with CONSULT-II or tester.

**Voltage : Approximately 5V**

**OK or NG**

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

**2. DETECT MALFUNCTIONING PART**

Check the harness for open or short between ECM and engine coolant temperature sensor.

>> Repair harness or connectors.

**3. CHECK GROUND CIRCUIT**

1. Turn ignition switch OFF.
2. Check harness continuity between engine coolant temperature sensor terminal 2 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

**OK or NG**

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

**4. DETECT MALFUNCTIONING PART**

Check the harness for open or short between ECM and engine coolant temperature sensor.

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

**5. CHECK ENGINE COOLANT TEMPERATURE SENSOR**

Refer to [EC-158, "Component Inspection"](#) .

OK or NG

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

**6. CHECK INTERMITTENT INCIDENT**

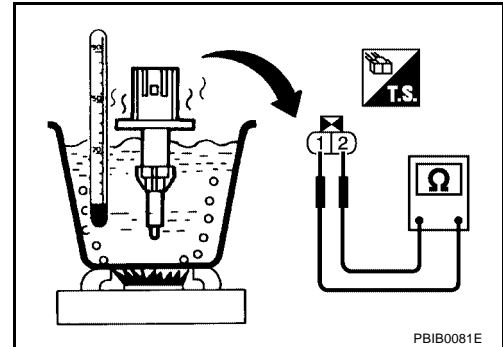
Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Component Inspection  
ENGINE COOLANT TEMPERATURE SENSOR**

UBS006F4

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

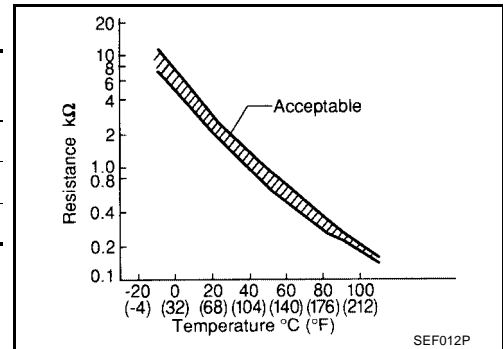


**<Reference data>**

| 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 |

\*: These data are reference values and are measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.

2. If NG, replace engine coolant temperature sensor.



DTC P0121 TP SENSOR

PF16119

Component Description

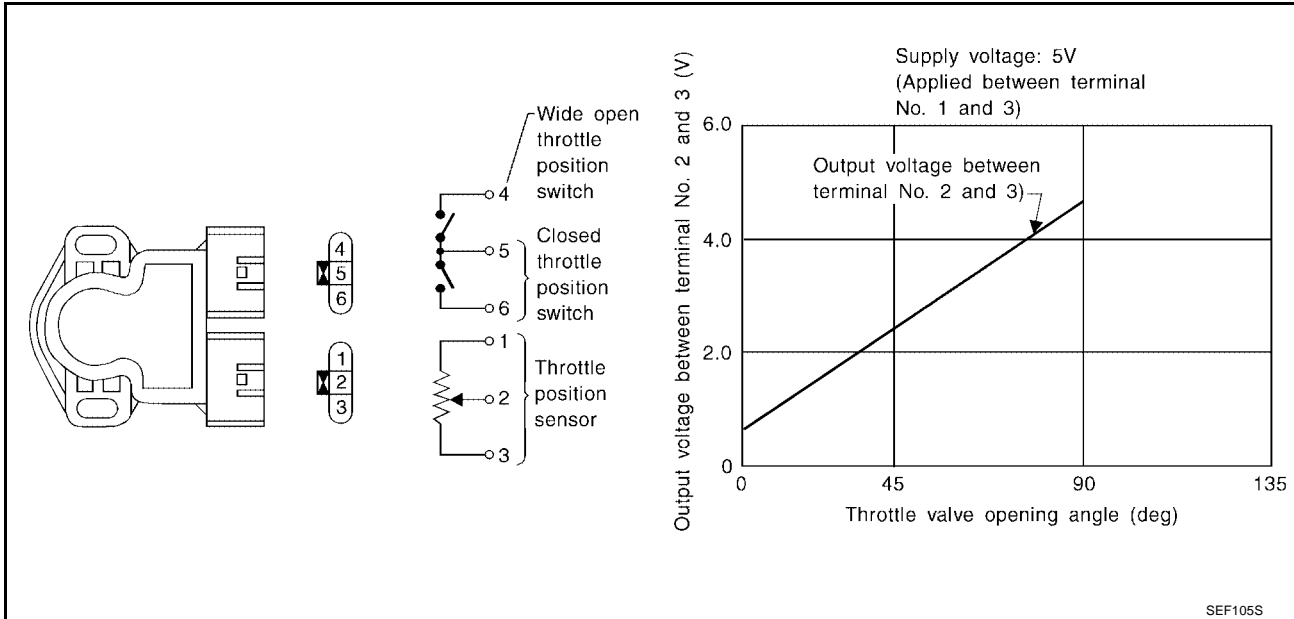
UBS005AI

NOTE:

If DTC P0121 is displayed with DTC P0510, first perform trouble diagnosis for DTC P0510, [EC-408](#).

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

UBS005AJ

Specification data are reference values.

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

**On Board Diagnosis Logic**

This self-diagnosis has the one trip detection logic.

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The throttle position sensor circuit is open or shorted.)</li> <li>● Throttle position sensor</li> <li>● Fuel injector</li> <li>● Camshaft position sensor</li> <li>● Mass air flow sensor</li> </ul> |
|         |  | B)                      | A low voltage from the sensor is sent to ECM under heavy load driving condition.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The throttle position sensor circuit is open or shorted.)</li> <li>● throttle position sensor</li> <li>● Intake air leaks</li> </ul>  |

**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   |                   |
|----------------------------------|--|-------------------|
| 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**

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

**NOTE:**

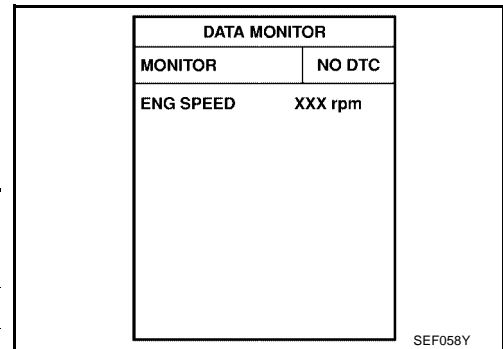
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

**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.

|                   |  |
|-------------------|--|
| Selector lever    | Suitable position except "N" (Higher gear position such as 3rd or 4th is better to keep low engine rpm.) |
| Accelerator pedal | Released   |
| Vehicle speed     | As slow as possible  |



4. If DTC is detected, go to [EC-163, "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**

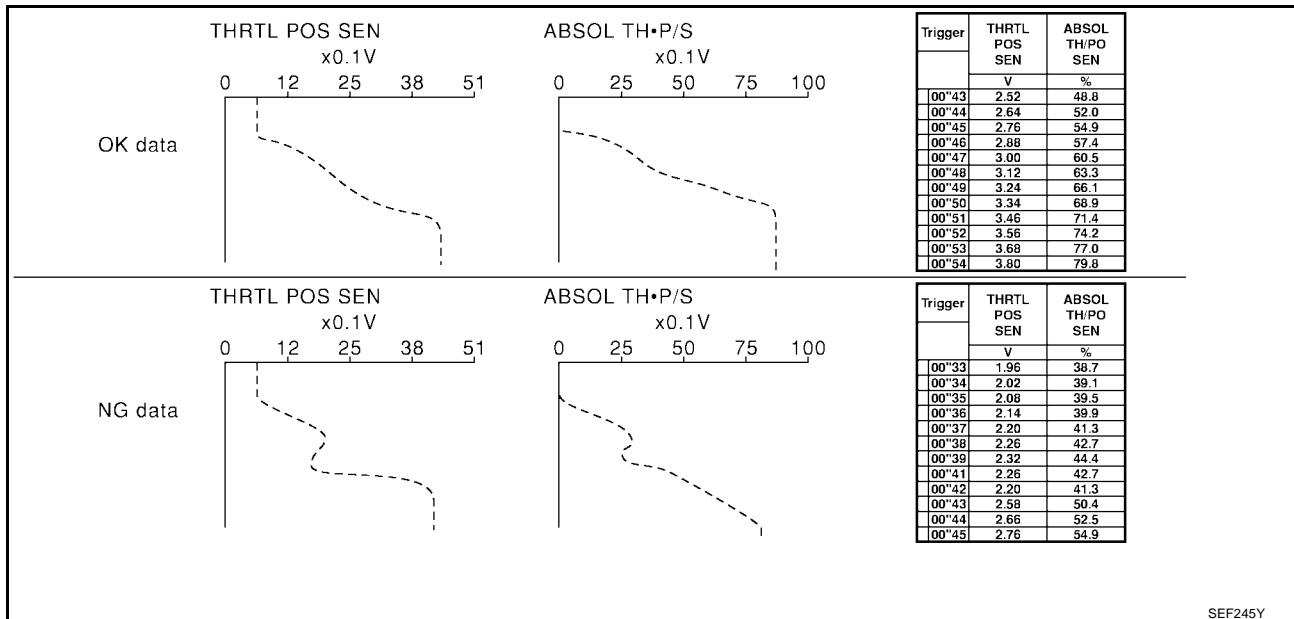
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Turn ignition switch ON.
4. Select "MANU TRIG" in "DATA MONITOR" mode with CONSULT-II.
5. Select "THRTL POS SEN" and "ABSOL TH·P/S" in "DATA MONITOR" mode with CONSULT-II.
6. Press 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-163, "Diagnostic Procedure"](#) .

If OK, go to following step.

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

SEF177Y



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)   |
| Selector 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 DTC is detected, go to [EC-163, "Diagnostic Procedure"](#) .

**With GST**

Follow the procedure "With CONSULT-II".

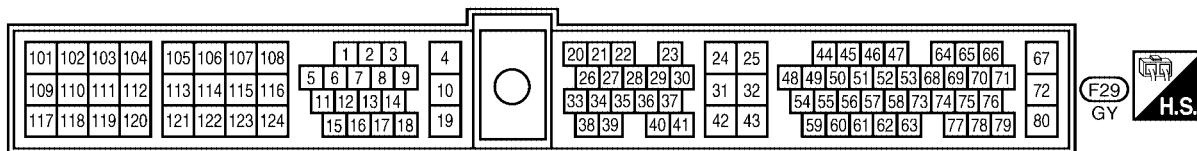
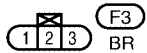
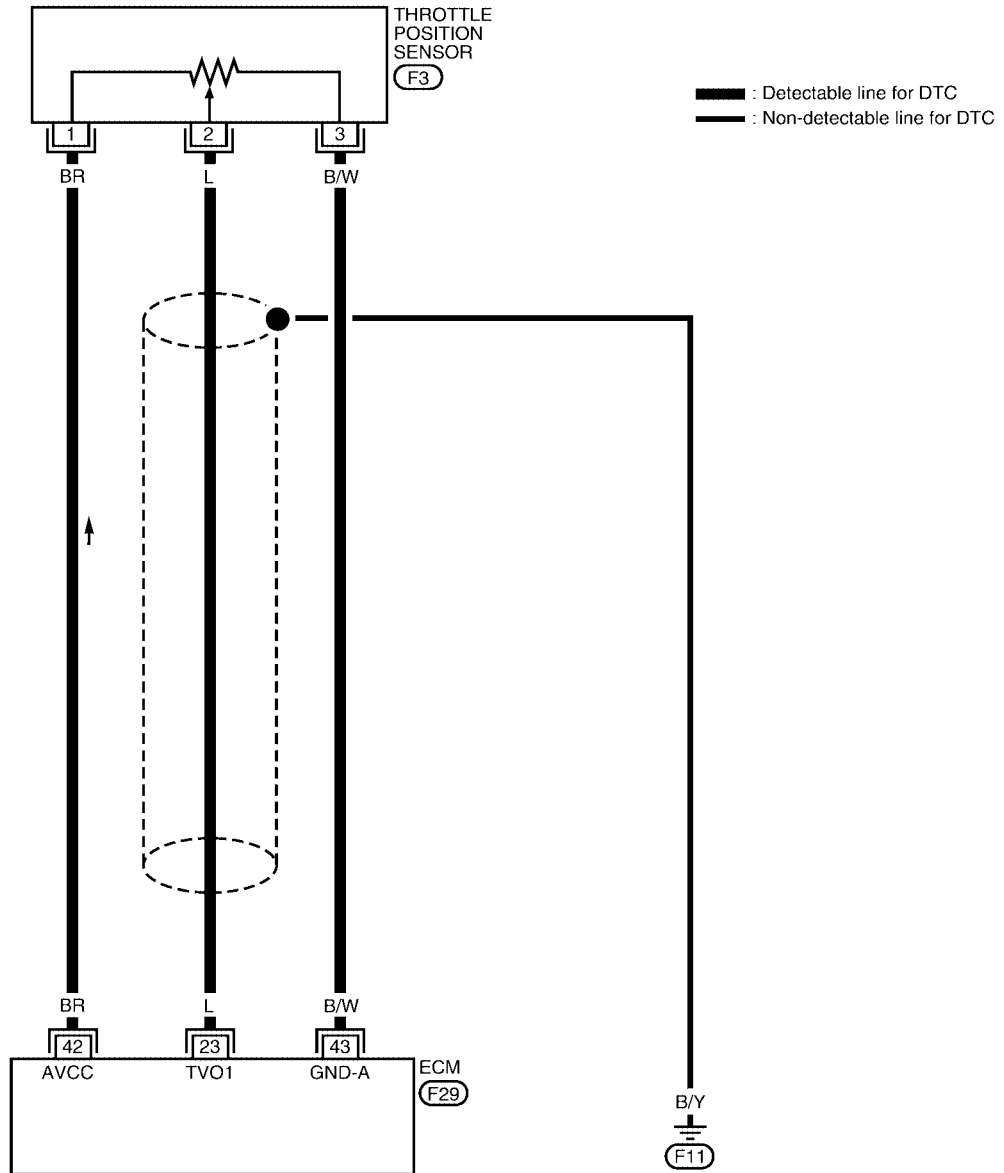
# DTC P0121 TP SENSOR

[KA24DE]

## Wiring Diagram

UBS005AN

EC-TPS-01



BBWA0547E

# DTC P0121 TP SENSOR

[KA24DE]

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

**CAUTION:**

Do not use ECM ground terminals when measuring input/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 COLO R | ITEM                     | CONDITION   | DATA (DC Voltage) |
|---------------|-------------|--------------------------|---|-------------------|
| 23            | L           | Throttle position sensor | [Ignition switch ON]<br>● Warm-up condition<br>● Accelerator pedal fully released | 0.2 - 0.8V        |
|               |             |                          | [Ignition switch ON]<br>● Accelerator pedal fully depressed                       | 3.5 - 4.5V        |
| 42            | BR          | Sensors' power supply    | [Ignition switch ON]  | Approximately 5V  |
| 43            | B/W         | Sensors' ground          | [Engine is running]<br>● Idle speed   | Approximately 0V  |

## Diagnostic Procedure

UBS005AO

### 1. INSPECTION START

Which malfunction A or B is duplicated?

| MALFUNCTION | Type |
|-------------|------|
| A           | A    |
| B           | B    |

Type A or B

Type A >> GO TO 4.

Type B >> GO TO 2.

### 2. ADJUST THROTTLE POSITION SENSOR

1. Check the following items. Refer to [EC-73, "Basic Inspection"](#) .

| Items  | Specifications   |
|--|--|
| Ignition timing  | 20° ± 2° BTDC  |
| Base idle speed  | 750 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.1 mm (0.004 in): ON<br>0.3 mm (0.012 in): OFF |
| Target idle speed  | 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 to intake manifold collector

OK or NG

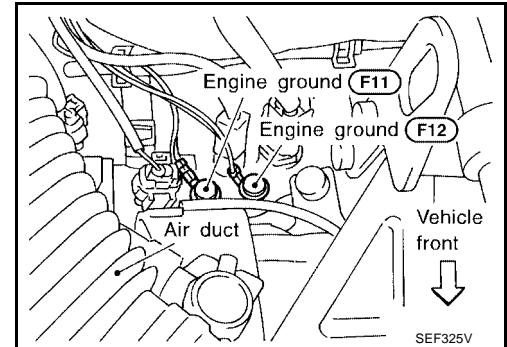
OK >> GO TO 4.

NG >> Reconnect the parts.

#### 4. RETIGHTEN GROUND SCREWS

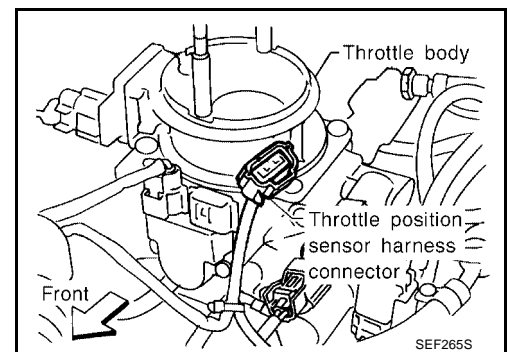
1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

>> GO TO 5.



#### 5. CHECK POWER SUPPLY

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

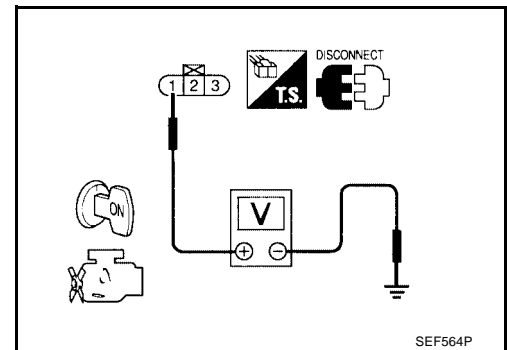


3. Check voltage between terminal 1 and ground with CONSULT-II or tester.

**Voltage : Approximately 5V**

OK or NG

- OK >> GO TO 6.
- NG >> Repair harness or connectors.



#### 6. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between throttle position sensor terminal 3 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 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 power in harness or connectors.

---

## 8. CHECK INPUT SIGNAL CIRCUIT

---

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 23 and 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 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-166, "Component Inspection"](#) .

OK or NG

OK >> GO TO 10.

NG >> Replace throttle position sensor. To adjust it, perform [EC-73, "Basic Inspection"](#) .

---

## 10. CHECK MASS AIR FLOW SENSOR

---

Refer to [EC-166, "Component Inspection"](#) .

OK or NG

OK >> GO TO 11.

NG >> Replace mass air flow sensor.

---

## 11. CHECK CAMSHAFT POSITION SENSOR

---

Refer to [EC-273, "Component Inspection"](#)

OK or NG

OK >> GO TO 12.

NG >> Replace distributor assembly with camshaft position sensor.

---

## 12. CHECK FUEL INJECTOR

---

Refer to [EC-166, "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.**

A

EC

C

D

E

F

G

H

I

J

K

L

M

**Component Inspection**  
**THROTTLE POSITION SENSOR**

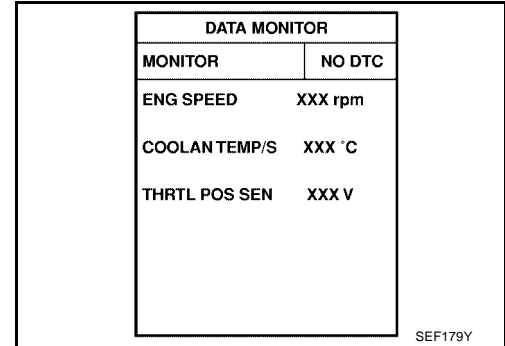
**With CONSULT-II**

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-73](#), "Basic Inspection".

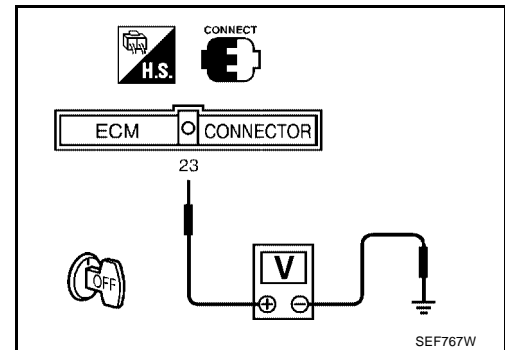
**Without CONSULT-II**

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. 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)       |

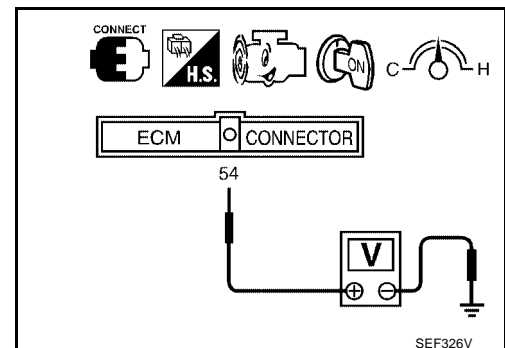


If NG, adjust closed throttle position switch. Refer to [EC-73](#), "Basic Inspection".

**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*  | 1.3 - 1.7 to Approx. 3.0 |



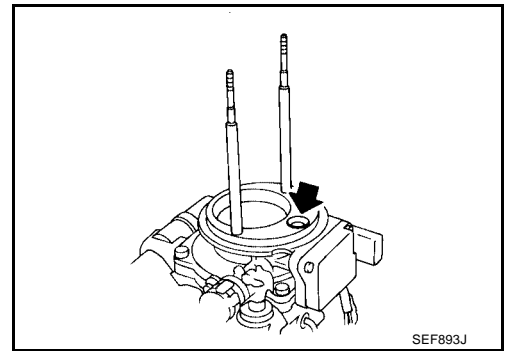
\*: Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Repeat above check.

# DTC P0121 TP SENSOR

[KA24DE]

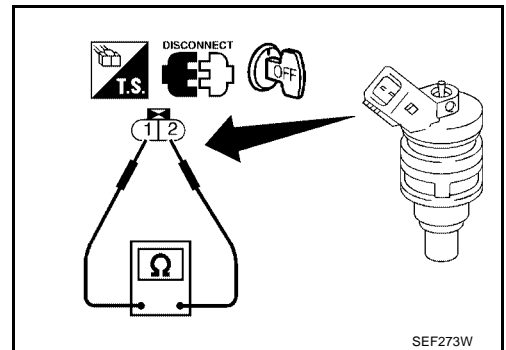
5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.



## FUEL INJECTOR

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

**Resistance : 7.3 - 9.9Ω [at 25°C (77°F)]**



A  
EC  
C  
D  
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DTC P0122, P0123 TP SENSOR

PF16119

Component Description

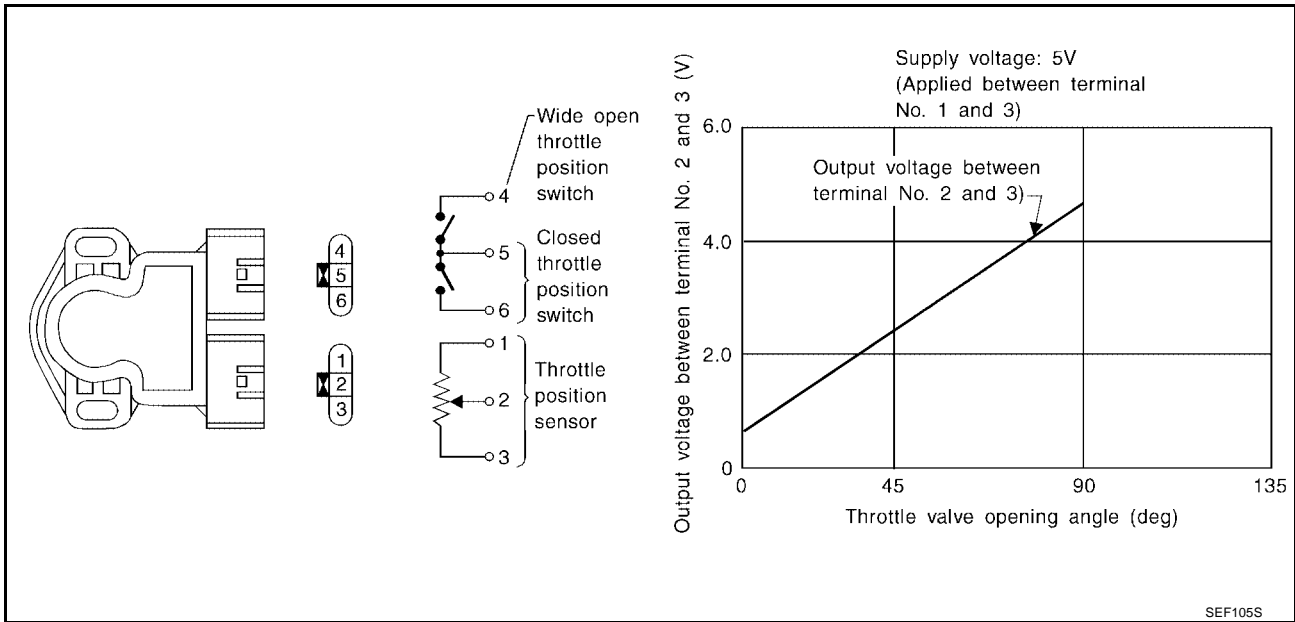
UBS006F9

NOTE:

If DTC, P0122 or P0123 is displayed with DTC P0510, first perform trouble diagnosis for DTC P0510, [EC-408](#).

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.



SEF105S

CONSULT-II Reference Value in Data Monitor Mode

UBS006FA

Specification data are reference values.

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

On Board Diagnosis Logic

UBS006FC

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.)<br>● 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 in 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

UBS006FD

### 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)                     |
| Selector lever | Suitable position except "P" or "N" position |

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| VHCL SPEED SE | XXX km/h |
| P/N POSI SW   | OFF      |

SEF065Y

3. If DTC is detected, go to [EC-171, "Diagnostic Procedure"](#).

### WITH GST

Follow the procedure "WITH CONSULT-II".

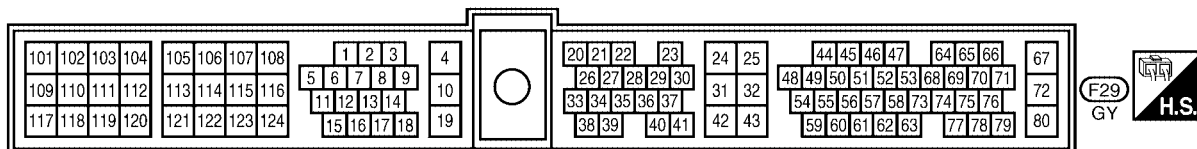
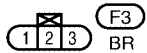
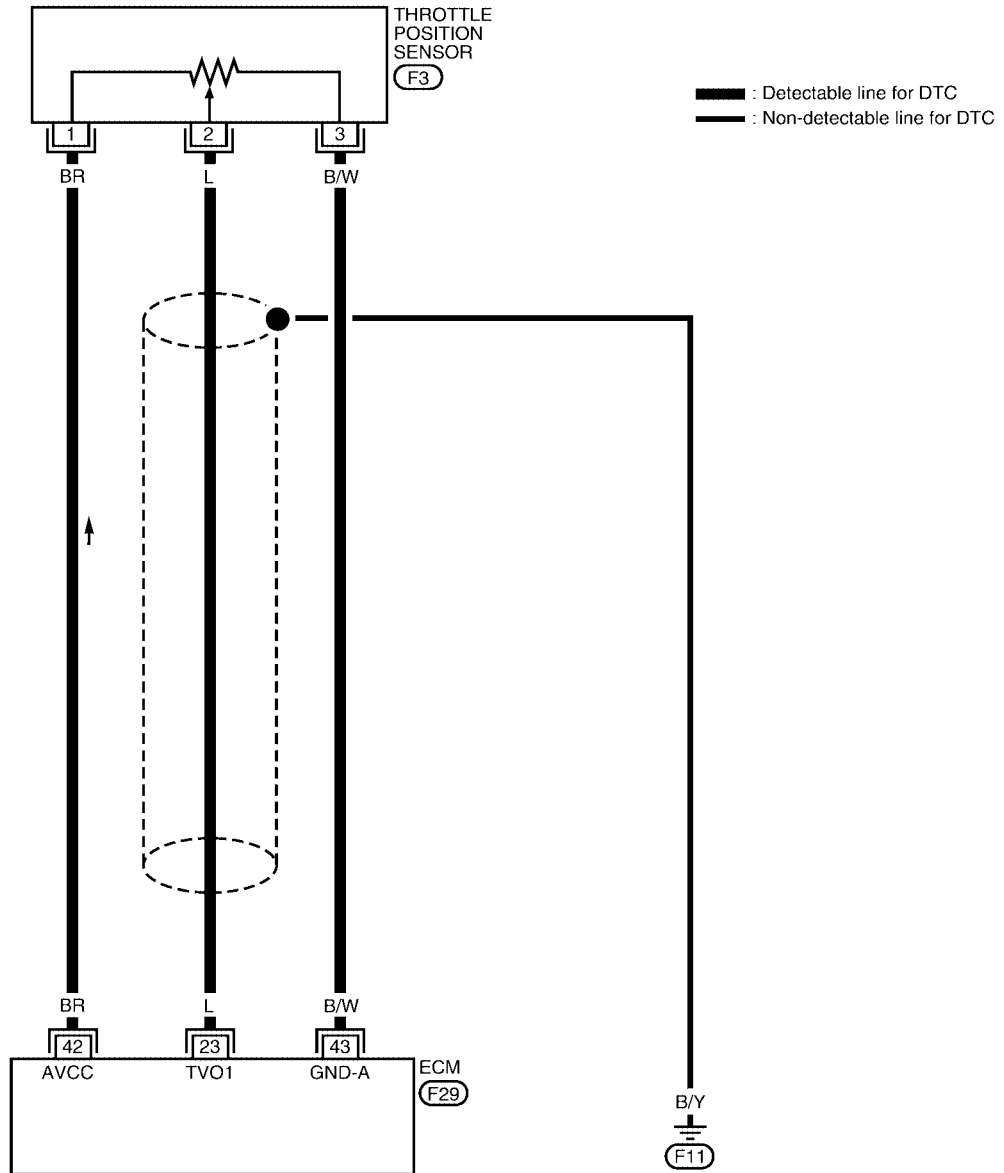
# DTC P0122, P0123 TP SENSOR

[KA24DE]

UBS006FE

## Wiring Diagram

EC-TPS-01



BBWA0547E

# DTC P0122, P0123 TP SENSOR

[KA24DE]

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

**CAUTION:**

Do not use ECM ground terminals when measuring input/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 COLO R | ITEM                     | CONDITION   | DATA (DC Voltage) |
|---------------|-------------|--------------------------|---|-------------------|
| 23            | L           | Throttle position sensor | [Ignition switch ON]<br>● Warm-up condition<br>● Accelerator pedal fully released | 0.2 - 0.8V        |
|               |             |                          | [Ignition switch ON]<br>● Accelerator pedal fully depressed                       | 3.5 - 4.5V        |
| 42            | BR          | Sensors' power supply    | [Ignition switch ON]  | Approximately 5V  |
| 43            | B/W         | Sensors' ground          | [Engine is running]<br>● Idle speed   | Approximately 0V  |

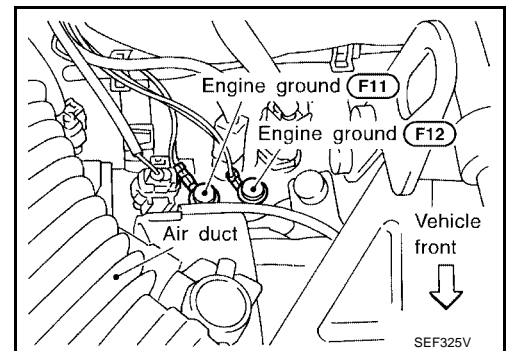
## Diagnostic Procedure

UBS006FF

### 1. RETIGHTEN GROUND SCREWS

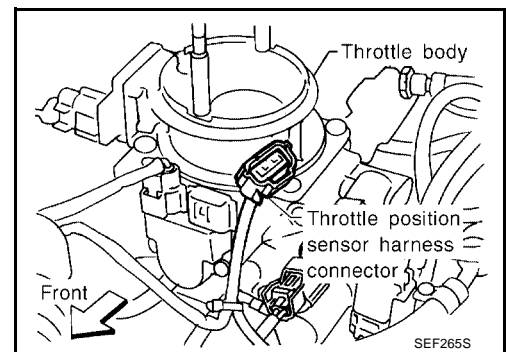
1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



### 2. CHECK POWER SUPPLY

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

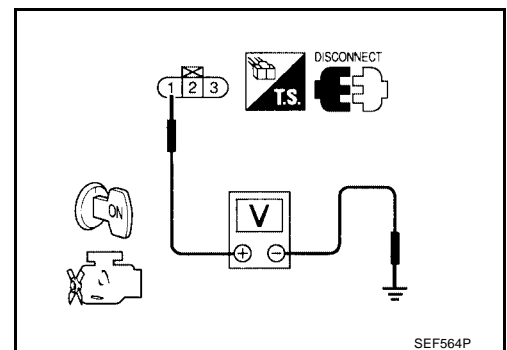


3. Check voltage between throttle position sensor terminal 1 and ground with CONSULT-II or tester.

**Voltage : Approximately 5V**

OK or NG

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



### 3. CHECK GROUND CIRCUIT

---

1. Turn ignition switch OFF.
2. Check harness continuity between throttle position sensor terminal 3 and engine ground.  
Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 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 power in harness or connectors.

### 5. CHECK INPUT SIGNAL CIRCUIT

---

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

**Continuity should exist.**

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

OK or NG

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

### 6. CHECK THROTTLE POSITION SENSOR

---

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

OK or NG

- OK >> GO TO 7.  
NG >> Replace throttle position sensor. To adjust it, perform [EC-73, "Basic Inspection"](#) .

### 7. CHECK INTERMITTENT INCIDENT

---

Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

## Component Inspection THROTTLE POSITION SENSOR

UBS006J3

### 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.

# DTC P0122, P0123 TP SENSOR

[KA24DE]

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)       |

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |
| THRTL POS SEN | XXX V   |

SEF179Y

If NG, adjust closed throttle position switch. Refer to [EC-73](#), "Basic Inspection".

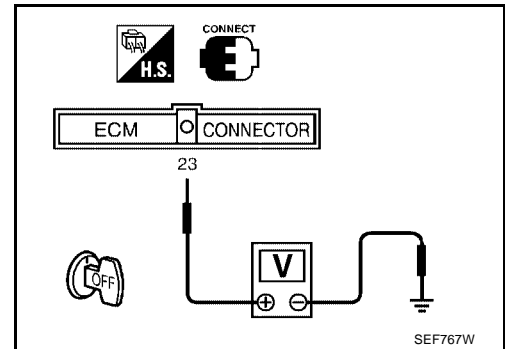
⊗ **Without CONSULT-II**

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. 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-73](#), "Basic Inspection".

## DTC P0125 ECT SENSOR

PFP:22630

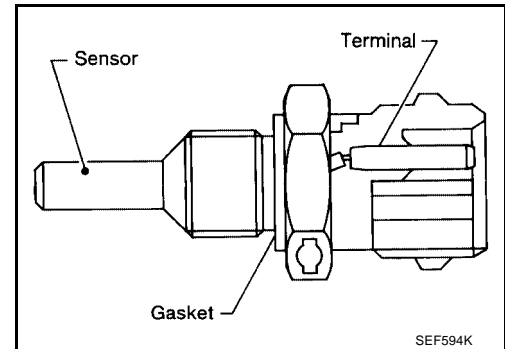
### Component Description

UBS005AP

**NOTE:**

If DTC P0125 is displayed with P0117 or P0118, first perform trouble diagnosis for DTC P0117 or P0118, [EC-154](#).

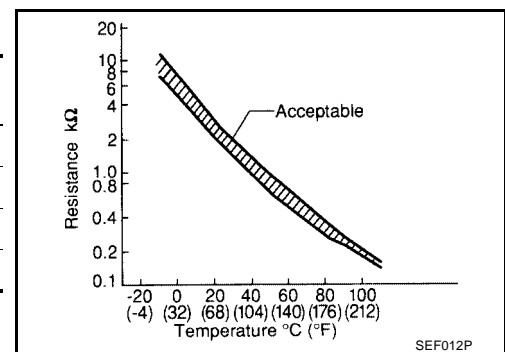
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

| Engine coolant temperature<br>°C (°F) | Voltage*<br>V | Resistance<br>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 ECM terminals, such as the ground.

### On Board Diagnosis Logic

UBS005AQ

This self-diagnosis has the one trip detection logic.

| DTC No. | Trouble diagnosis name   | DTC detecting condition   | Possible cause  |
|---------|--|---|---|
| P0125   | Insufficient engine coolant temperature for closed loop fuel control | <ul style="list-style-type: none"> <li>● Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine.</li> <li>● Engine coolant temperature is insufficient for closed loop fuel control.</li> </ul> | <ul style="list-style-type: none"> <li>● Harness or connectors (High resistance in the circuit)</li> <li>● Engine coolant temperature sensor</li> <li>● Thermostat</li> </ul> |

**DTC Confirmation Procedure**

**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 DTC is detected, go to [EC-177, "Diagnostic Procedure"](#) .

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

SEF174Y

**WITH GST**

Follow the procedure “WITH CONSULT-II”.

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

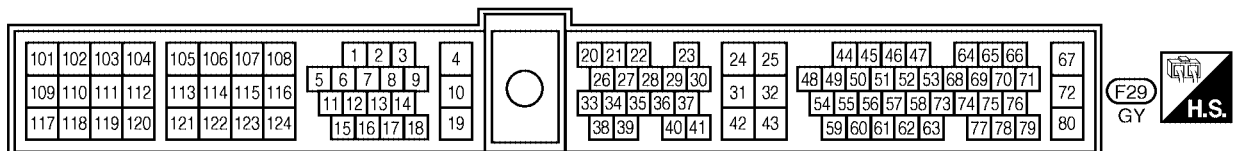
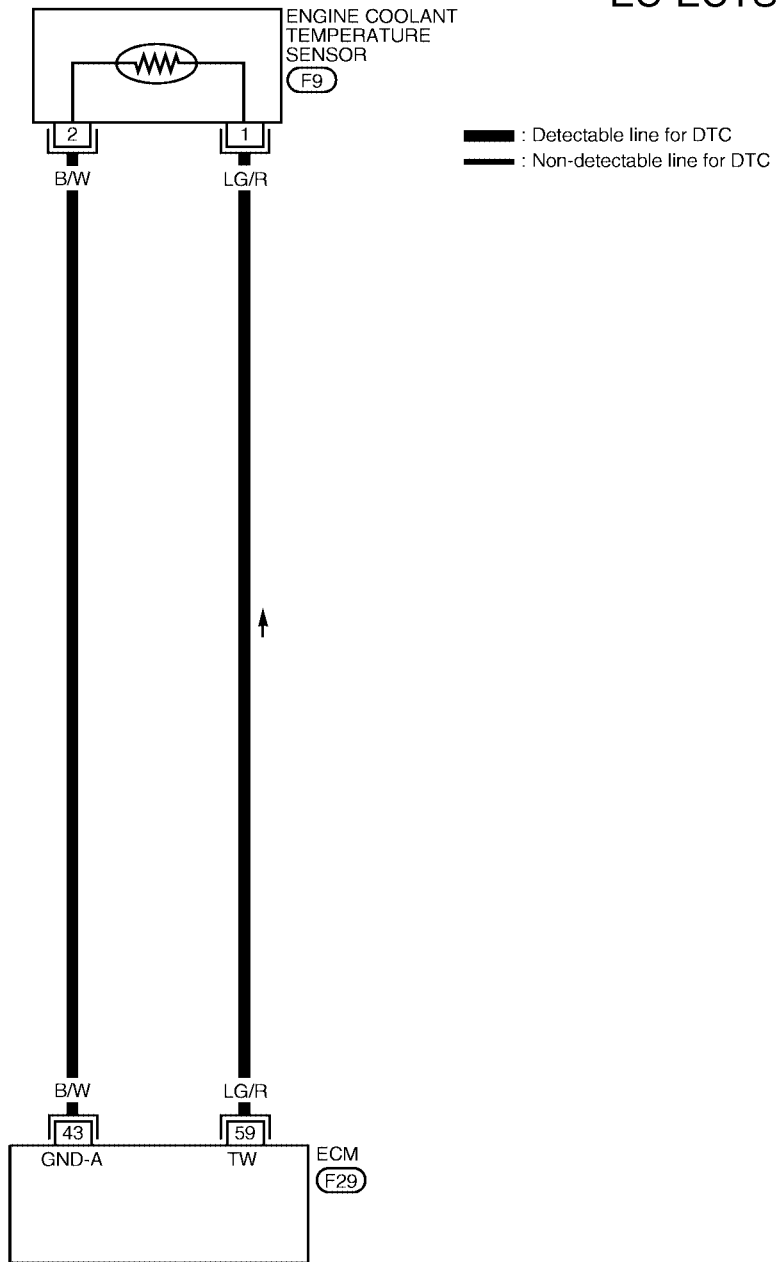
# DTC P0125 ECT SENSOR

[KA24DE]

UBS005AS

## Wiring Diagram

EC-ECTS-01

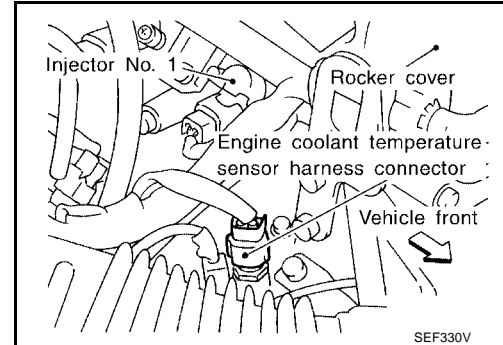


AEC984A



**Diagnostic Procedure****1. CHECK POWER SUPPLY**

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

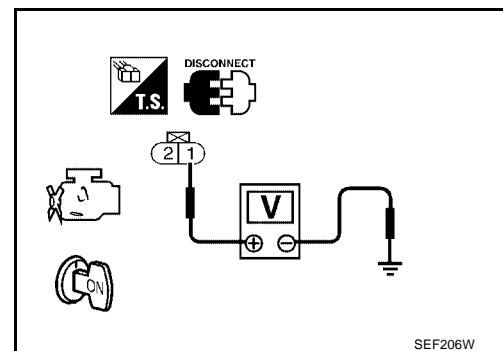


4. Check voltage between engine coolant temperature sensor terminal 1 and ground with CONSULT-II or tester.

**Voltage : Approximately 5V**

**OK or NG**

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

**2. DETECT MALFUNCTIONING PART**

Check the harness for open or short between ECM and engine coolant temperature sensor.

>> Repair harness or connectors.

**3. CHECK GROUND CIRCUIT**

1. Turn ignition switch OFF.
2. Check harness continuity between engine coolant temperature sensor terminal 2 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

**OK or NG**

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

**4. DETECT MALFUNCTIONING PART**

Check the harness for open or short between ECM and engine coolant temperature sensor.

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

**5. CHECK ENGINE COOLANT TEMPERATURE SENSOR**

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

OK or NG

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

**6. 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 7.
- NG >> Repair or replace thermostat. Refer to [CO-13, "THERMOSTAT"](#) .

**7. CHECK INTERMITTENT INCIDENT**

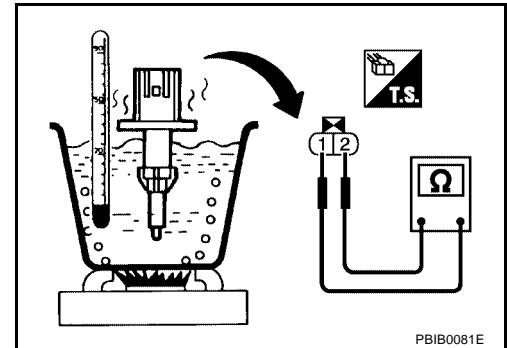
Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Component Inspection  
ENGINE COOLANT TEMPERATURE SENSOR**

UBS006F6

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



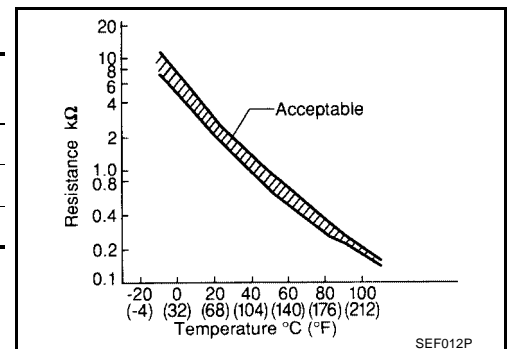
PBIB0081E

**<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 |

\*: These data are reference values and are measured between ECM terminal 59 (Engine coolant temperature sensor) and ground.

2. If NG, replace engine coolant temperature sensor.

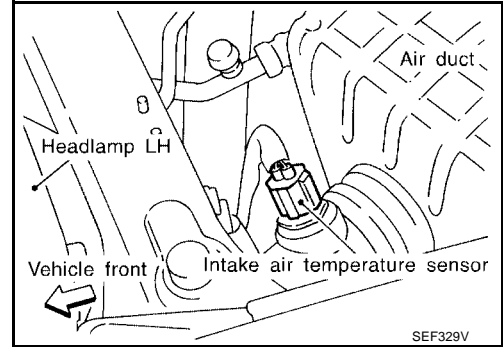


SEF012P

**DTC P0127 IAT SENSOR**

**Component Description**

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.

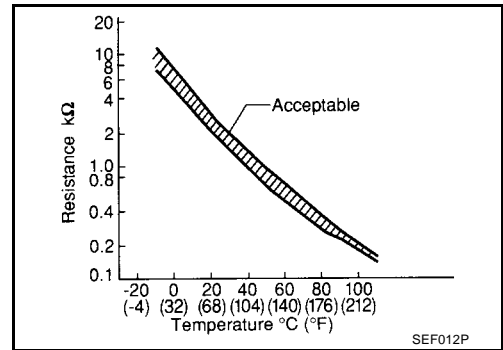


The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

**<Reference data>**

| Intake air temperature<br>°C (°F) | Voltage*<br>V | Resistance<br>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 ECM terminals, such as the ground.

**On Board Diagnosis Logic**

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Intake air temperature sensor</li> </ul> |

## DTC Confirmation Procedure

**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-182, "Diagnostic Procedure"](#) .

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| COOLAN TEMP/S | XXX °C   |
| VHCL SPEED SE | XXX km/h |

SEF176Y

**Ⓟ WITH GST**

Follow the procedure “WITH CONSULT-II”.

# DTC P0127 IAT SENSOR

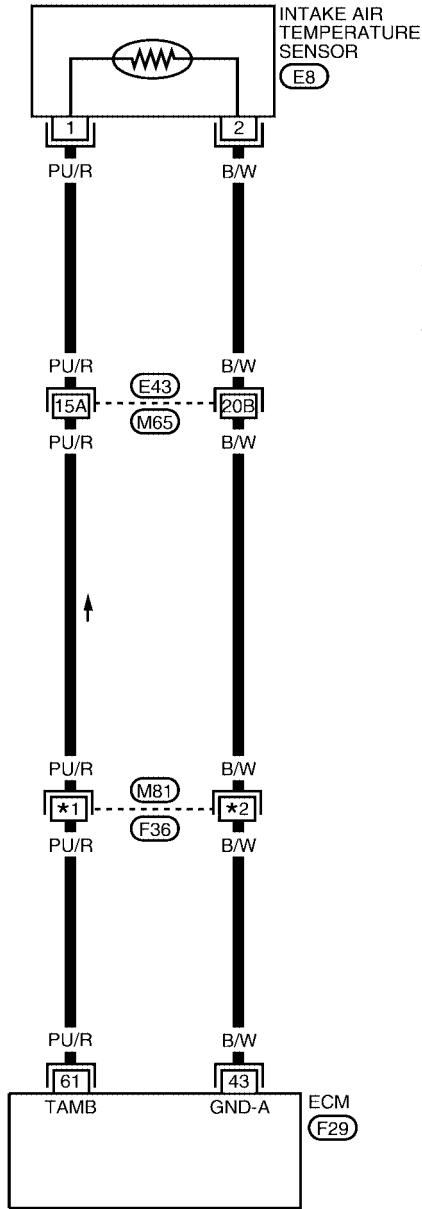
[KA24DE]

UBS006EY

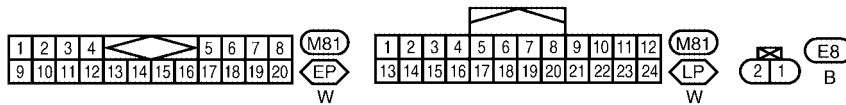
## Wiring Diagram

EC-IATS-01

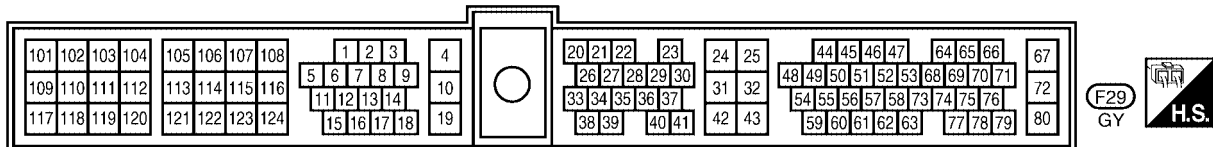
A  
EC  
C  
D  
E  
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H  
I  
J  
K  
L  
M



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- \*1 EP : 19
- LP : 22
- \*2 EP : 1
- LP : 4



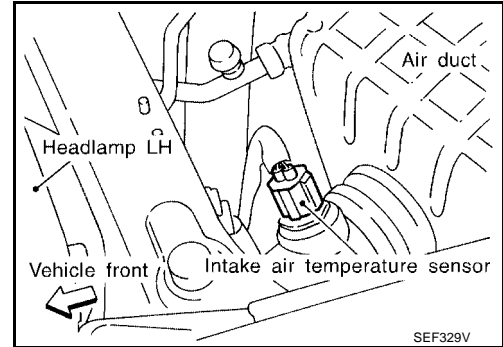
Refer to the following.  
E43 - SUPER MULTIPLE JUNCTION (SMJ)



WBWA0011E

**Diagnostic Procedure****1. CHECK POWER SUPPLY**

1. Turn ignition switch OFF.
2. Disconnect intake air temperature sensor harness connector.
3. Turn ignition switch ON.

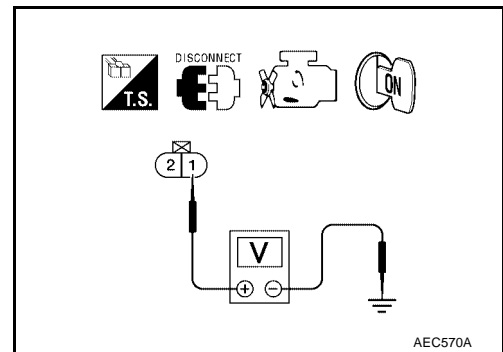


4. Check voltage between terminal 1 and ground with CONSULT-II or tester.

**Voltage : Approximately 5V**

OK or NG

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

**2. DETECT MALFUNCTIONING PART**

Check the following.

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

>> Repair harness or connectors.

**3. CHECK GROUND CIRCUIT**

1. Turn ignition switch OFF.
2. Check harness continuity between intake air temperature sensor terminal 2 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 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 ECM and intake air temperature sensor

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

**5. CHECK INTAKE AIR TEMPERATURE SENSOR**

Refer to [EC-183, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 6.
- NG >> Replace intake air temperature sensor.

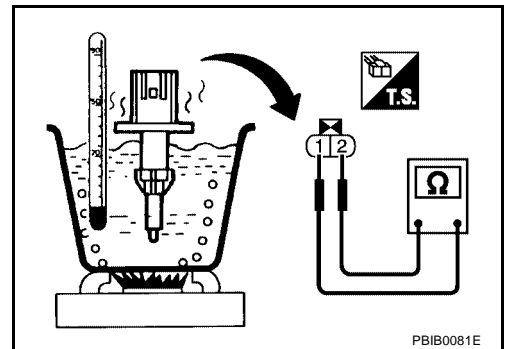
**6. CHECK INTERMITTENT INCIDENT**

Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Component Inspection  
INTAKE AIR TEMPERATURE SENSOR**

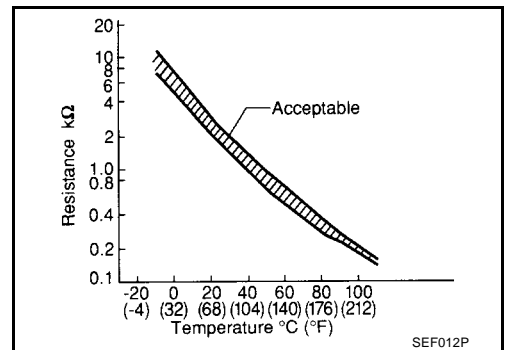
1. Check resistance between intake air temperature sensor terminals 1 and 2 as shown in the figure.



**<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**

PF2:21200

**On Board Diagnosis Logic**

UBS005AU

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. | <ul style="list-style-type: none"> <li>● Thermostat</li> <li>● Leakage from sealing portion of thermostat</li> <li>● Engine coolant temperature sensor</li> </ul> |

**DTC Confirmation Procedure**

UBS005AW

**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.

|                      |                                    |
|----------------------|------------------------------------|
| <b>VHCL SPEED SE</b> | <b>80 - 120 km/h (50 - 75 MPH)</b> |
|----------------------|------------------------------------|

If 1st trip DTC is detected, go to [EC-185, "Diagnostic Procedure"](#) .

 **WITH GST**

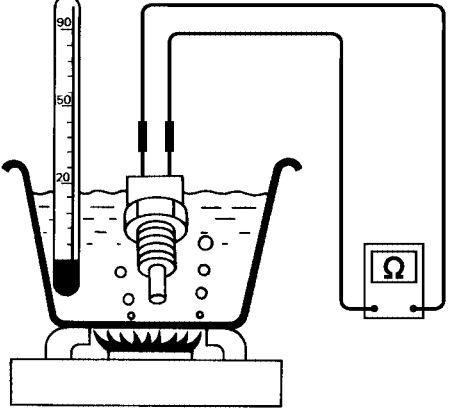
1. Follow the procedure “WITH CONSULT-II” above.



## Diagnostic Procedure

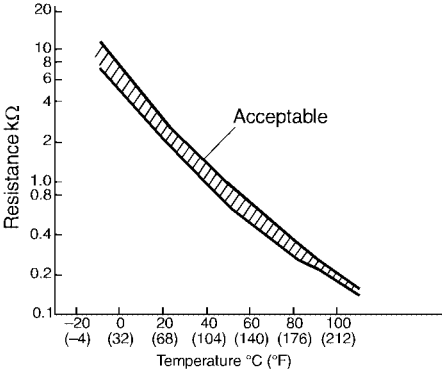
### 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove engine coolant temperature sensor.
3. Check resistance between engine coolant temperature sensor terminals under the following conditions.



**<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 |



SEF304X

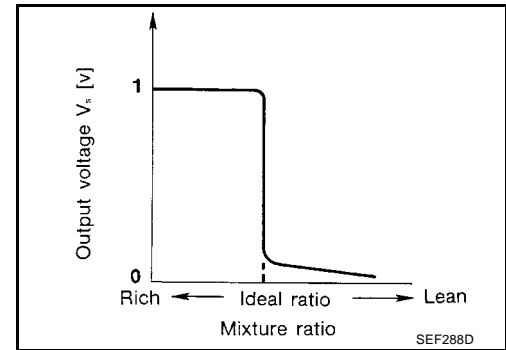
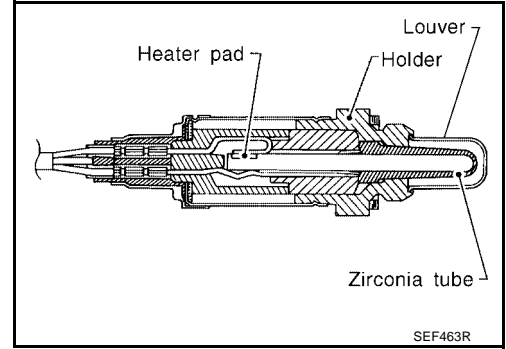
OK or NG

- OK >> **INSPECTION END.**
- NG >> Replace engine coolant temperature sensor.

**DTC P0132 HO2S1**

**Component Description**

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.



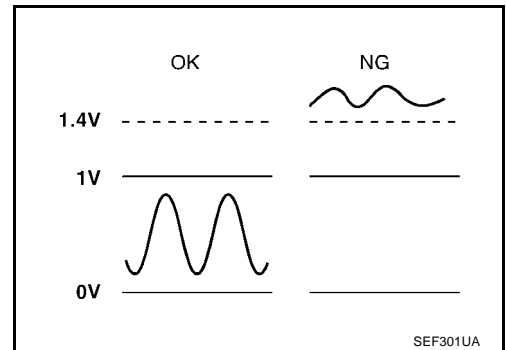
**CONSULT-II Reference Value in Data Monitor Mode**

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<br>Changes more than 5 times during 10 seconds. |

**On Board Diagnosis Logic**

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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Heated oxygen sensor 1</li> </ul> |

**DTC Confirmation Procedure****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-189, "Diagnostic Procedure"](#)

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

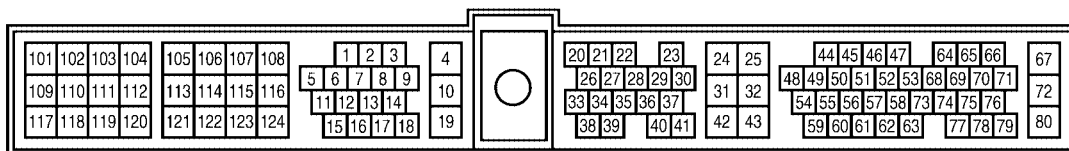
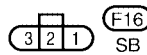
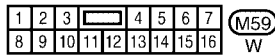
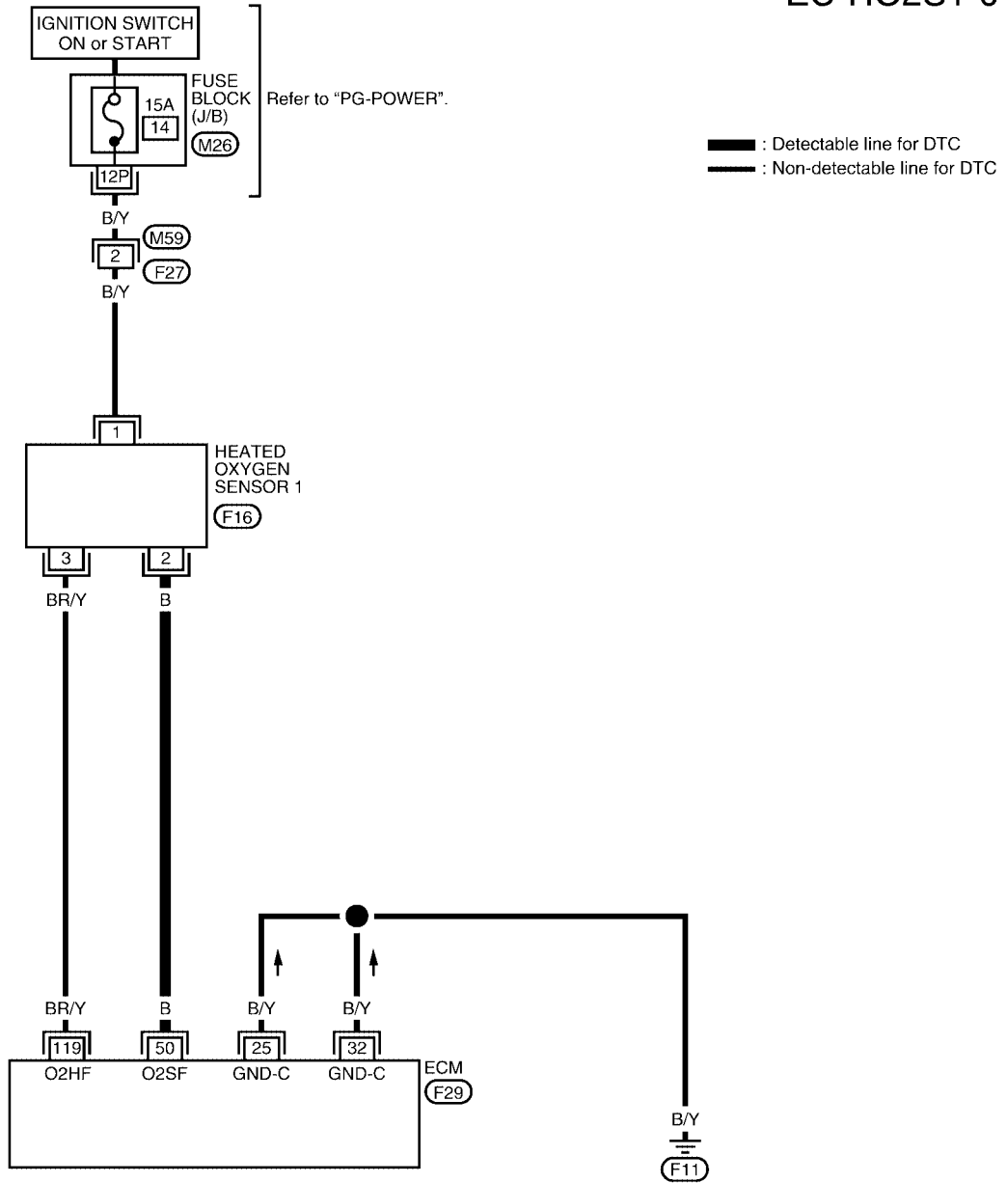
SEF174Y

**WITH GST**

1. Start engine and warm it up to normal operating temperature.
  2. Turn ignition switch OFF and wait at least 5 seconds.
  3. Restart engine and let it idle for 2 minutes.
  4. Turn ignition switch OFF and wait at least 5 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-189, "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

EC-HO2S1-01



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

**CAUTION:**

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

| TER-MINAL NO. | WIRE COLOR | ITEM                   | CONDITION  | DATA (DC Voltage)                               |
|---------------|------------|------------------------|--|---|
| 50            | B          | Heated oxygen sensor 1 | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>After warming up to normal operating temperature and engine speed is 2,000 rpm</li> </ul> | 0 - Approximately 1.0V<br>(Periodically change) |

**Diagnostic Procedure**

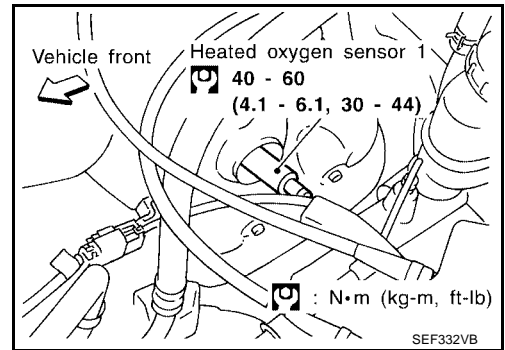
UBS005B4

**1. RETIGHTEN HEATED OXYGEN SENSOR 1**

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

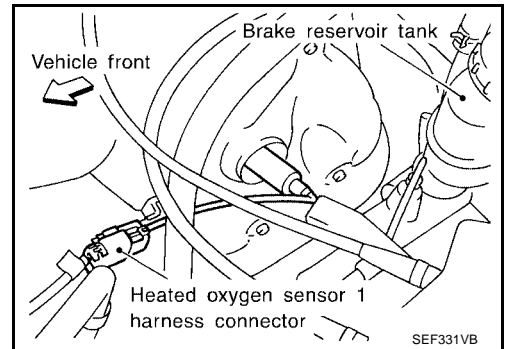
**Tightening torque : 40 - 60 N·m  
(4.1 - 6.1 kg-m, 30 - 44 ft-lb)**

>> GO TO 2.



**2. CHECK INPUT SIGNAL CIRCUIT**

- Disconnect heated oxygen sensor 1 harness connector and ECM harness connector.



- Check harness continuity between ECM terminal 50 and HO2S1 terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

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

**Continuity should not exist.**

- 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 HARNESS CONNECTOR

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

OK or NG

- OK >> GO TO 4.
- NG >> Repair or replace harness connector.

### 4. CHECK HEATED OXYGEN SENSOR 1

Refer to [EC-190, "Component Inspection"](#) .

OK or NG

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

### 5. CHECK INTERMITTENT INCIDENT

Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## Component Inspection HEATED OXYGEN SENSOR 1

UBS006F8

#### Ⓟ 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.

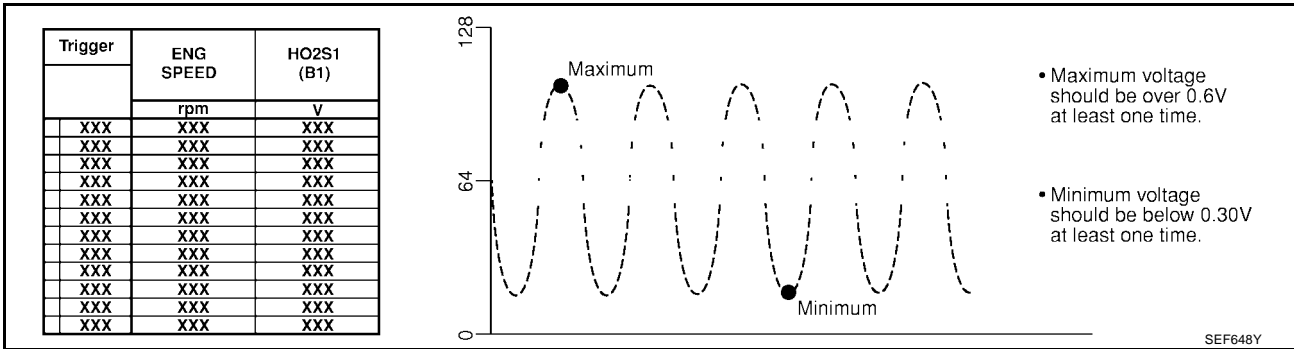
| DATA MONITOR    |         |
|-----------------|---------|
| MONITOR         | NO DTC  |
| ENG SPEED       | XXX rpm |
| MAS A/F SE-B1   | XXX V   |
| COOLANT TEMP/S  | XXX °C  |
| HO2S1 (B1)      | XXX V   |
| HO2S1 MNTR (B1) | LEAN    |

SEF646Y

7. Check the following.
  - "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 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 |
| R means HO2S1 MNTR (B1) indicates RICH<br>L means HO2S1 MNTR (B1) indicates LEAN |                   |

SEF217YA

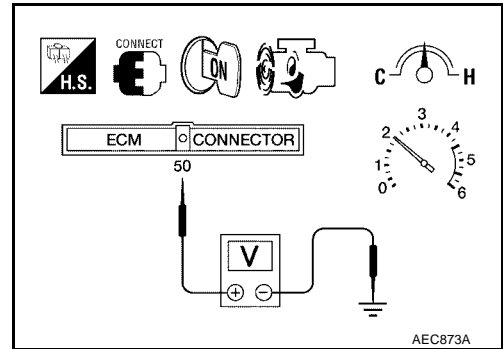


**CAUTION:**

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

**⊗ Without CONSULT-II**

1. 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 engine 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 five 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 one time.
  - The minimum voltage is below 0.3V at least one 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  
HEATED OXYGEN SENSOR 1**

Refer to [EM-13, "OUTER COMPONENT PARTS"](#) .

UBS007G5

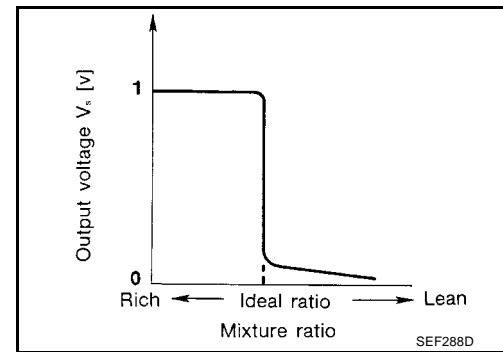
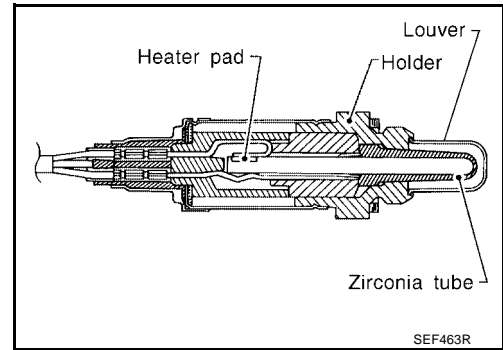
**DTC P0133 HO2S1**

PFP:22690

**Component Description**

UBS005B5

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**

UBS005B6

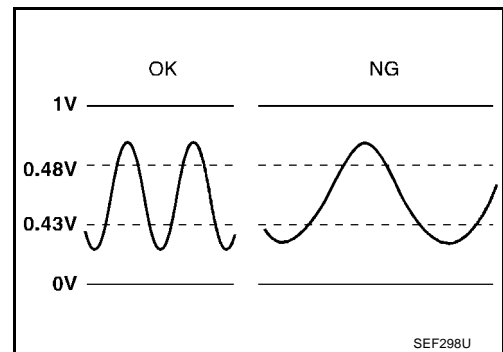
Specification data are reference values.

| MONITOR ITEM    | CONDITION  |                                       | SPECIFICATION   |
|-----------------|--|---------------------------------------|---|
| HO2S1 (B1)      | <ul style="list-style-type: none"> <li>Engine: After warming up</li> </ul> | Maintaining engine speed at 2,000 rpm | 0 - 0.3V ↔ Approx. 0.6 - 1.0V                               |
| HO2S1 MNTR (B1) |  |                                       | LEAN ↔ RICH<br>Changes more than 5 times during 10 seconds. |

**On Board Diagnosis Logic**

UBS005B8

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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Heated oxygen sensor 1</li> <li>● Heated oxygen sensor 1 heater</li> <li>● Fuel pressure</li> <li>● Injectors</li> <li>● Intake air leaks</li> <li>● Exhaust gas leaks</li> <li>● PCV valve</li> <li>● Mass air flow sensor</li> </ul> |

**DTC Confirmation Procedure**

UBS007UF

**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 3.5 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.)

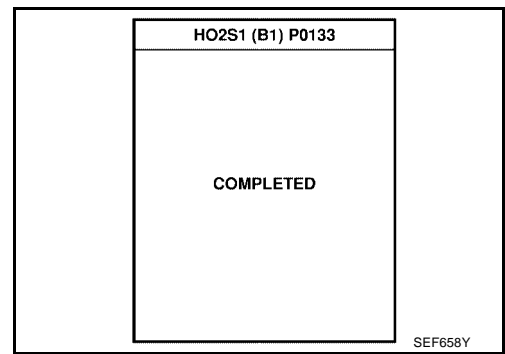
|                |                            |
|----------------|----------------------------|
| ENG SPEED      | 1,750 - 3,750 rpm          |
| Vehicle speed  | More than 80 km/h (50 MPH) |
| B/FUEL SCHDL   | 3.5 - 15.5 msec            |
| Selector lever | Suitable position          |

|                  |          |
|------------------|----------|
| 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-220, "Diagnostic Procedure"](#).



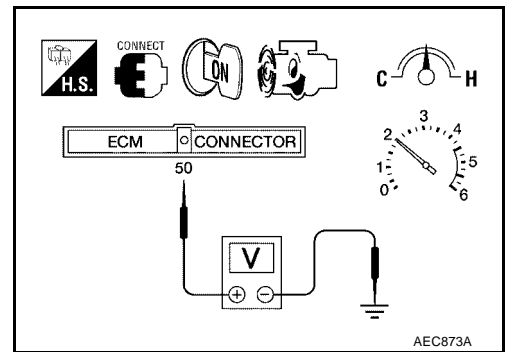
## Overall Function Check

UBS006VF

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

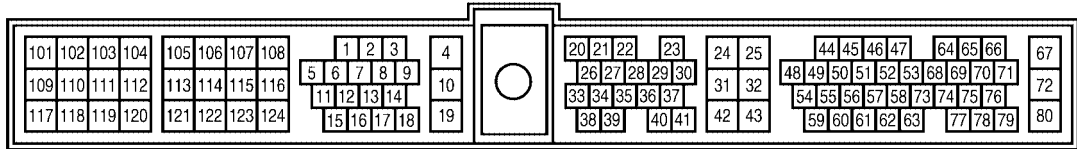
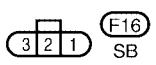
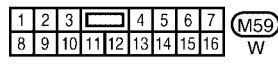
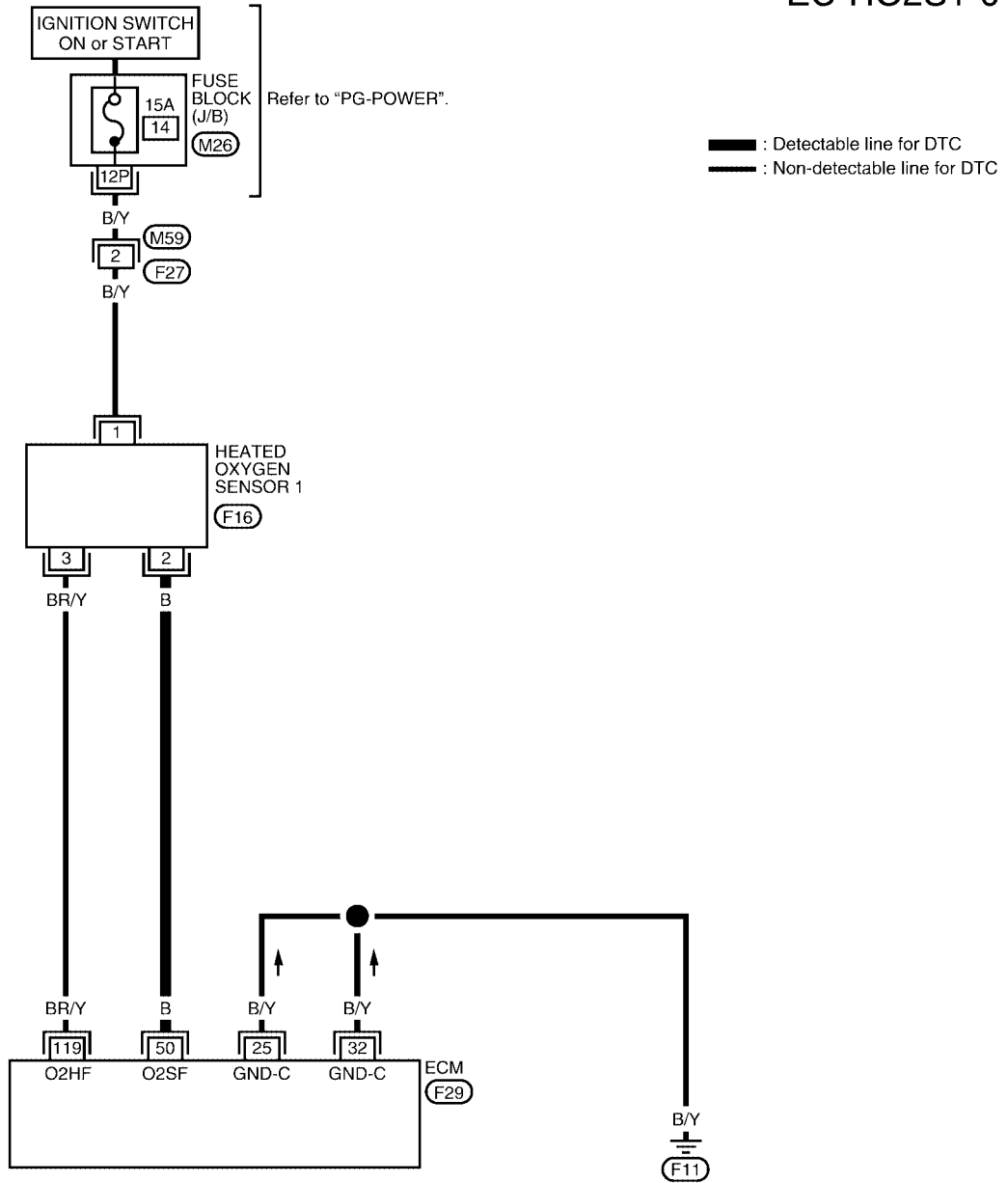
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
  - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than five 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-220, "Diagnostic Procedure"](#).



Wiring Diagram

EC-HO2S1-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



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

**CAUTION:**

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

| TER-MINAL NO. | WIRE COLOR | ITEM                   | CONDITION  | DATA (DC Voltage)                               |
|---------------|------------|------------------------|--|---|
| 50            | B          | Heated oxygen sensor 1 | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>After warming up to normal operating temperature and engine speed is 2,000 rpm</li> </ul> | 0 - Approximately 1.0V<br>(Periodically change) |

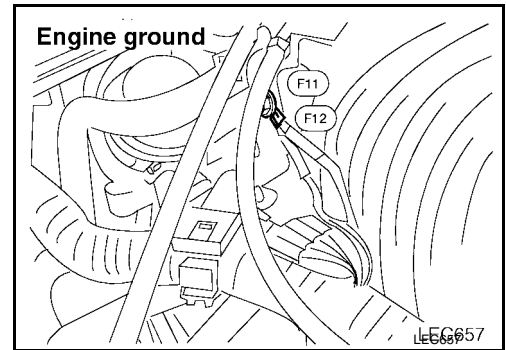
**Diagnostic Procedure**

UBS007UG

**1. RETIGHTEN GROUND SCREWS**

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

>> GO TO 2.

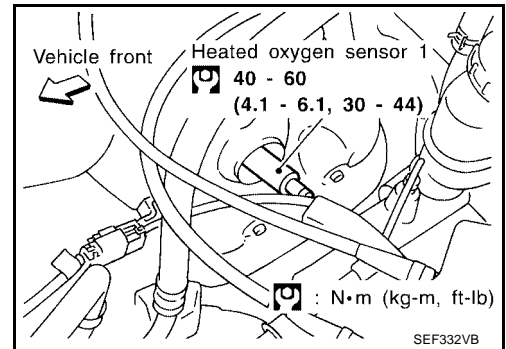


**2. RETIGHTEN HEATED OXYGEN SENSOR 1**

Loosen and retighten corresponding heated oxygen sensor 1.

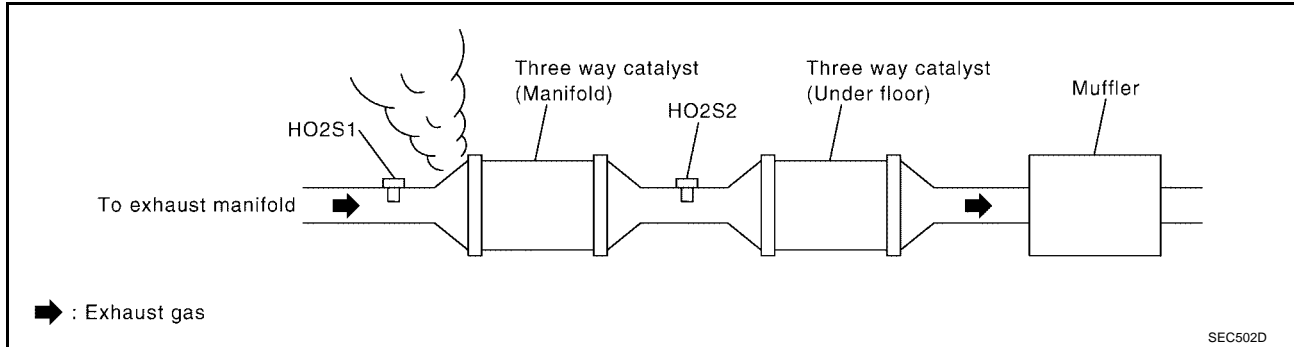
**Tightening torque : 40 - 60 N·m  
(4.1 - 6.1 kg-m, 30 - 44 ft-lb)**

>> 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.



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.

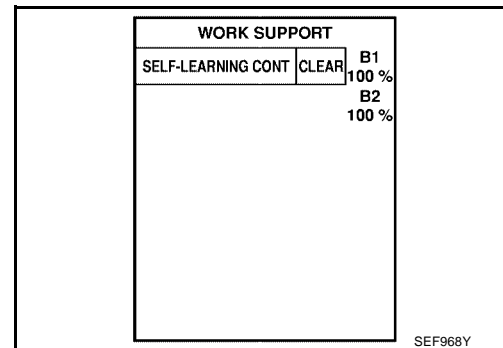
### 5. CLEAR THE SELF-LEARNING DATA

#### 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-60. "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-225](#) or [EC-232](#).  
 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.

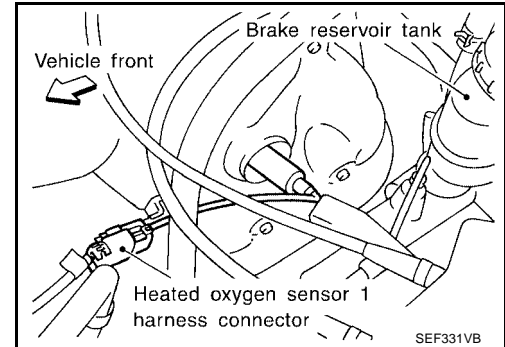
**Continuity should not exist.**

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 HEATED OXYGEN SENSOR 1 HEATER

Check resistance between HO2S1 terminals 3 and 1.

**Resistance : 2.3 - 4.3Ω at 25°C (77°F)**

Check continuity between HO2S1 terminals 2 and 1, 3 and 2.

**Continuity should not exist.**

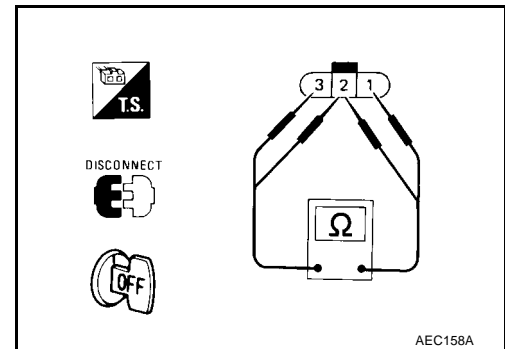
### CAUTION:

- 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 >> GO TO 8.

NG >> Replace heated oxygen sensor 1.



## 8. CHECK MASS AIR FLOW SENSOR

Refer to [EC-199, "Component Inspection"](#) .

OK or NG

OK >> GO TO 9.

NG >> Replace mass air flow sensor.

## 9. CHECK PCV VALVE

Refer to [EC-199, "Component Inspection"](#) .

OK or NG

OK >> GO TO 10.

NG >> Replace PCV valve.

# 10. CHECK FRONT HEATED OXYGEN SENSOR

Refer to [EC-199, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 11.
- NG >> Replace heated oxygen sensor 1.

# 11. CHECK INTERMITTENT INCIDENT

Refer to [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## Component Inspection HEATED OXYGEN SENSOR 1

UBS006VI

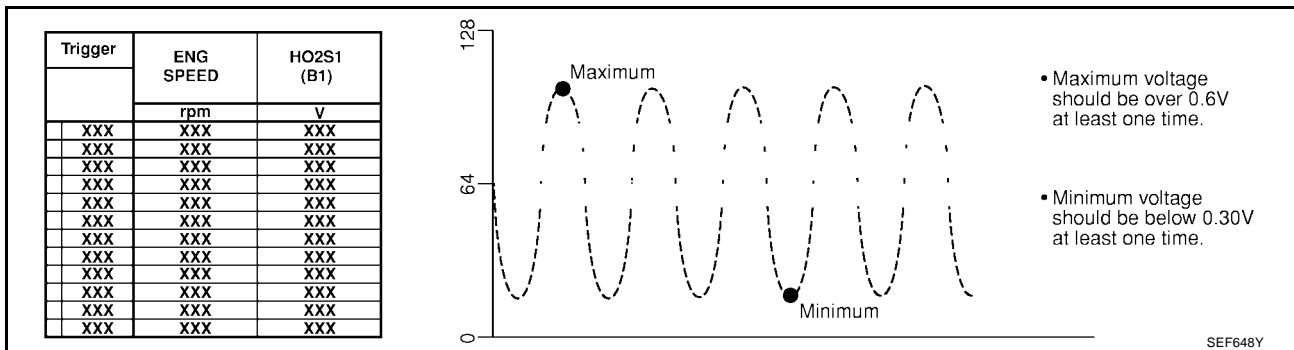
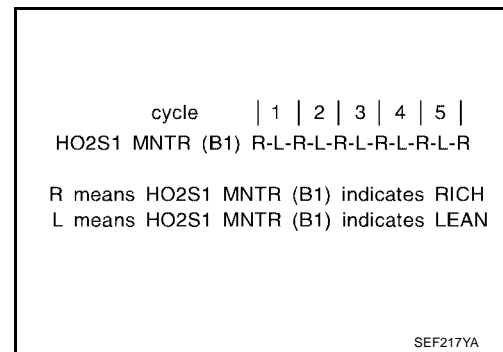
### Ⓟ With CONSULT-II

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   |
| COOLANT 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" 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.

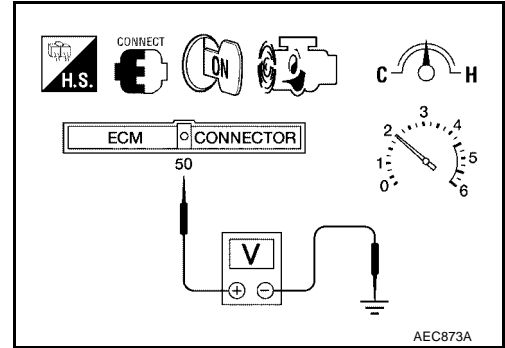


**CAUTION:**

- 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 engine 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 five 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 one time.
  - The minimum voltage is below 0.3V at least one 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.

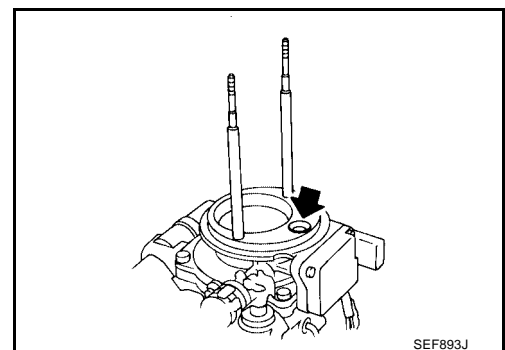
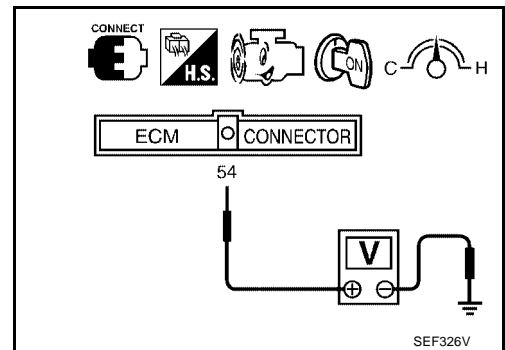
**MASS AIR FLOW SENSOR**

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.

| 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*   | 1.3 - 1.7 to Approx. 3.0 |

\*: 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, disconnect mass air flow sensor harness connector and connect it again. Repeat above check.
5. If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.

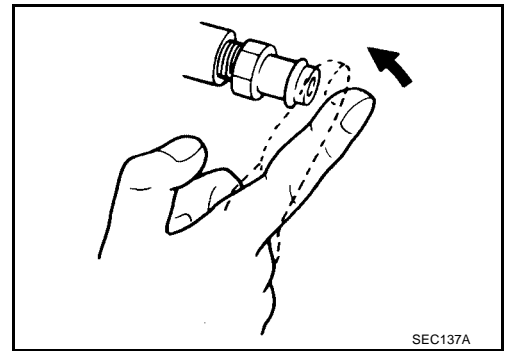


**PCV VALVE**

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  
HEATED OXYGEN SENSOR 1**

Refer to [EM-13, "OUTER COMPONENT PARTS"](#) .

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

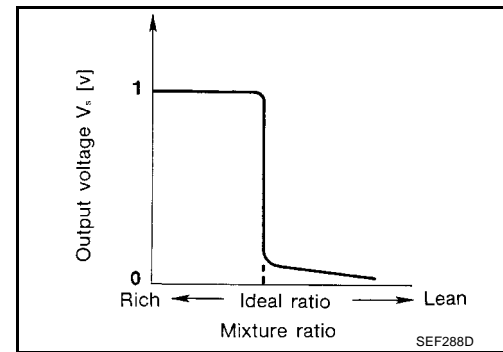
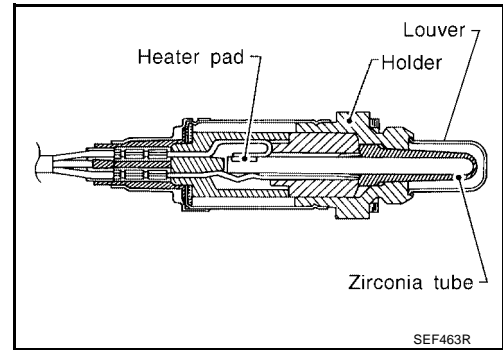
DTC P0134 HO2S1

PFP:22690

Component Description

UBS005BD

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

UBS005BE

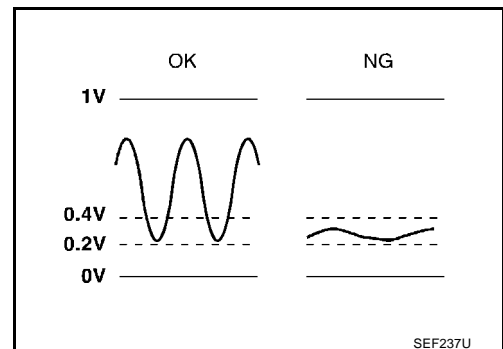
Specification data are reference values.

| MONITOR ITEM    | CONDITION  |                                       | SPECIFICATION   |
|-----------------|--|---------------------------------------|---|
| HO2S1 (B1)      | <ul style="list-style-type: none"> <li>Engine: After warming up</li> </ul> | Maintaining engine speed at 2,000 rpm | 0 - 0.3V ↔ Approx. 0.6 - 1.0V                               |
| HO2S1 MNTR (B1) |  |                                       | LEAN ↔ RICH<br>Changes more than 5 times during 10 seconds. |

On Board Diagnosis Logic

UBS005BG

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. | <ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 1</li> </ul> |

**DTC Confirmation Procedure**

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 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.

|                  |          |
|------------------|----------|
| HO2S1 (B1) P0134 |          |
| OUT OF CONDITION |          |
| MONITOR          |          |
| ENG SPEED        | XXX rpm  |
| B/FUEL SCHDL     | XXX msec |
| THRTL POS SEN    | XXX V    |

LEC032A

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 - 4,000 rpm           |
| Vehicle speed  | 64 - 130 km/h (40 - 81 MPH) |
| B/FUEL SCHDL   | 3.5 - 17 msec               |
| Selector lever | Suitable position           |

|                  |          |
|------------------|----------|
| HO2S1 (B1) P0134 |          |
| TESTING          |          |
| MONITOR          |          |
| ENG SPEED        | XXX rpm  |
| B/FUEL SCHDL     | XXX msec |
| THRTL POS SEN    | XXX V    |

LEC033A

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-206. "Diagnostic Procedure"](#).

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

|                  |  |
|------------------|--|
| HO2S1 (B1) P0134 |  |
| COMPLETED        |  |

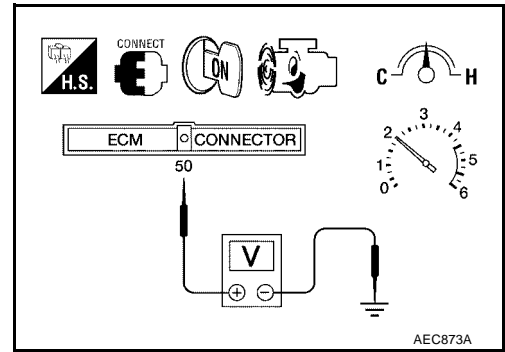
LEC034A

**Overall Function Check**

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

**WITH GST**

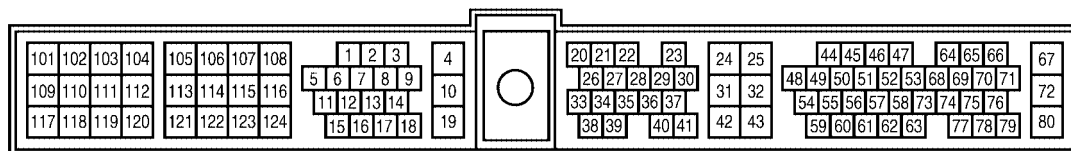
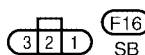
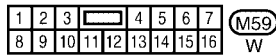
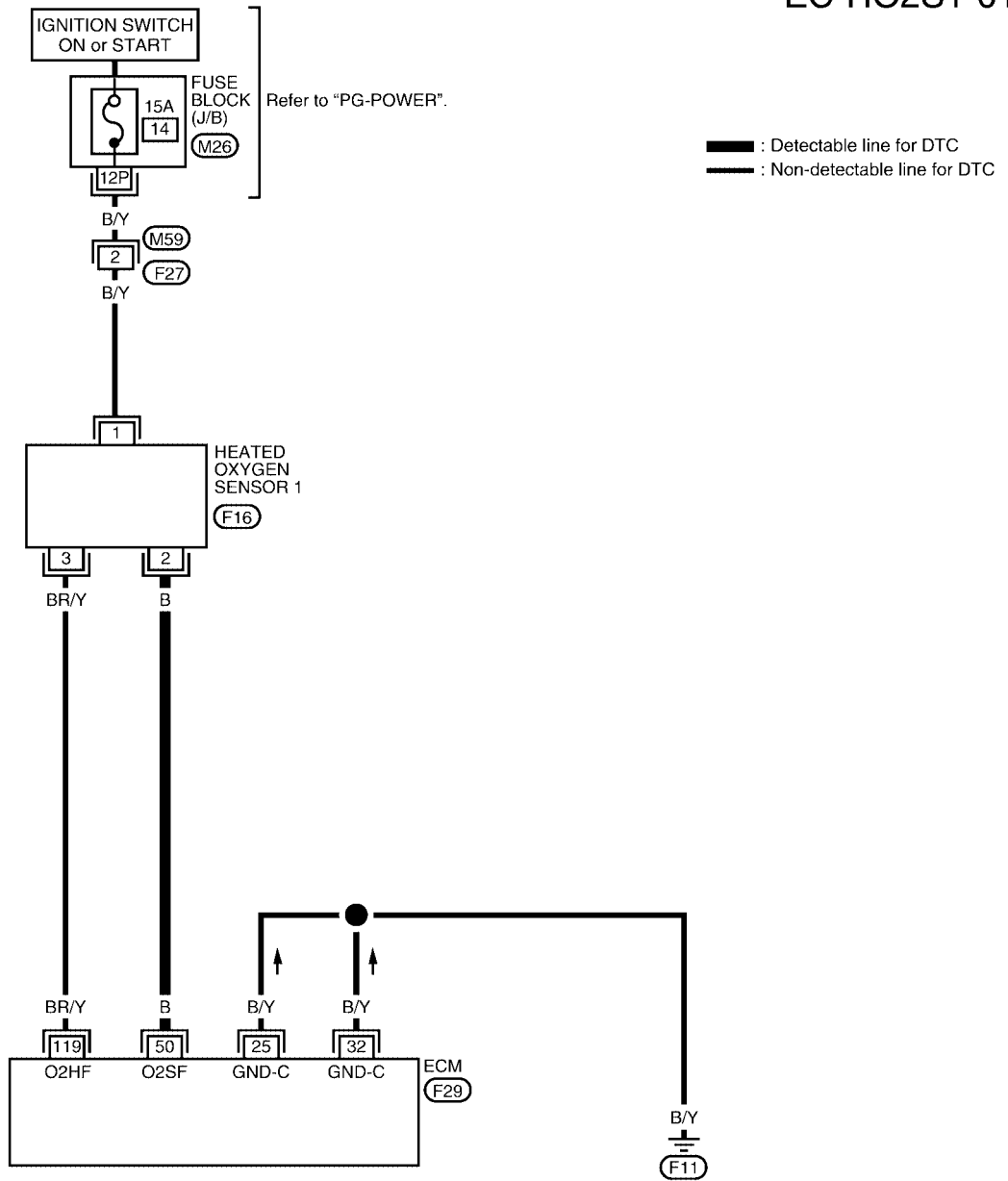
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [Heated oxygen sensor 1 signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
  - The voltage does not remain in the range of 0.2 - 0.4V.
4. If NG, go to [EC-206, "Diagnostic Procedure"](#).



Wiring Diagram

EC-HO2S1-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



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

**CAUTION:**

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

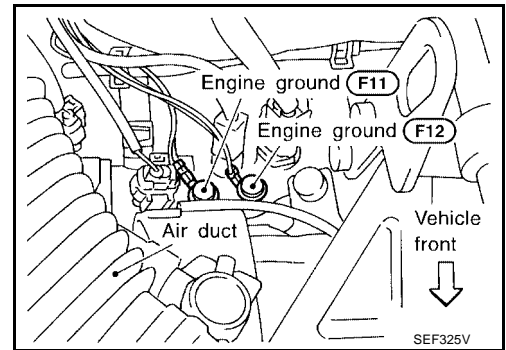
| TER-MINAL NO. | WIRE COLOR | ITEM                   | CONDITION   | DATA (DC Voltage)                               |
|---------------|------------|------------------------|---|---|
| 50            | B          | Heated oxygen sensor 1 | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>After warming up to normal operating temperature and engine speed is 2,000 rpm</li> </ul> | 0 - Approximately 1.0V<br>(Periodically change) |

**Diagnostic Procedure**

UBS005BK

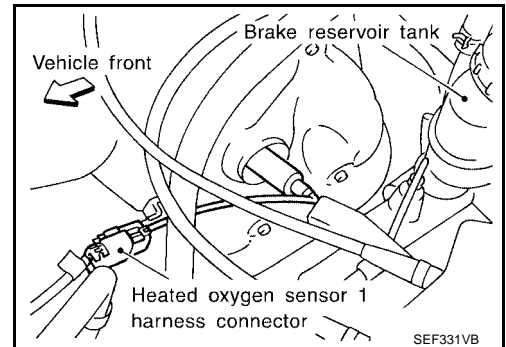
**1. INSPECTION START**

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



3. Disconnect heated oxygen sensor 1 harness connector.

>> GO TO 2.



**2. CHECK INPUT SIGNAL CIRCUIT**

1. Disconnect 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-207, "Component Inspection"](#) .

With CONSULT-II

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 HEATED OXYGEN SENSOR 1

UBS006SH

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    |

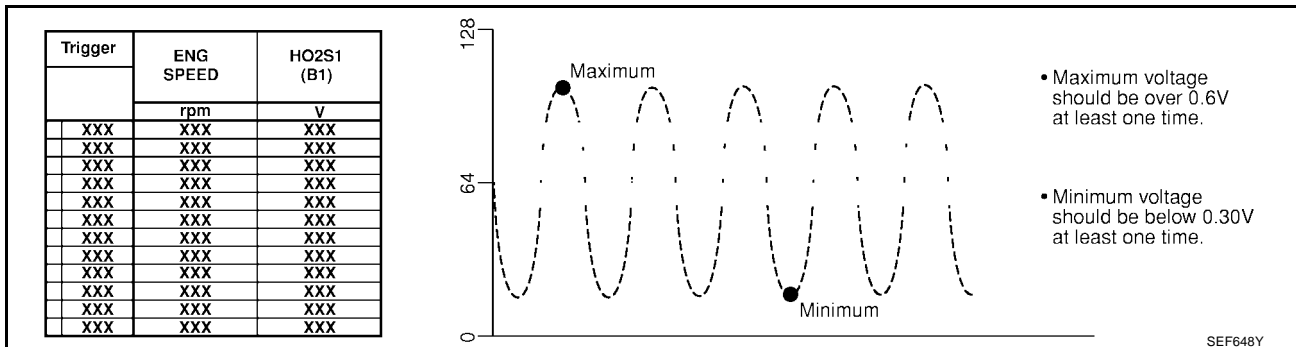
SEF646Y

7. Check the following.
  - "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 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

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

SEF217YA

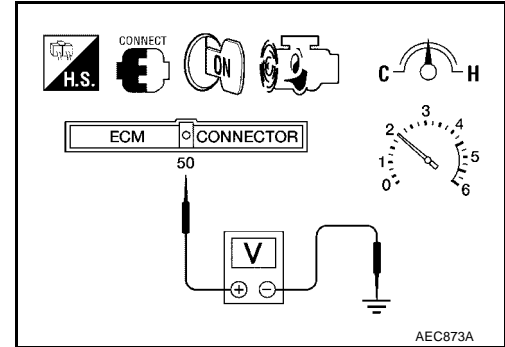


**CAUTION:**

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

⊗ **Without CONSULT-II**

1. 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 engine 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 five 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 one time.
  - The minimum voltage is below 0.3V at least one 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

### HEATED OXYGEN SENSOR 1

UBS007H2

Refer to [EM-13, "OUTER COMPONENT PARTS"](#) .



**DTC P0138 HO2S2**

PF2:226A0

**Component Description**

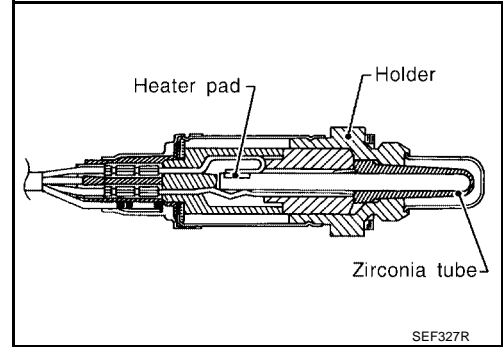
UBS005BL

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**

UBS005BM

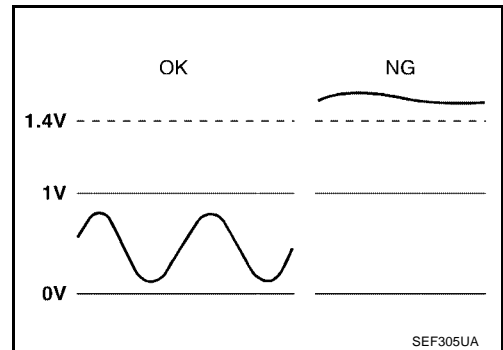
Specification data are reference values.

| MONITOR ITEM    | CONDITION  |   | SPECIFICATION                 |
|-----------------|--|---|-------------------------------|
| HO2S2 (B1)      | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load</li> </ul> | Revving engine from idle up to 3,000 rpm quickly. | 0 - 0.3V ↔ Approx. 0.6 - 1.0V |
| HO2S2 MNTR (B1) | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load</li> </ul> | Revving engine from idle up to 3,000 rpm quickly. | LEAN ↔ RICH                   |

**On Board Diagnosis Logic**

UBS005BO

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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Heated oxygen sensor 2</li> </ul> |

## DTC Confirmation Procedure

### 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.

### ④ WITH CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch "OFF" and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
5. Let engine idle for two minutes.
6. If 1st trip DTC is detected, go to [EC-212, "Diagnostic Procedure"](#)

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

SEF174Y

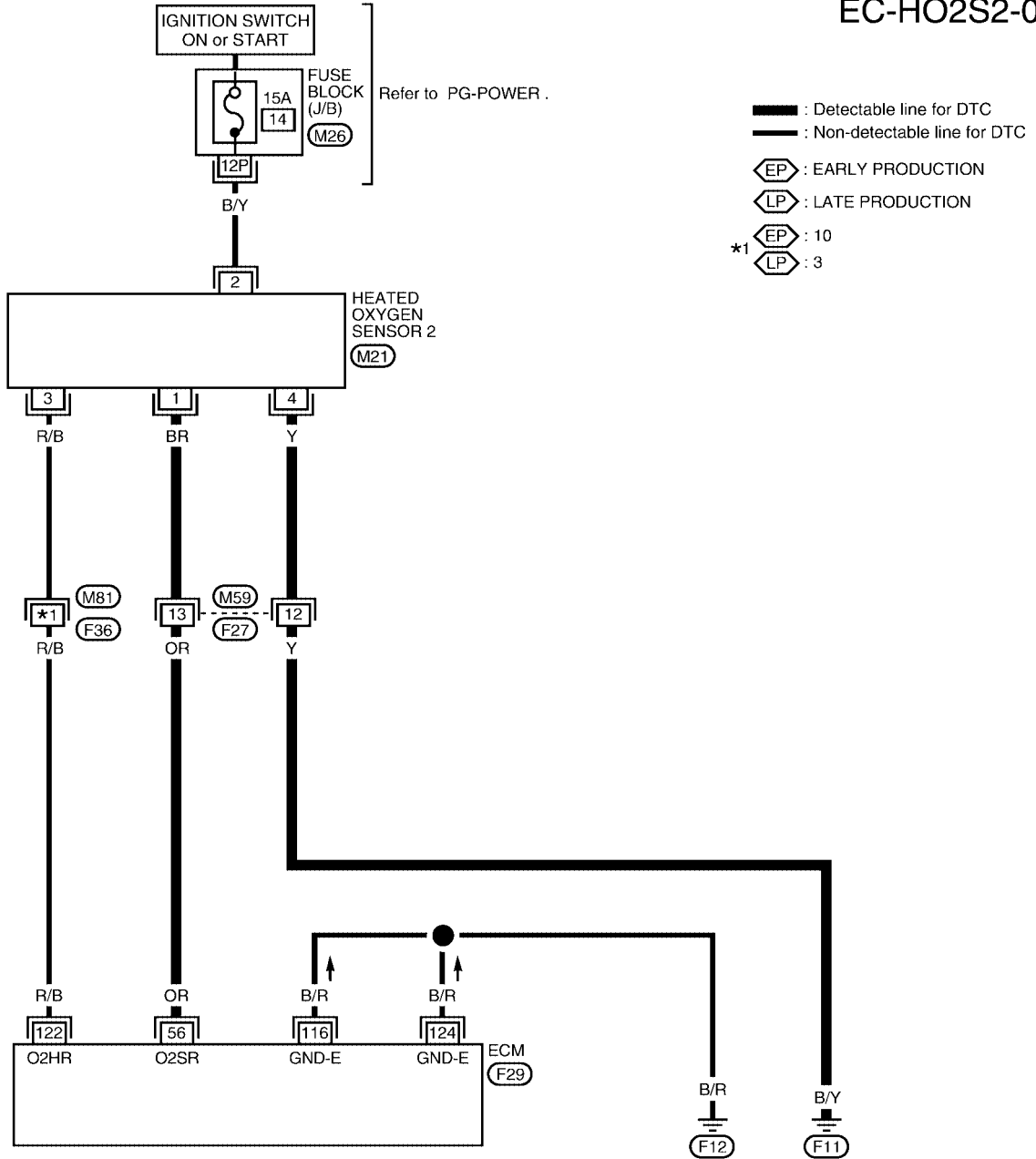
### ④ WITH GST

1. Start engine and warm it up to the normal operating temperature.
  2. Turn ignition switch "OFF" and wait at least 10 seconds.
  3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
  4. Let engine idle for two minutes.
  5. Turn ignition switch "OFF" and wait at least 10 seconds.
  6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
  7. Let engine idle for two minutes.
  8. Select "Mode 3" with GST.
  9. If NG, go to [EC-212, "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.

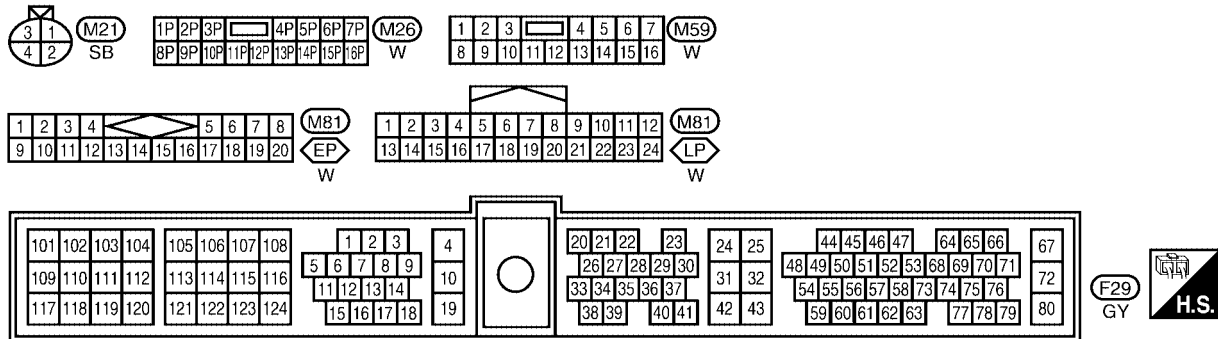
Wiring Diagram

EC-HO2S2-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- \*1 EP : 10
- LP : 3



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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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)      |
|---------------|------------|------------------------|--|------------------------|
| 56            | OR         | Heated oxygen sensor 2 | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● <b>Warm-up condition</b></li> <li>● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met.</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load</li> </ul> | 0 - Approximately 1.0V |

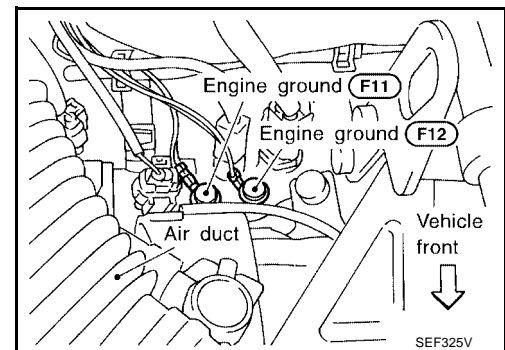
**Diagnostic Procedure**

UBS005BS

**1. RETIGHTEN GROUND SCREWS**

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

>> GO TO 2.

**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 M58, F28
- 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 engine 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 M58, F28
- Harness for open or short between heated oxygen sensor 2 and engine 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-213, "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  
HEATED OXYGEN SENSOR 2**

UBS006U2

**Ⓟ With CONSULT-II**

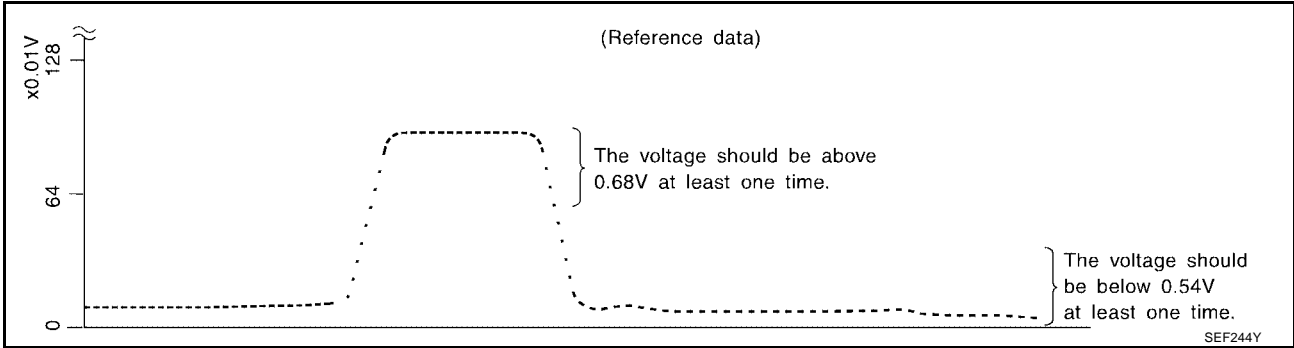
1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch "OFF" and wait at least 5 seconds.
4. Start engine and keep engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
5. Let engine idle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

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

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

SEF662Y

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



"HO2S2 (B1)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)" should be below 0.54V 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**

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

- Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and engine ground.
- Check the voltage when revving up to 4,000 rpm under no load at least 10 times.

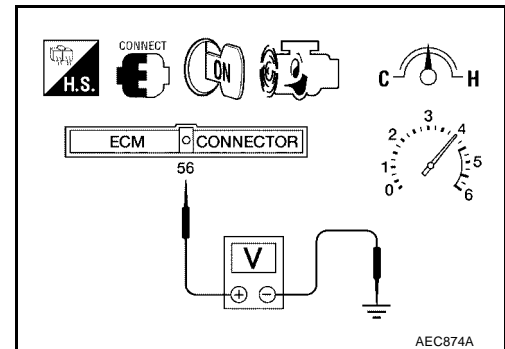
(Depress and release accelerator pedal as soon as possible.)  
**The voltage should be above 0.56V at least once.**  
**If the voltage is above 0.56V at step 4, step 5 is not necessary.**

- 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 0.54V 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**  
**HEATED OXYGEN SENSOR 2**

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

A

EC

C

D

E

F

G

H

I

J

K

L

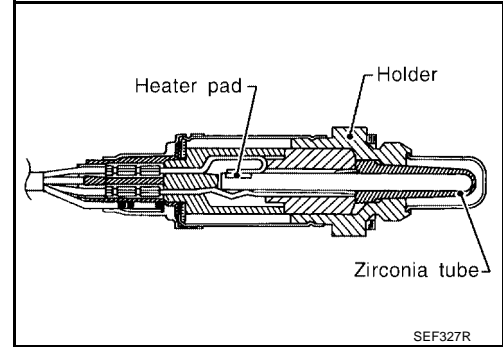
M

**DTC P0139 HO2S2**

**Component Description**

UBS005BT

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**

UBS005BU

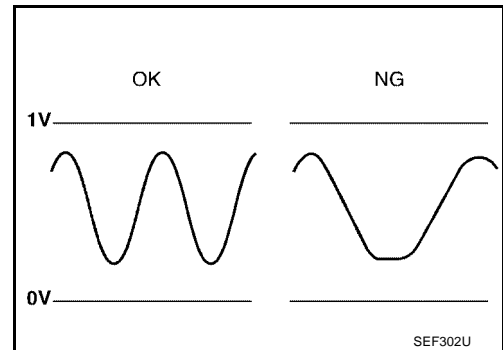
Specification data are reference values.

| MONITOR ITEM    | CONDITION  |   | SPECIFICATION                 |
|-----------------|--|---|-------------------------------|
| HO2S2 (B1)      | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load</li> </ul> | Revving engine from idle up to 3,000 rpm quickly. | 0 - 0.3V ↔ Approx. 0.6 - 1.0V |
| HO2S2 MNTR (B1) | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load</li> </ul> | Revving engine from idle up to 3,000 rpm quickly. | LEAN ↔ RICH                   |

**On Board Diagnosis Logic**

UBS005BW

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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Heated oxygen sensor 2</li> <li>● Fuel pressure</li> <li>● Injectors</li> <li>● Intake air leaks</li> </ul> |



## DTC Confirmation Procedure

### NOTE:

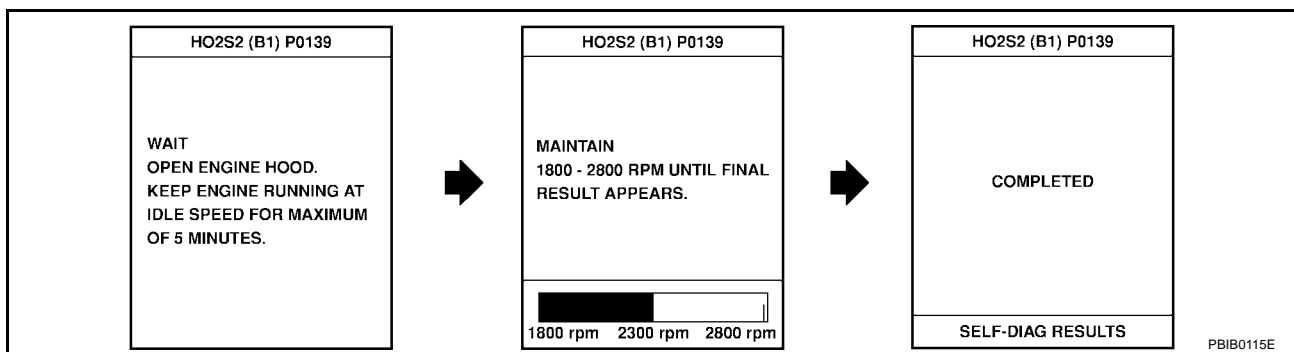
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

### TESTING CONDITION

- Open engine hood before conducting following procedure
- For best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°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 and keep engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Select "HO2S2 (B1) P0139" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II and follow the instruction of CONSULT-II.



6. Make sure the "OK" is displayed after touching "SELF-DIAG RESULTS".  
If NG is displayed, refer to [EC-220, "Diagnostic Procedure"](#).  
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
  - Turn ignition switch "ON" and leave the vehicle in a cool place (soak the vehicle).
  - Turn ignition switch "ON" and select "COOLANT TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
  - Start engine and warm it up while monitoring "COOLAN TEMP/S" indication on CONSULT-II.
  - When "COOLANT TEMP/S" indication reach to 70°C (158°F), go to step 3.

## Overall Function Check

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.**

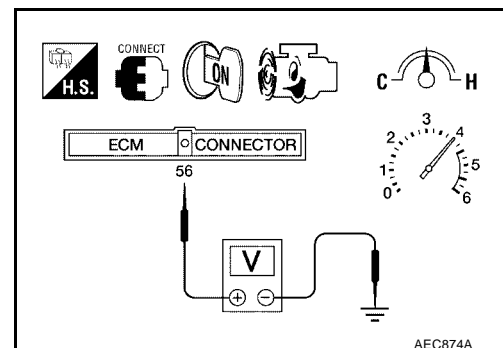
### WITHOUT CONSULT-II

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 keep engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.

(Depress and release accelerator pedal as soon as possible.)

**The voltage should change at more than 0.06V for 1 second during this procedure.**

**If the voltage can be confirmed in step 4, step 5 is not necessary.**

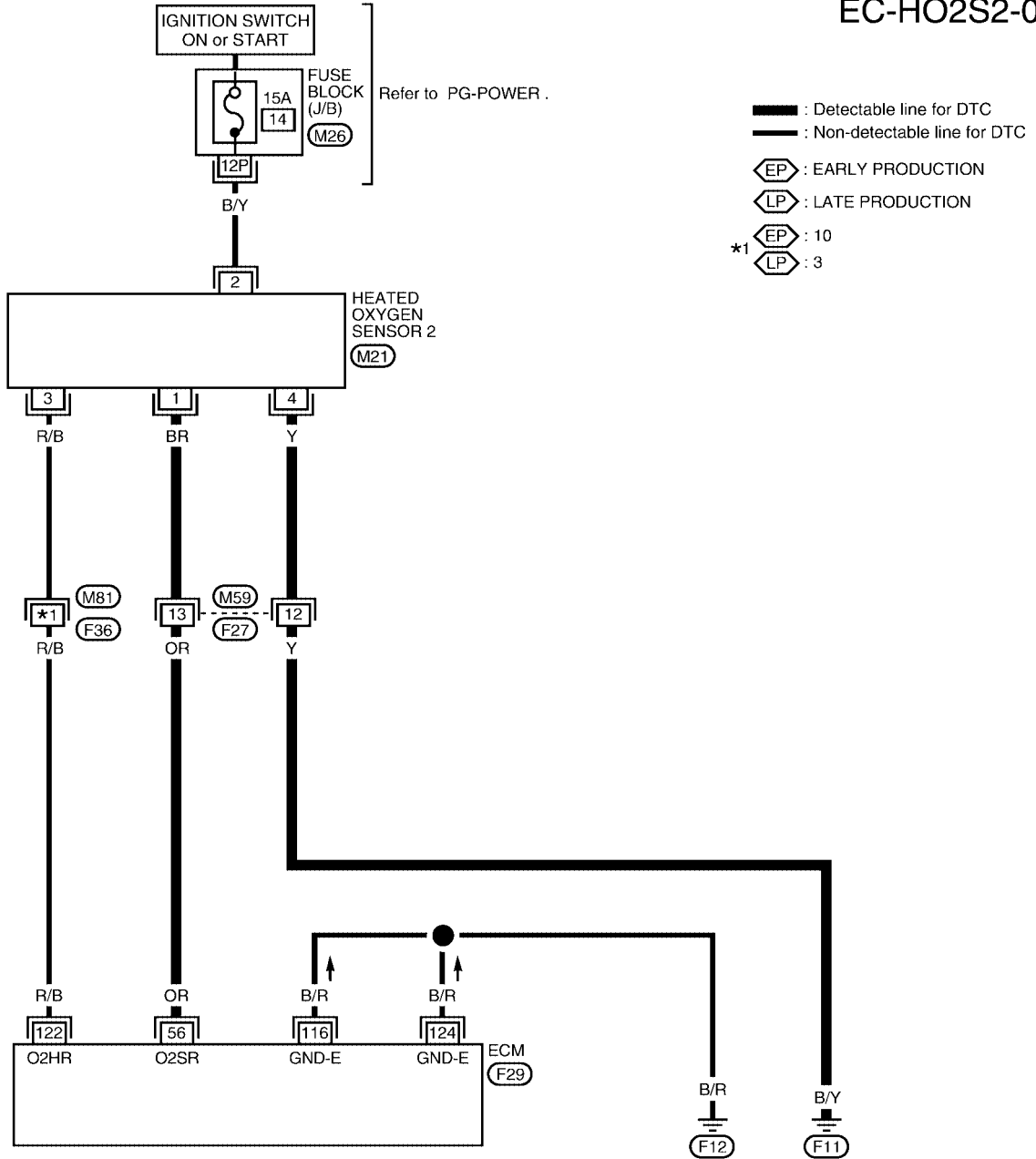


- 
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "OD" OFF (A/T).  
**The voltage should change at more than 0.06V for 1 second during this procedure.**
  8. If NG, go to [EC-220, "Diagnostic Procedure"](#) .

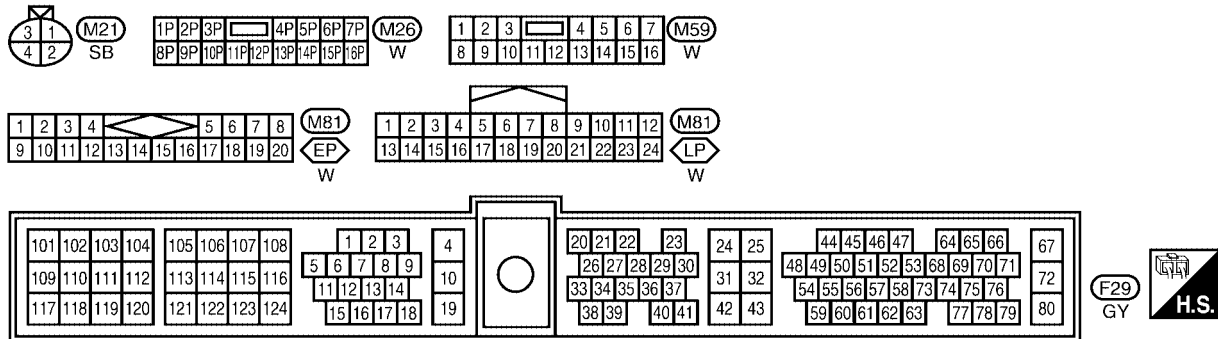
Wiring Diagram

EC-HO2S2-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- \*1 EP : 10
- LP : 3



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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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)      |
|---------------|------------|------------------------|--|------------------------|
| 56            | OR         | Heated oxygen sensor 2 | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● <b>Warm-up condition</b></li> <li>● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met.</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load</li> </ul> | 0 - Approximately 1.0V |

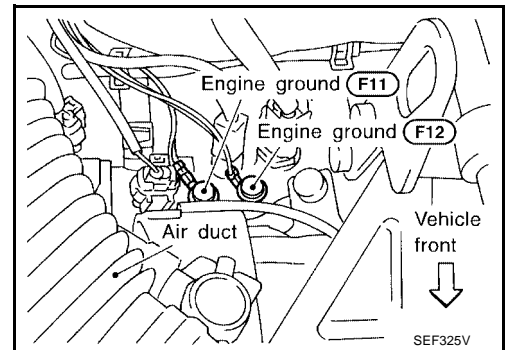
**Diagnostic Procedure**

UBS005C0

**1. RETIGHTEN GROUND SCREWS**

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

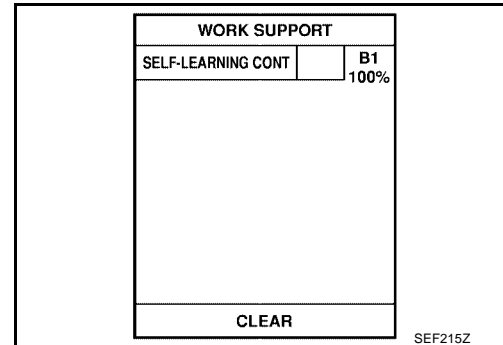
>> GO TO 2.



## 2. CLEAR THE SELF-LEARNING DATA

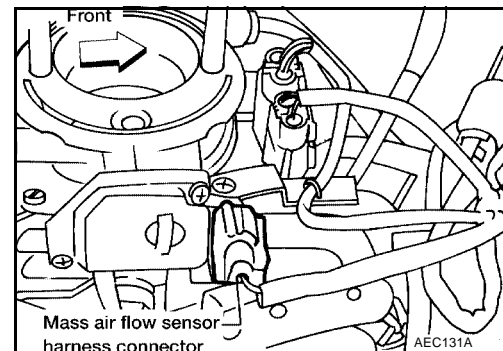
### With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC 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-60. "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-225](#) or [EC-232](#).  
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 M58, F28
- 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 engine 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 M58, F28
- Harness for open or short between heated oxygen sensor 2 and engine ground

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

#### 7. CHECK HEATED OXYGEN SENSOR 2

---

Refer to [EC-222, "Component Inspection"](#) .

K 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 HEATED OXYGEN SENSOR 2

UBS006U5

##### With CONSULT-II

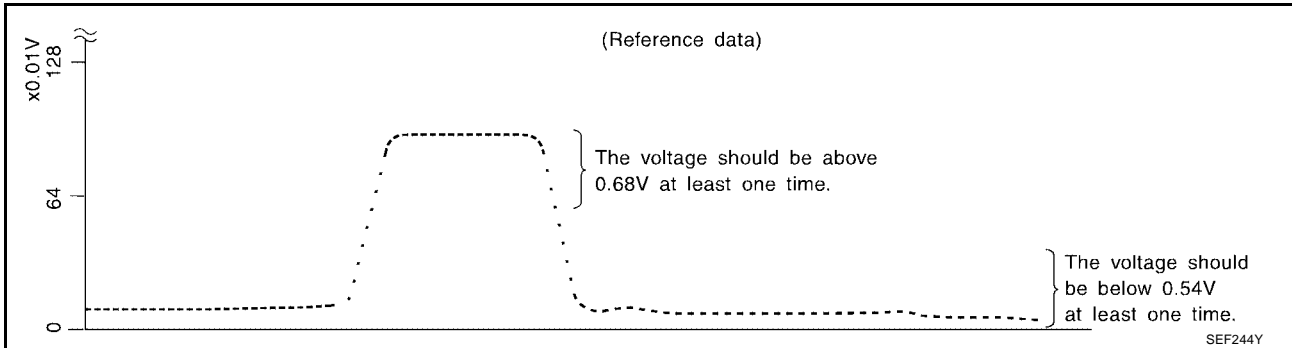
1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch "OFF" and wait at least 5 seconds.
4. Start engine and keep engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
5. Let engine idle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

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

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

SEF662Y

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



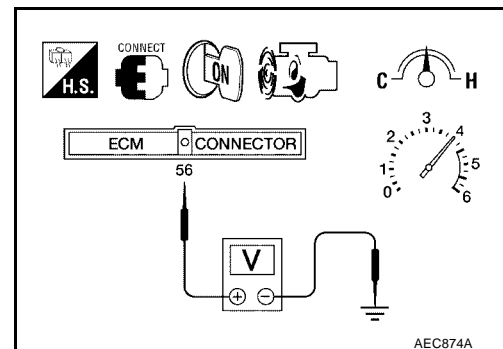
"HO2S2 (B1)" should be above 0.56V at least once when the "FUEL INJECTION" is +25%. "HO2S2 (B1)" should be below 0.54V at least once when the "FUEL INJECTION" is -25%.

**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**

- Reconnect all harness connectors disconnected.
- Start engine and warm it up to the normal operating temperature.
- Turn ignition switch "OFF" and wait at least 5 seconds.
- Start engine and keep engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
- Let engine idle for one minute.
- Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and engine ground.
- 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 0.56V at least once.**  
**If the voltage is above 0.56V at step 4, step 5 is not necessary.**
- 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 0.54V 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**  
**HEATED OXYGEN SENSOR 2**

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



## DTC P0171 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

### On Board Diagnosis Logic

UBS005C1

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 | Injectors |

| DTC No. | Trouble diagnosis name         | DTC detecting condition   | Possible cause   |
|---------|--------------------------------|---|--|
| P0171   | Fuel injection system too lean | <ul style="list-style-type: none"> <li>● Fuel injection system does not operate properly.</li> <li>● The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)</li> </ul> | <ul style="list-style-type: none"> <li>● Intake air leaks</li> <li>● Heated oxygen sensor 1</li> <li>● Injectors</li> <li>● Exhaust gas leaks</li> <li>● Incorrect fuel pressure</li> <li>● Lack of fuel</li> <li>● Mass air flow sensor</li> <li>● Incorrect PCV hose connection</li> </ul> |

### DTC Confirmation Procedure

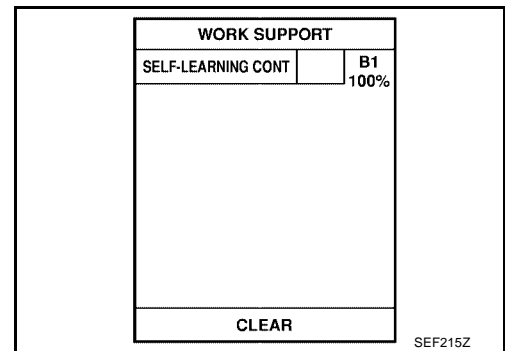
UBS005C2

**NOTE:**

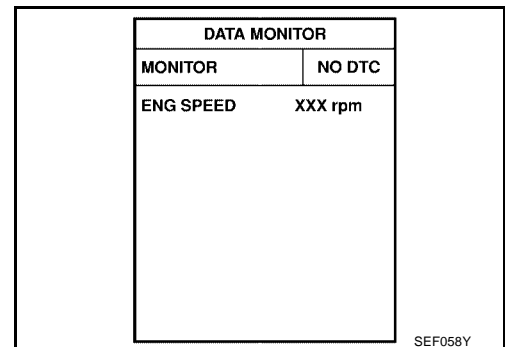
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

**Ⓟ 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.

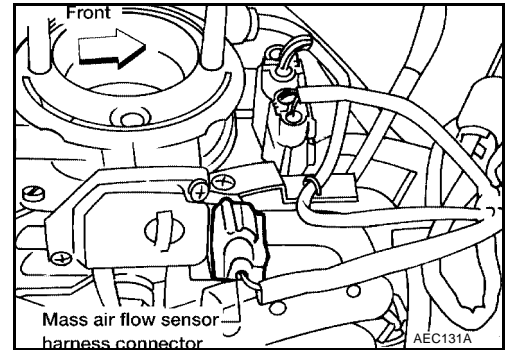


6. Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to [EC-228, "Diagnostic Procedure"](#).
7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8. Crank engine while depressing accelerator pedal. If engine starts, go to [EC-228, "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 7" 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-228, "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-228, "Diagnostic Procedure"](#) . If engine does not start, visually check for exhaust and intake air leak.



# DTC P0171 FUEL INJECTION SYSTEM FUNCTION

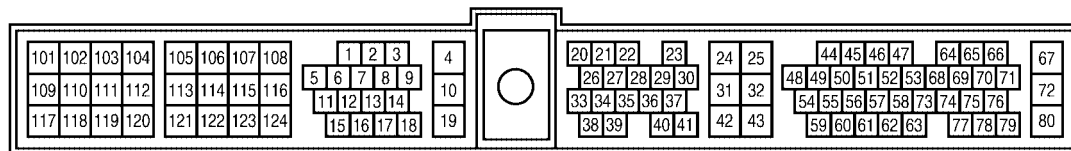
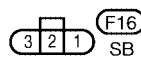
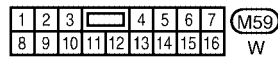
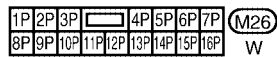
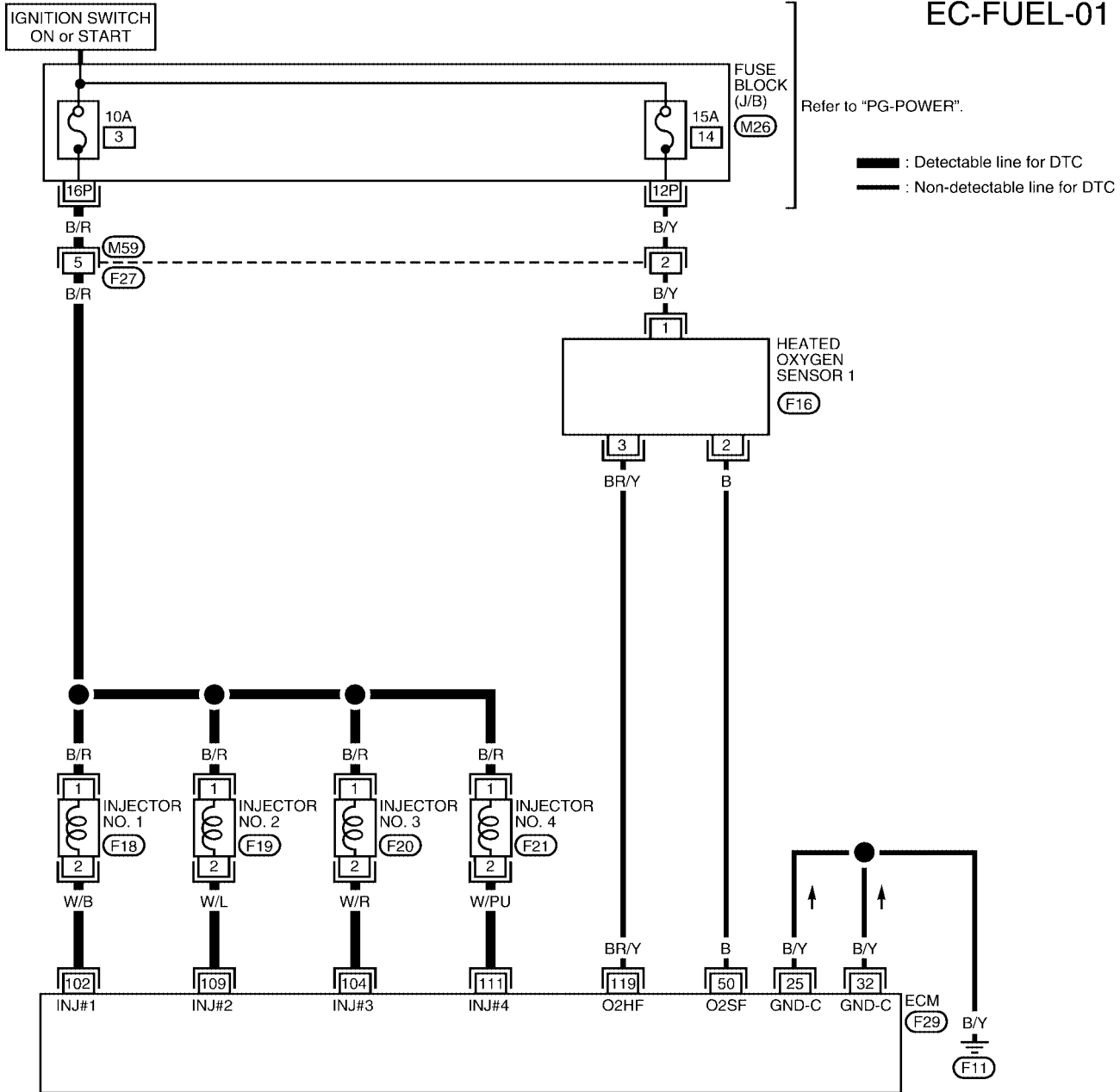
[KA24DE]

UBS005C3

## Wiring Diagram

EC-FUEL-01

A  
EC  
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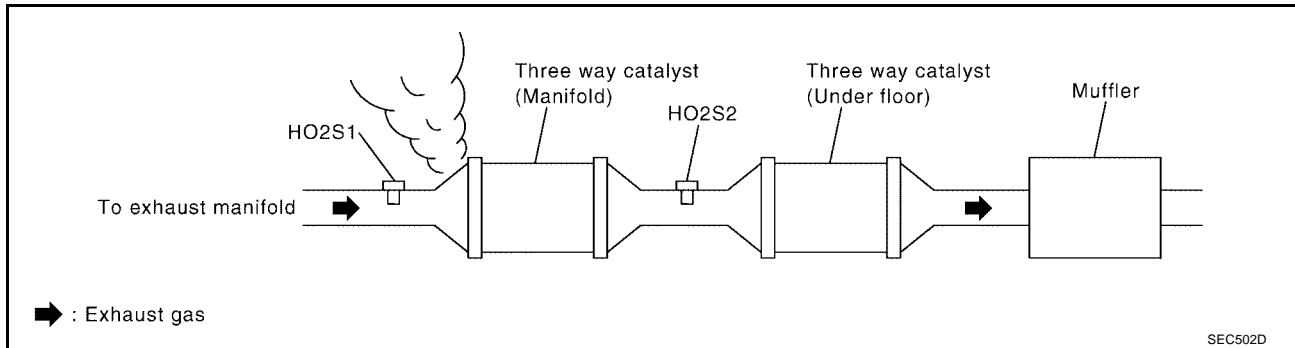


BBWA0441E

## Diagnostic Procedure

### 1. CHECK EXHAUST GAS LEAK

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



OK or NG

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

### 2. CHECK FOR INTAKE AIR LEAK 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.**

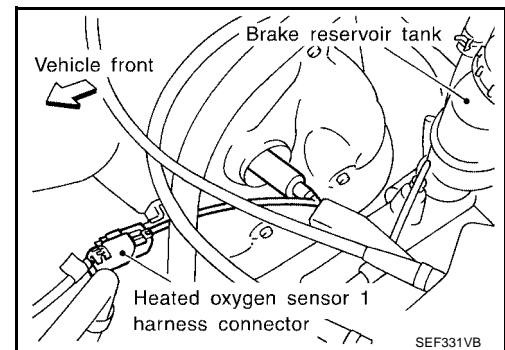
4. Check harness continuity between ECM terminal 50 or HO2S1 terminal 2 and ground.  
 Refer to Wiring Diagram.

**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-45, "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<sup>2</sup> , 34 psi)**

**When fuel pressure regulator valve vacuum hose is disconnected.**                      **294 kPa (3.0 kg/cm<sup>2</sup> , 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-551](#) .)
- Fuel pressure regulator (Refer to [EC-47](#) .)
- Fuel lines (Refer to [MA-18, "Checking Fuel Lines"](#) .)
- Fuel filter for clogging

>> Repair or replace.

**6. CHECK MASS AIR FLOW SENSOR**

Refer to [EC-231, "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 engine grounds. Refer to [EC-143, "DTC P0102, P0103 MAF SENSOR"](#) .

A  
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## 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.

| ACTIVE TEST   |         |
|---------------|---------|
| POWER BALANCE |         |
| MONITOR       |         |
| ENG SPEED     | XXX rpm |
| MAS A/F SE-B1 | XXX V   |
| IACV-AAC/V    | XXX %   |
|               |         |
|               |         |

SEF981Z

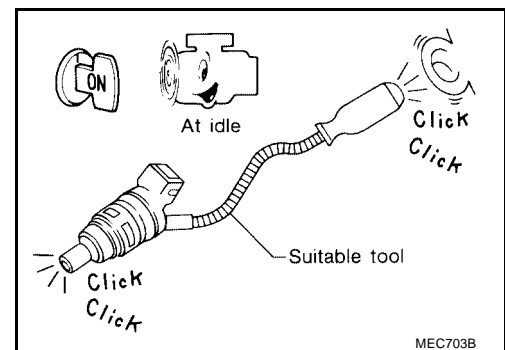
### Without CONSULT-II

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 8.

NG >> Perform trouble diagnosis for injector, refer to [EC-542](#), "[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-231](#), "[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

### 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.

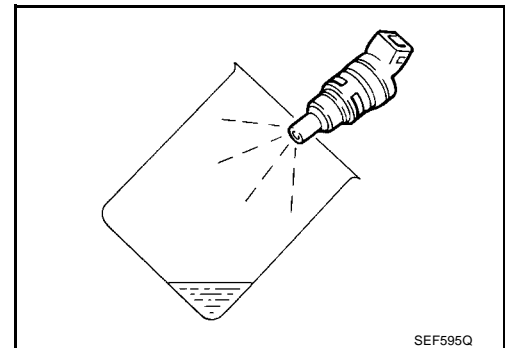
at idling : 0.9 - 5.8 g-m/sec

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.**



SEF595Q

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## DTC P0172 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

### On Board Diagnosis Logic

UBS005C5

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 | Injectors |

| DTC No. | Trouble diagnosis name         | DTC detecting condition   | Possible cause  |
|---------|--------------------------------|---|---|
| P0172   | Fuel injection system too rich | <ul style="list-style-type: none"> <li>● Fuel injection system does not operate properly.</li> <li>● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)</li> </ul> | <ul style="list-style-type: none"> <li>● Heated oxygen sensor 1</li> <li>● Injectors</li> <li>● Exhaust gas leaks</li> <li>● Incorrect fuel pressure</li> <li>● Mass air flow sensor</li> </ul> |

### DTC Confirmation Procedure

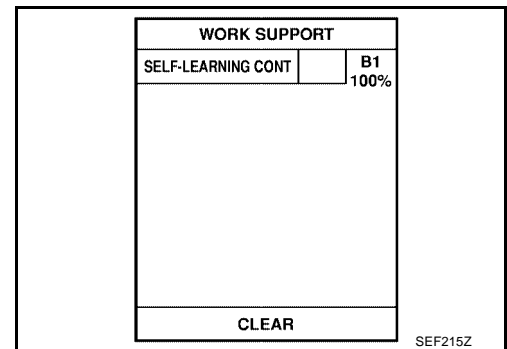
UBS005C6

**NOTE:**

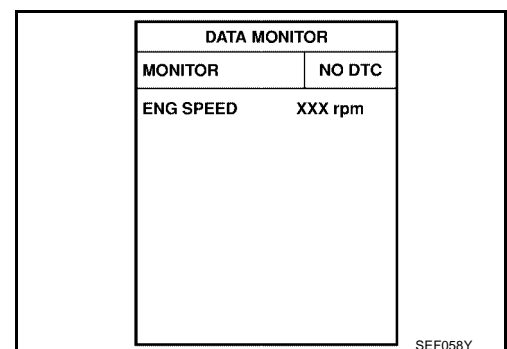
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

**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-235, "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-235, "Diagnostic Procedure"](#). If engine does not start, remove ignition plugs and check for fouling, etc.



**WITH GST**

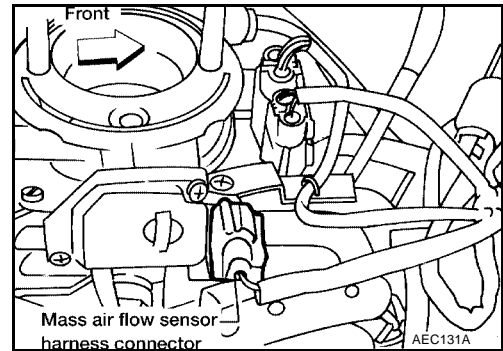
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.



## DTC P0172 FUEL INJECTION SYSTEM FUNCTION

[KA24DE]

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 7" 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-235, "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-235, "Diagnostic Procedure"](#). If engine does not start, remove ignition plugs and check for fouling, etc.



A

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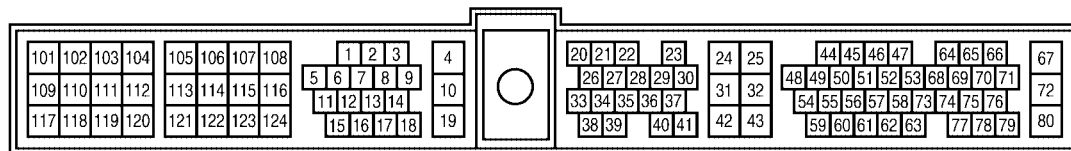
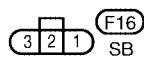
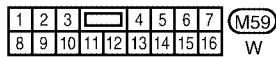
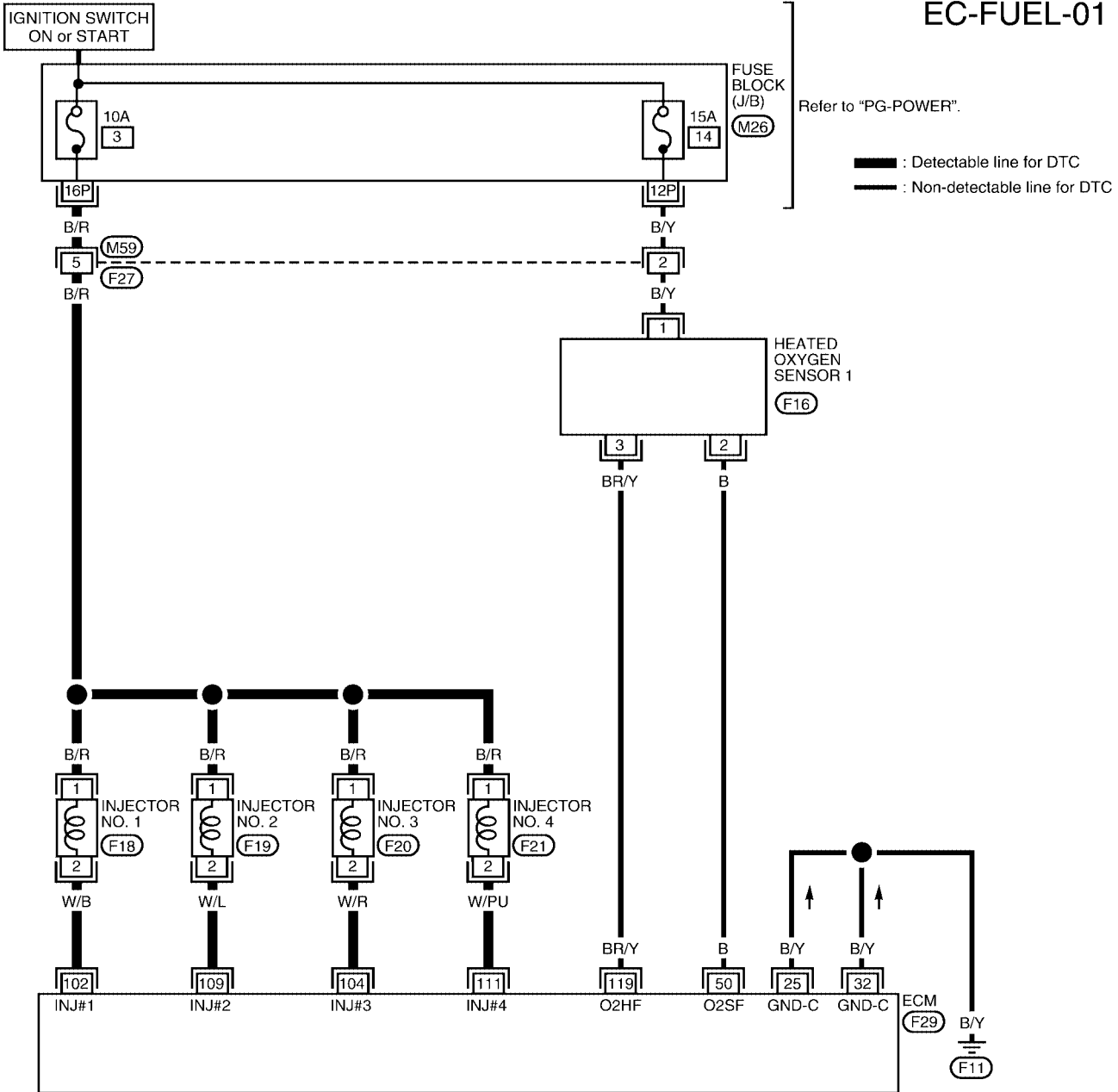
# DTC P0172 FUEL INJECTION SYSTEM FUNCTION

[KA24DE]

UBS005C7

## Wiring Diagram

EC-FUEL-01

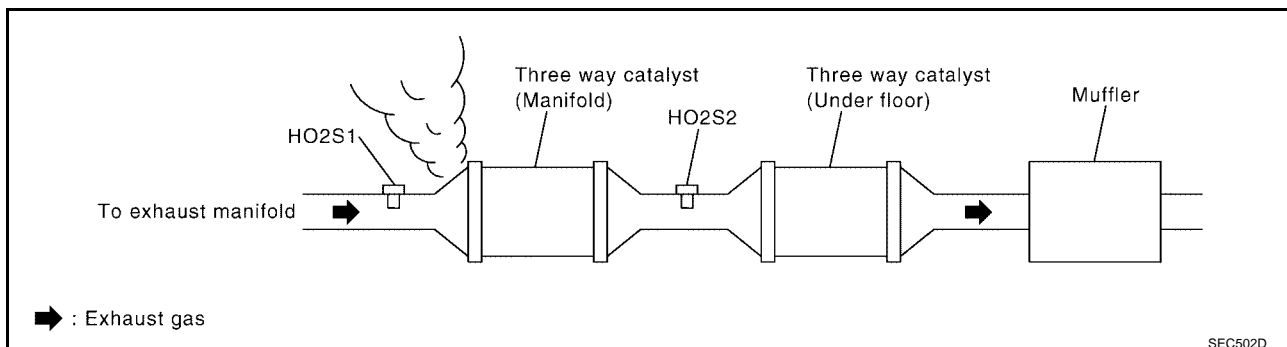


BBWA0441E

## Diagnostic Procedure

### 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.**

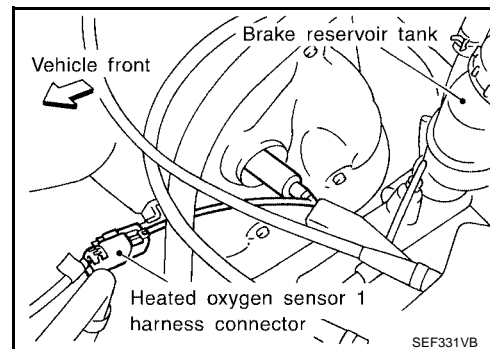
4. Check harness continuity between ECM terminal 50 or HO2S1 terminal 2 and ground.  
Refer to Wiring Diagram.

**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-45, "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<sup>2</sup> , 34 psi)**

**When fuel pressure regulator valve vacuum hose is disconnected.      Approximately 294 kPa (3.0 kg/cm<sup>2</sup> , 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-551](#) .)
- Fuel pressure regulator (Refer to [EC-47](#) .)

>> Repair or replace.

## 5. CHECK MASS AIR FLOW SENSOR

Refer to [EC-238, "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 engine grounds. Refer to [EC-143, "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

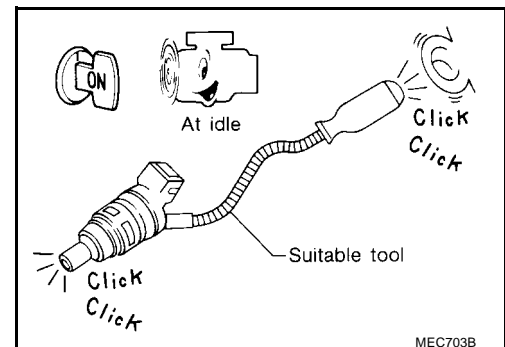
### Without CONSULT-II

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-542](#) .



## 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-238, "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.**

A

EC

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**Component Inspection****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

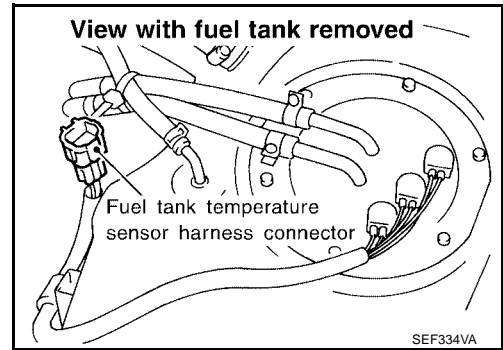
**INJECTOR**

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

### Component Description

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.



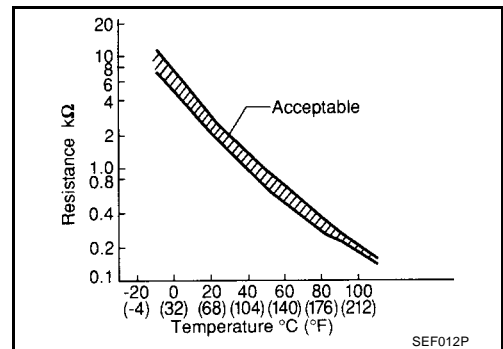
### <Reference data>

| Fluid temperature<br>°C (°F) | Voltage*<br>V | Resistance<br>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 ECM terminals, such as the ground.**



### On Board Diagnosis Logic

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Fuel tank temperature sensor</li> </ul> |

### DTC Confirmation Procedure

#### 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-242, "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-242, "Diagnostic Procedure"](#).

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

SEF174Y



**WITH GST**

Follow the procedure "WITH CONSULT-II".



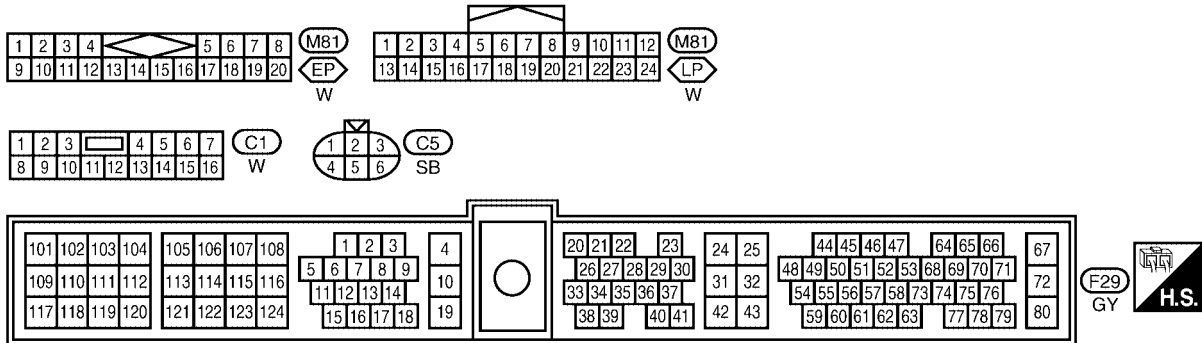
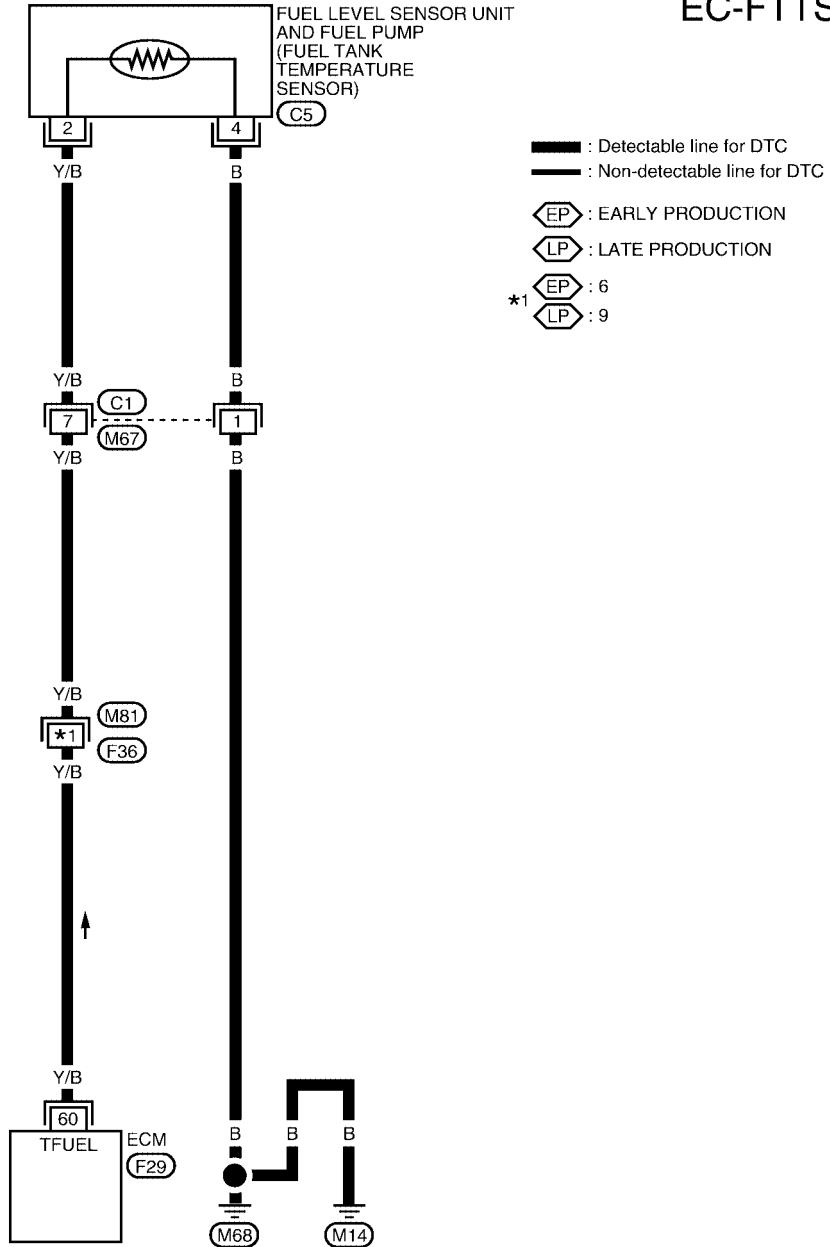
# DTC P0181 FTT SENSOR

[KA24DE]

UBS005CC

## Wiring Diagram

### EC-FTTS-01

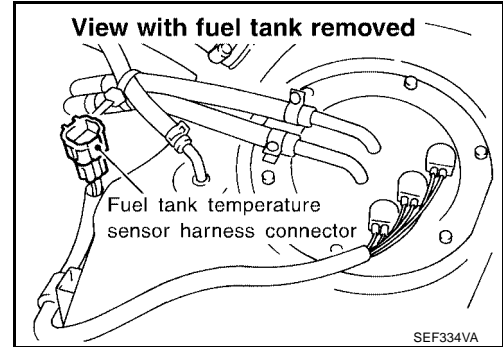


WBWA0049E

## Diagnostic Procedure

### 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.

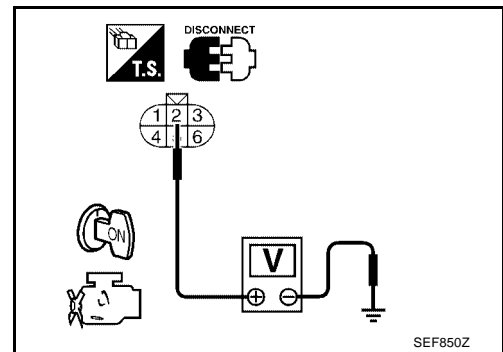


4. Check voltage between terminal 2 and ground with CONSULT-II or tester.

**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 harness or connector.

### 3. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between terminal 4 and body 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 body ground

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

**5. CHECK FUEL TANK TEMPERATURE SENSOR**

Refer to [EC-243, "Component Inspection"](#)

OK or NG

- OK >> GO TO 6.
- NG >> Replace fuel tank temperature sensor.

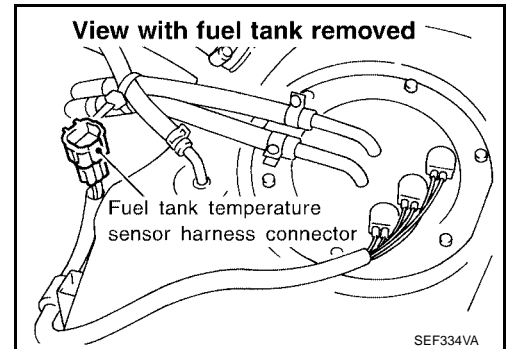
**6. CHECK INTERMITTENT INCIDENT**

Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

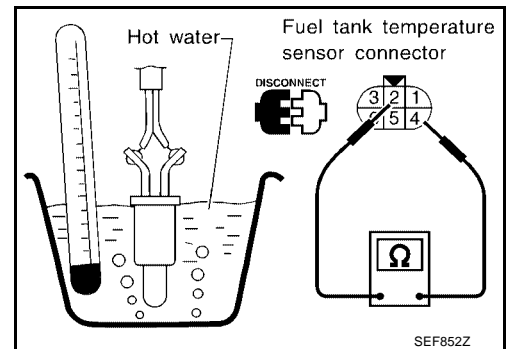
**Component Inspection  
FUEL TANK TEMPERATURE SENSOR**

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  
FUEL TANK TEMPERATURE SENSOR**

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

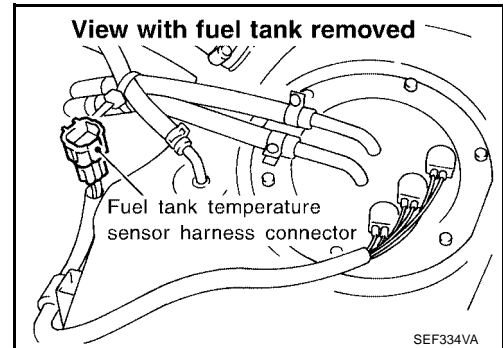
## DTC P0182, P0183 FTT SENSOR

PFP:22630

### Component Description

UBS006FG

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.



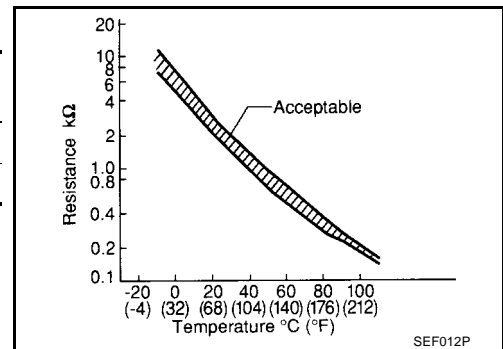
### <Reference data>

| Fluid temperature<br>°C (°F) | Voltage*<br>V | Resistance<br>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 ECM terminals, such as the ground.**



### On Board Diagnosis Logic

UBS006FH

| 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.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> </ul> |
| P0183   | Fuel tank temperature sensor circuit high input | An excessively high voltage from the sensor is sent to ECM. | <ul style="list-style-type: none"> <li>● Fuel tank temperature sensor</li> </ul>                                   |

### DTC Confirmation Procedure

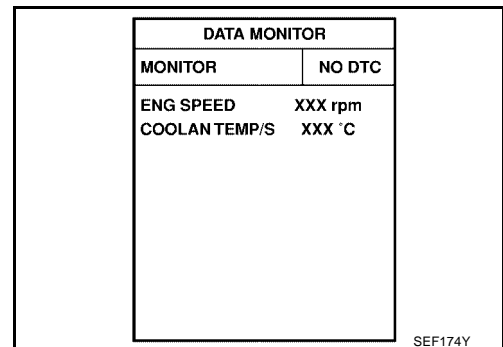
UBS006FI

#### 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-246, "Diagnostic Procedure"](#)



#### WITH GST

Follow the procedure "WITH CONSULT-II".

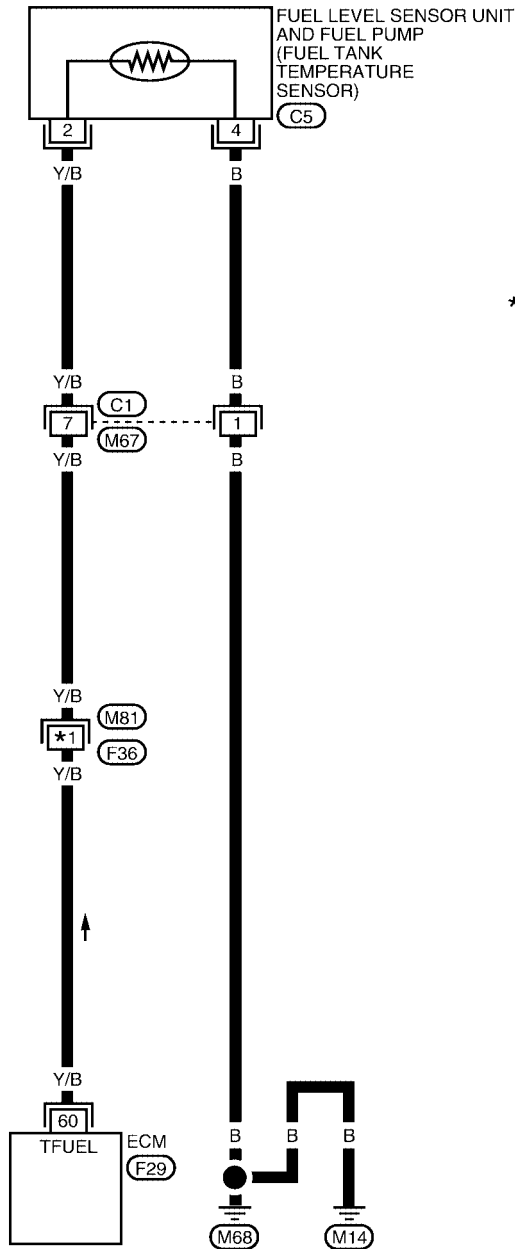
# DTC P0182, P0183 FTT SENSOR

[KA24DE]

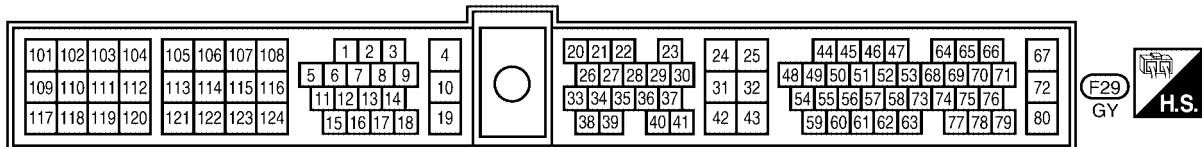
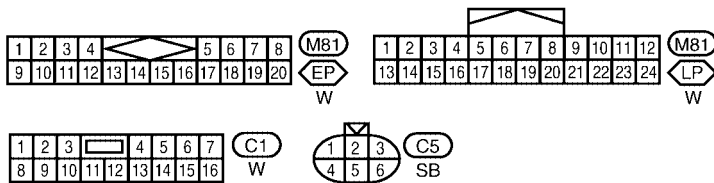
UBS006FJ

## Wiring Diagram

EC-FTTS-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- \*1 EP : 6
- LP : 9

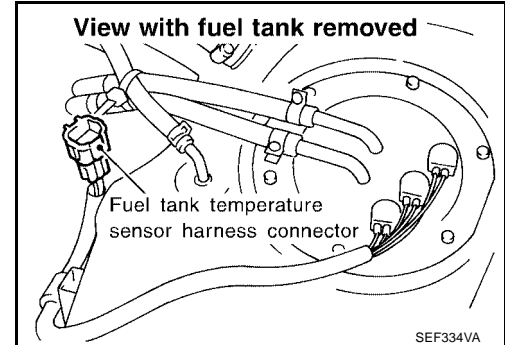


WBWA0049E

## Diagnostic Procedure

### 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.

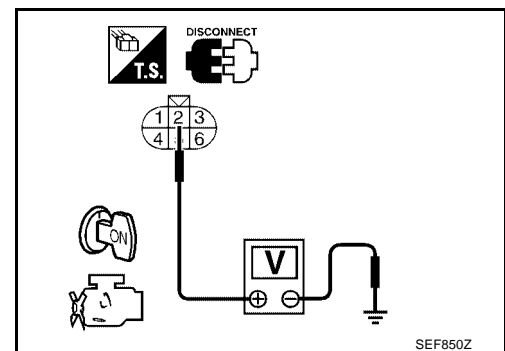


4. Check voltage between terminal 2 and ground with CONSULT-II or tester.

**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 harness or connector.

### 3. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between terminal 4 and body 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 body ground

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

**5. CHECK FUEL TANK TEMPERATURE SENSOR**

Refer to [EC-247, "Component inspection"](#) .

OK or NG

- OK >> GO TO 6.
- NG >> Replace fuel tank temperature sensor.

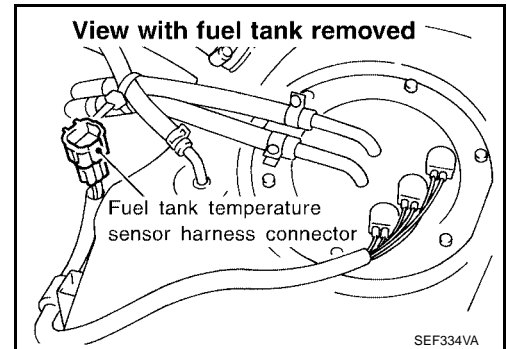
**6. CHECK INTERMITTENT INCIDENT**

Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

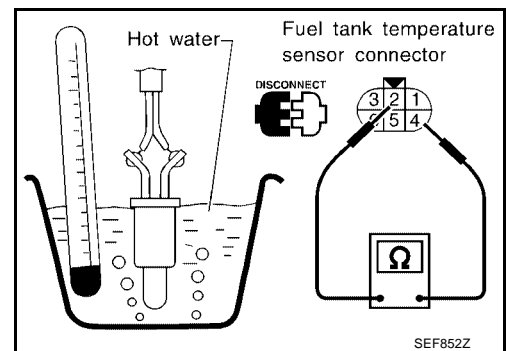
**Component inspection  
FUEL TANK TEMPERATURE SENSOR**

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  
FUEL TANK TEMPERATURE SENSOR**

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

# DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

[KA24DE]

## DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

PFP:00019

### On Board Diagnosis Logic

UBS005CE

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy.

When malfunction is detected, the malfunction indicator lamp (MIL) will light up even in the first trip.

| DTC No.       | Trouble diagnosis name                    | DTC detecting condition   | Possible cause   |
|---------------|---|---|--|
| P0217<br>0217 | Engine coolant over temperature condition | Engine coolant temperature is excessively high under normal engine speed. | <ul style="list-style-type: none"><li>● Cooling fan</li><li>● Thermostat</li><li>● Improper ignition timing</li><li>● Engine coolant temperature sensor</li><li>● Blocked radiator</li><li>● Blocked front end (Improper fitting of nose mask)</li><li>● Crushed vehicle frontal area (Vehicle frontal is collided but not repaired)</li><li>● Blocked air passage by improper installation of front fog lamp or fog lamps</li><li>● Improper mixture ratio of coolant</li><li>● Damaged bumper</li></ul> For more information, refer to <a href="#">EC-250, "Main 11 Causes of Overheating"</a> . |

#### 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

UBS005CG

Use this procedure to check the overall function of the coolant overtemperature 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-249, "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-249, "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-24, "TROUBLE DIAGNOSIS"](#). After repair, go to the next step.



# DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

[KA24DE]

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-249, "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-158, "Component Inspection"](#) .  
If NG, replace ECT sensor and go to the next step.
9. Check ignition timing. Refer to [EC-73, "Basic Inspection"](#) .  
Make sure that ignition timing is  $20^{\circ} \pm 2^{\circ}$  at idle.  
If NG, adjust ignition timing and then recheck.

## Diagnostic Procedure

UBS005CH

### 1. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

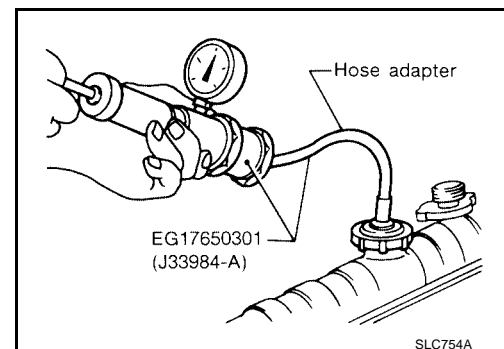
**Testing pressure** : 157 kPa (1.6 kg/cm<sup>2</sup> , 23 psi)

#### CAUTION:

Higher than the specified pressure may cause radiator damage.  
Pressure should not drop.

#### OK or NG

- OK >> GO TO 2.  
NG >> Check the following for leak.
- Hose
  - Radiator
  - Water pump  
Refer to [CO-10, "WATER PUMP"](#) .



### 2. CHECK RADIATOR CAP

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

#### OK or NG

- OK >> GO TO 3.  
NG >> Replace radiator cap.

### 3. CHECK THERMOSTAT

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

#### OK or NG

- OK >> GO TO 4.  
NG >> Replace thermostat.

## 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-158, "Component Inspection"](#) .

OK or NG

OK >> GO TO 5.

NG >> Replace engine coolant temperature sensor.

## 5. CHECK MAIN 11 CAUSES

If the cause cannot be isolated, go to [EC-250, "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

*UBS005CI*

| Engine | Step | Inspection item  | Equipment                                      | Standard  | Reference page  |
|--------|------|--|--|---|---|
| OFF    | 1    | <ul style="list-style-type: none"> <li>● Blocked radiator</li> <li>● Blocked condenser</li> <li>● Blocked radiator grille</li> <li>● Blocked bumper</li> </ul> | ● Visual                                       | No blocking   | —   |
|        | 2    | ● Coolant mixture  | ● Coolant tester                               | 50 - 50% coolant mixture  | See <a href="#">MA-12, "RECOMMENDED FLUIDS AND LUBRICANTS"</a> .                |
|        | 3    | ● Coolant level  | ● Visual                                       | Coolant up to MAX level in reservoir tank and radiator filler neck  | See <a href="#">MA-16</a> , "Changing Engine Coolant".                          |
|        | 4    | ● Radiator cap   | ● Pressure tester                              | 78 - 98 kPa (0.8 - 1.0 kg/cm <sup>2</sup> , 11 - 14 psi)<br>59 - 98 kPa (0.6 - 1.0 kg/cm <sup>2</sup> , 9 - 14 psi) (Limit) | See <a href="#">CO-8, "System Check"</a> .                                      |
| ON*2   | 5    | ● Coolant leaks  | ● Visual                                       | No leaks  | See <a href="#">CO-8, "System Check"</a> .                                      |
| ON*2   | 6    | ● Thermostat   | ● Touch the upper and lower radiator hoses     | Both hoses should be hot  | See <a href="#">CO-13, "THERMOSTAT"</a> and <a href="#">CO-14, "RADIATOR"</a> . |
| 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 <a href="#">MA-16</a> , "Changing Engine Coolant".                          |
| OFF*4  | 9    | ● Coolant return from reservoir tank to radiator   | ● Visual                                       | Should be initial level in reservoir tank   | See <a href="#">CO-8, "ENGINE COOLANT"</a> .                                    |
| OFF    | 10   | ● Cylinder head  | ● Straight gauge feeler gauge                  | 0.1 mm (0.004 in) Maximum distortion (warping)  | See <a href="#">EM-32, "CYLINDER HEAD"</a> .                                    |
|        | 11   | ● Cylinder block and pistons   | ● Visual                                       | No scuffing on cylinder walls or piston   | See <a href="#">EM-48, "CYLINDER BLOCK"</a> .                                   |

\*1: Turn the ignition switch ON.

# DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION [KA24DE]

\*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"](#) .

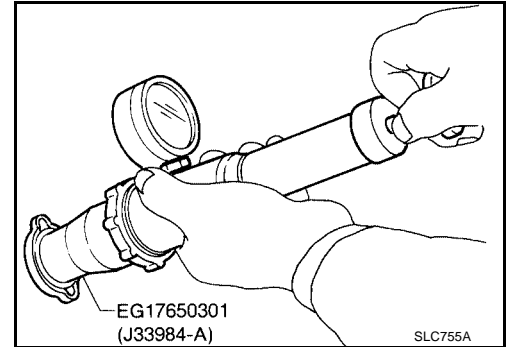
## Component Inspection RADIATOR CAP

UBS006UC

EC

Apply pressure to cap with a tester.

**Radiator cap relief pressure** : 78 - 98 kPa (0.8 - 1.0 kg/cm<sup>2</sup> , 11 - 14 psi)



## THERMOSTAT

1. Check valve seating condition at normal room temperatures.  
**It should seat tightly.**

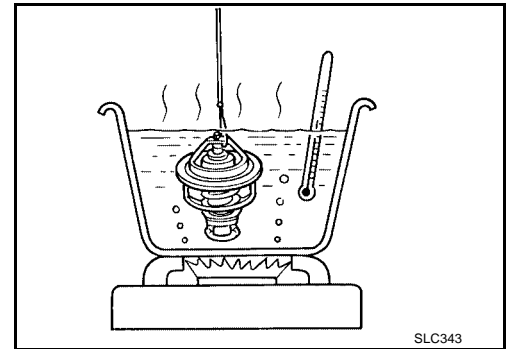
2. Check valve opening temperature and valve lift.

**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 (9°F) below valve opening temperature.

For details, refer to [CO-13. "THERMOSTAT"](#) .



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

[KA24DE]

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

PFP:00020

### On Board Diagnosis Logic

*UBS005CJ*

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<br>0300 | Multiple cylinder misfire detected | Multiple cylinder misfire. | <ul style="list-style-type: none"> <li>● Improper spark plug</li> <li>● Insufficient compression</li> <li>● Incorrect fuel pressure</li> <li>● The injector circuit is open or shorted</li> <li>● Fuel injectors</li> <li>● Intake air leak</li> <li>● The ignition secondary circuit is open or shorted</li> <li>● Lack of fuel</li> <li>● Drive plate/Fly wheel</li> <li>● Heated oxygen sensor 1</li> <li>● Incorrect distributor rotor</li> <li>● EGR valve</li> </ul> |
| P0301<br>0301 | No.1 cylinder misfire detected     | No. 1 cylinder misfires.   |  |
| P0302<br>0302 | No. 2 cylinder misfire detected    | No. 2 cylinder misfires.   |  |
| P0303<br>0303 | No. 3 cylinder misfire detected    | No. 3 cylinder misfires.   |  |
| P0304<br>0304 | No. 4 cylinder misfire detected    | No. 4 cylinder misfires.   |  |

## DTC Confirmation Procedure

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 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. Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.  
Hold the accelerator pedal as steady as possible.

**NOTE:**

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

5. If 1st trip DTC is detected, go to [EC-253, "Diagnostic Procedure"](#)

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |
| SEF174Y       |         |

**WITH GST**

Follow the procedure "WITH CONSULT-II".

## Diagnostic Procedure

### 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-459](#).

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?

|               |         |
|---------------|---------|
| ACTIVE TEST   |         |
| POWER BALANCE |         |
| MONITOR       |         |
| ENG SPEED     | XXX rpm |
| MAS A/F SE-B1 | XXX V   |
| IACV-AAC/V    | XXX %   |
|               |         |
|               |         |

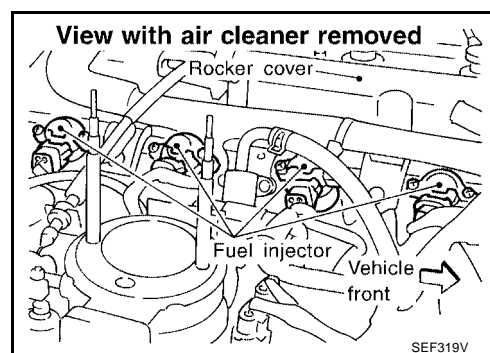
SEF981Z

**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.

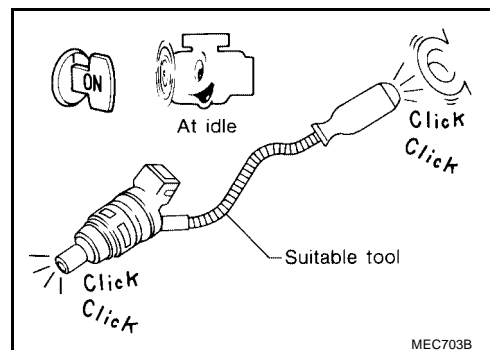


#### 5. CHECK INJECTOR

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-542](#), "[INJECTOR CIRCUIT](#)".

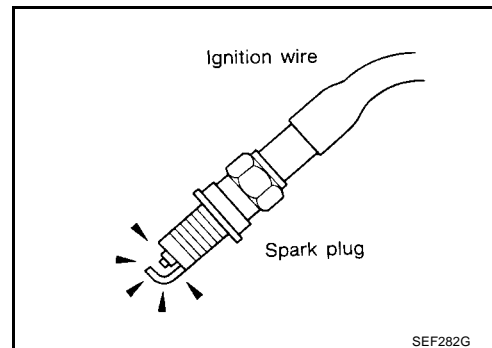


## 6. CHECK IGNITION SPARK

1. Turn ignition switch OFF.
2. Disconnect ignition wire from spark plug.
3. Connect a known good spark plug to the ignition wire.
4. Place end of spark plug against a suitable ground and crank engine.
5. Check for spark.

### OK or NG

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



## 7. CHECK IGNITION WIRES

Refer to [EC-257, "Component Inspection"](#) .

### OK or NG

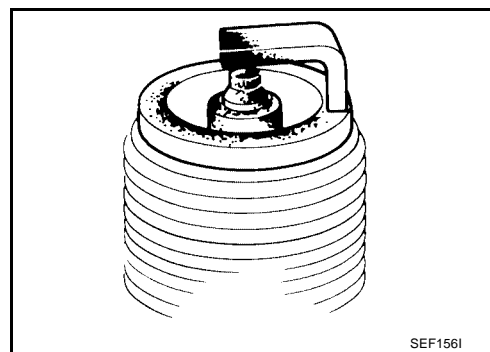
- OK >> Check distributor rotor head for incorrect parts. Check ignition coil, power transistor and their circuits. Refer to [EC-535, "IGNITION SIGNAL"](#) .  
 NG >> Replace.

## 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"](#) .

|   |   |
|---|---|
| <b>Standard</b>                         | <b>: 1,226 kPa (12.5 kg/cm<sup>2</sup> , 178 psi)/300 rpm</b> |
| <b>Minimum</b>                          | <b>: 1,030 kPa (10.5 kg/cm<sup>2</sup> , 149 psi)/300 rpm</b> |
| <b>Difference between each cylinder</b> | <b>: 98 kPa (1.0 kg/cm<sup>2</sup> , 14 psi)/300 rpm</b>      |

### OK or NG

- OK >> GO TO 10.  
 NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

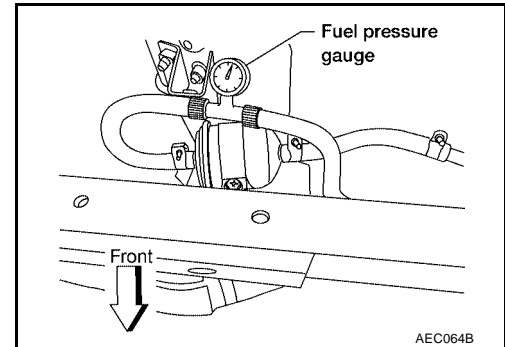
## 10. CHECK FUEL PRESSURE

1. Install any parts removed.
2. Release fuel pressure to zero. Refer to [EC-45, "FUEL PRESSURE RELEASE"](#) .
3. Install fuel pressure gauge and check fuel pressure. Refer to [EC-46, "FUEL PRESSURE CHECK"](#) .

**At idle : Approx. 235 kPa (2.4 kg/cm<sup>2</sup> , 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-551, "FUEL PUMP CIRCUIT"](#) .)
- Fuel pressure regulator (Refer to [EC-47, "Fuel Pressure Regulator Check"](#) .)
- Fuel lines (Refer to "Checking Fuel Lines", [MA-18](#) ).
- Fuel filter for clogging

>> Repair or replace.

## 12. CHECK IGNITION TIMING

1. Check the following items. Refer to [EC-73, "Basic Inspection"](#) .

| Items  | Specifications   |
|--|--|
| Ignition timing  | 20° ± 2° BTDC  |
| Base idle speed  | 750 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.1 mm (0.004 in): ON<br>0.3 mm (0.012 in): OFF |
| Target idle speed  | 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-190, "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 engine grounds.

Refer to [EC-143, "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 "Symptom Matrix Chart", [EC-83](#).

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-60, "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 IGNITION WIRES

UBS006UE

1. Inspect wires for cracks, damage, burned terminals and for improper fit.

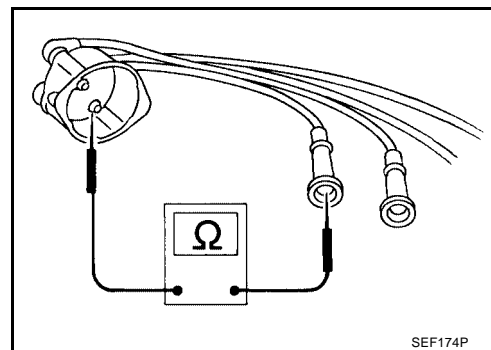
# DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

[KA24DE]

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 k $\Omega$ /m (4.15 - 5.61 k $\Omega$ /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.



UBS006UF

## Removal and Installation INJECTOR

Refer to [EM-13, "OUTER COMPONENT PARTS"](#) .

## SPARK PLUGS

Refer to [EM-13, "OUTER COMPONENT PARTS"](#) .

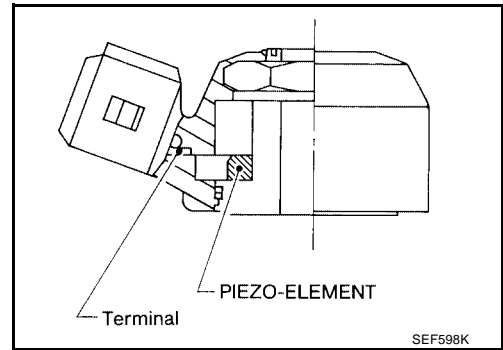
**DTC P0327, P0328 KS**

PF2:22060

**Component Description**

UBS005CM

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**

UBS005CO

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.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Knock sensor</li> </ul> |
| P0328   | Knock sensor circuit high input | An excessively high voltage from the sensor is sent to ECM. |  |

**DTC Confirmation Procedure**

UBS005CP

**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:**

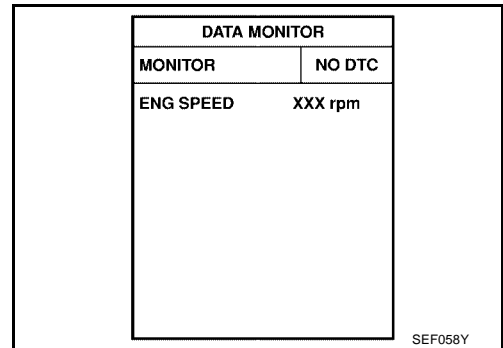
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

**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-261, "Diagnostic Procedure"](#).

**WITH GST**

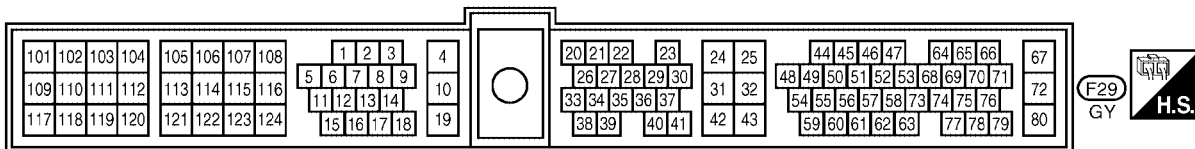
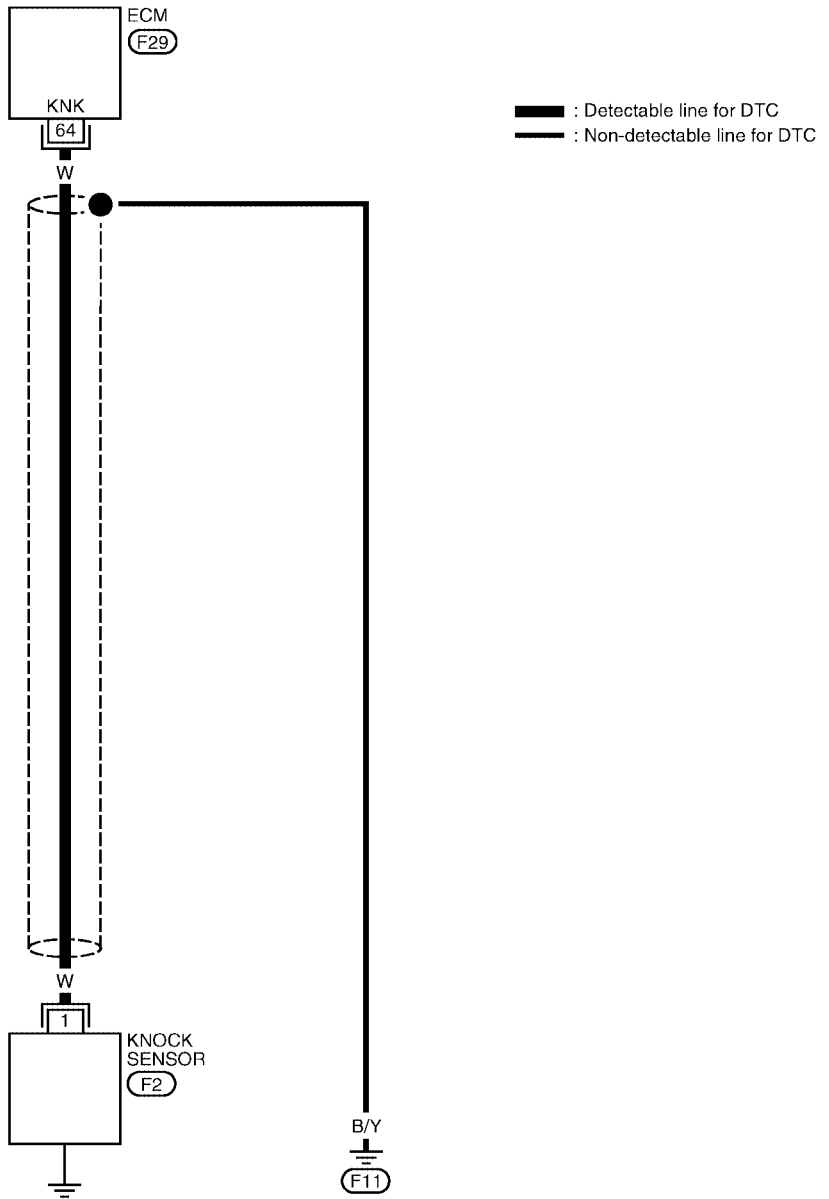
Follow the procedure "WITH CONSULT-II".



Wiring Diagram

UBS005CQ

EC-KS-01



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

**CAUTION:**

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

| TER-MINAL NO. | WIRE COLO R | ITEM         | CONDITION                           | DATA (DC Voltage)  |
|---------------|-------------|--------------|-------------------------------------|--------------------|
| 64            | W           | Knock sensor | [Engine is running]<br>● Idle speed | Approximately 2.4V |

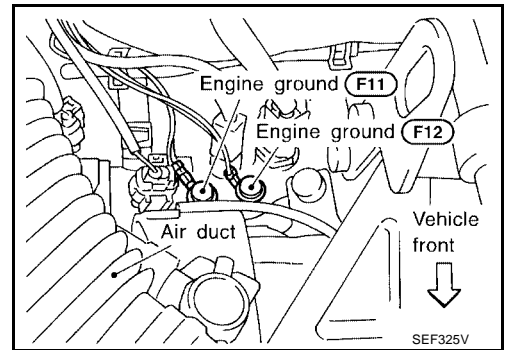
**Diagnostic Procedure**

UBS005CR

**1. RETIGHTEN GROUND SCREWS**

Loosen and retighten engine ground screws.

>> GO TO 2.



**2. CHECK INPUT SIGNAL CIRCUIT-1**

1. Turn ignition switch "OFF".
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 64 and ground. Refer to Wiring Diagram.

**Resistance : Approximately 500 - 620 kΩ [at 25°C (77°F)]**

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

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-262, "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 KNOCK SENSOR

UBS006UG

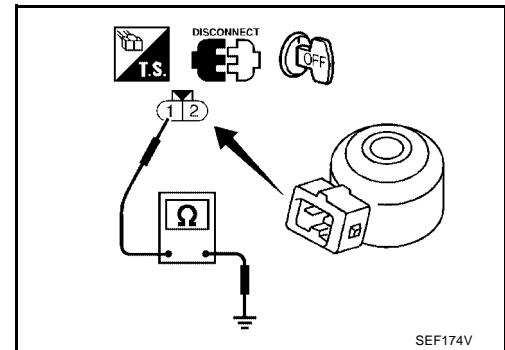
Use an ohmmeter which can measure more than 10 M $\Omega$ .

1. Disconnect knock sensor harness connector.
2. Check resistance between terminal 1 and ground.

**Resistance** : 500 - 620 k $\Omega$  [at 25°C (77°F)]

#### **CAUTION:**

Discard any knock sensors that have been dropped or physically damaged. Use only new ones.



UBS006UH

### Removal and Installation KNOCK SENSOR

Refer to [EM-13, "OUTER COMPONENT PARTS"](#) .

DTC P0335 CKP SENSOR (OBD)

PF2:23731

UBS005CS

Component Description

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.

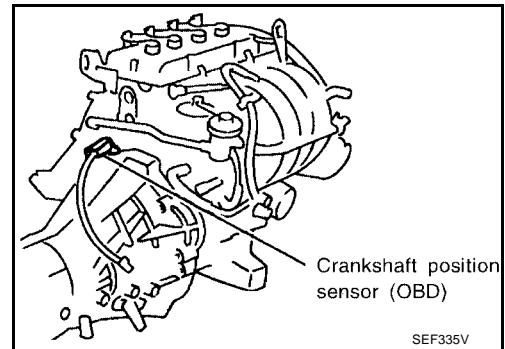
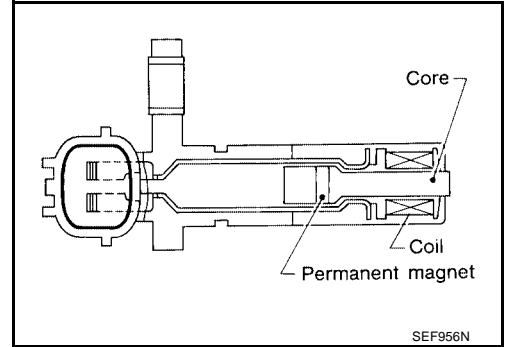
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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.



On Board Diagnosis Logic

UBS005CU

| DTC No. | Trouble diagnosis name                   | DTC detecting condition   | Possible cause   |
|---------|--|---|--|
| P0335   | Crankshaft position sensor (POS) circuit | <ul style="list-style-type: none"> <li>The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking.</li> <li>The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running.</li> <li>The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.</li> </ul> | <ul style="list-style-type: none"> <li>Harness or connectors (The crankshaft position sensor (OBD) circuit is open)</li> <li>Crankshaft position sensor (OBD)</li> <li>Dead battery</li> </ul> |

DTC Confirmation Procedure

UBS005CV

NOTE:

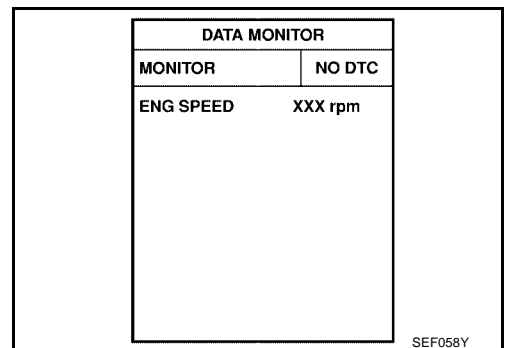
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

WITH CONSULT-II

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 15 seconds at idle speed.
- If 1st trip DTC is detected, go to [EC-265, "Diagnostic Procedure"](#)

WITH GST

Follow the procedure "WITH CONSULT-II".



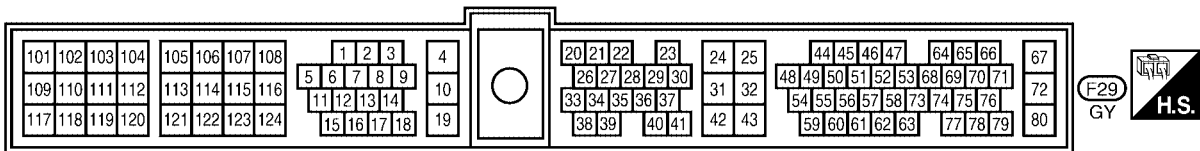
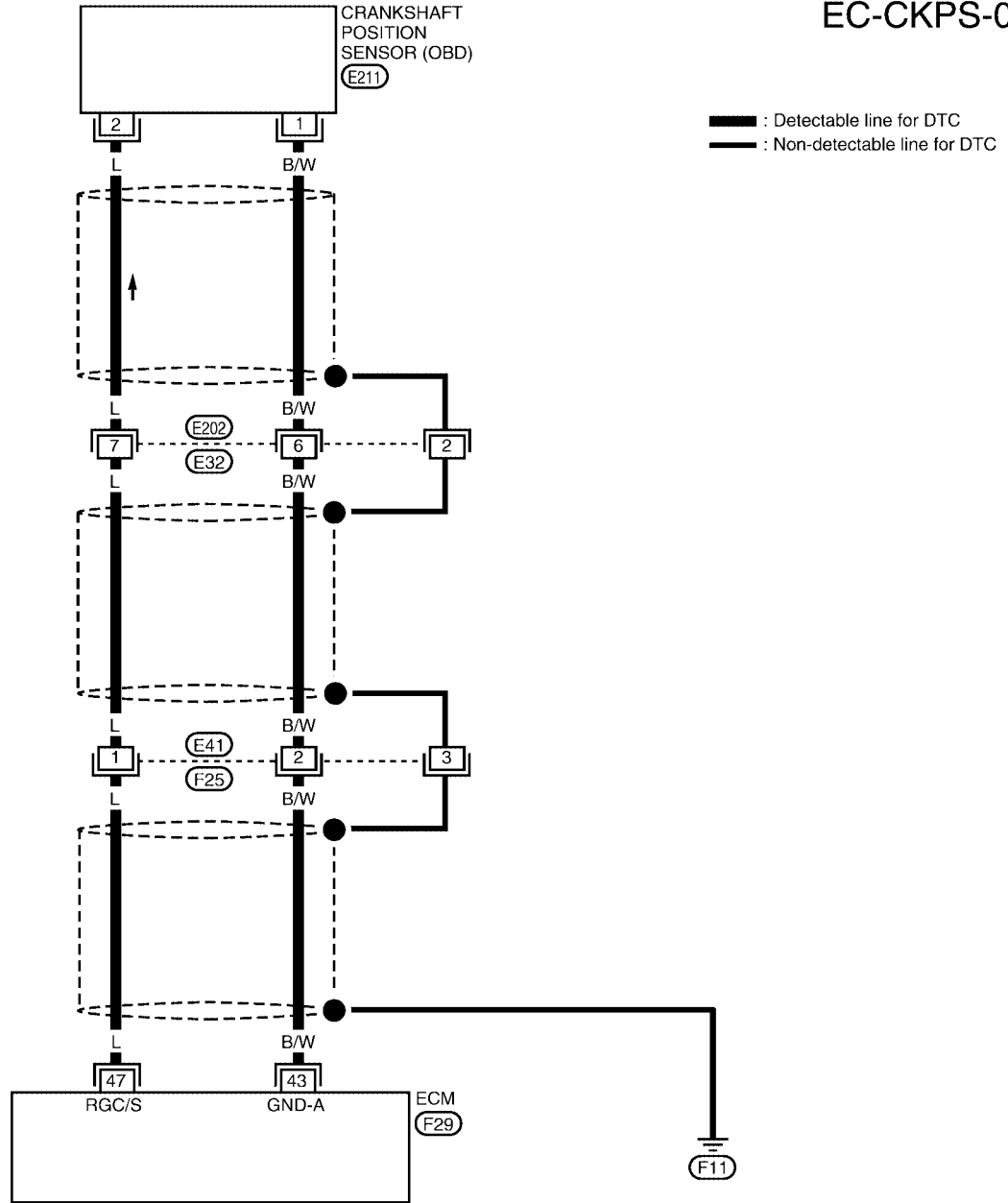
# DTC P0335 CKP SENSOR (OBD)

[KA24DE]

UBS005CV

## Wiring Diagram

EC-CKPS-01



BBWA0548E



# DTC P0335 CKP SENSOR (OBD)

[KA24DE]

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

**CAUTION:**

Do not use ECM ground terminals when measuring input/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 (AC Voltage)        |
|---------------|------------|----------------------------------|--|--------------------------|
| 47            | L          | Crankshaft position sensor (OBD) | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul> | <p>Approximately 0V★</p> |
|               |            |                                  | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>               | <p>Approximately 0V★</p> |

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

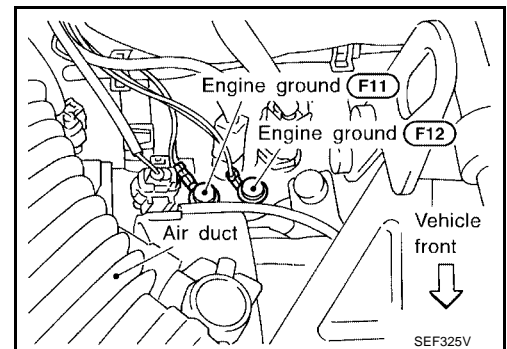
## Diagnostic Procedure

UBS005CX

### 1. RETIGHTEN GROUND SCREWS

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

>> GO TO 2.



### 2. CHECK INPUT SIGNAL CIRCUIT

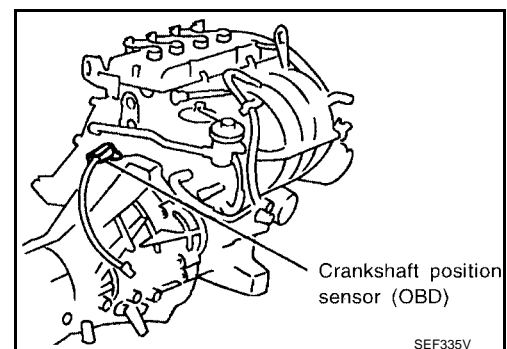
1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.
2. Disconnect ECM harness connector.
3. Check continuity between ECM terminal 47 and crankshaft position sensor (OBD) terminal 2. Refer to Wiring Diagram.

**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.



---

### 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. Reconnect ECM harness connector.
2. Check harness continuity between crankshaft position sensor (OBD) terminal 1 and engine ground. Refer to wiring diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

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

### 5. DETECT MALFUNCTIONING PART

---

Check the following.

- Harness connectors E202, E32
- Harness connectors E41, F25
- Harness for open or short between crankshaft position sensor (OBD) and ECM

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

### 6. CHECK SHIELD CIRCUIT

---

1. Turn ignition switch OFF.
2. Disconnect harness connectors E202, E32.
3. Check harness continuity between harness connector E32 terminal 2 and ground. Refer to wiring diagram.

**Continuity should exist.**

4. Also check harness for short to power.

OK or NG

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

### 7. DETECT MALFUNCTIONING PART

---

Check the following.

- Harness connectors E41, F25
- Harness for open or short between harness connector E32 and engine ground

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

**8. CHECK CRANKSHAFT POSITION SENSOR (OBD)**

Refer to [EC-267, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 9.  
 NG >> Replace crankshaft position sensor (OBD).

**9. CHECK INTERMITTENT INCIDENT**

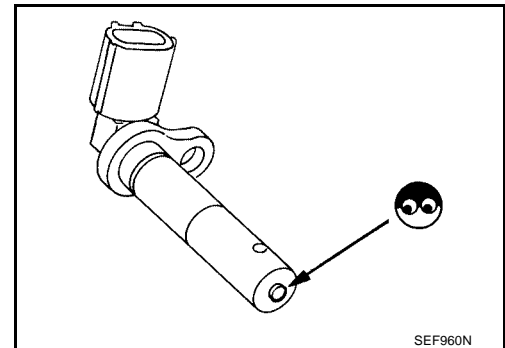
Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Component Inspection**  
**CRANKSHAFT POSITION SENSOR**

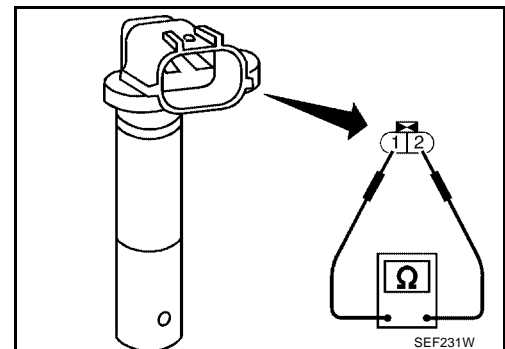
UBS006UI

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**

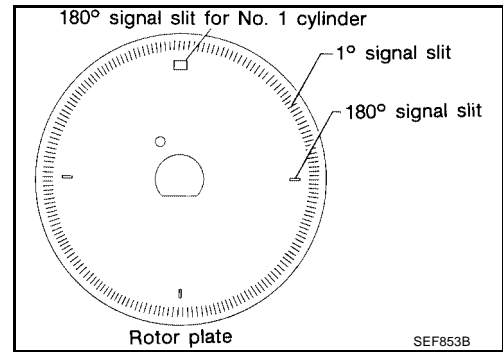
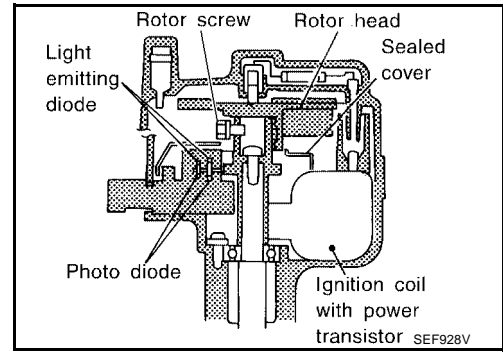
**Component Description**

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.



**On Board Diagnosis Logic**

| 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.                              | <ul style="list-style-type: none"> <li>● Harness or connectors (The camshaft position sensor circuit is open or shorted.)</li> <li>● Camshaft position sensor</li> <li>● Starter motor (Refer to <a href="#">SC-9</a>.)</li> <li>● Starting system circuit (Refer to <a href="#">SC-9</a>.)</li> <li>● Dead (Weak) battery</li> </ul> |
|         |                                  | 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**

Perform "Procedure for malfunction A" first. If 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-272, "Diagnostic Procedure"](#)

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

 **With GST**

Follow the procedure "With CONSULT-II".

**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-272, "Diagnostic Procedure"](#)

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

 **With GST**

Follow the procedure "With CONSULT-II".

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

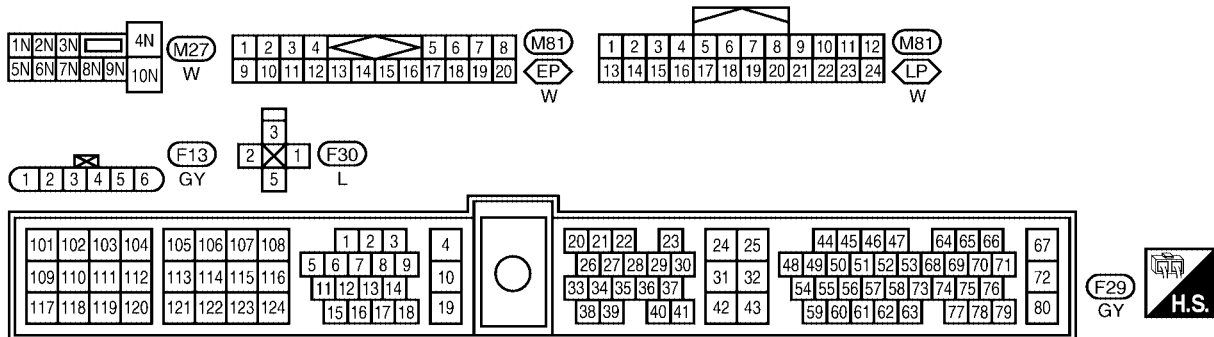
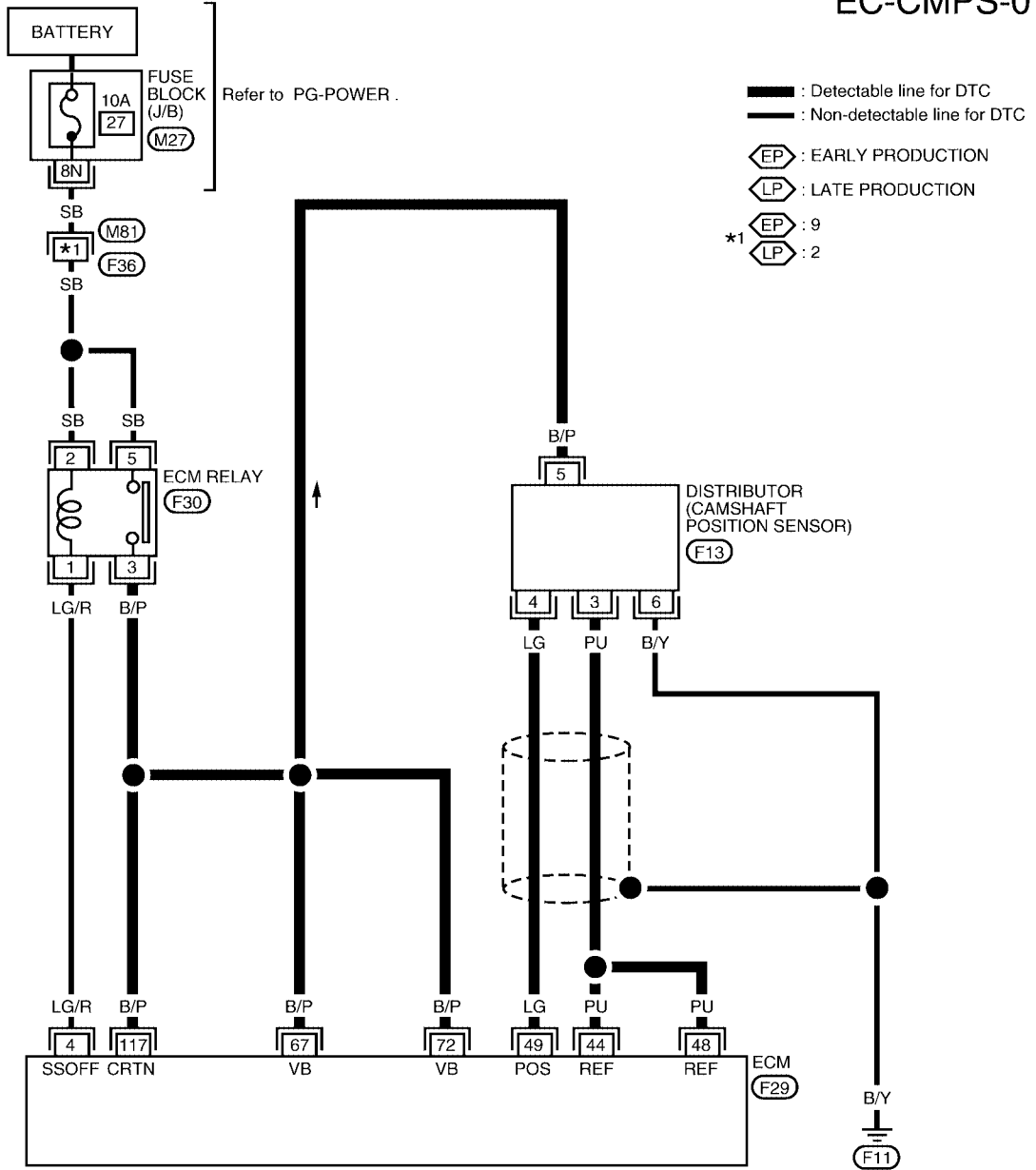
# DTC P0340 CMP SENSOR

[KA24DE]

UBS005D2

## Wiring Diagram

EC-CMPS-01



WBWA0014E

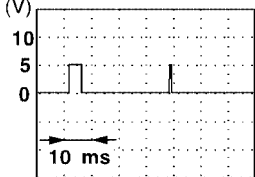
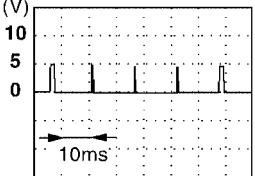
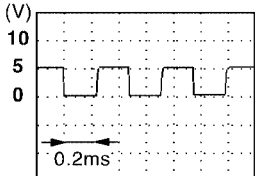
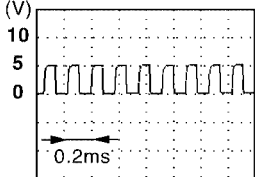
# DTC P0340 CMP SENSOR

[KA24DE]

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

**CAUTION:**

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

| TER-MINAL NO. | WIRE COLOR | ITEM  | CONDITION   | DATA (DC Voltage)  |
|---------------|------------|---|---|--|
| 4             | LG/R       | ECM relay (Self shutoff)                    | [Engine is running]<br>[Ignition switch OFF]<br>● For a few seconds after turning ignition switch OFF | 0 - 1V   |
|               |            |   | [Ignition switch OFF]<br>● More than a few seconds after turning ignition switch OFF                  | BATTERY VOLTAGE (11 - 14V)   |
| 44<br>48      | PU<br>PU   | Camshaft position sensor (Reference signal) | [Engine is running]<br>● Warm-up condition<br>● Idle speed  | 0.2 - 0.5V★<br>                 |
|               |            |   | [Engine is running]<br>● Engine speed is 2,000 rpm  | 0 - 0.5V★<br>                  |
| 49            | LG         | Camshaft position sensor (Position signal)  | [Engine is running]<br>● Warm-up condition<br>● Idle speed  | Approximately 2.6V★<br>       |
|               |            |   | [Engine is running]<br>● Engine speed is 2,000 rpm  | Approximately 2.5 - 2.6V★<br> |
| 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]<br>● Idle speed   | BATTERY VOLTAGE (11 - 14V)   |

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

## Diagnostic Procedure

### 1. CHECK STARTING SYSTEM

Does the engine turn over?  
(Does the starter motor operate?)

Yes or No

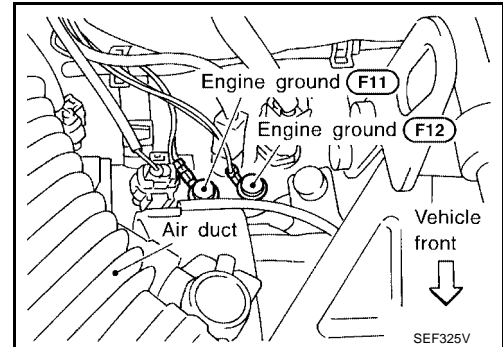
Yes >> GO TO 2.

No >> Check starting system. Refer to [SC-9, "STARTING SYSTEM"](#) .

### 2. RETIGHTEN GROUND SCREWS

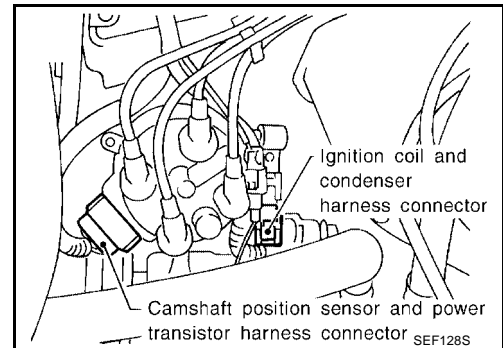
1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

>> GO TO 3.



### 3. CHECK POWER SUPPLY

1. Disconnect camshaft position (CMP) sensor harness connector.
2. Turn ignition switch ON.



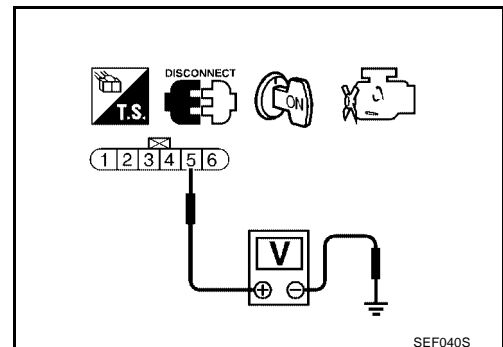
3. Check voltage between terminal 5 and ground with CONSULT-II or tester.

**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 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 engine 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-273, "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**  
**CAMSHAFT POSITION SENSOR**

UBS006UK

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

# DTC P0340 CMP SENSOR

[KA24DE]

3. Check voltage between ECM terminal 49 and engine ground, ECM terminals 44, 48 and engine ground.

**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 |                    |                          |

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## Removal and Installation CAMSHAFT POSITION SENSOR

Refer to [EM-13, "OUTER COMPONENT PARTS"](#)

UBS006UL

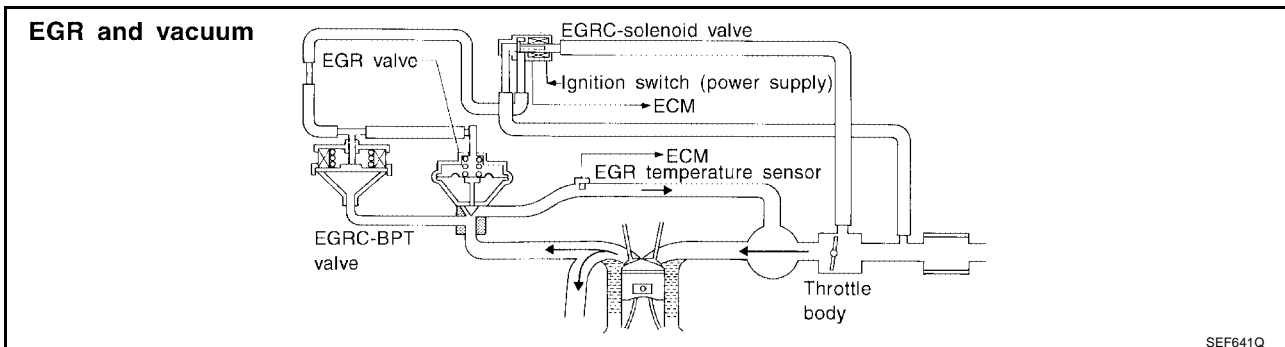
**DTC P0400 EGR FUNCTION**

**Description  
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.

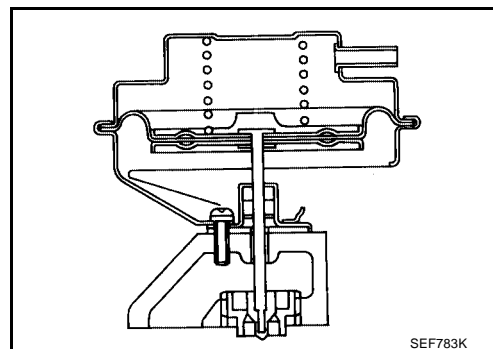
- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction
- Low intake air temperature



**COMPONENT DESCRIPTION**

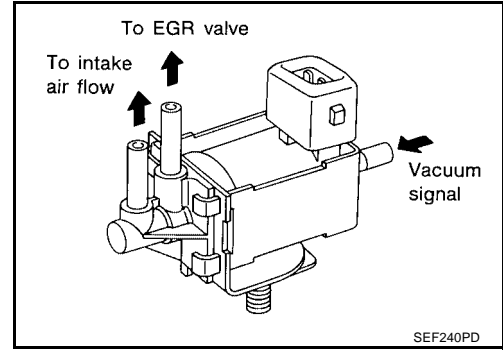
**Exhaust Gas Recirculation (EGR) Valve**

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.



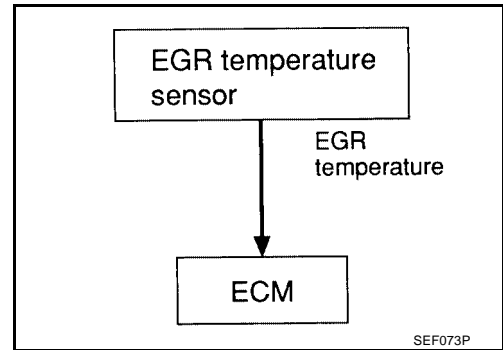
**EGRC Solenoid Valve**

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.



**On Board Diagnosis Logic**

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 system closed stuck | <ul style="list-style-type: none"> <li>No EGR flow is detected under conditions that call for EGR.</li> </ul> | <ul style="list-style-type: none"> <li>EGR valve stuck closed</li> <li>EGRC-BPT valve</li> <li>Vacuum hose</li> <li>EGRC solenoid valve</li> <li>EGR passage</li> <li>EGR temperature sensor</li> <li>Exhaust gas leaks</li> </ul> |

**DTC Confirmation Procedure**

**CAUTION:**  
Always drive vehicle at a safe speed.

**NOTE:**

- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 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**

- Turn ignition switch ON.
- 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)**

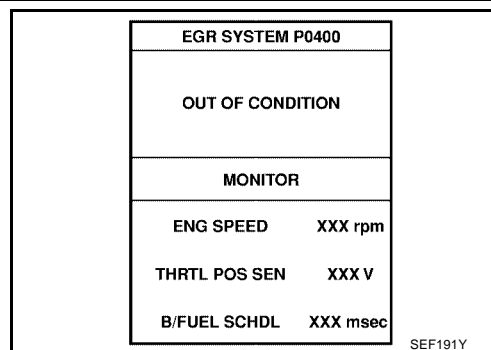
If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

- 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.
- Select “EGR SYSTEM P0400” of “EGR SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.

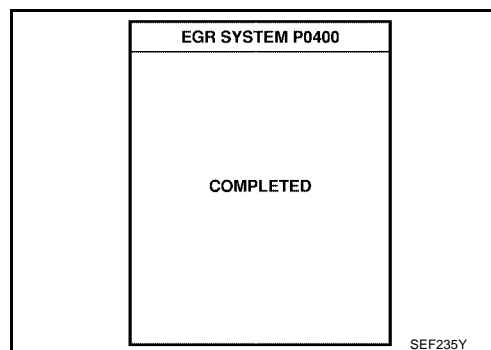
# DTC P0400 EGR FUNCTION

[KA24DE]

5. Touch "START".



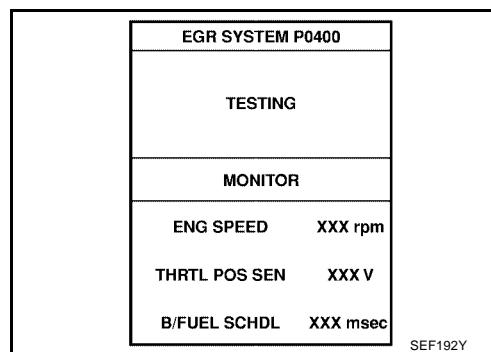
6. Accelerate vehicle to a speed of 40 km/h (25 MPH) once and then stop vehicle with engine running.  
If "COMPLETED" appears on CONSULT-II screen, go to step 9.  
If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.



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  | $(X + 0.23) - (X + 0.74) V$<br>X = Voltage value measured at step 7 |
| Selector lever | Suitable position   |



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

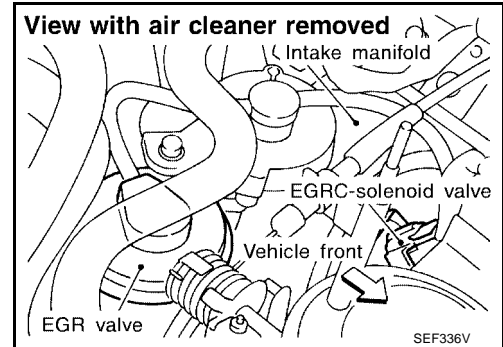
9. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".  
If "NG" is displayed, refer to [EC-280, "Diagnostic Procedure"](#).

## Overall Function Check

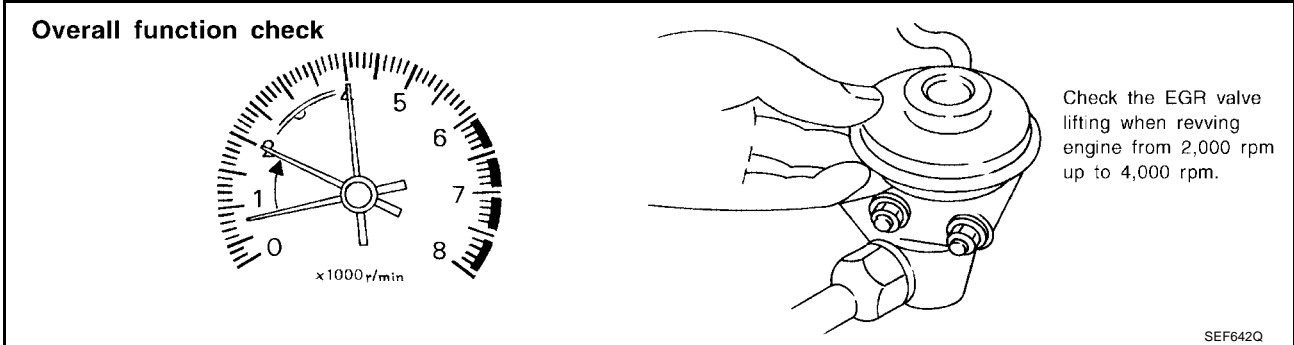
Use this procedure to check the overall EGR function. During this check, a 1st trip DTC might not be confirmed.

**GSJ 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-280, "Diagnostic Procedure"](#).

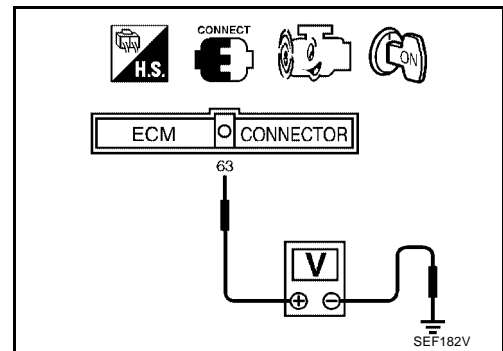
If OK, go to the next step.

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.

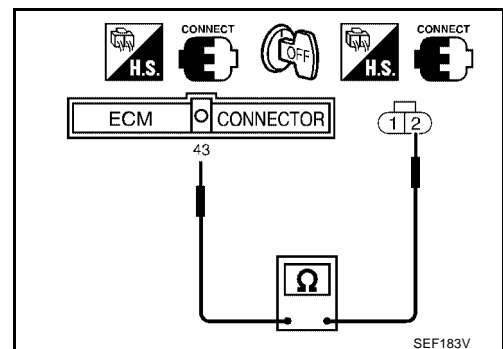
5. Turn ignition switch OFF.



6. Check harness continuity between EGR temperature sensor harness connector terminal 2 and ECM terminal 43 (ECM ground).

**Continuity should exist.**

7. Check "EGR TEMPERATURE SENSOR". Refer to [EC-283, "Component Inspection"](#).



# DTC P0400 EGR FUNCTION

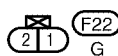
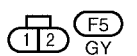
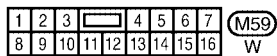
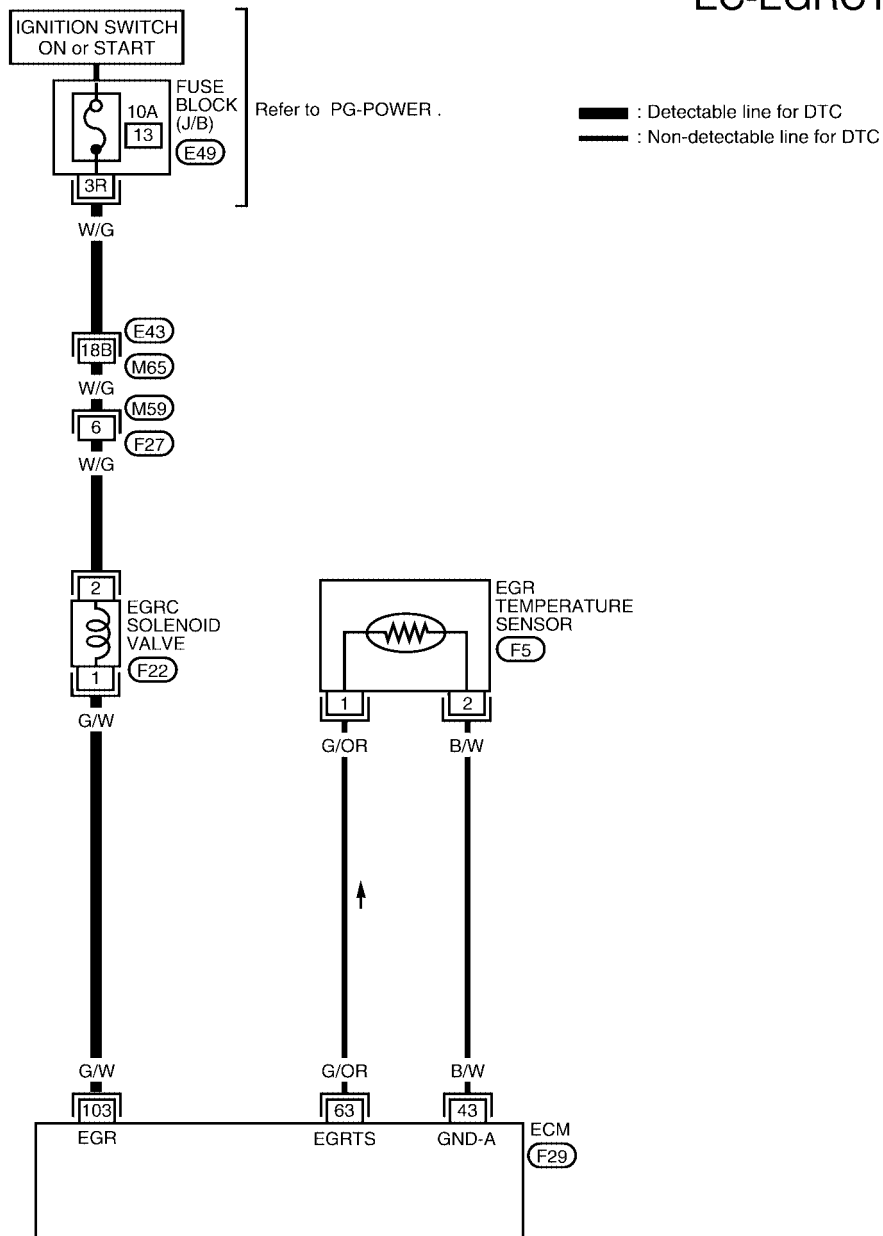
[KA24DE]

## Wiring Diagram

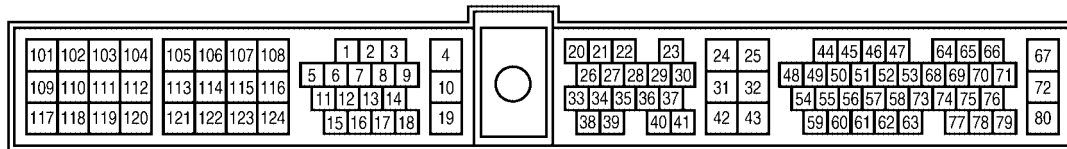
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EC-EGRC1-01

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



BBWA0453E

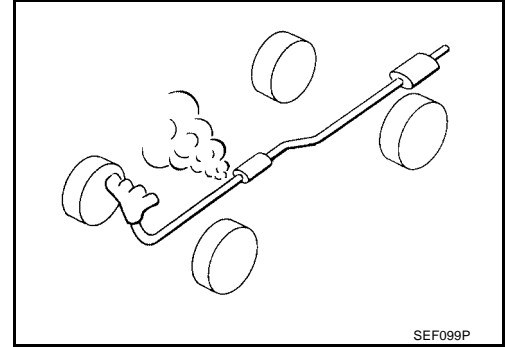
**Diagnostic Procedure**

**1. CHECK EXHAUST SYSTEM**

1. Start engine.
2. Check exhaust pipes and muffler for leaks.

OK or NG

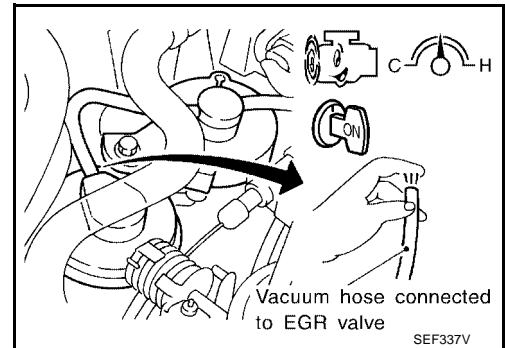
- OK (With CONSULT-II)>>GO TO 2.
- OK (Without CONSULT-II)>>GO TO 3.
- NG >> Repair or replace exhaust system.



**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.

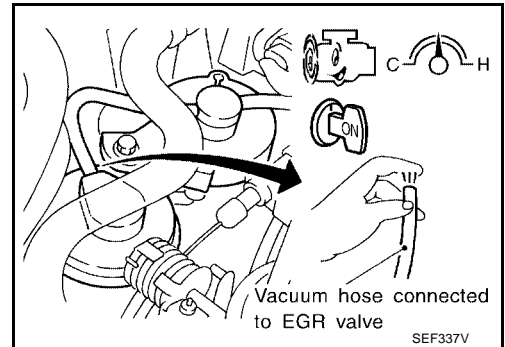
| ACTIVE TEST |         |
|-------------|---------|
| EGRC SOL/V  | ON      |
| (EGR)       | CUT     |
| MONITOR     |         |
| ENG SPEED   | XXX rpm |
|             |         |
|             |         |
|             |         |
|             |         |
|             |         |



### 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-283, "Component Inspection"](#).

OK or NG

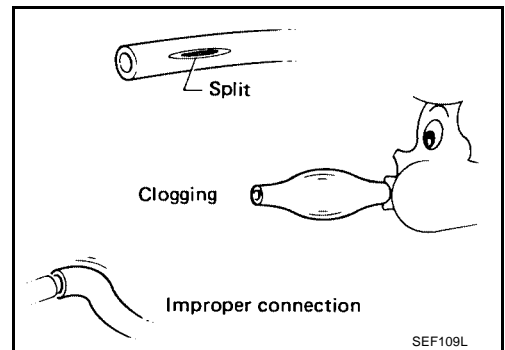
- OK >> GO TO 11.
- NG >> Repair or replace EGR valve.

### 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.

| ACTIVE TEST |         |
|-------------|---------|
| EGRC SOL/V  | ON      |
| (EGR)       | CUT     |
| MONITOR     |         |
| ENG SPEED   | XXX rpm |
|             |         |
|             |         |
|             |         |
|             |         |
|             |         |

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## 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 block 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-283, "Component Inspection"](#) .

OK or NG

OK >> GO TO 10.

NG >> Replace EGRC solenoid valve.

---

## 10. CHECK EGRC-BPT VALVE

---

Refer to [EC-283, "Component Inspection"](#) .

OK or NG

OK >> GO TO 11.

NG >> Replace EGRC-BPT valve.

---

## 11. CHECK EGR TEMPERATURE SENSOR

---

Refer to [EC-283, "Component Inspection"](#) .

OK or NG

OK >> GO TO 12.

NG >> Replace EGR temperature sensor.

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## 12. CHECK INTERMITTENT INCIDENT

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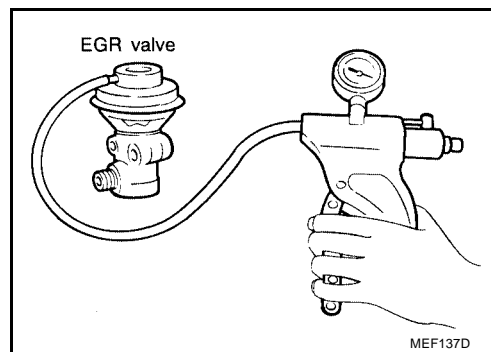
Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## Component Inspection

### 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.

CONNECT

| EGRC SOL/V | ON      |
|------------|---------|
| (EGR)      | CUT     |
| MONITOR    |         |
| ENG SPEED  | XXX rpm |
|            |         |
|            |         |
|            |         |
|            |         |

| Condition           | Air passage continuity between A and B | Air passage continuity between A and C |
|---------------------|--|--|
| EGRC SOLENOID VALVE |  |  |
| ON                  | Yes                                    | No                                     |
| OFF                 | No                                     | Yes                                    |

**Operation takes less than 1 second.**

LEC036A

#### ⊗ Without CONSULT-II

Check air passage continuity shown in the figure.

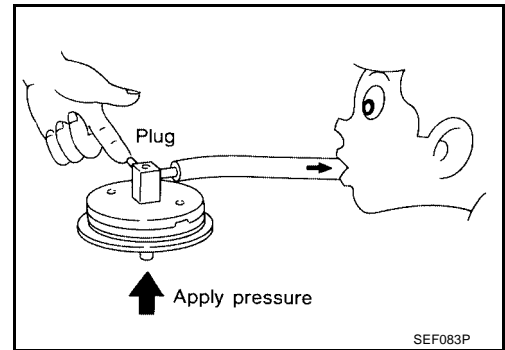
| Condition   | Air passage continuity between A and B | Air passage continuity between A and C |
|---|--|--|
| 12V direct current supply between terminals 1 and 2 | Yes                                    | No                                     |
| No supply   | No                                     | Yes                                    |

**Operation takes less than 1 second.**

LEC037A

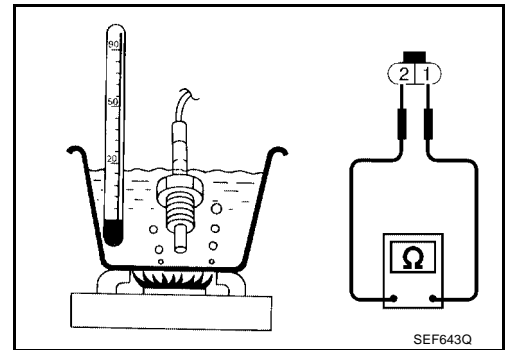
## EGRC-BPT VALVE

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 mmHg O, 3.94 inHg O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.



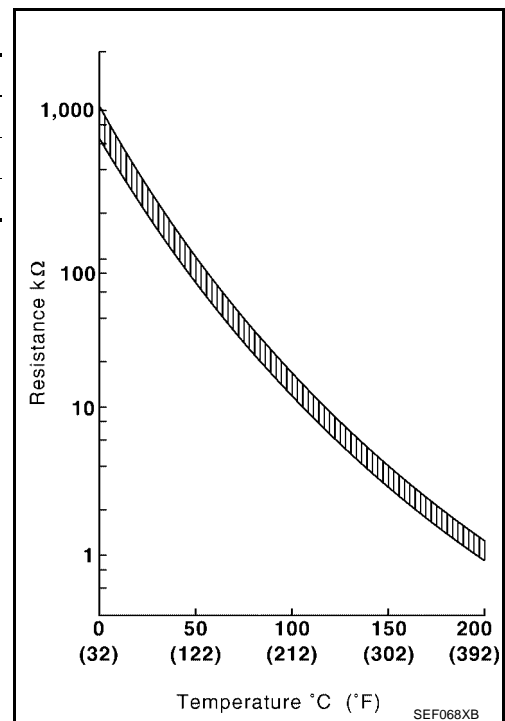
## EGR TEMPERATURE SENSOR

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 |



## Removal and Installation EGR VALVE

Refer to [EM-13, "OUTER COMPONENT PARTS"](#) .

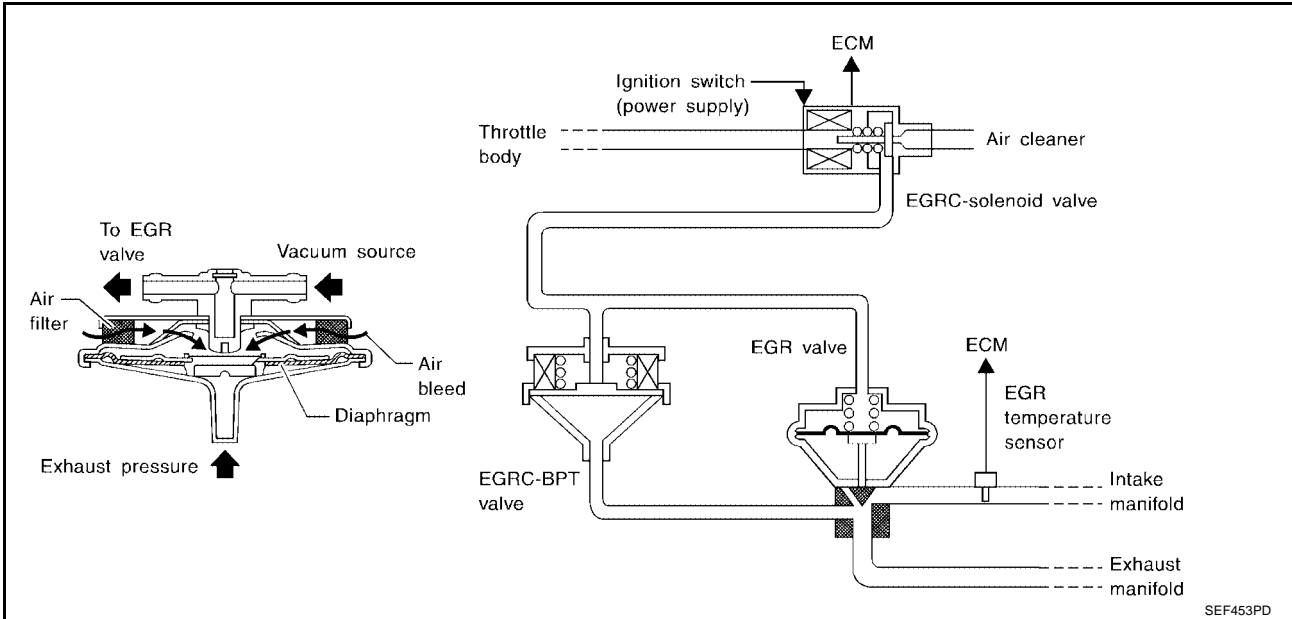
UBS006UN

DTC P0402 EGRC-BPT VALVE FUNCTION

PF0:14741

Description

UBS005DA



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

UBS005DB

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 | <ul style="list-style-type: none"> <li>The EGRC-BPT valve does not operate properly.</li> </ul> | <ul style="list-style-type: none"> <li>EGRC-BPT valve</li> <li>EGR valve</li> <li>Loose or disconnected rubber tube</li> <li>Blocked rubber tube</li> <li>Camshaft position sensor</li> <li>Blocked exhaust system</li> <li>Orifice</li> <li>Mass air flow sensor</li> <li>EGRC solenoid valve</li> </ul> |

## DTC Confirmation Procedure

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

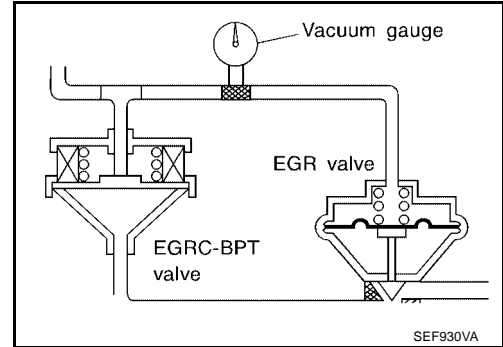
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

**TESTING CONDITION:**

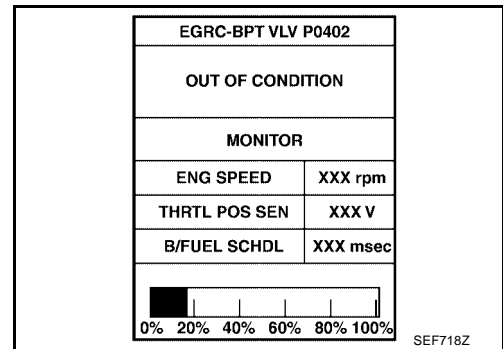
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

**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.

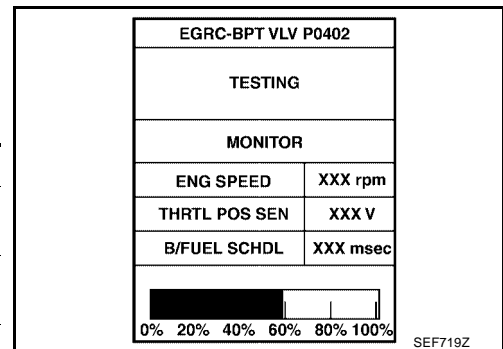


6. Touch "START".
7. Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.



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.

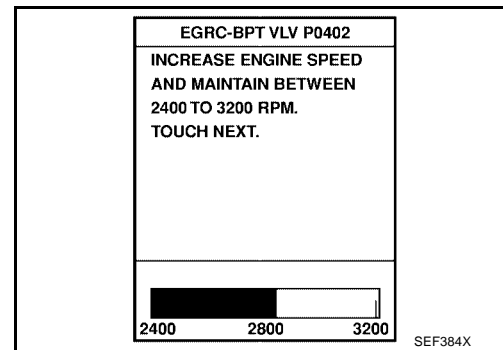
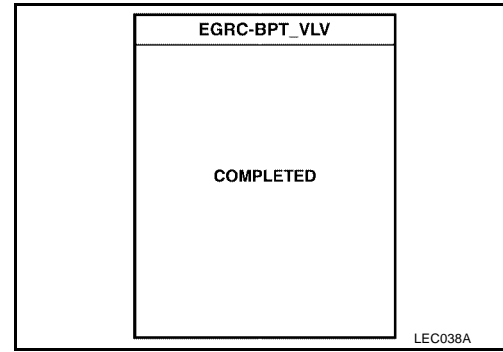
| Selector lever | Suitable position   |
|----------------|---|
| ENG SPEED      | 1,400 - 2,000 rpm (M/T)<br>1,400 - 1,800 rpm (A/T)                    |
| Vehicle speed  | 30 - 100 km/h (19 - 62 MPH) (M/T)<br>30 - 55 km/h (19 - 34 MPH) (A/T) |
| B/FUEL SCHDL   | 5 - 7.5 msec (M/T)<br>5.5 - 8.0 msec (A/T)                            |
| THRTL POS SEN  | $(X - (X + 0.88) V)$<br>X = Voltage value measured at step 7          |



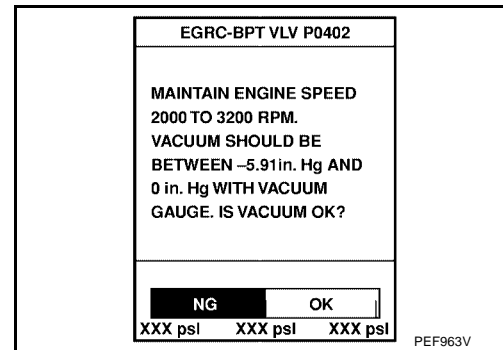
**NOTE:**

- 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.

- If CONSULT-II instructs to carry out "Overall Function Check", go to next step. If "NG" is displayed, refer to [EC-288, "Diagnostic Procedure"](#).
- Open engine hood.
- Raise engine speed to 2,400 to 3,200 rpm under no-load and hold it. Then touch "NEXT" on CONSULT-II screen.



- 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-288, "Diagnostic Procedure"](#).  
 If OK, touch "YES" on the CONSULT-II screen.



- 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.
- 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.

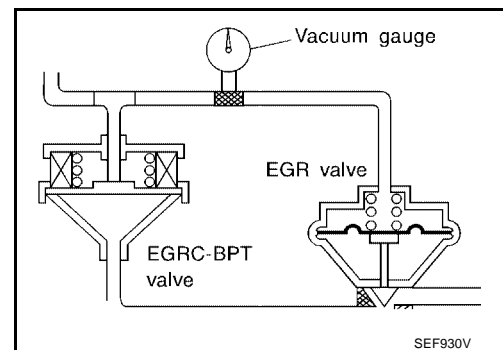
## Overall Function Check

UBS005DD

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**

- Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
- Lift up vehicle.
- Start engine and shift to 1st gear position.
- 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-288, "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-288, "Diagnostic Procedure"](#) .

## Diagnostic Procedure

UBS005DE

### 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-289, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 5.
- NG >> Replace EGRC-BPT valve.

### 5. CHECK CAMSHAFT POSITION SENSOR

---

Refer to [EC-273, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 6.
- NG >> Replace camshaft position sensor.

### 6. CHECK MASS AIR FLOW SENSOR

---

Refer to [EC-289, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 7.
- NG >> Replace mass air flow sensor.

### 7. CHECK EGRC SOLENOID VALVE

---

Refer to [EC-289, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 8.
- NG >> Replace EGRC solenoid valve.



**8. CHECK EGR VALVE**

Refer to [EC-289, "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"](#) .

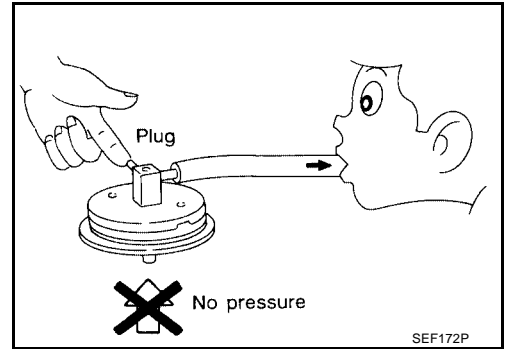
>> INSPECTION END.

**Component Inspection  
EGRC-BPT VALVE**

UBS006U3

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.**



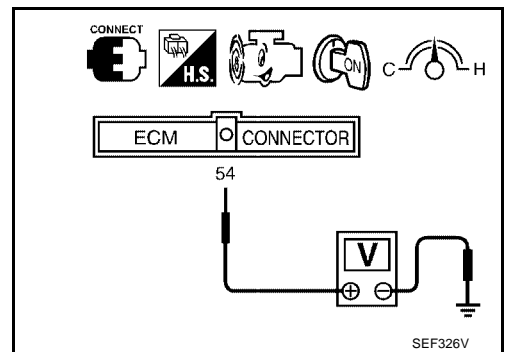
**MASS AIR FLOW SENSOR**

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.

| 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*   | 1.3 - 1.7 to Approx. 3.0 |

\*: Check for linear voltage rise in response to increases to about 4,000 rpm in engine speed.

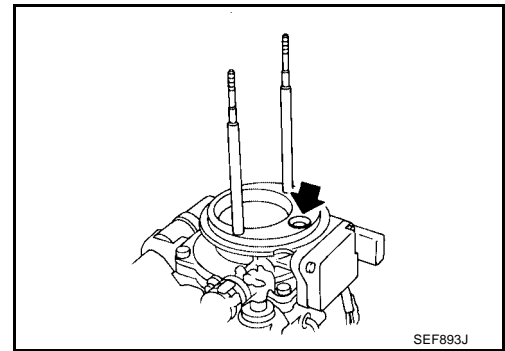
4. If the voltage is out of specification, disconnect mass air flow sensor harness connector and connect it again. Repeat above check.



# DTC P0402 EGRC-BPT VALVE FUNCTION

[KA24DE]

- If NG, remove mass air flow sensor from air duct. Check hot wire for damage or dust.



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<br>EGRC SOLENOID<br>VALVE | Air passage continuity<br>between A and B | Air passage continuity<br>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.

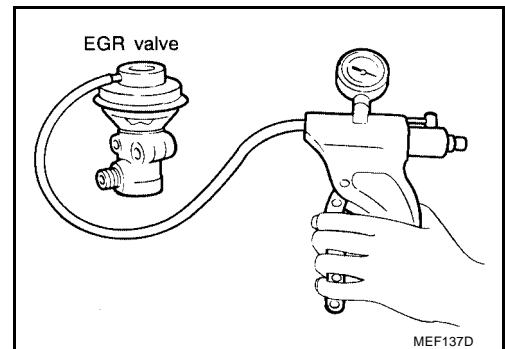
| Condition   | Air passage continuity<br>between A and B | Air passage continuity<br>between A and C |
|---|---|---|
| 12V direct current<br>supply between<br>terminals 1 and 2 | Yes                                       | No  |
| No supply   | No  | Yes                                       |

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.



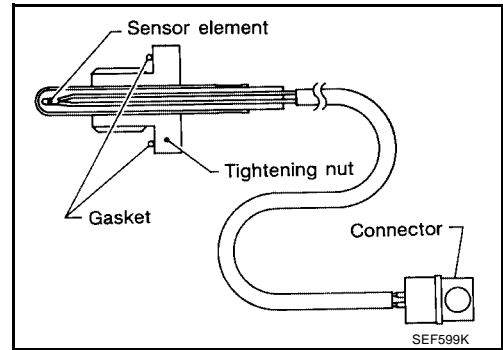
MEF137D

DTC P0405, P0406 EGRT SENSOR

Component Description

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.



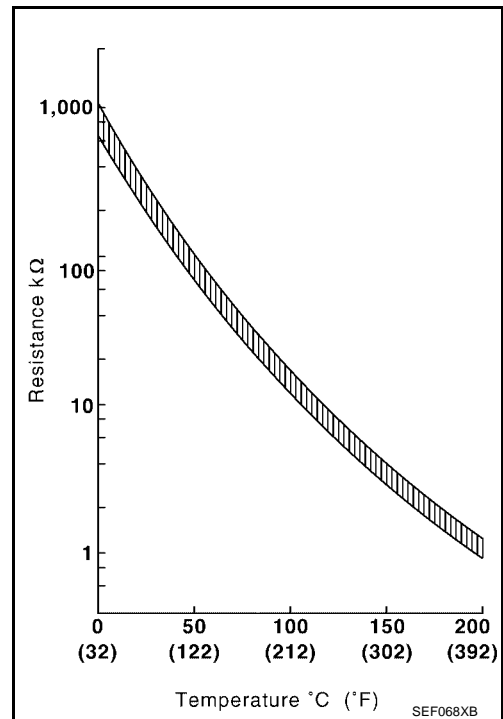
<Reference data>

| EGR temperature<br>°C (°F) | Voltage*<br>V | Resistance<br>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

| DTC No. | Trouble Diagnosis Name                    | DTC Detecting Condition |  | Possible Cause   |
|---------|---|-------------------------|--|--|
| P0405   | EGR temperature sensor circuit low input  | A)                      | An excessively low voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is low.   | <ul style="list-style-type: none"> <li>● Harness or connectors (The EGR temperature sensor circuit is shorted.)</li> <li>● EGR temperature sensor</li> <li>● Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve</li> </ul> |
| P0406   | EGR temperature sensor circuit high input | B)                      | An excessively high voltage from the EGR temperature sensor is sent to ECM even when engine coolant temperature is high. | <ul style="list-style-type: none"> <li>● Harness or connectors (The EGR temperature sensor circuit is open.)</li> <li>● EGR temperature sensor</li> <li>● Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve</li> </ul>    |

## DTC Confirmation Procedure

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

**NOTE:**

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 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. 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-295, "Diagnostic Procedure"](#).

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

SEF174Y

 **With GST**

- Follow the procedure "With CONSULT-II".

### PROCEDURE FOR MALFUNCTION B

**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. Run engine at idle for at least 2 minutes.
3. Confirm that EGR valve is not lifting.  
If the result is NG, perform trouble diagnosis for DTC P1402. Refer to [EC-458](#).
4. Select "DATA MONITOR" mode with CONSULT-II.
5. 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 1.0V.**  
If the result is NG, go to [EC-295, "Diagnostic Procedure"](#).  
If the result is OK, go to following step.
6. Turn ignition switch OFF and wait at least 5 seconds.
7. Turn ignition switch ON.
8. Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.
9. Start engine and maintain the following conditions for at least 5 consecutive seconds.

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| COOLAN TEMP/S | XXX °C   |
| VHCL SPEED SE | XXX km/h |
| THRTL POS SEN | XXX V    |
| B/FUEL SCHDL  | XXX msec |

SEF201Y

|                |   |
|----------------|---|
| 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<br>X = Voltage value measured at step 7 |
| Selector lever | Suitable position   |

10. If 1st trip DTC is detected, go to [EC-295, "Diagnostic Procedure"](#).

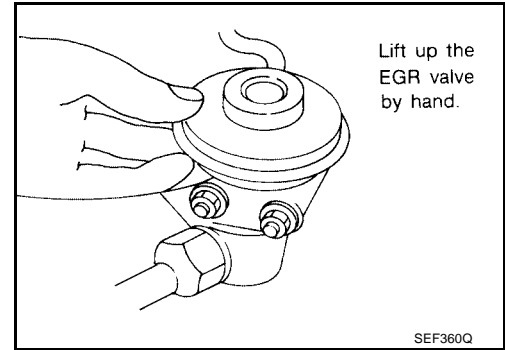
## Overall Function Check

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

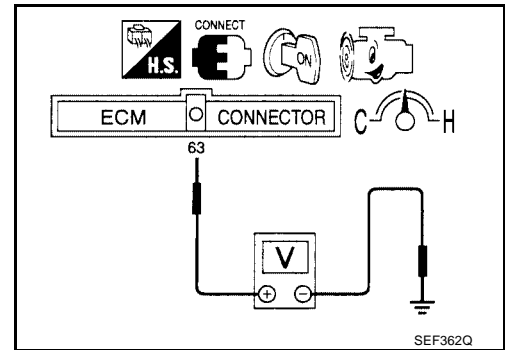
### PROCEDURE FOR MALFUNCTION B

#### 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-458](#) .



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-295, "Diagnostic Procedure"](#) .  
If OK, perform trouble diagnoses for DTC P0400 and P1400.  
Refer to [EC-275](#) , [EC-452](#) .



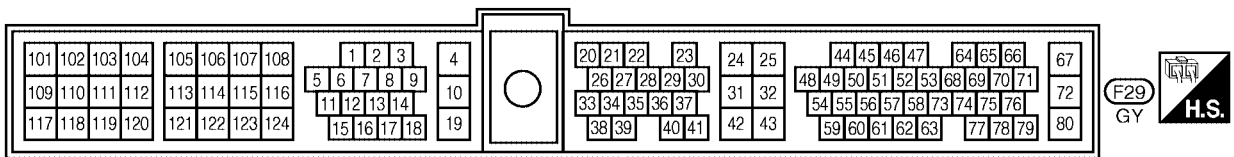
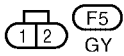
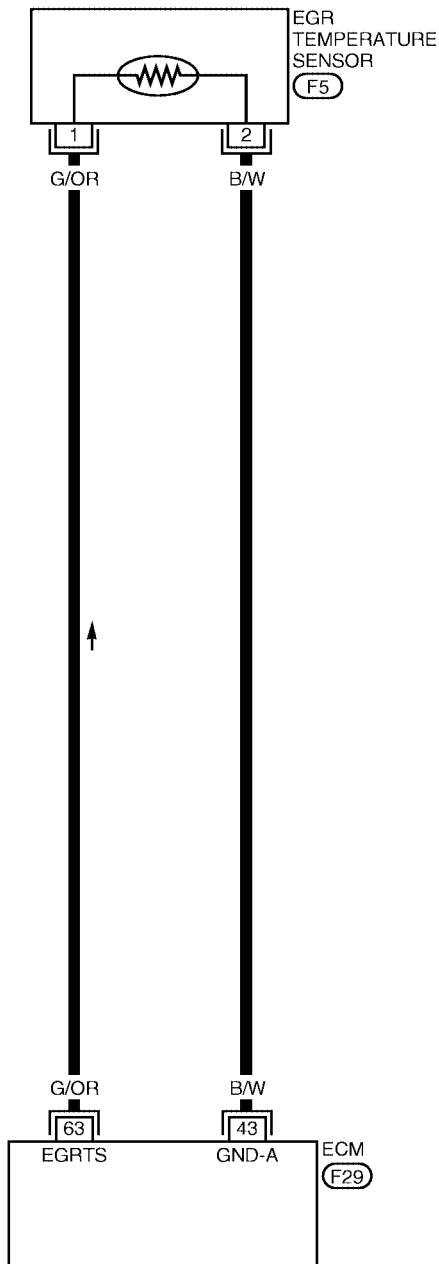
# DTC P0405, P0406 EGRT SENSOR

[KA24DE]

UBS005DJ

## Wiring Diagram

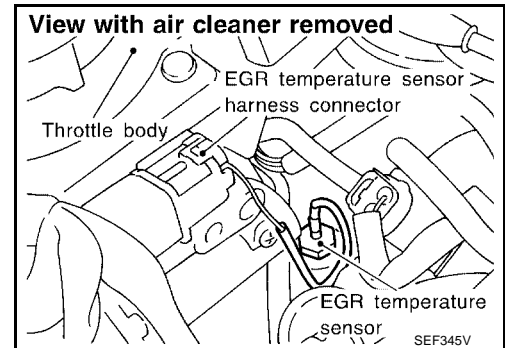
EC-EGR/TS-01



AEC006B

**Diagnostic Procedure****1. CHECK POWER SUPPLY**

1. Turn ignition switch "OFF".
2. Disconnect EGR temperature sensor harness connector.
3. Turn ignition switch "ON".

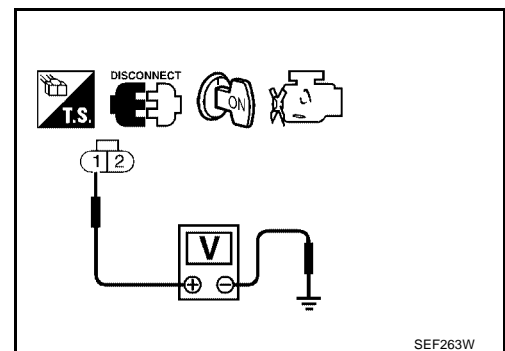


4. Check voltage between terminal 1 and ground with CONSULT-II or tester.

**Voltage : Approximately 5V**

OK or NG

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

**2. CHECK GROUND CIRCUIT**

1. Turn ignition switch "OFF".
2. Check harness continuity between EGR temperature sensor terminal 2 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

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

**3. 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.

**4. CHECK EGR TEMPERATURE SENSOR**

Refer to [EC-296, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.  
 NG >> Replace EGR temperature sensor.

**5. CHECK INTERMITTENT INCIDENT**

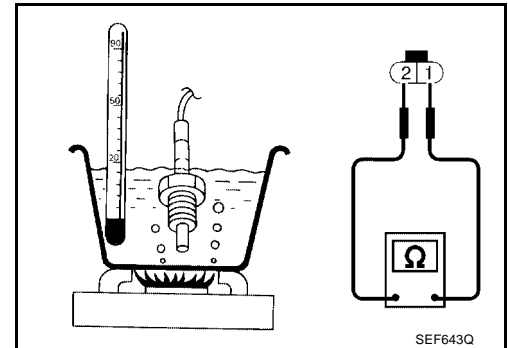
Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Component Inspection  
EGR TEMPERATURE SENSOR**

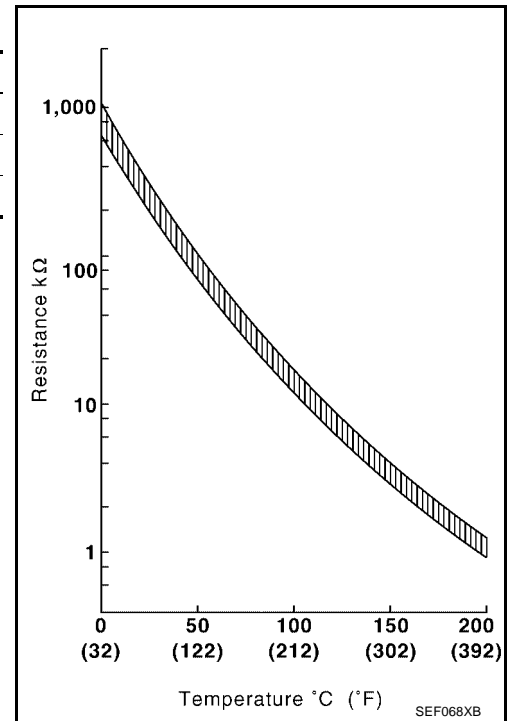
UBS006U6

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 |



**Removal and Installation  
EGR TEMPERATURE SENSOR**

UBS006U7

Refer to [EM-13, "OUTER COMPONENT PARTS"](#)



## DTC P0420 THREE WAY CATALYST FUNCTION

PFP:20905

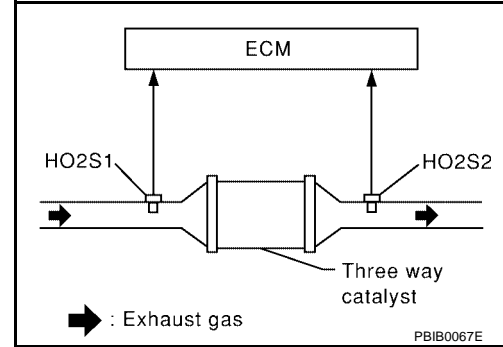
### On Board Diagnosis Logic

UBS005DL

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 | <ul style="list-style-type: none"> <li>Three way catalyst (manifold) does not operate properly.</li> <li>Three way catalyst (manifold) does not have enough oxygen storage capacity.</li> </ul> | <ul style="list-style-type: none"> <li>Three way catalyst (manifold)</li> <li>Exhaust tube</li> <li>Intake air leaks</li> <li>Injectors</li> <li>Injector leaks</li> <li>Spark plug</li> <li>Improper ignition timing</li> </ul> |

### DTC Confirmation Procedure

UBS005DM

**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 one minute under no load.
4. Let engine idle for one 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.

| SRT WORK SUPPORT |         |
|------------------|---------|
| CATALYST         | INCMP   |
| EVAP SYSTEM      | INCMP   |
| HO2S HTR         | CMPLT   |
| HO2S             | INCMP   |
| MONITOR          |         |
| ENG SPEED        | XXX rpm |
| MAS A/F SE-B1    | XXX V   |

PBIB0822E

# DTC P0420 THREE WAY CATALYST FUNCTION

[KA24DE]

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).

| SRT WORK SUPPORT |         |
|------------------|---------|
| CATALYST         | CMPLT   |
| EVAP SYSTEM      | INCMP   |
| HO2S HTR         | CMPLT   |
| HO2S             | INCMP   |
| MONITOR          |         |
| ENG SPEED        | XXX rpm |
| MAS A/F SE-B1    | XXX V   |

PBIB0823E

- b. Turn ignition switch "ON" and select "COOLANTEMP/S" in "DATA MONITOR" mode with CONSULT-II.  
c. Start engine and warm it up while monitoring "COOLANTEMP/S" indication on CONSULT-II.  
d. When "COOLANTEMP/S" indication reaches to 70°C (158°F), go to step 3.

| DATA MONITOR |        |
|--------------|--------|
| MONITOR      | NO DTC |
| COOLANTEMP/S | XXX °C |

SEF013Y

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-299, "Diagnostic Procedure"](#).

| SELF DIAG RESULTS  |      |
|--|------|
| DTC RESULTS  | TIME |
| NO DTC IS DETECTED.<br>FURTHER TESTING<br>MAY BE REQUIRED. |      |
|  |      |
|  |      |

SEF535Z

## Overall Function Check

UBS005DN

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

- Start engine and warm it up to the normal operating temperature.
- Turn ignition switch "OFF" and wait at least 5 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for one minute under no load.
- Let engine idle for one minute.
- Set voltmeters probes between ECM terminals 50 (Heated oxygen sensor 1 signal), 56 (Heated oxygen sensor 2 signal) and engine ground.
- Keep engine speed at 2,000 rpm constant under no load.
- Make sure that the voltage switching frequency (high & low) between ECM terminal 56 and engine ground is much less than that of ECM terminal 50 and engine ground.

**Switching frequency ratio = A/B**

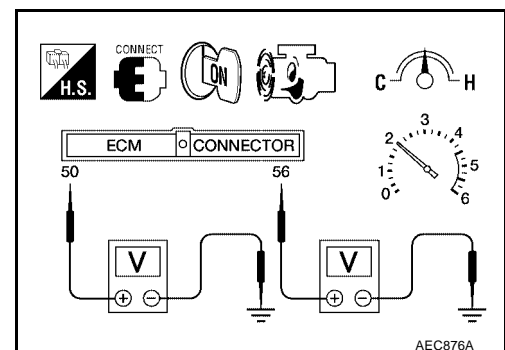
**A: Heated oxygen sensor 2 voltage switching frequency**

**B: Heated oxygen sensor 1 voltage switching frequency**

**This ratio should be less than 0.75.**

If the ratio is greater than above, it means three way catalyst (manifold) does not operate properly.

Go to [EC-299, "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-192](#).)

## Diagnostic Procedure

UBS005DO

### 1. CHECK EXHAUST SYSTEM

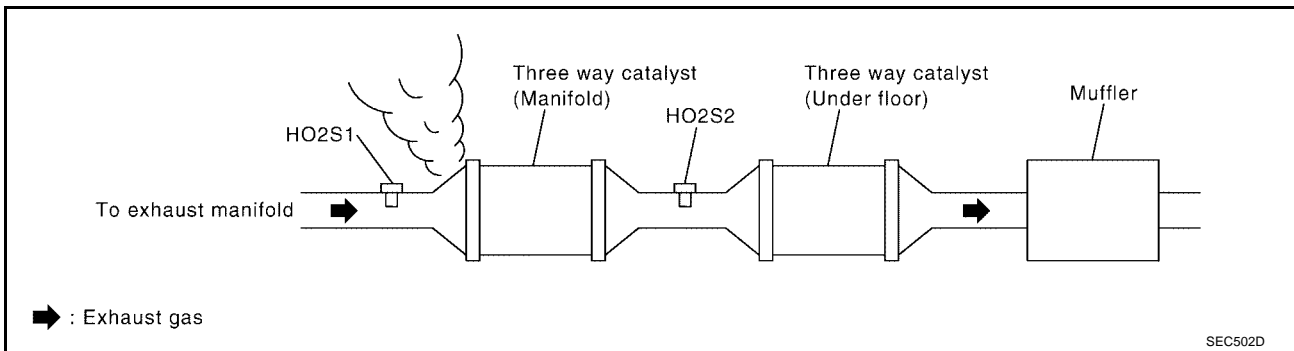
Visually check exhaust tubes and muffler for dent.

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-73. "Basic Inspection"](#) .

| Items  | Specifications   |
|--|--|
| Ignition timing  | 20° ± 2° BTDC  |
| Base idle speed  | 750 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.1 mm (0.004 in): ON<br>0.3 mm (0.012 in): OFF |
| Target idle speed  | 800 ± 50 rpm (in P or N position)  |

OK or NG

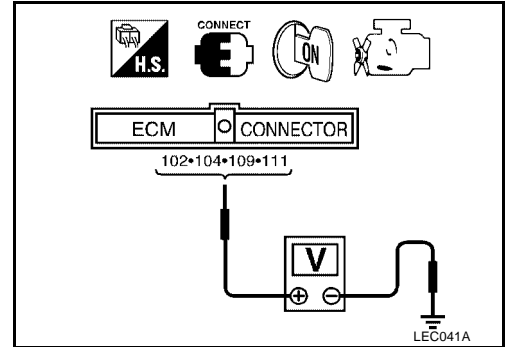
- OK >> GO TO 5.
- NG >> Adjust ignition timing.

## 5. CHECK INJECTORS

1. Refer to Wiring Diagram for Injectors, [EC-543](#) .
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-545, "Diagnostic Procedure"](#) .

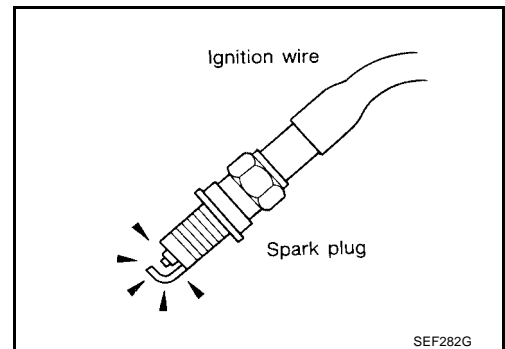


## 6. CHECK IGNITION SPARK

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

OK or NG

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



## 7. CHECK IGNITION WIRES

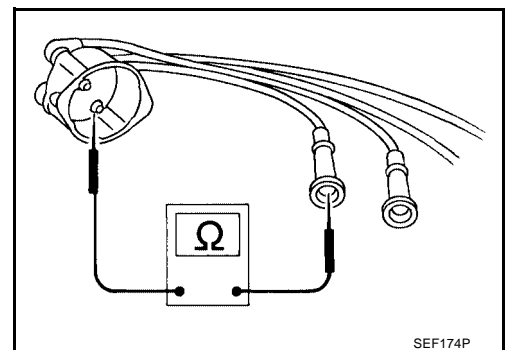
1. Inspect wires for cracks, damage, burned terminals and for improper fit.
2. Measure the resistance of wires to their distributor cap terminal. Move each wire while testing to check for intermittent breaks.

**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-535, "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. Disconnect camshaft position sensor harness connector.
4. 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).

A

EC

C

D

E

F

G

H

I

J

K

L

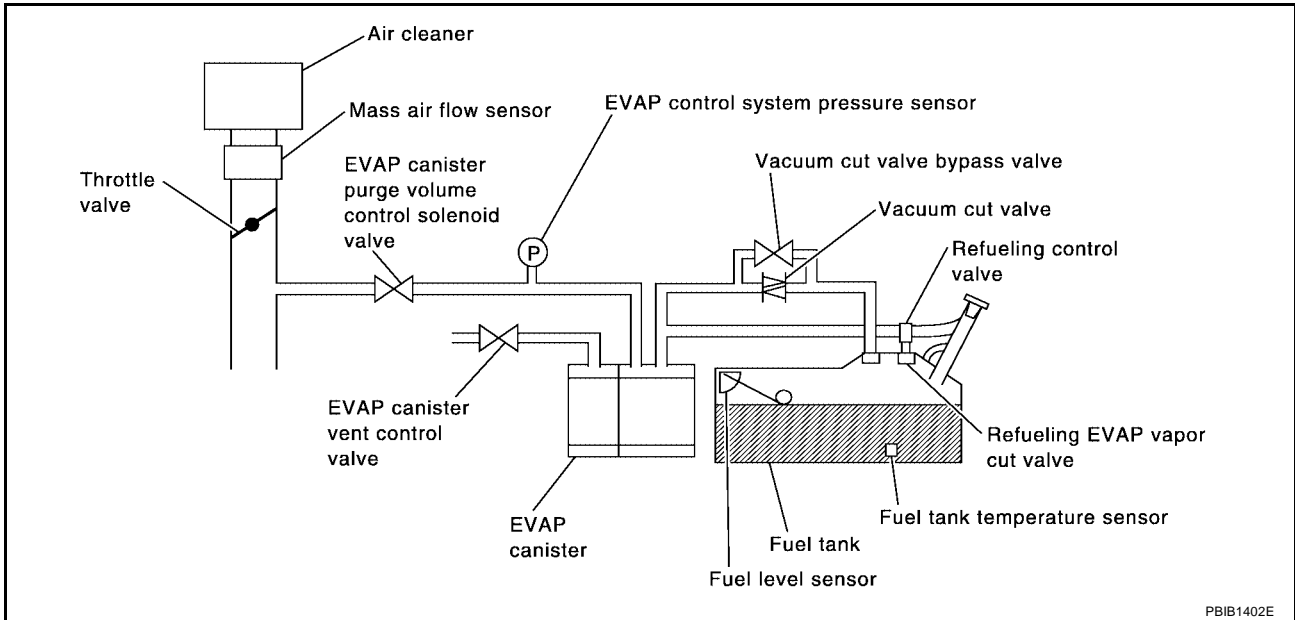
M

DTC P0441 EVAP CONTROL SYSTEM

System Description

NOTE:

If DTC P0441 is displayed with DTC P0510, perform trouble diagnosis for “DTC P0510” first. (See [EC-408](#).)



PBIB1402E

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

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. | <ul style="list-style-type: none"> <li>● EVAP canister purge volume control solenoid valve stuck closed</li> <li>● EVAP control system pressure sensor and the circuit</li> <li>● Loose, disconnected or improper connection of rubber tube</li> <li>● Blocked rubber tube</li> <li>● Cracked EVAP canister</li> <li>● Closed throttle position switch</li> <li>● Blocked purge port</li> <li>● EVAP canister vent control valve</li> </ul> |

## DTC Confirmation Procedure

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

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

**TESTING CONDITION:**

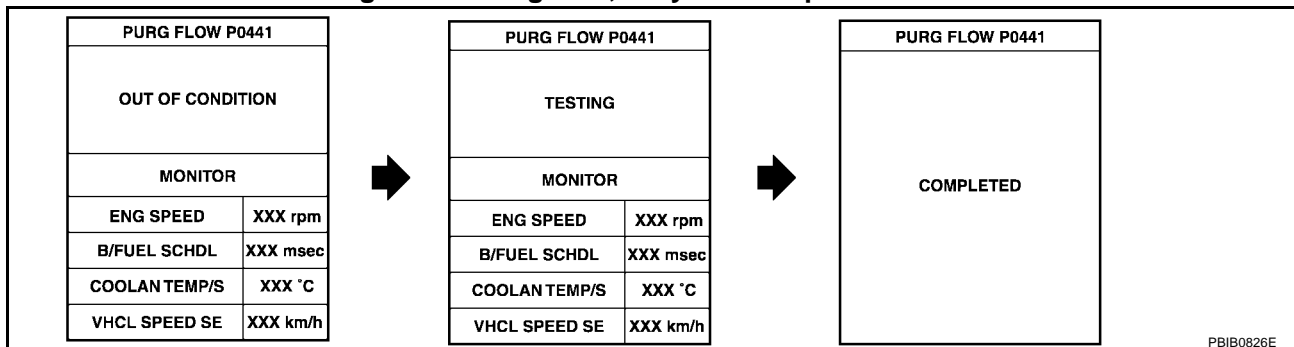
- For best results perform test at a temperature of 5°C (41°F) or more.
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

**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.)

|                            |                             |
|----------------------------|-----------------------------|
| Selector 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-304, "Diagnostic Procedure"](#).

## Overall Function Check

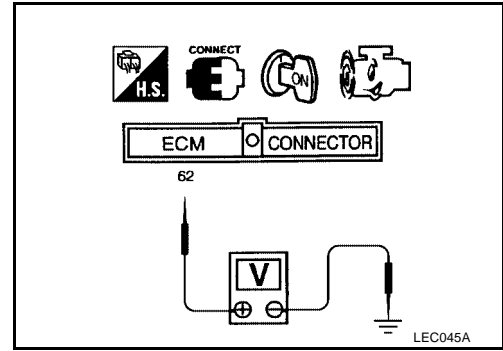
Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a DTC might not be confirmed.

**WITH GST**

1. Lift up drive wheels.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF, 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
- Headlamp switch** : ON
- Rear window defogger switch** : ON
- Engine speed** : Approx. 3,000 rpm
- Gear position** : Any position other than "Neutral" or "Reverse"



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-304, "Diagnostic Procedure"](#).

## Diagnostic Procedure

UBS005DT

### 1. CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

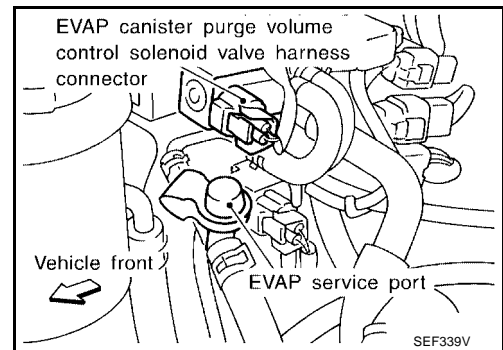
OK or NG

- 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            |
|-----------------|-------------------|
| 100.0%          | Should exist.     |
| 0.0%            | Should not exist. |

OK or NG

- OK >> GO TO 8.
- NG >> GO TO 4.

| 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   |
|                 |         |
|                 |         |

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**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.

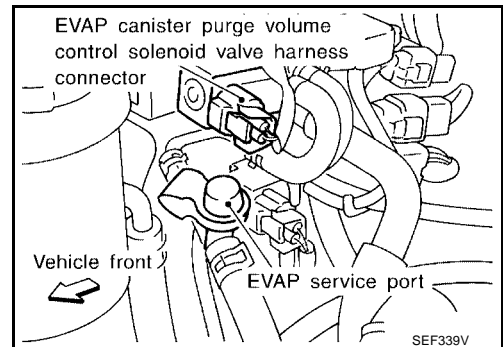
**Vacuum should exist.**

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**

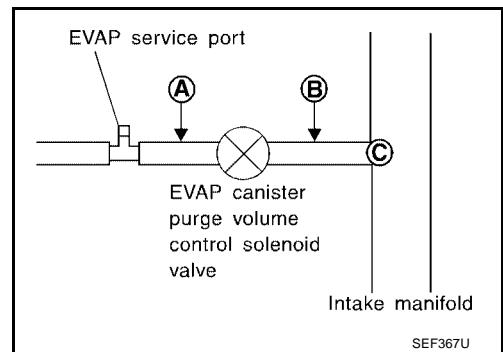
Check EVAP purge line for improper connection or disconnection. Refer to [EC-568, "EVAPORATIVE EMISSION LINE DRAWING"](#) .

OK or NG

- OK >> GO TO 5.
- NG >> Repair it.

**5. CHECK EVAP PURGE HOSE AND PURGE PORT**

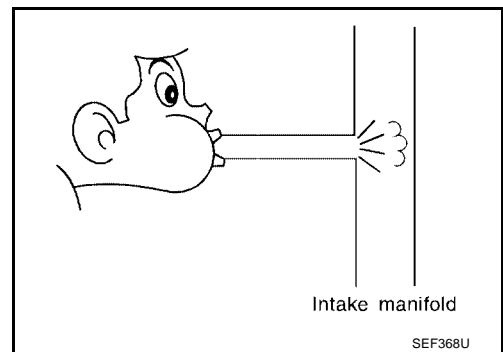
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B** .
2. Blow air into each hose and EVAP purge port **C** .



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.

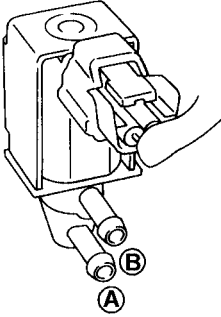
| ACTIVE TEST     |         |
|-----------------|---------|
| PURG VOL CONT/V | XXX %   |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| HO2S1 MNTR (B1) | LEAN    |
| THR TL POS SEN  | XXX V   |
|                 |         |
|                 |         |
|                 |         |

SEF801Y

**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.

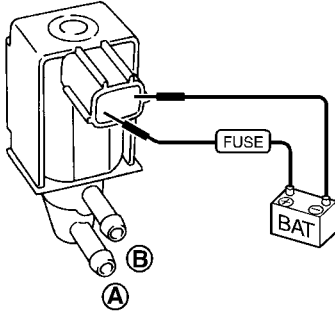


| Condition<br>PURG VOL CONT/V value | Air passage continuity<br>between A and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |

SEF334X

**Without CONSULT-II**

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



| Condition   | Air passage continuity<br>between A and B |
|---|---|
| 12V direct current supply between terminals 1 and 2 | Yes                                       |
| No supply   | No  |

SEF335X

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

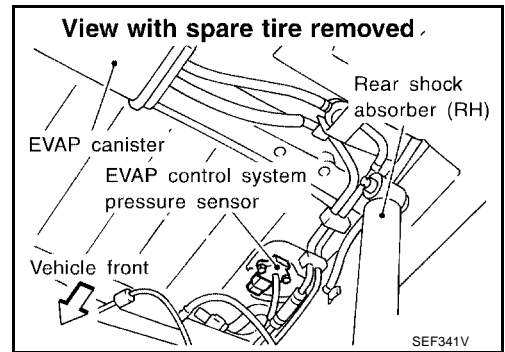
- OK >> GO TO 9.
- NG >> Repair it.

**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-338](#) and DTC P0453, [EC-345](#).

OK or NG

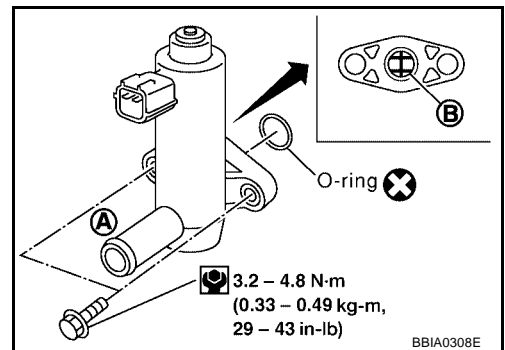
- OK (With CONSULT-II)>>GO TO 11.
- OK (Without CONSULT-II)>>GO TO 12.
- NG >> Replace EVAP control system pressure sensor.

**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**

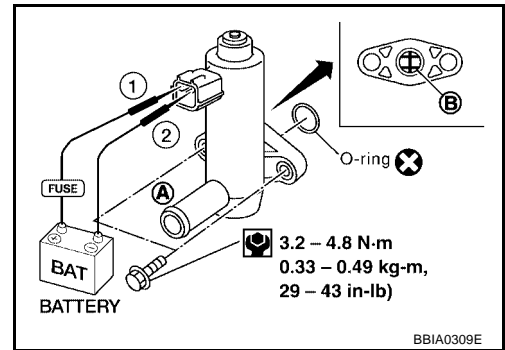
Check air passage continuity and operation delay time under the following condition.

| 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.

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.

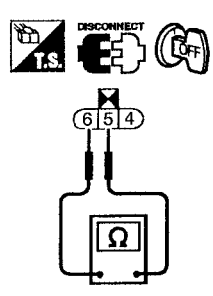
| Throttle valve conditions         | CLSD THL/P SW |
|-----------------------------------|---------------|
| Completely closed                 | ON            |
| Partially open or completely open | OFF           |

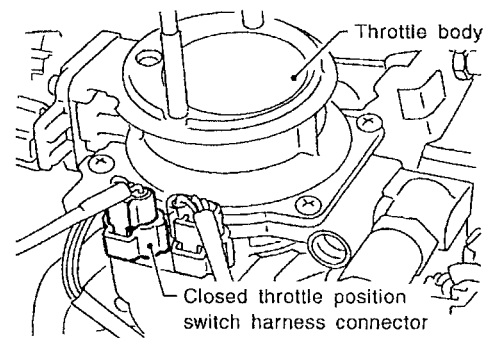
OK or NG

- 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-73, "Basic Inspection"](#) .

| Items  | Specifications   |
|--|--|
| Ignition timing  | 20° ± 2° BTDC  |
| Base idle speed  | 750 ± 50 rpm   |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.1 mm (0.004 in): ON<br>0.3 mm (0.012 in): OFF |
| Target idle speed  | 800 ± 50 rpm   |

**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-568, "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

On Board Diagnosis Logic

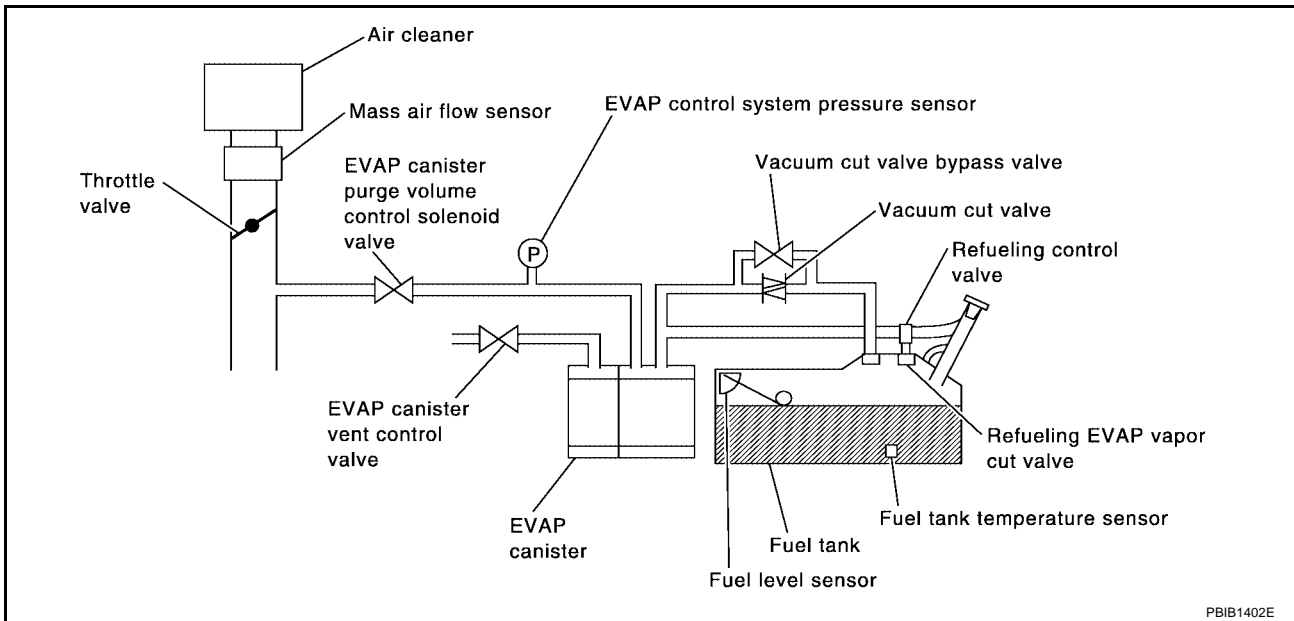
NOTE:

If DTC P0442 is displayed with DTC P1448, first perform trouble diagnosis for DTC P1448. (See EC-483 .)

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.



PBIB1402E

| 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. | <ul style="list-style-type: none"> <li>● Incorrect fuel tank vacuum relief valve</li> <li>● Incorrect fuel filler cap used</li> <li>● Fuel filler cap remains open or fails to close.</li> <li>● Foreign matter caught in fuel filler cap.</li> <li>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>● Foreign matter caught in EVAP canister vent control valve.</li> <li>● EVAP canister or fuel tank leaks</li> <li>● EVAP purge line (pipe and rubber tube) leaks</li> <li>● EVAP purge line rubber tube bent</li> <li>● Blocked or bent rubber tube to EVAP control system pressure sensor</li> <li>● Loose or disconnected rubber tube</li> <li>● EVAP canister vent control valve and the circuit</li> <li>● EVAP canister purge volume control solenoid valve and the circuit</li> <li>● Fuel tank temperature sensor</li> <li>● O-ring of EVAP canister vent control valve is missing or damaged</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water</li> <li>● EVAP control system pressure sensor</li> <li>● Fuel level sensor and the circuit</li> <li>● Refueling control valve</li> <li>● ORVR system leaks</li> </ul> |

**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

*UBS005DV*

**NOTE:**

- If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. Refer to [EC-483](#).
- 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 to 3/4 full and vehicle is placed on flat level surface.
  - Always perform test at a temperature of 0 to 30°C (32 to 86°F).
1. Turn ignition switch ON.
  2. Turn ignition switch OFF and wait at least 5 seconds.
  3. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
  4. Check that the following conditions are met.

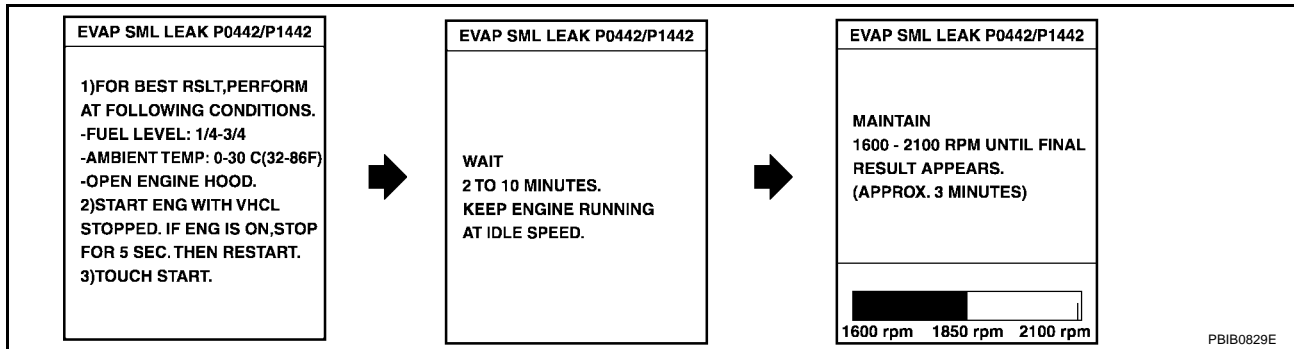
|               |                       |
|---------------|-----------------------|
| COOLAN TEMP/S | 0 - 70°C (32 - 158°F) |
| INT/A TEMP SE | 0 - 60°C (32 - 140°F) |



# DTC P0442 EVAP CONTROL SYSTEM

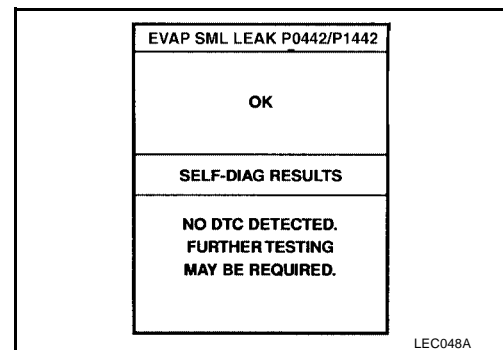
[KA24DE]

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-73, "Basic Inspection"](#).
6. Make sure that "OK" is displayed.  
If "NG" is displayed, refer to [EC-314, "Diagnostic Procedure"](#).



## WITH GST

1. Start engine.
2. Drive vehicle according to [EC-57, "Driving Pattern"](#).

## NOTE:

**Be sure to read the explanation of "Driving pattern" on [EC-57](#) 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.

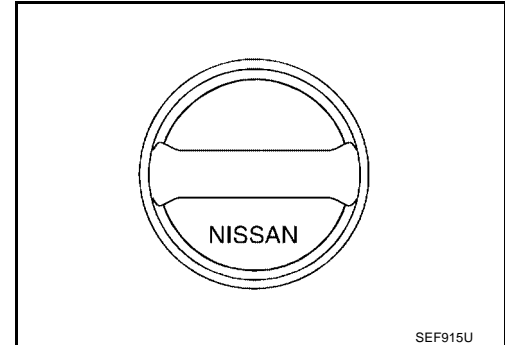
**It is not necessary to cool engine down before driving.**
7. Drive vehicle again according to the "Driving pattern", [EC-57](#).
8. Stop vehicle.
9. Select "MODE 3" with GST.
  - If P0441 is displayed on the screen, go to [EC-304, "Diagnostic Procedure"](#).
  - If P0442 is displayed on the screen, go to [EC-314, "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****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**

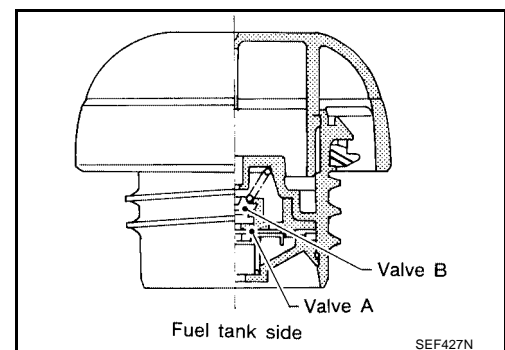
Check for air releasing sound while opening the fuel filler cap.

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.

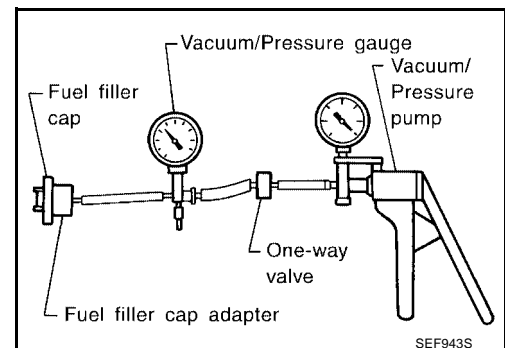
**Pressure** : 16.0 - 20.0 kPa  
 (0.163 - 0.204 kg/cm<sup>2</sup> , 2.32 - 2.90 psi)  
**Vacuum** : -6.0 to -3.5 kPa  
 (-0.061 to -0.036 kg/cm<sup>2</sup> , -0.87 to -0.51 psi)

**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.

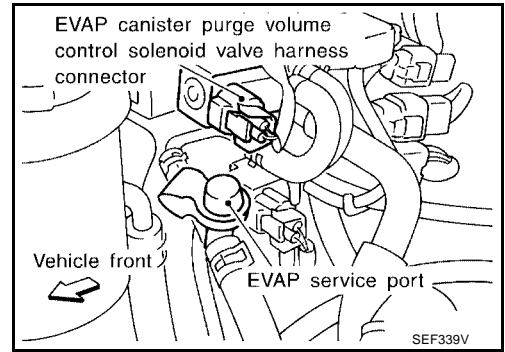
OK or NG

- OK >> GO TO 5.  
 NG >> Replace fuel filler cap with a genuine one.



**5. INSTALL PRESSURE PUMP**

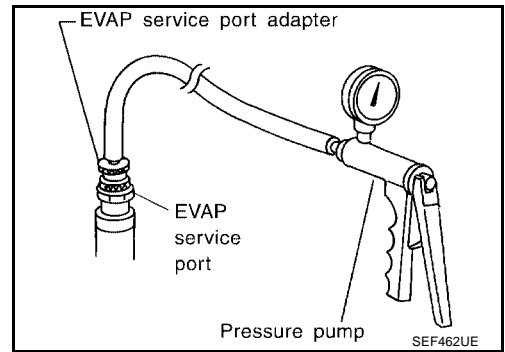
1. Install the EVAP service port adapter and the pressure pump securely to EVAP service port.



**NOTE:**

- Improper installation of service port may cause leaking.

Models with CONSULT-II>>GO TO 6.  
 Models without CONSULT-II>>GO TO 7.

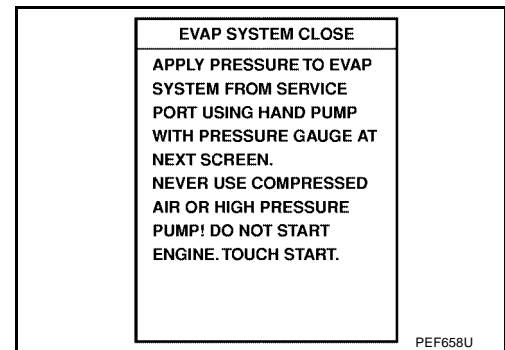


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## 6. CHECK FOR EVAP LEAK

### With CONSULT-II

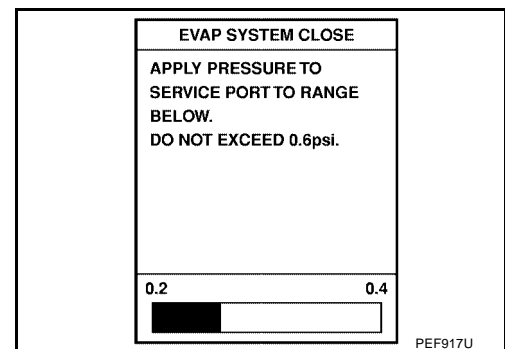
1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.



3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of bar graph.

#### NOTE:

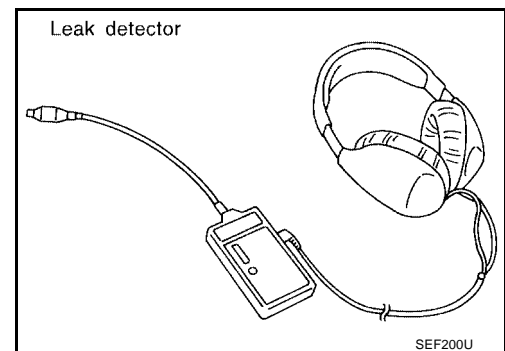
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



4. Using EVAP leak detector, locate the leak portion. For the leak detector, refer to instruction manual for more details. Refer to [EC-568, "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).

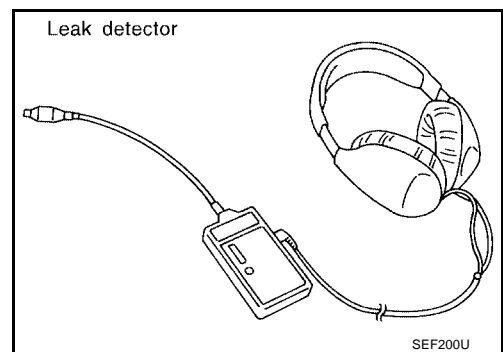
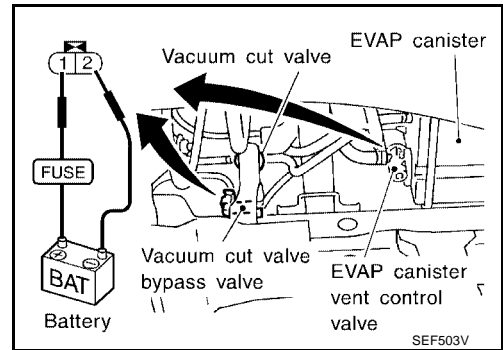
**NOTE:**

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.

5. Using EVAP leak detector, locate the leak. For the leak detector, refer to instruction manual for more details. Refer to [EC-568, "EVAPORATIVE EMISSION LINE DRAWING"](#).

**OK or NG**

- OK >> GO TO 8.  
 NG >> Repair or replace.

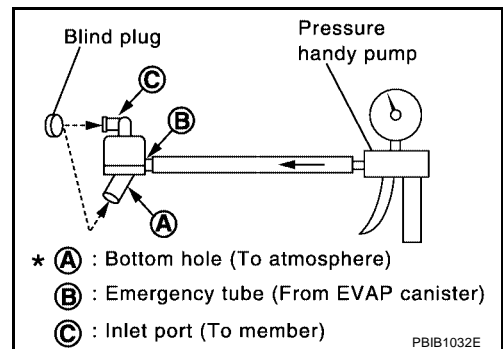


**8. CHECK WATER SEPARATOR**

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-484, "DTC Confirmation Procedure"](#).

**OK or NG**

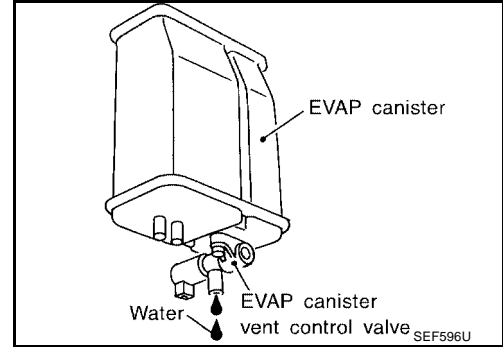
- OK >> GO TO 10.  
 NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connectors.

**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 100.0%.
5. Check vacuum hose for vacuum.

|                 |         |                      |
|-----------------|---------|----------------------|
| ACTIVE TEST     |         | Vacuum should exist. |
| PURG VOL CONT/V | XXX %   |                      |
| MONITOR         |         |                      |
| ENG SPEED       | XXX rpm |                      |
| A/F ALPHA-B1    | XXX %   |                      |
| HO2S1 MNTR (B1) | LEAN    |                      |
| THRTL POS SEN   | XXX V   |                      |
|                 |         |                      |
|                 |         |                      |
|                 |         |                      |

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-29, "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.

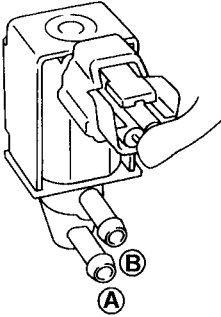
| ACTIVE TEST     |         |
|-----------------|---------|
| PURG VOL CONT/V | XXX %   |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| HO2S1 MNTR (B1) | LEAN    |
| THRTL POS SEN   | XXX V   |
|                 |         |
|                 |         |
|                 |         |

SEF801Y

**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.

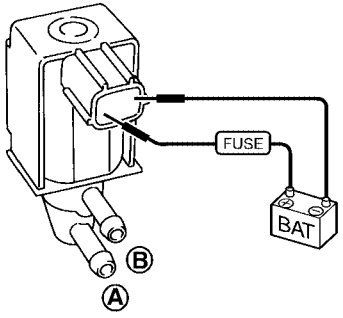


| Condition<br>PURG VOL CONT/V value | Air passage continuity<br>between A and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |

SEF334X

**Without CONSULT-II**

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



| Condition  | Air passage continuity<br>between A and B |
|--|---|
| 12V direct current supply between<br>terminals 1 and 2 | Yes                                       |
| No supply  | No  |

SEF335X

OK or NG

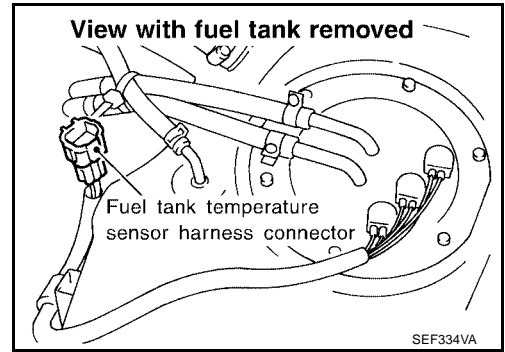
OK >> GO TO 18.

NG >> Replace EVAP canister purge volume control solenoid valve.



**18. CHECK FUEL TANK TEMPERATURE SENSOR**

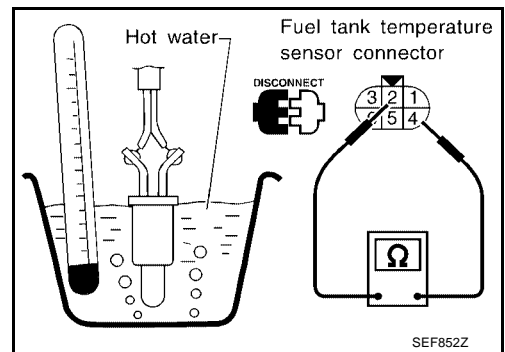
Check resistance by heating with hot water or heat gun as shown in the figure.



| Temperature °C (°F) | Resistance kΩ |
|---------------------|---------------|
| 20 (68)             | 2.3 - 2.7     |
| 50 (122)            | 0.79 - 0.90   |

**OK or NG**

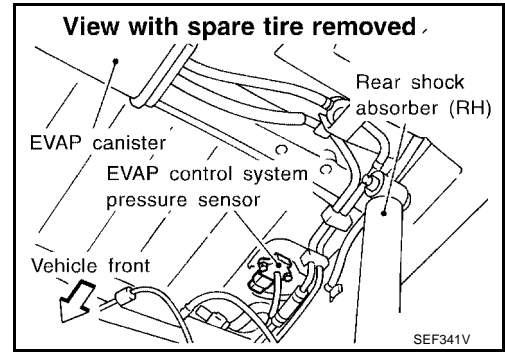
- OK >> GO TO 19.
- NG >> Replace fuel tank temperature sensor.



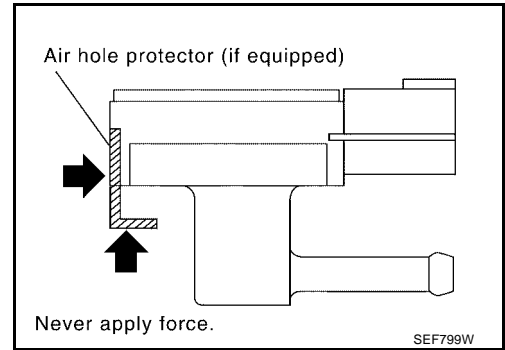
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19. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



**CAUTION:**  
Never apply force to the air hole protector of the sensor, if equipped.



2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

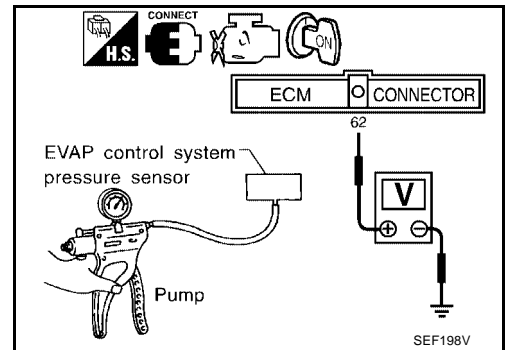
**CAUTION:**

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below  $-93.3 \text{ kPa}$  ( $-700 \text{ mmHg}$ ,  $-27.56 \text{ inHg}$ ) or over  $101.3 \text{ kPa}$  ( $760 \text{ mmHg}$ ,  $29.56 \text{ inHg}$ ) of pressure.

4. Check output voltage between ECM terminal 62 and engine 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-568, "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-573, "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.

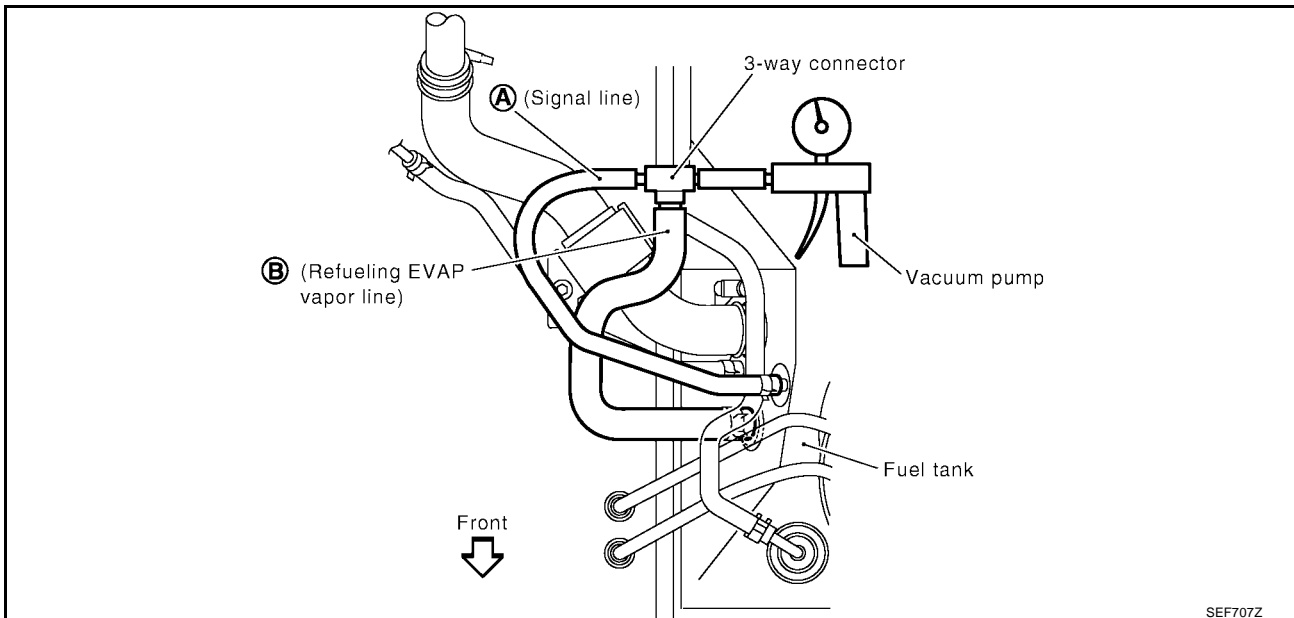
OK or NG

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 .

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

[KA24DE]

## DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFPP:14920

### Description SYSTEM DESCRIPTION

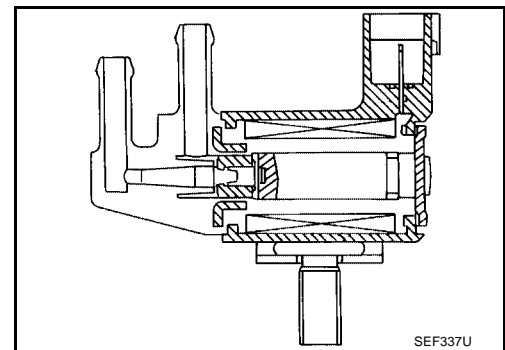
UBS005DX

| 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

UBS005DY

Specification data are reference values.

| MONITOR ITEM | CONDITION   |                        | SPECIFICATION |
|--------------|---|------------------------|---------------|
| PURG VOL C/V | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch "OFF"</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle (Vehicle stopped) | 0%            |
|              |   | 2,000 rpm              | —             |

# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[KA24DE]

## On Board Diagnosis Logic

UBS005E0

| 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  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● EVAP canister purge volume control solenoid valve</li> </ul> |
| P0445   | EVAP canister purge volume control solenoid valve circuit shorted | An excessively high voltage signal is sent to ECM through the valve | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is shorted.)</li> <li>● EVAP canister purge volume control solenoid valve</li> </ul>         |

## DTC Confirmation Procedure

UBS005E1

### 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 30 seconds.
4. If 1st trip DTC is detected, go to [EC-329. "Diagnostic Procedure"](#)

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

#### WITH GST

Follow the procedure "WITH CONSULT-II".

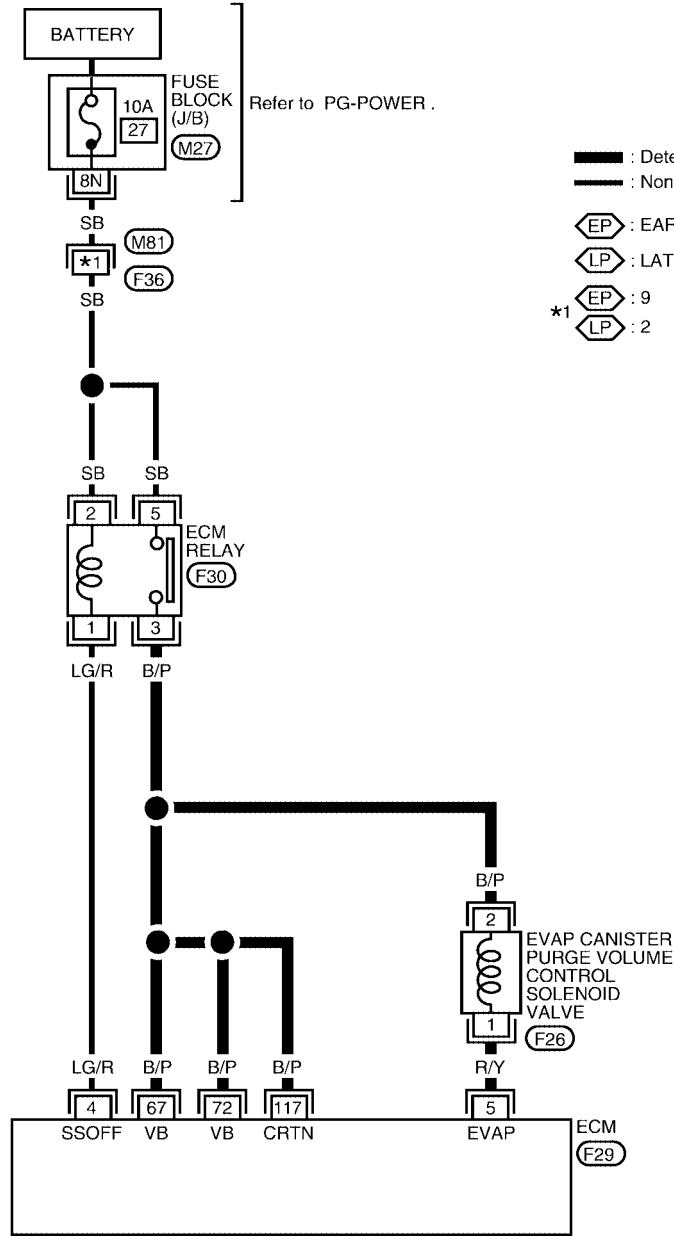
# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[KA24DE]

UBS005E2

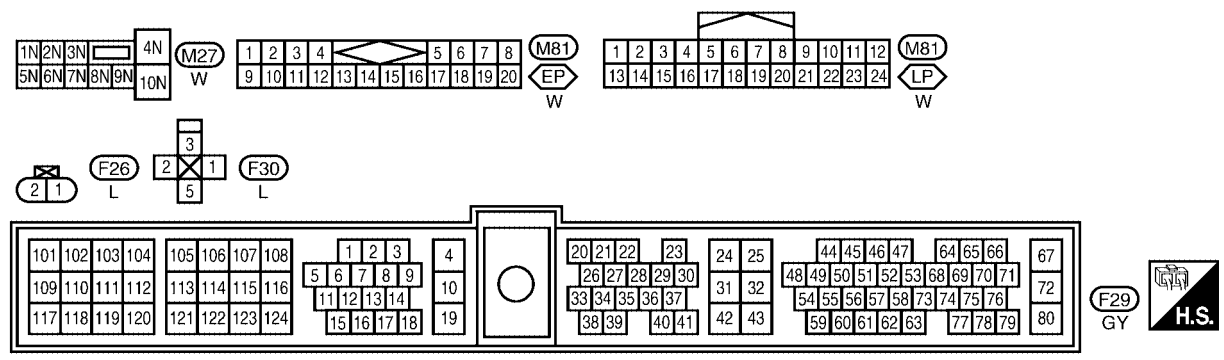
## Wiring Diagram

EC-PGC/V-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- \*1 EP : 9
- LP : 2

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



WBWA0015E

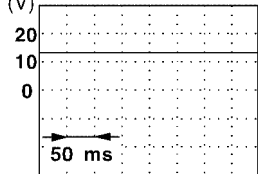
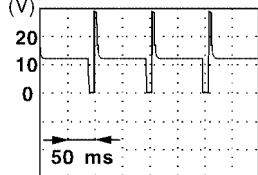
# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[KA24DE]

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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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-shutoff)                          | <b>[Engine is running]</b><br><b>[Ignition switch OFF]</b> <ul style="list-style-type: none"> <li>For a few seconds after turning ignition switch OFF</li> </ul> | 0 - 1V  |
|              |            |   | <b>[Ignition switch OFF]</b> <ul style="list-style-type: none"> <li>A few seconds passed after turning ignition switch OFF</li> </ul>                            | BATTERY VOLTAGE (11 - 14V)  |
| 5            | R/Y        | EVAP canister purge volume control solenoid valve | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>Idle speed</li> </ul>  | BATTERY VOLTAGE (11 - 14V)★<br>  |
|              |            |   | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>Engine speed is 2,000 rpm (More than 200 seconds after starting engine)</li> </ul>             | BATTERY VOLTAGE (11 - 14V)★<br> |
| 67           | B/P        | Power supply for ECM                              | <b>[Ignition switch ON]</b>  | BATTERY VOLTAGE (11 - 14V)  |
| 72           | B/P        |   |  |   |
| 117          | B/P        | Current return                                    | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>Idle speed</li> </ul>  | BATTERY VOLTAGE (11 - 14V)  |

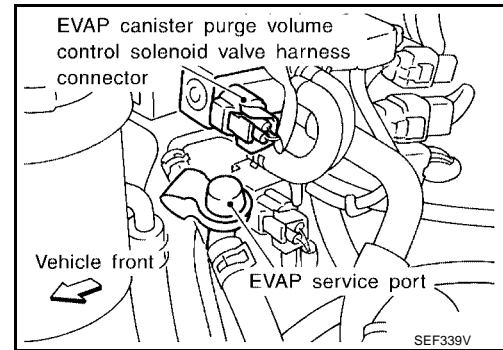
★ : Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)



## Diagnostic Procedure

### 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".

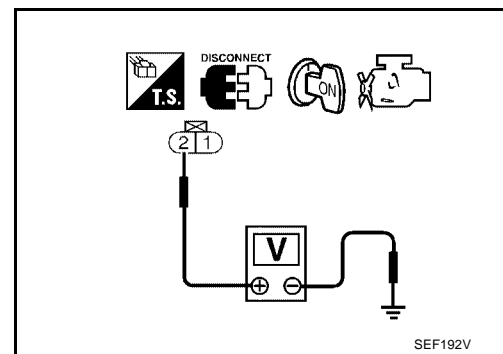


4. Check voltage between EVAP canister purge volume control solenoid valve terminal 2 and ground with CONSULT-II or tester.

**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 (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.

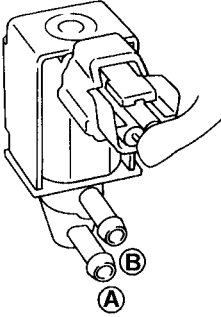
| ACTIVE TEST     |         |
|-----------------|---------|
| PURG VOL CONT/V | XXX %   |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| HO2S1 MNTR (B1) | LEAN    |
| THRTL POS SEN   | XXX V   |
|                 |         |
|                 |         |
|                 |         |

SEF801Y

## 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.

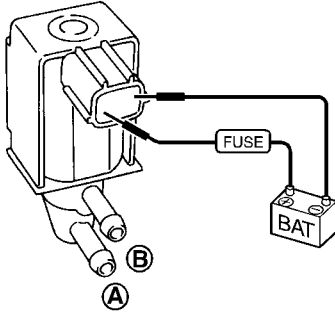


| Condition<br>PURG VOL CONT/V value | Air passage continuity<br>between A and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |

SEF334X

**Without CONSULT-II**

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



| Condition  | Air passage continuity<br>between A and B |
|--|---|
| 12V direct current supply between<br>terminals 1 and 2 | Yes                                       |
| No supply  | No  |

SEF335X

**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

UBS005E4

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

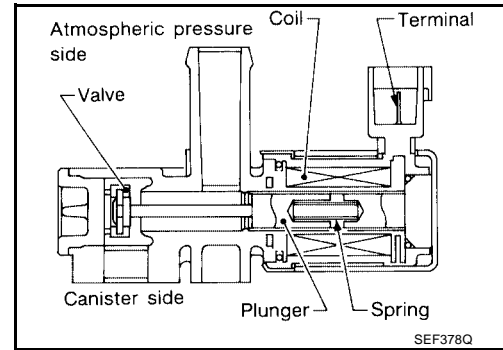
This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.

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

UBS005E5

Specification data are reference values.

| MONITOR ITEM | CONDITION             | SPECIFICATION |
|--------------|-----------------------|---------------|
| VENT CONT/V  | ● Ignition switch: ON | OFF           |

### On Board Diagnosis Logic

UBS005E7

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The valve circuit is open or shorted.)</li> <li>● EVAP canister vent control valve</li> </ul> |

### DTC Confirmation Procedure

UBS005E8

#### 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-333, "Diagnostic Procedure"](#)

#### WITH GST

Follow the procedure "WITH CONSULT-II".

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

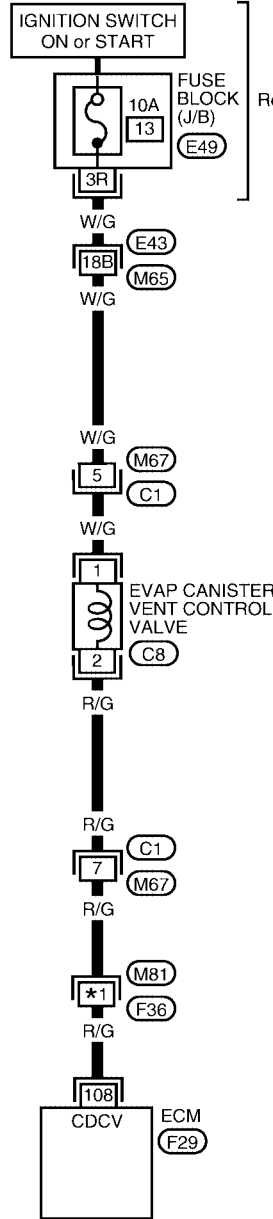
# DTC P0447 EVAP CANISTER VENT CONTROL VALVE

[KA24DE]

UBS005E9

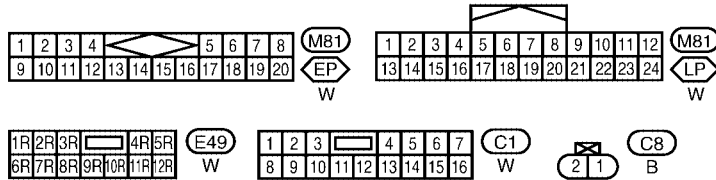
## Wiring Diagram

### EC-VENT/V-01

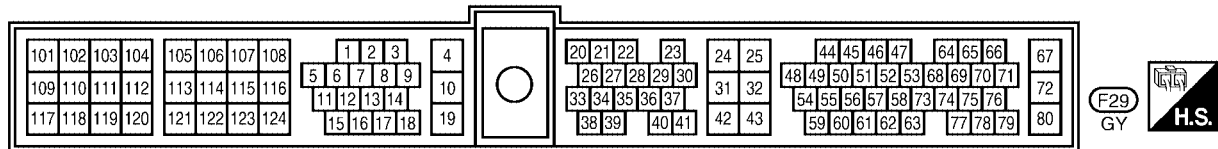


Refer to PG-POWER .

- : Detectable line for DTC
- : Non-detectable line for DTC
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 18
- : 21



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



WBWA0050E

# DTC P0447 EVAP CANISTER VENT CONTROL VALVE

[KA24DE]

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

**CAUTION:**

Do not use ECM ground terminals when measuring input/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 COLO R | ITEM                             | CONDITION            | DATA (DC Voltage)          |
|---------------|-------------|----------------------------------|----------------------|----------------------------|
| 108           | R/G         | EVAP canister vent control valve | [Ignition switch ON] | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

UBS005EA

### 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

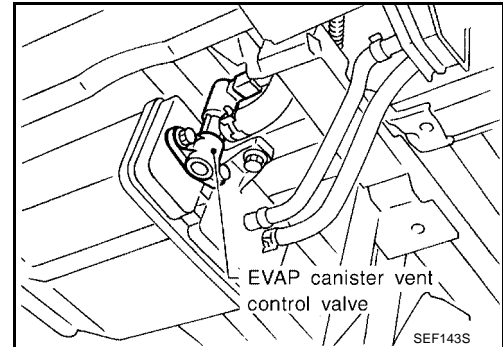
- OK >> GO TO 7.
- NG >> GO TO 3.

| 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   |
|                |         |
|                |         |
|                |         |

SEF802Y

## 3. CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.
3. Turn ignition switch ON.

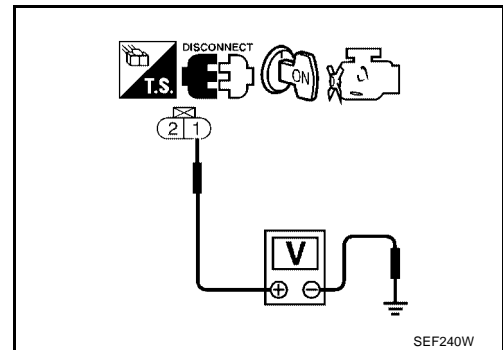


4. Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-II or tester.

**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 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 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

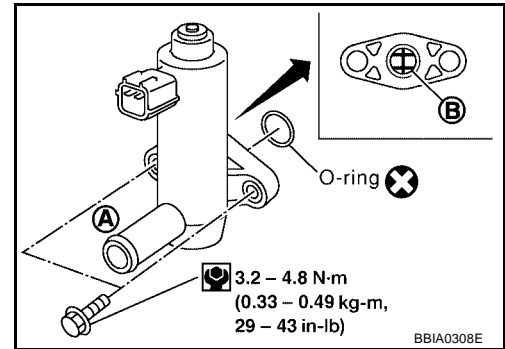
>> Repair open circuit or short to ground or short to power in harness or connectors.

## 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.

Without CONSULT-II

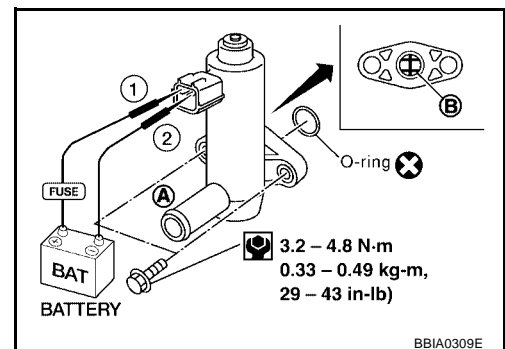
Check air passage continuity and operation delay time under the following condition.

| 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

[KA24DE]

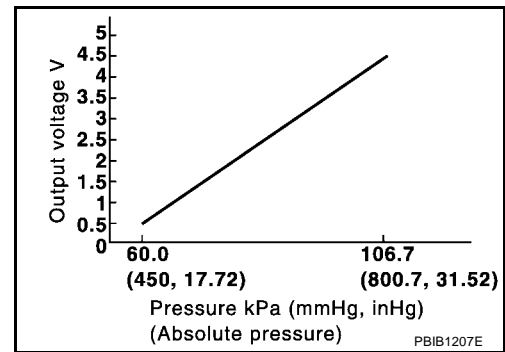
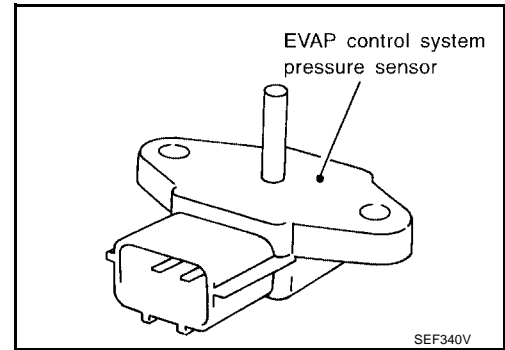
## DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

PF2:25085

### Component Description

UBS005EB

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

UBS005EC

Specification data are reference values.

| MONITOR ITEM  | CONDITION             | SPECIFICATION |
|---------------|-----------------------|---------------|
| EVAP SYS PRES | ● Ignition switch: ON | 1.8 - 4.8V    |

### On Board Diagnosis Logic

UBS005EE

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● EVAP control system pressure sensor</li> </ul> |

## DTC Confirmation Procedure

**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**

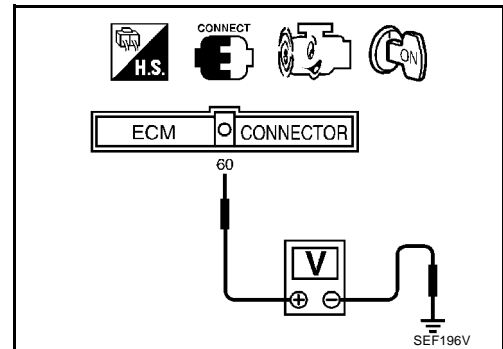
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “FUEL T/TMP SE” is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. If 1st trip DTC is detected, go to [EC-340, "Diagnostic Procedure"](#)

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |
| FUEL T/TMP SE | XXX °C  |

SEF194Y

 **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-340, "Diagnostic Procedure"](#)



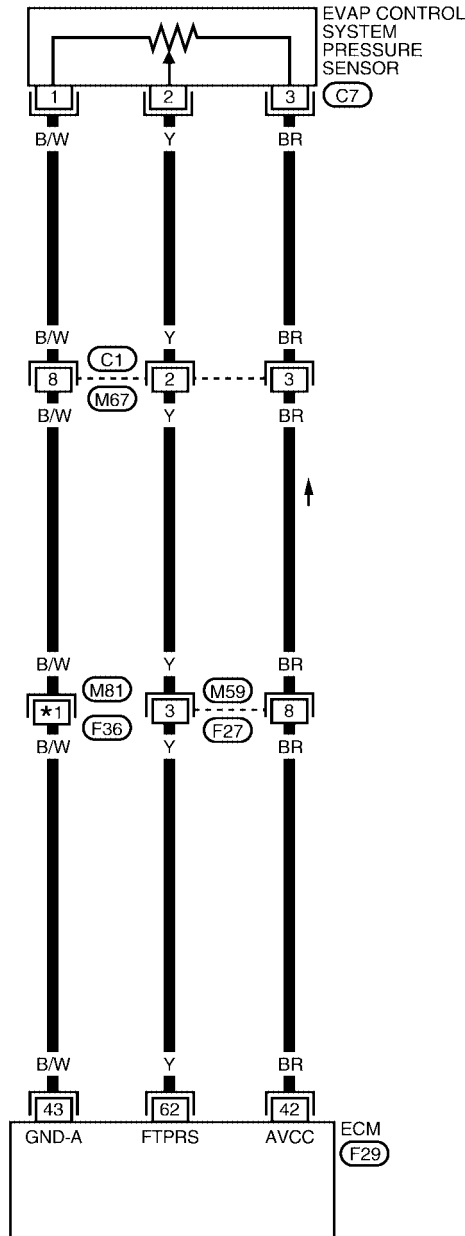
# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

[KA24DE]

## Wiring Diagram

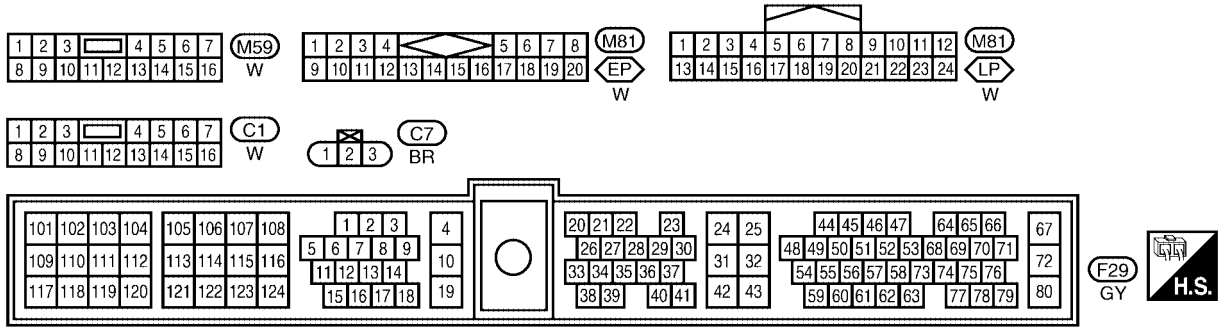
UBS005EG

EC-PRE/SE-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 1
- : 4

A  
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WBWA0051E

# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

[KA24DE]

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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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 COLO R | ITEM                                 | CONDITION  | DATA (DC Voltage) |
|---------------|-------------|--------------------------------------|--|-------------------|
| 42            | BR          | Sensors' power supply                | [Ignition switch ON]                                       | Approximately 5V  |
| 43            | B/W         | Sensors' ground                      | [Engine is running]<br>● Warm-up condition<br>● Idle speed | Approximately 0V  |
| 62            | Y           | EVAP control system pres-sure sensor | [Ignition switch ON]                                       | 1.8 - 4.8V        |

## Diagnostic Procedure

UBS005EH

### 1. CHECK RUBBER TUBE CONNECTED TO THE SENSOR

Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.

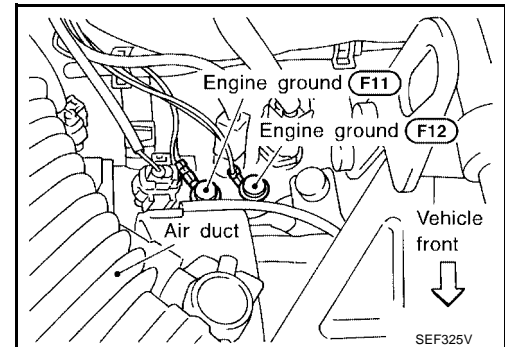
OK or NG

- OK >> GO TO 2.
- NG >> Reconnect, repair or replace.

### 2. RETIGHTEN GROUND SCREWS

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

>> GO TO 3.

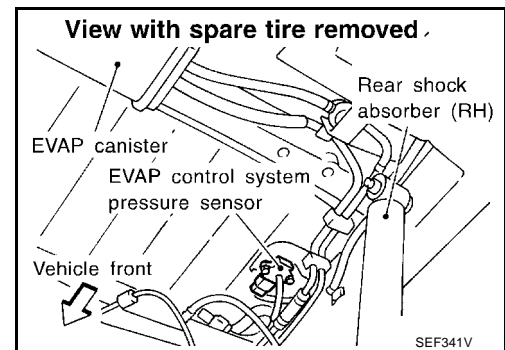


### 3. CHECK HARNESS CONNECTOR

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.



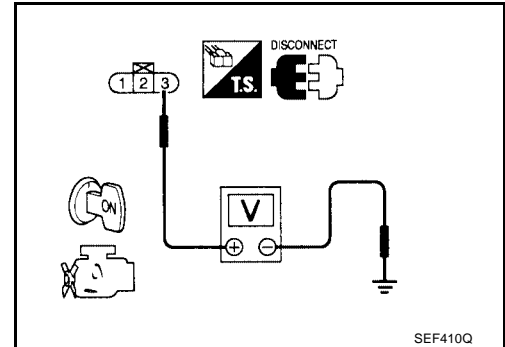
#### 4. CHECK POWER SUPPLY

1. Turn ignition switch ON.
2. Check voltage between terminal 3 and engine 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 harness or connectors.

#### 6. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between EVAP control system pressure sensor terminal 1 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 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 power in harness or connectors.

---

## 8. CHECK INPUT SIGNAL CIRCUIT

---

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 62 and EVAP control system pressure sensor terminal 2.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

- OK >> 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

---

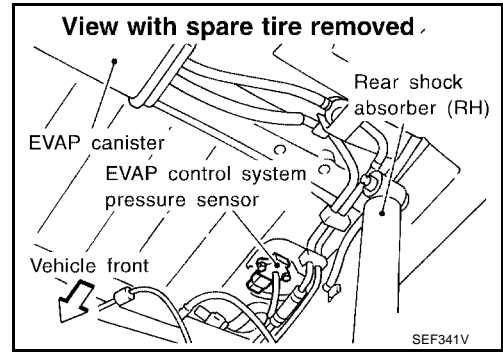
1. Turn ignition switch "OFF".
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

OK or NG

- OK >> GO TO 11.  
NG >> Repair it.

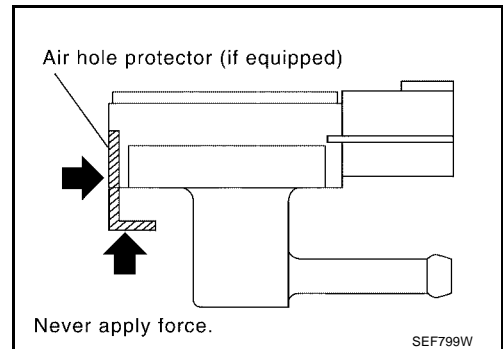
11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



**CAUTION:**

Never apply force to the air hole protector of the sensor, if equipped.



2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

**CAUTION:**

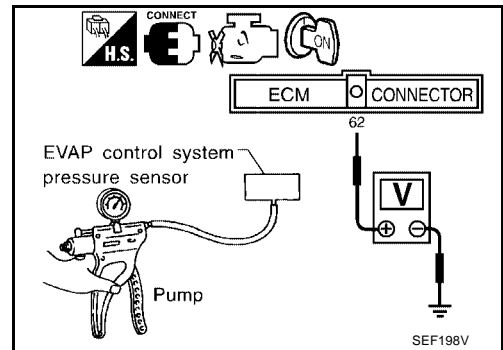
- Always calibrate the vacuum pump gauge when using it.
- Do not apply below  $-93.3 \text{ kPa}$  ( $-700 \text{ mmHg}$ ,  $-27.56 \text{ inHg}$ ) or over  $101.3 \text{ kPa}$  ( $760 \text{ mmHg}$ ,  $29.56 \text{ inHg}$ ) of pressure.

4. Check output voltage between ECM terminal 62 and engine 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

[KA24DE]

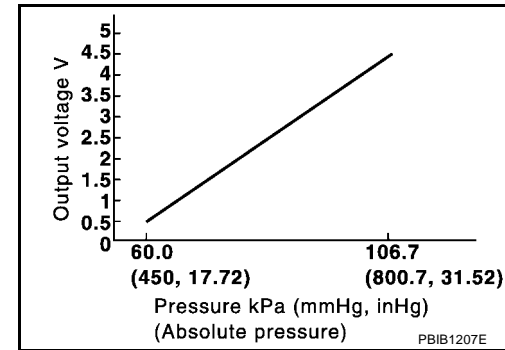
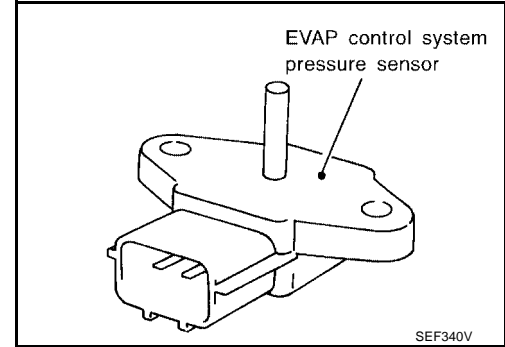
## DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

PFP:25085

### Component Description

UBS006HN

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

UBS006HO

Specification data are reference values.

| MONITOR ITEM  | CONDITION             | SPECIFICATION |
|---------------|-----------------------|---------------|
| EVAP SYS PRES | ● Ignition switch: ON | 1.8 - 4.8V    |

### On Board Diagnosis Logic

UBS006HQ

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● EVAP control system pressure sensor</li> <li>● Rubber hose to EVAP control system pressure is clogged, vent, kinked, disconnected or improper connection.</li> <li>● EVAP canister vent control valve</li> <li>● EVAP canister purge volume control solenoid valve</li> <li>● EVAP canister</li> <li>● Water separator</li> </ul> |



## DTC Confirmation Procedure

### 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

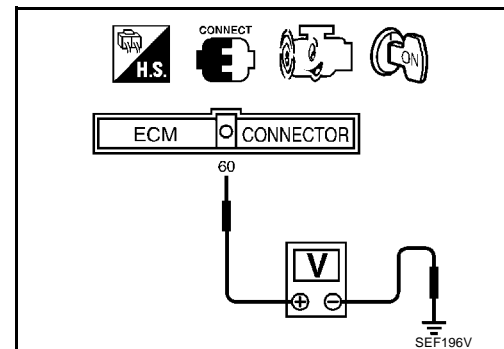
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Turn ignition switch ON.
4. Select "DATA MONITOR" mode with CONSULT-II.
5. Make sure that "FUEL T/TMP SE" is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. If 1st trip DTC is detected, go to [EC-347, "Diagnostic Procedure"](#)

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |
| FUEL T/TMP SE | XXX °C  |

SEF194Y

### 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"](#)



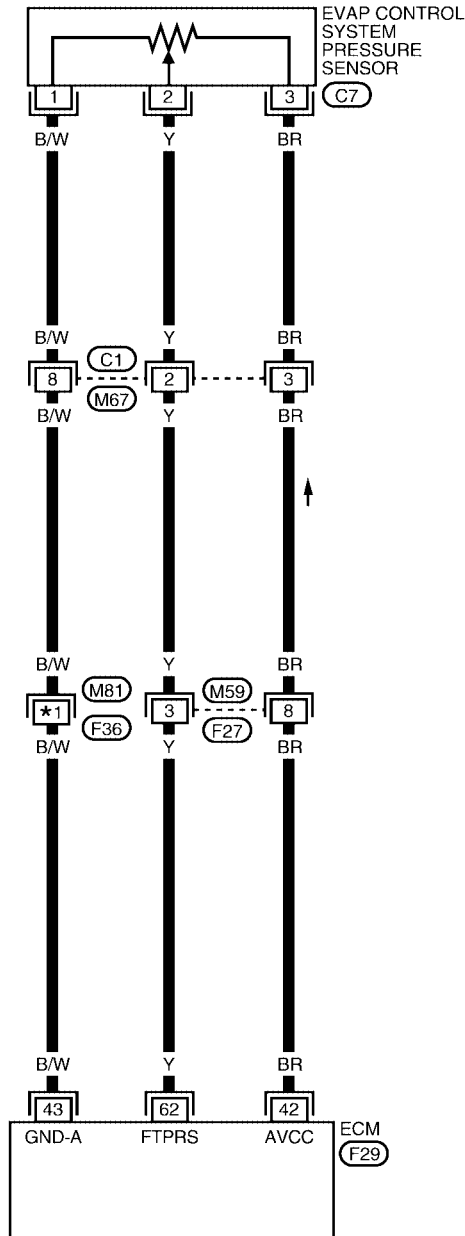
# DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

[KA24DE]

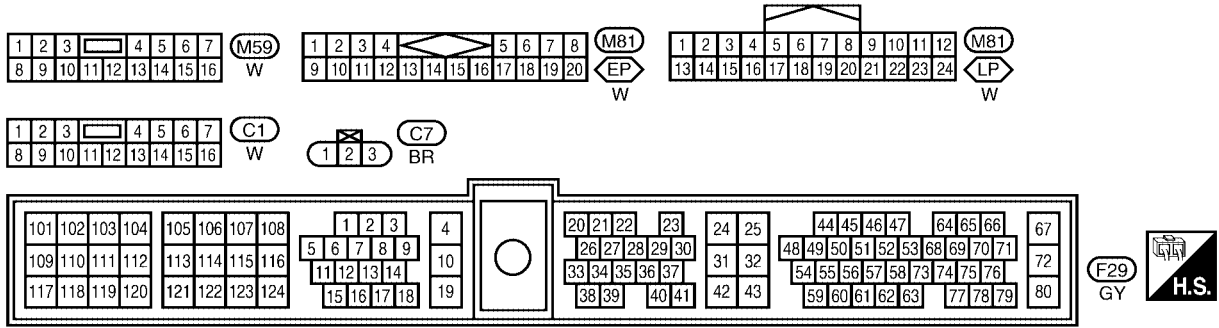
UBS006HS

## Wiring Diagram

EC-PRE/SE-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 1
- : 4



WBWA0051E

# DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

[KA24DE]

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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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         | Sensors' power supply               | [Ignition switch ON]                                       | Approximately 5V  |
| 43           | B/W        | Sensors' ground                     | [Engine is running]<br>● Warm-up condition<br>● Idle speed | Approximately 0V  |
| 62           | Y          | EVAP control system pressure sensor | [Ignition switch ON]                                       | 1.8 - 4.8V        |

## Diagnostic Procedure

UBS006HT

### 1. CHECK RUBBER TUBE CONNECTED TO THE SENSOR

Check rubber tube connected to the sensor for clogging, vent, kink, disconnection or improper connection.

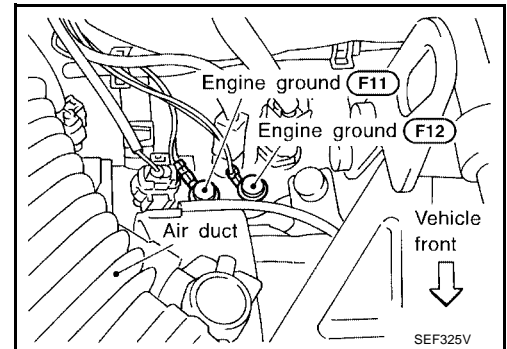
OK or NG

- OK >> GO TO 2.
- NG >> Reconnect, repair or replace.

### 2. RETIGHTEN GROUND SCREWS

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

>> GO TO 3.

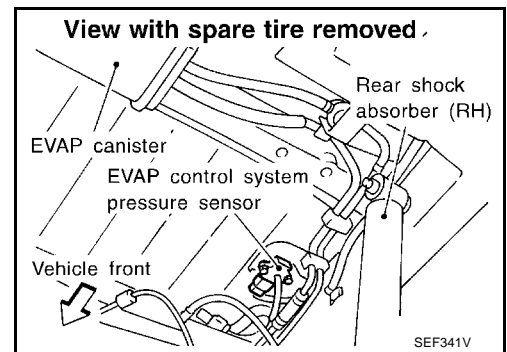


### 3. CHECK HARNESS CONNECTOR

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.



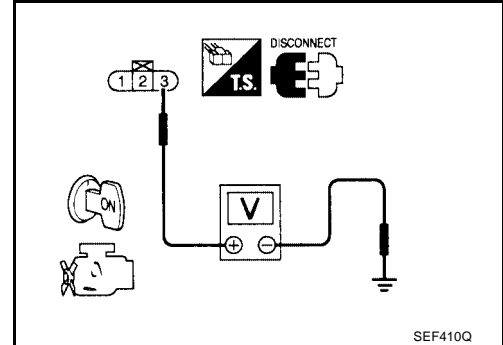
## 4. CHECK POWER SUPPLY

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and engine 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 harness or connectors.

## 6. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check harness continuity between EVAP control system pressure sensor terminal 1 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 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 power in harness or connectors.

**8. CHECK INPUT SIGNAL CIRCUIT**

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 62 and EVAP control system pressure sensor terminal 2.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK (With CONSULT-II)>>GO TO 10.

OK (Without CONSULT-II)>>GO TO 11.

NG >> GO TO 9.

**9. DETECT MALFUNCTIONING PART**

Check the following.

- Harness connectors 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.

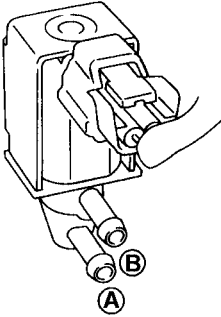
| ACTIVE TEST     |         |
|-----------------|---------|
| PURG VOL CONT/V | XXX %   |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| HO2S1 MNTR (B1) | LEAN    |
| THRTL POS SEN   | XXX V   |
|                 |         |
|                 |         |
|                 |         |

SEF801Y

## 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.

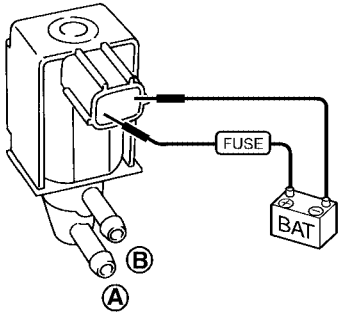


| Condition<br>PURG VOL CONT/V value | Air passage continuity<br>between A and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |

SEF334X

### Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



| Condition  | Air passage continuity<br>between A and B |
|--|---|
| 12V direct current supply between<br>terminals 1 and 2 | Yes                                       |
| No supply  | No  |

SEF335X

#### 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

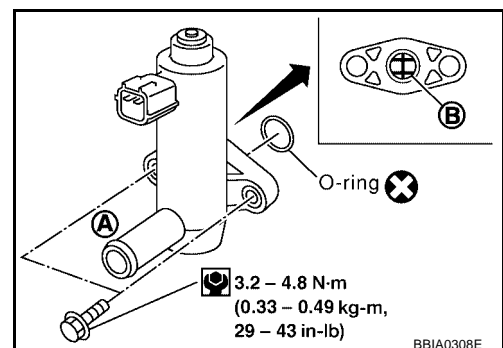
- OK >> GO TO 13.
- NG >> Repair it.

## 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

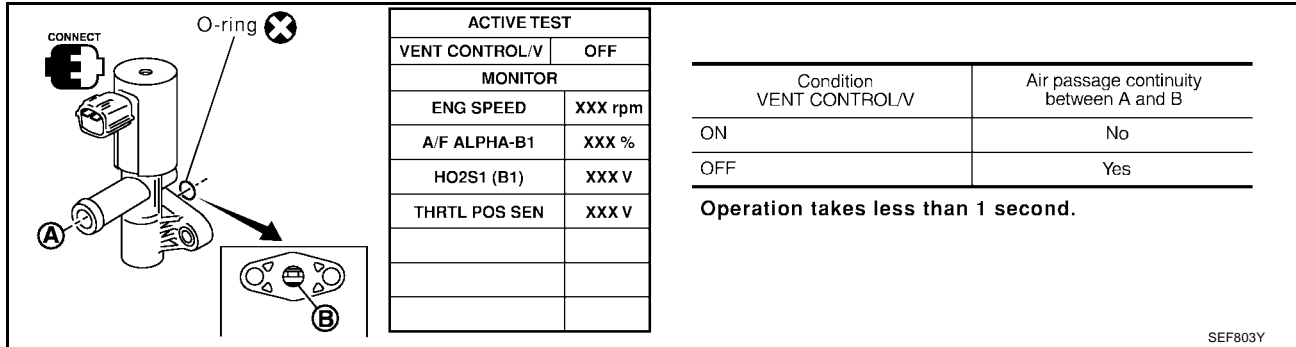
- OK >> GO TO 14.
- NG >> Replace EVAP canister vent control valve.



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<br>VENT CONTROL/V | Air passage continuity<br>between A and B |
|-----------------------------|---|
| ON                          | No  |
| OFF                         | Yes                                       |

Operation takes less than 1 second.

SEF803Y

 Without CONSULT-II

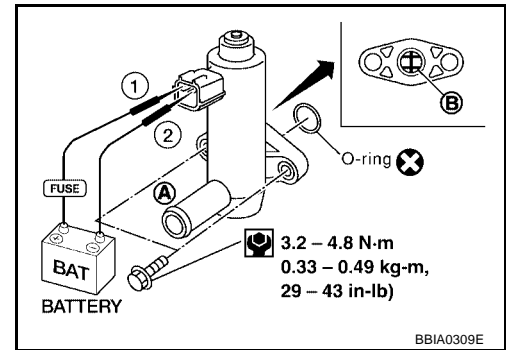
Check air passage continuity and operation delay time under the following condition.

| Condition  | Air passage continuity between<br>A and B |
|--|---|
| 12V direct current supply between<br>terminals 1 and 2 | No  |
| OFF  | Yes                                       |

Operation takes less than 1 second.

OK or NG

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



15. CHECK EVAP CANISTER VENT CONTROL VALVE-III

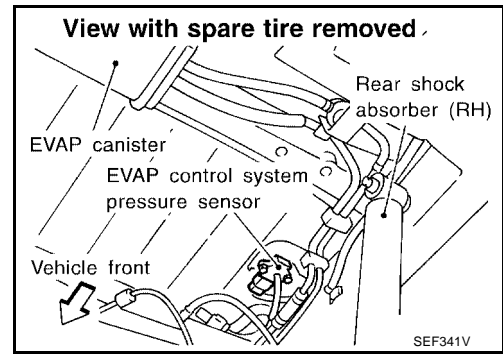
1. Clean the air passage (Portion A to B) of EVAP canister vent control valve using an air blower.
2. Perform Test No. 13 again.

OK or NG

- OK >> GO TO 16.
- NG >> Replace EVAP canister vent control valve.

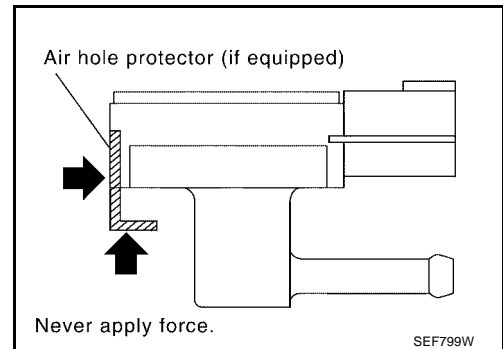
16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



**CAUTION:**

Never apply force to the air hole protector of the sensor, if equipped.



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:**

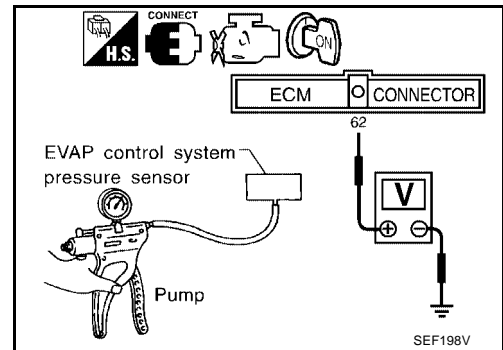
- Always calibrate the vacuum pump gauge when using it.
- Do not apply below  $-93.3 \text{ kPa}$  ( $-700 \text{ mmHg}$ ,  $-27.56 \text{ inHg}$ ) or over  $101.3 \text{ kPa}$  ( $760 \text{ mmHg}$ ,  $29.56 \text{ inHg}$ ) of pressure.

4. Check output voltage between ECM terminal 62 and engine 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.

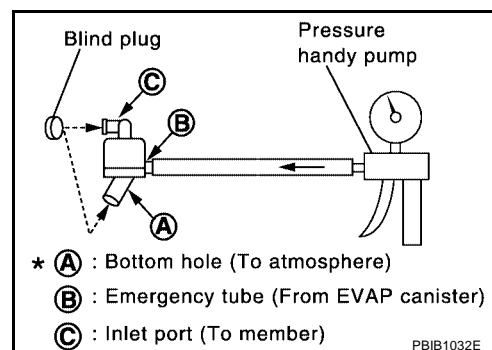
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG 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.



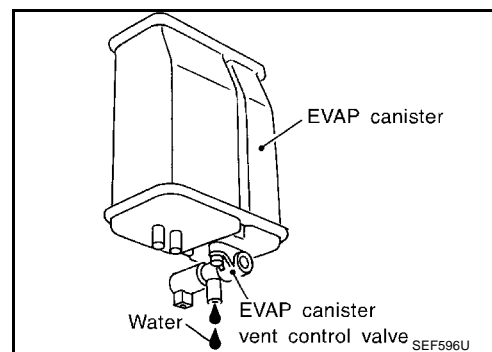
## 18. CHECK IF EVAP CANISTER SATURATED WITH WATER

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.

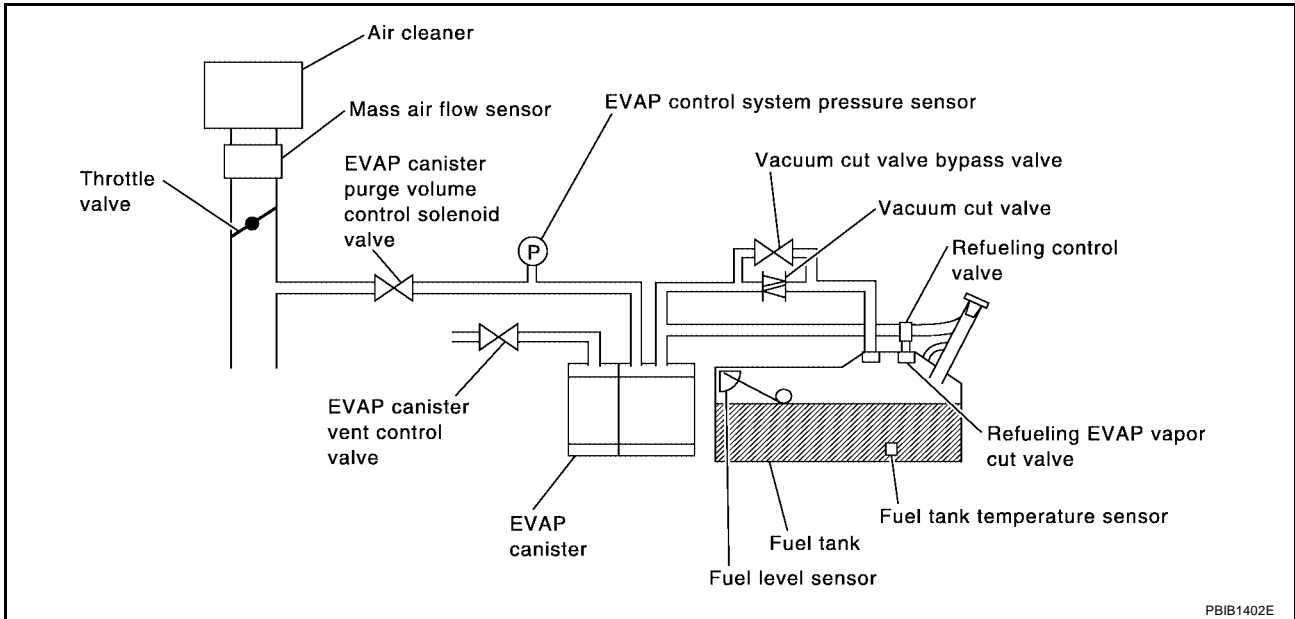
DTC P0455 EVAP CONTROL SYSTEM

On Board Diagnosis Logic

NOTE:

If DTC P0455 is displayed with DTC P1448, first perform trouble diagnosis for DTC P1448. (See EC-483.)

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.



PBIB1402E

| DTC No. | Trouble diagnosis name                   | DTC detecting condition   | Check Items (Possible Cause)   |
|---------|--|---|--|
| P0442   | EVAP control system gross leak detected. | <ul style="list-style-type: none"> <li>● EVAP control system has a leak.</li> <li>● EVAP control system does not operate properly.</li> </ul> | <ul style="list-style-type: none"> <li>● Incorrect fuel tank vacuum relief valve</li> <li>● Incorrect fuel filler cap used</li> <li>● Fuel filler cap remains open or fails to close.</li> <li>● Foreign matter caught in fuel filler cap.</li> <li>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>● Foreign matter caught in EVAP canister vent control valve.</li> <li>● EVAP canister or fuel tank leaks</li> <li>● EVAP purge line (pipe and rubber tube) leaks</li> <li>● EVAP purge line rubber tube bent.</li> <li>● Blocked or bent rubber tube to EVAP control system pressure sensor</li> <li>● Loose or disconnected rubber tube</li> <li>● EVAP canister vent control valve and the circuit</li> <li>● EVAP canister purge volume control solenoid valve and the circuit</li> <li>● Fuel tank temperature sensor</li> <li>● O-ring of EVAP canister vent control valve is missing or damaged.</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water.</li> <li>● EVAP control system pressure sensor</li> <li>● Fuel level sensor and the circuit</li> <li>● Refueling control valve</li> <li>● ORVR system leaks</li> </ul> |

**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

UBS005EJ

**CAUTION:**

Never remove fuel filter cap during the DTC confirmation procedure.

**NOTE:**

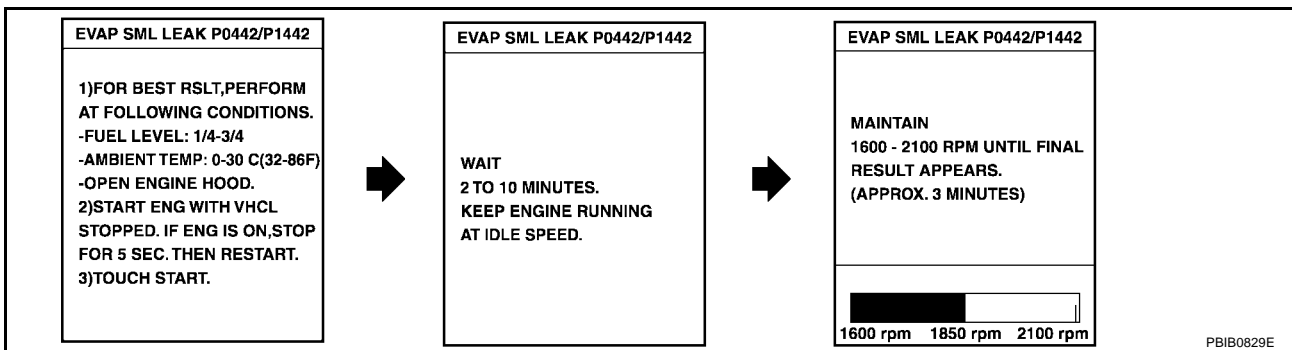
- If DTC P0455 is displayed with DTC P1448, first perform trouble diagnosis for DTC P1448. (See [EC-483](#).)
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

**TESTING CONDITION:**

- Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedure.

**WITH CONSULT-II**

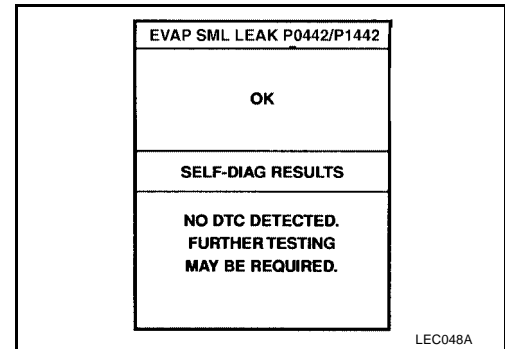
1. Tighten fuel filter cap securely until ratcheting sound is heard.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 5 seconds.
4. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
5. Make sure that the following conditions are met.  
**COOLAN TEMP/S: 0 - 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-73, "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-356, "Diagnostic Procedure"](#).  
If P0442 is displayed, perform "Diagnostic Procedure" for DTC P0442, [EC-314](#).



## WITH GST

### NOTE:

- Be sure to read the explanation of "Driving Pattern" on [EC-57](#) before driving vehicle.
  - It is better that the fuel level is low.
1. Start engine.
  2. Drive vehicle according to [EC-57, "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 "Driving Pattern", [EC-57](#).
  8. Stop vehicle.
  9. Select "MODE 3" with GST.
    - If P0455 is displayed on the screen, go to [EC-356, "Diagnostic Procedure"](#).
    - If P0442 is displayed on the screen, go to [EC-314, "Diagnostic Procedure"](#).
    - If P0441 is displayed on the screen, go to [EC-304, "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

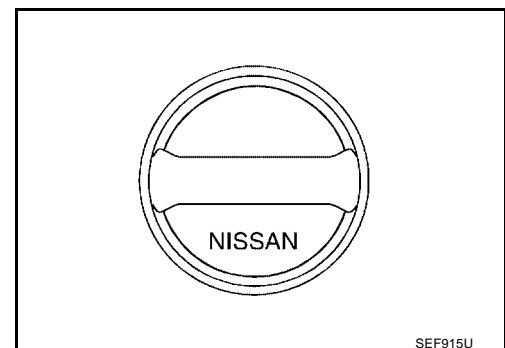
UBS005EK

### 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.

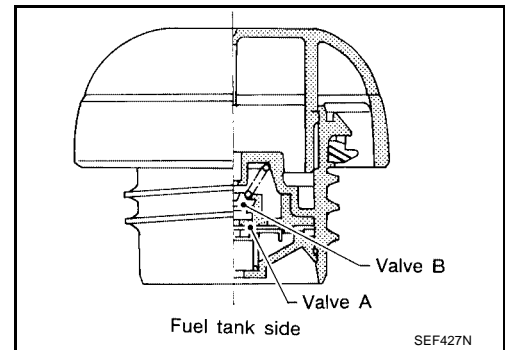
OK or NG

OK >> GO TO 6.

NG >> GO TO 4.

## 4. CHECK FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

1. Wipe clean valve housing.

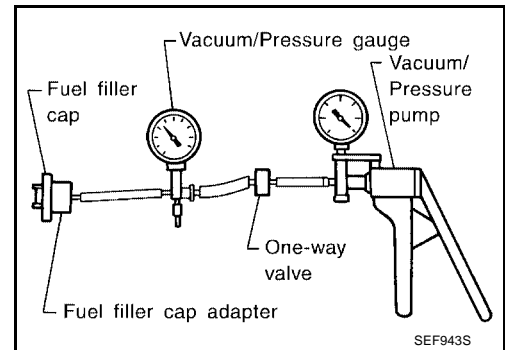


2. Check valve opening pressure and vacuum.

**Pressure** : 16.0 - 20.0 kPa  
(0.163 - 0.204 kg/cm<sup>2</sup> , 2.32 - 2.90 psi)  
**Vacuum** : -6.0 to -3.5 kPa  
(-0.061 to -0.036 kg/cm<sup>2</sup> , -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-568, "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-484, "DTC Confirmation Procedure"](#) .

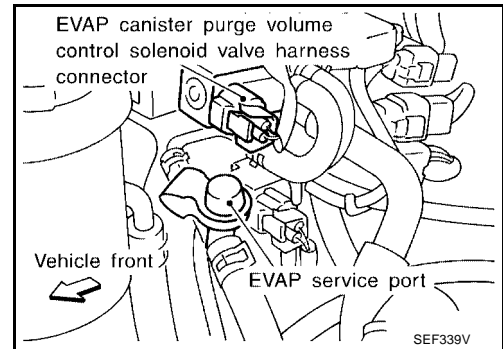
OK or NG

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.

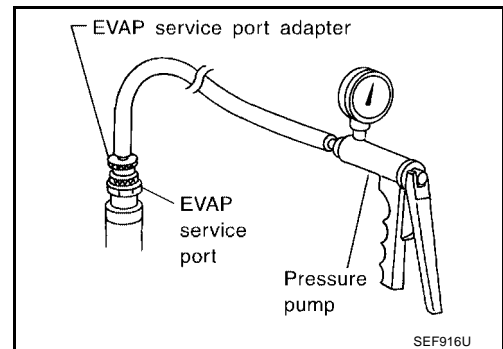


**NOTE:**

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II>>GO TO 9.

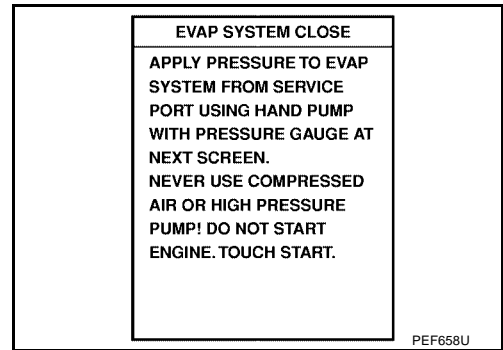
Models without CONSULT-II>>GO TO 10.



9. CHECK FOR EVAP LEAK

 With CONSULT-II

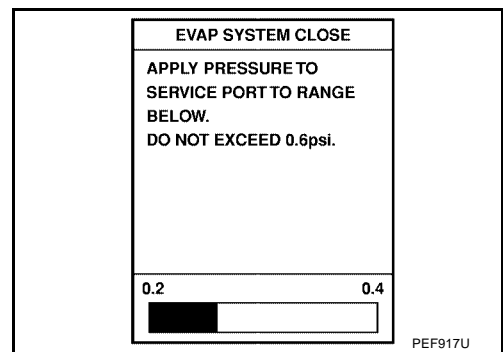
1. Turn ignition switch ON.
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.



3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

**NOTE:**

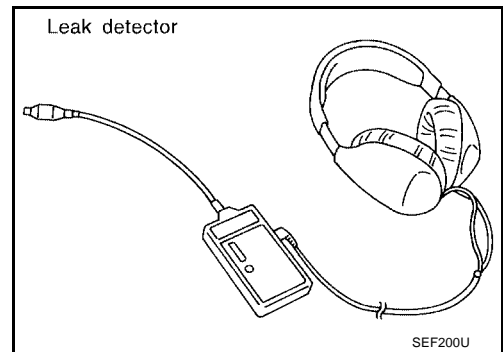
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-568, "EVAPORATIVE EMISSION LINE DRAWING"](#)

OK or NG

- OK >> GO TO 11.  
 NG >> Repair or replace.



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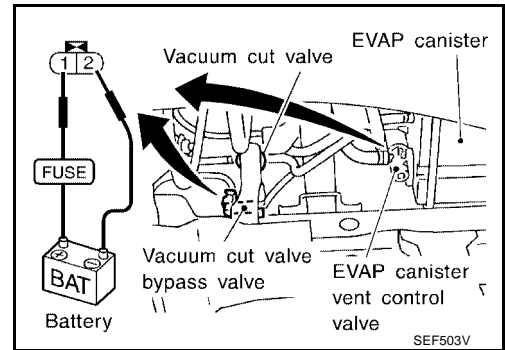
10. CHECK FOR EVAP LEAK

⊗ 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:**

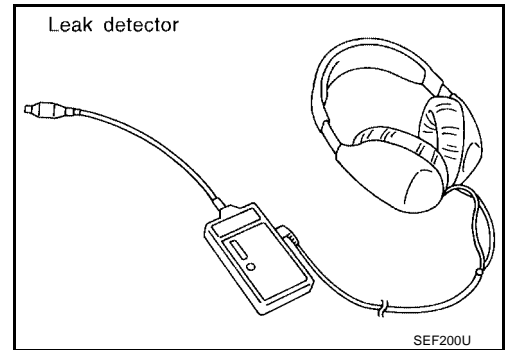
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-568, "EVAPORATIVE EMISSION LINE DRAWING"](#) .

OK or NG

- OK >> GO TO 12.  
 NG >> Repair or replace.



11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Ⓜ With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

|                 |         |
|-----------------|---------|
| 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   |
|                 |         |
|                 |         |
|                 |         |

**Vacuum should exist.**

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-29, "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.

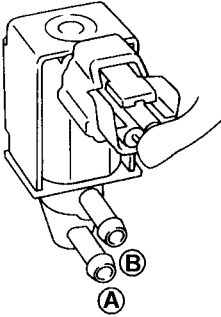
| ACTIVE TEST     |         |
|-----------------|---------|
| PURG VOL CONT/V | XXX %   |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| HO2S1 MNTR (B1) | LEAN    |
| THRTL POS SEN   | XXX V   |
|                 |         |
|                 |         |
|                 |         |

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.

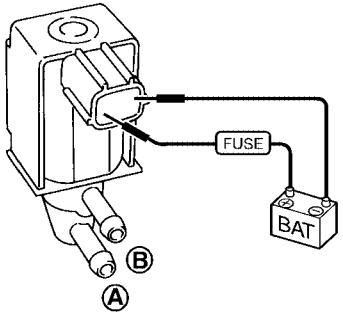


| Condition<br>PURG VOL CONT/V value | Air passage continuity<br>between A and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |

SEF334X

**Without CONSULT-II**

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



| Condition  | Air passage continuity<br>between A and B |
|--|---|
| 12V direct current supply between<br>terminals 1 and 2 | Yes                                       |
| No supply  | No  |

SEF335X

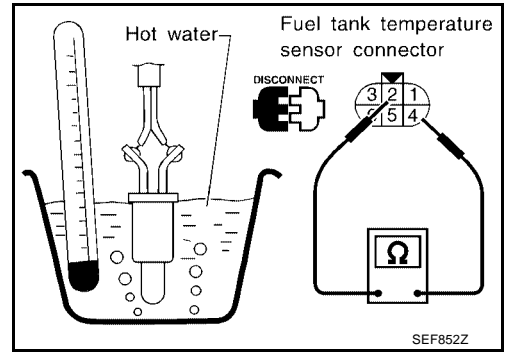
OK or NG

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.

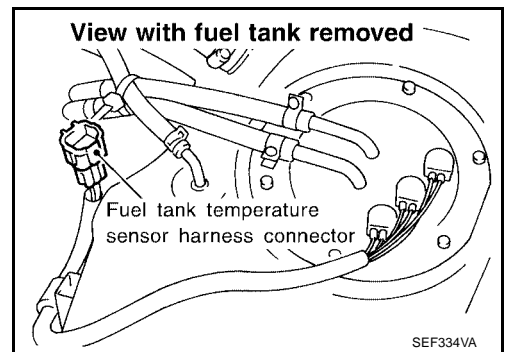


| Temperature °C (°F) | Resistance kΩ |
|---------------------|---------------|
| 20 (68)             | 2.3 - 2.7     |
| 50 (122)            | 0.79 - 0.90   |

**OK or NG**

OK >> GO TO 17.

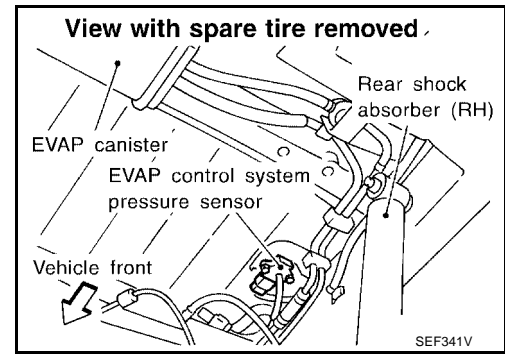
NG >> Replace fuel tank temperature sensor, refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#).



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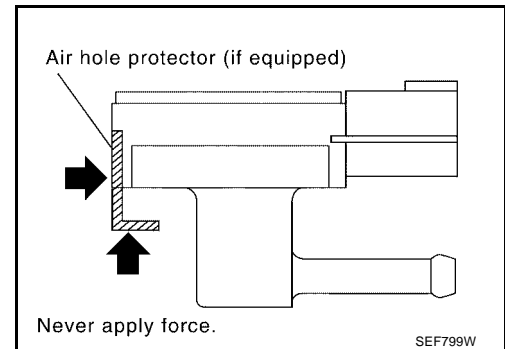
## 17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



**CAUTION:**

Never apply force to the air hole protector of the sensor, if equipped.



2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

**CAUTION:**

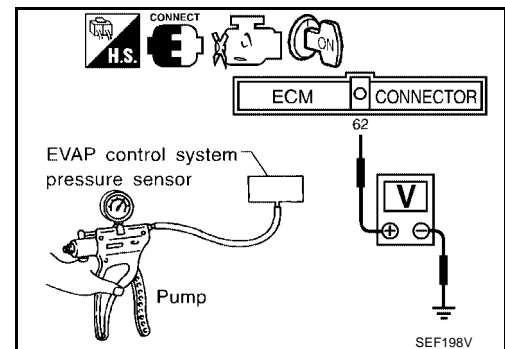
- Always calibrate the vacuum pump gauge when using it.
- Do not apply below  $-93.3 \text{ kPa}$  ( $-700 \text{ mmHg}$ ,  $-27.56 \text{ inHg}$ ) or over  $101.3 \text{ kPa}$  ( $760 \text{ mmHg}$ ,  $29.56 \text{ inHg}$ ) of pressure.

4. Check output voltage between ECM terminal 62 and engine 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 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 19.
- NG >> Replace fuel level sensor.

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19. CHECK INTERMITTENT INCIDENT

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Refer to [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

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## DTC P0456 EVAP CONTROL SYSTEM

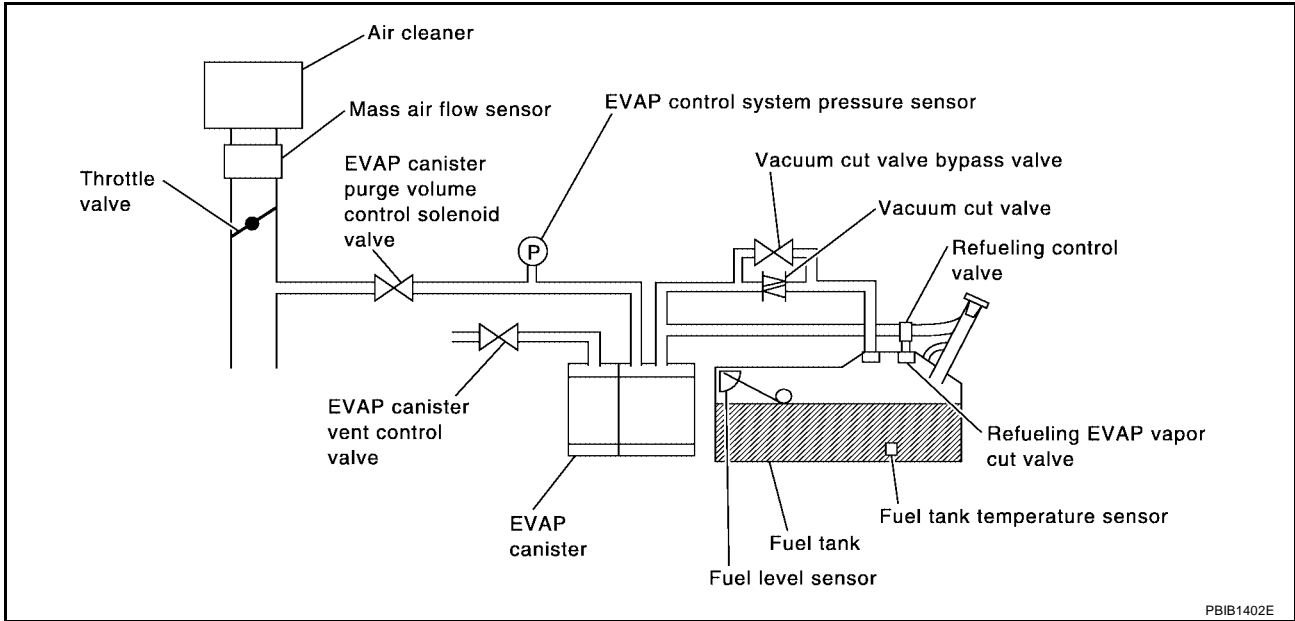
PFP:14950

### On Board Diagnosis Logic

UBS005EL

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 P0456 EVAP CONTROL SYSTEM

[KA24DE]

| DTC No. | Trouble diagnosis name  | DTC detecting condition  | Possible cause  |
|---------|---|--|---|
| P0456   | Evaporative emission control system very small leak (negative pressure check) | <ul style="list-style-type: none"> <li>● EVAP system has a very small leak.</li> <li>● EVAP system does not operate properly.</li> </ul> | <ul style="list-style-type: none"> <li>● Incorrect fuel tank vacuum relief valve</li> <li>● Incorrect fuel filler cap used</li> <li>● Fuel filler cap remains open or fails to close.</li> <li>● Foreign matter caught in fuel filler cap.</li> <li>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>● Foreign matter caught in EVAP canister vent control valve.</li> <li>● EVAP canister or fuel tank leaks</li> <li>● EVAP purge line (pipe and rubber tube) leaks</li> <li>● EVAP purge line rubber tube bent</li> <li>● Blocked or bent rubber tube to EVAP control system pressure sensor</li> <li>● Loose or disconnected rubber tube</li> <li>● EVAP canister vent control valve and the circuit</li> <li>● EVAP canister purge volume control solenoid valve and the circuit</li> <li>● Fuel tank temperature sensor</li> <li>● O-ring of EVAP canister vent control valve is missing or damaged</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water</li> <li>● EVAP control system pressure sensor</li> <li>● Refueling control valve</li> <li>● ORVR system leaks</li> <li>● Fuel level sensor and the circuit</li> <li>● Foreign matter caught in EVAP canister purge volume control solenoid valve</li> </ul> |

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**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**

UBS005EN

**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:**

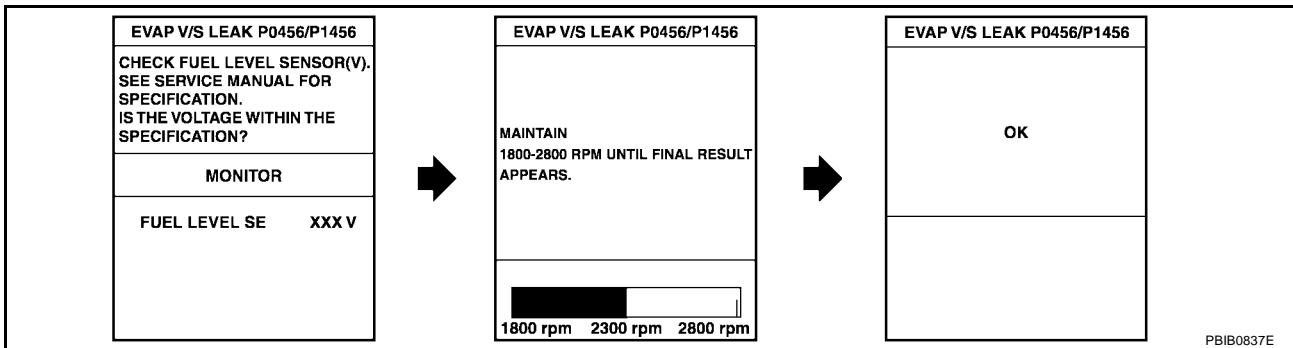
- Open engine hood before conducting following procedure.
- If any of following condition is met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.
  - Fuel filler cap is removed.
  - Refilled or drained the fuel.
  - EVAP component parts is/are removed.

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# DTC P0456 EVAP CONTROL SYSTEM

[KA24DE]

- 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-369, "Diagnostic Procedure"](#).

## NOTE:

- If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to [EC-73, "Basic Inspection"](#).

## Overall Function Check

UBS008LM

### 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<sup>2</sup>, 0.6 psi).

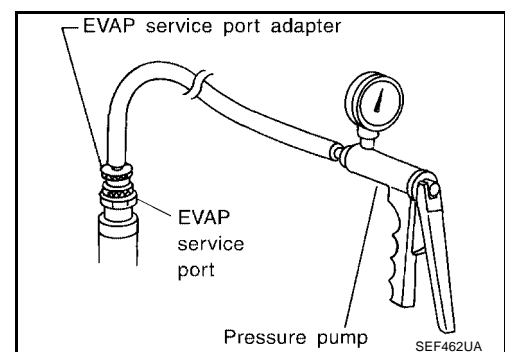
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Set the pressure pump and a hose.
3. Also set a vacuum gauge via 3-way connector and a hose.
4. Turn ignition switch "ON".
5. Connect GST and select mode 8.
6. Using mode 8 control the EVAP canister vent control valve (close) 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-369, "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**

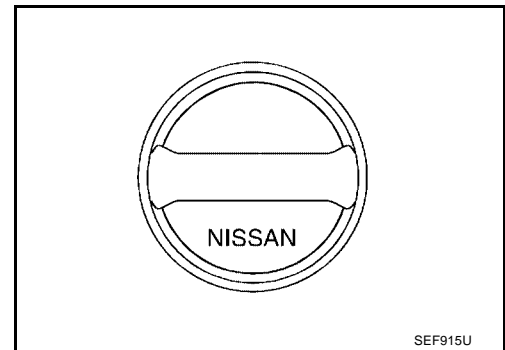
UBS005EO

**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**

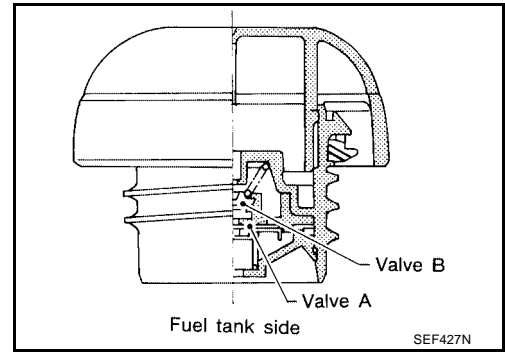
- Check for air releasing sound while opening the fuel filler cap.

**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<sup>2</sup> , 2.22 - 2.90 psi)

**Vacuum** : -6.0 to -3.3 kPa  
(-0.061 to -0.034 kg/cm<sup>2</sup> , -0.87 to -0.48 psi)

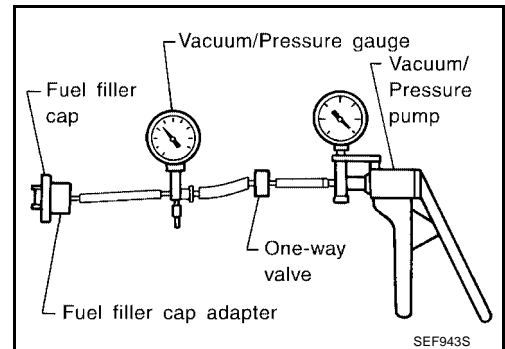
**CAUTION:**

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

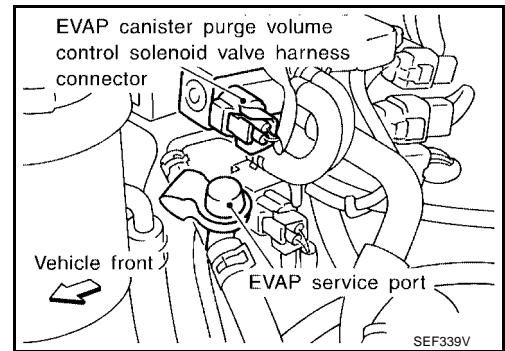
OK >> GO TO 5.

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.

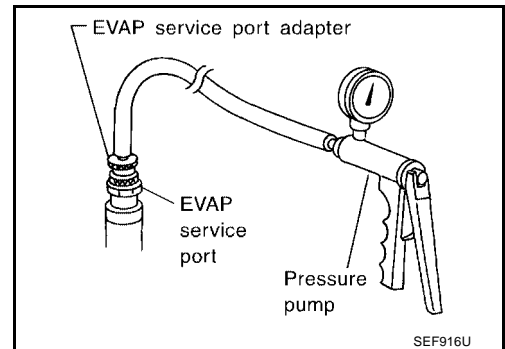


**NOTE:**

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.



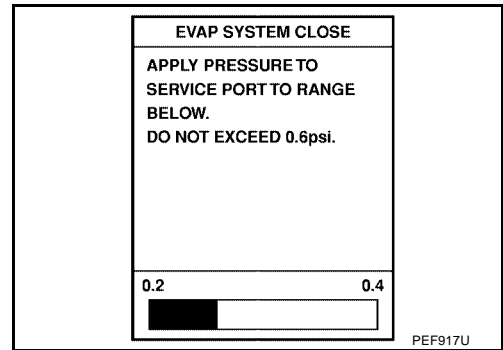
6. CHECK FOR EVAP LEAK

 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:**

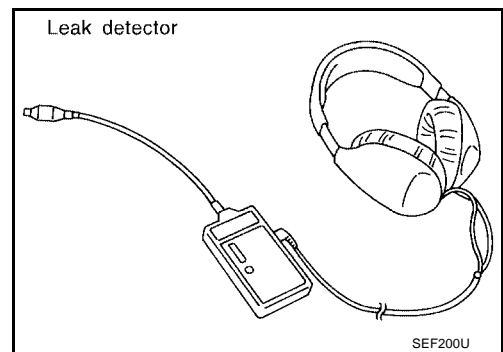
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-568, "EVAPORATIVE EMISSION LINE DRAWING"](#)

OK or NG

- OK >> GO TO 8.
- NG >> Repair or replace.



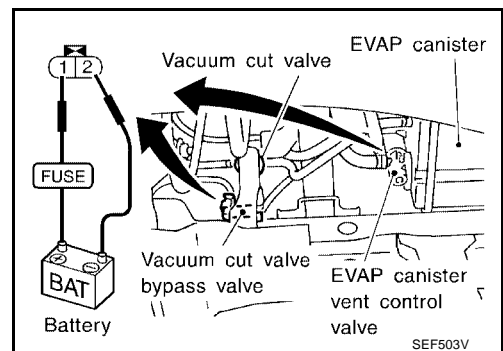
7. CHECK FOR EVAP LEAK

 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:**

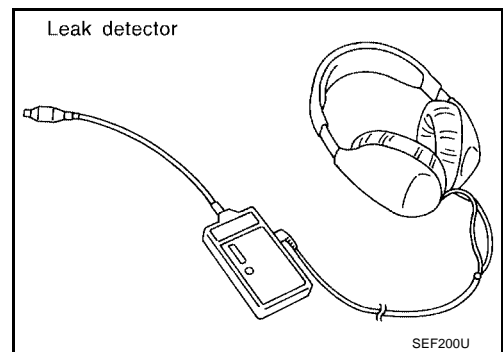
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-568, "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.

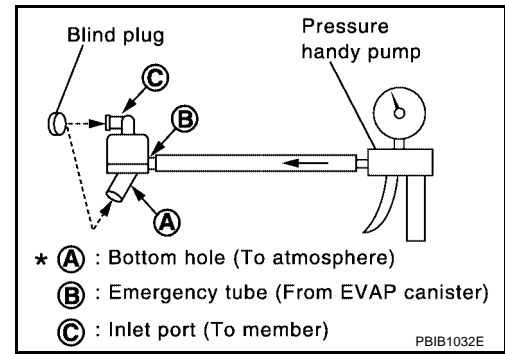
**NOTE:**

- 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-484, "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

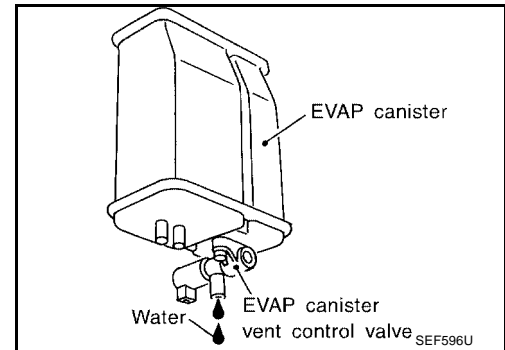
1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?

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 100.0%.
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.

| ACTIVE TEST     |         |
|-----------------|---------|
| PURG VOL CONT/V | XXX %   |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XX %    |
| HO2S1 MNTR (B1) | LEAN    |
|                 |         |
|                 |         |
|                 |         |
|                 |         |

PBIB0828E

**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-29, "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.

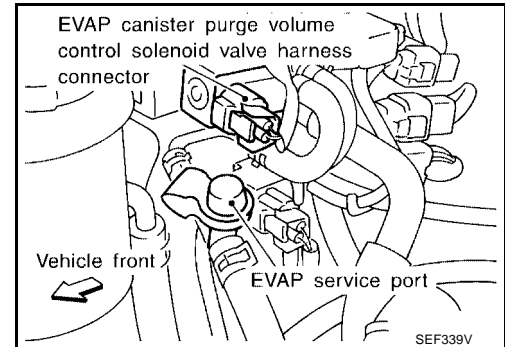
| ACTIVE TEST     |         |
|-----------------|---------|
| PURG VOL CONT/V | 0.0%    |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| A/F ALPHA-B2    | XXX %   |
| HO2S1 MNTR (B1) | RICH    |
| HO2S1 MNTR (B2) | RICH    |
| THRTL POS SEN   | XXX V   |
|                 |         |

SEF985Y

## 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.

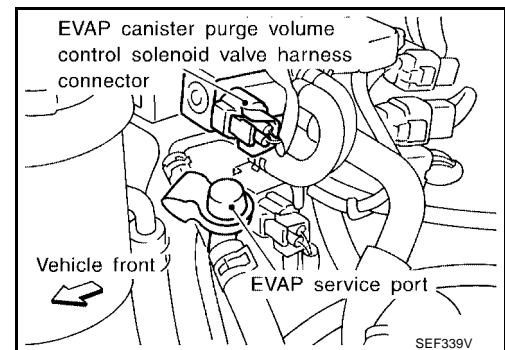


| Condition<br>PURG VOL CONT/V value | Air passage continuity<br>between A and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |

SEF334X

### Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



| Condition   | Air passage continuity<br>between A and B |
|---|---|
| 12V direct current supply between terminals 1 and 2 | Yes                                       |
| No supply   | No  |

SEF335X

OK or NG

OK >> GO TO 18.

NG >> Replace EVAP canister purge volume control solenoid valve.

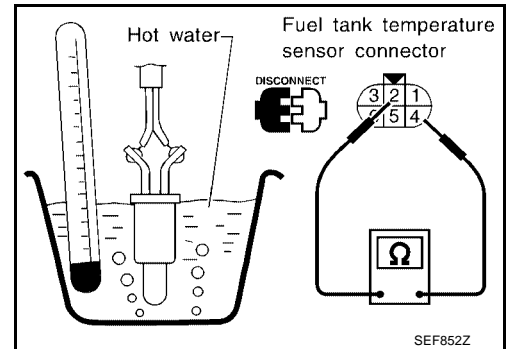
**18. CHECK FUEL TANK TEMPERATURE SENSOR**

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**

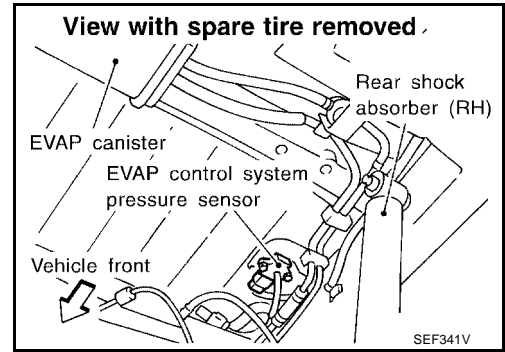
- OK >> GO TO 19.  
 NG >> Replace fuel level sensor unit.



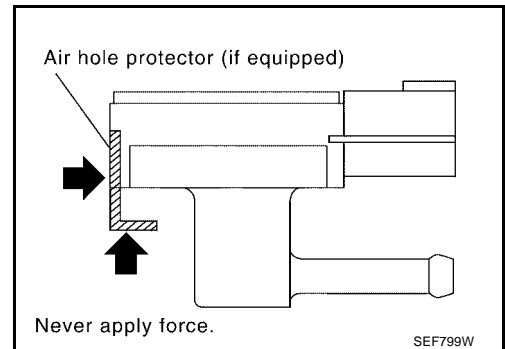
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19. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



**CAUTION:**  
Never apply force to the air hole protector of the sensor, if equipped.



2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

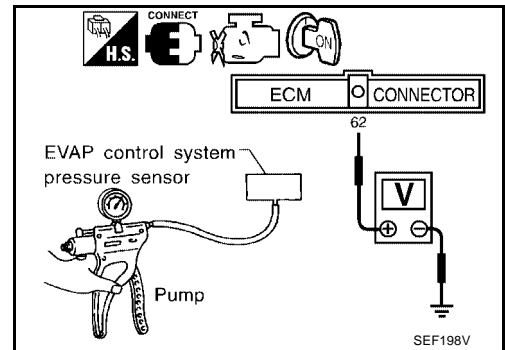
**CAUTION:**

- Always calibrate the vacuum pump gauge when using it.
- Do not apply below  $-93.3 \text{ kPa}$  ( $-700 \text{ mmHg}$ ,  $-27.56 \text{ inHg}$ ) or over  $101.3 \text{ kPa}$  ( $760 \text{ mmHg}$ ,  $29.56 \text{ inHg}$ ) of pressure.

4. Check output voltage between ECM terminal 62 and engine 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-568, "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 FUEL LEVEL SENSOR

---

Refer to [DI-18, "FUEL LEVEL SENSOR UNIT CHECK"](#) .

OK or NG

OK >> GO TO 23.

NG >> Replace fuel level sensor unit.

---

## 23. CHECK INTERMITTENT INCIDENT

---

- Refer to [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

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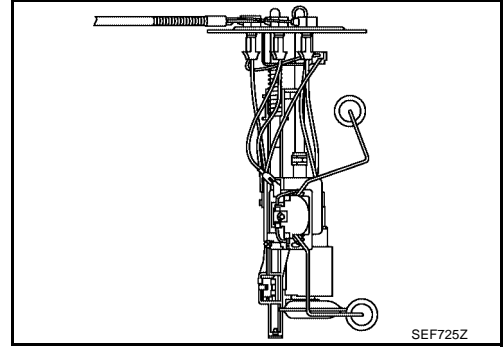
## DTC P0460 FUEL LEVEL SENSOR

### Component Description

UBS005EP

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 Diagnostic Logic

UBS005EQ

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. | <ul style="list-style-type: none"> <li>● Fuel level sensor circuit (The sensor circuit is open or shorted)</li> <li>● Fuel level sensor</li> </ul> |

### DTC Confirmation Procedure

UBS005ES

**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-380, "Diagnostic Procedure"](#)

| DATA MONITOR  |        |
|---------------|--------|
| MONITOR       | NO DTC |
| FUEL T/TMP SE | XXX °C |
| FUEL LEVEL SE | XXX V  |

SEF195Y

**WITH GST**

Follow the procedure "WITH CONSULT-II" above.

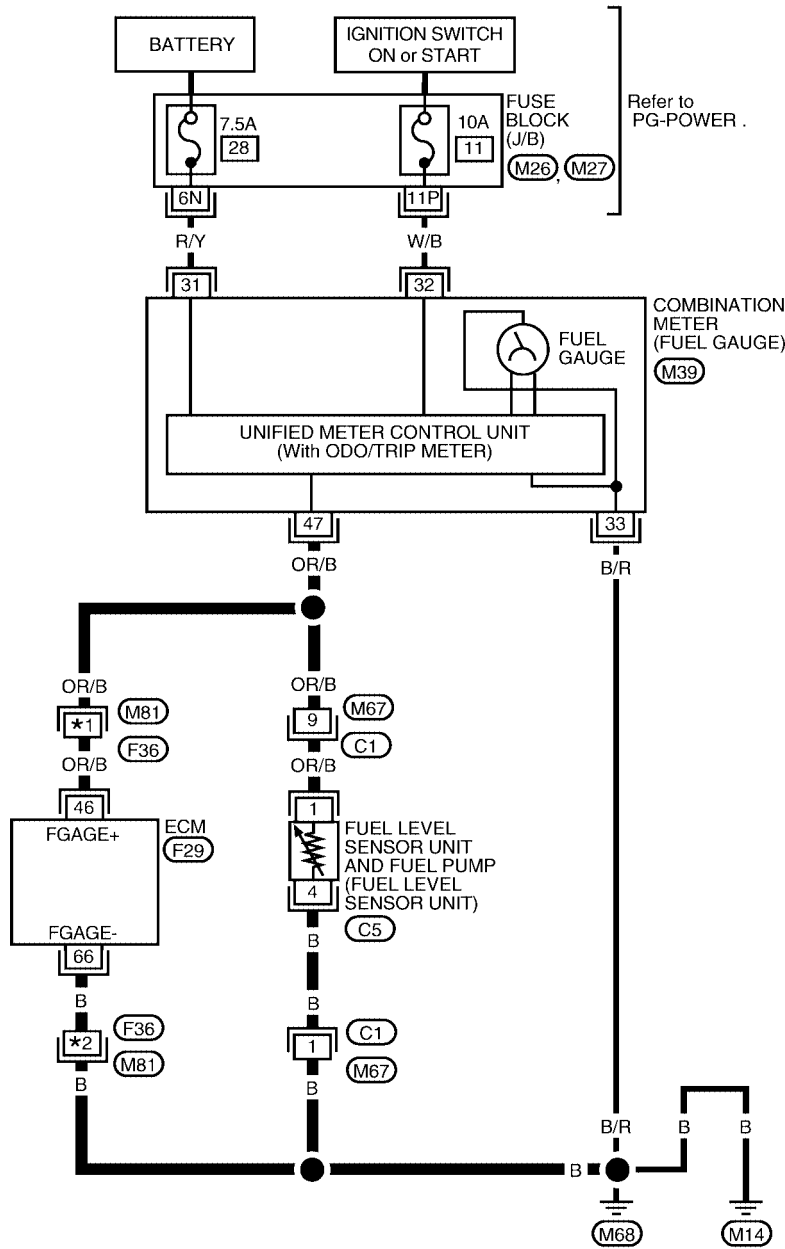
# DTC P0460 FUEL LEVEL SENSOR

[KA24DE]

UBS005ET

## Wiring Diagram

EC-FLS1-01



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

⬡ : EARLY PRODUCTION

⬢ : LATE PRODUCTION

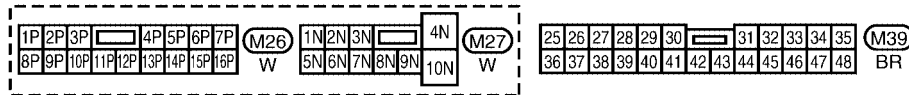
\*1 ⬡ : 15

⬢ : 18

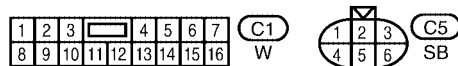
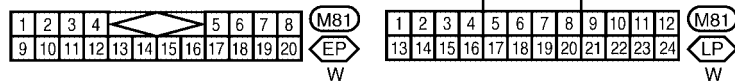
\*2 ⬡ : 16

⬢ : 19

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Refer to the following.  
 (F29) - ELECTRICAL UNITS



WBWA0052E

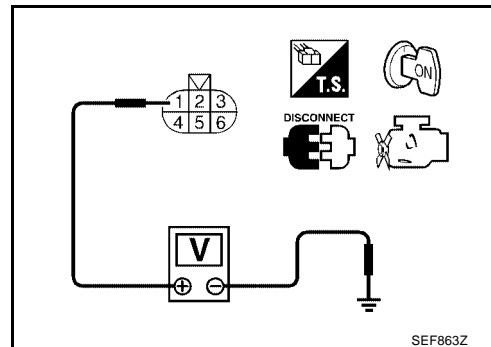
**Diagnostic Procedure****1. CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT**

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 terminal 4 and body 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 and body 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 1, ECM terminal 66 and fuel level sensor unit terminal 4.  
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

>> 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  
FUEL LEVEL SENSOR**

UBS007HA

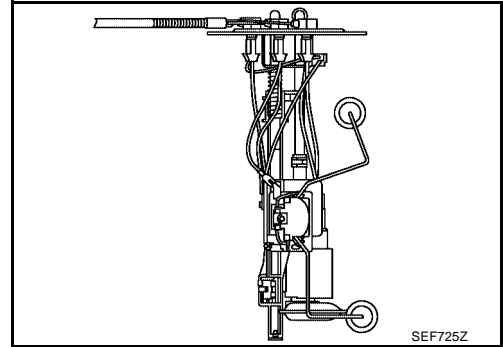
Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

DTC P0461 FUEL LEVEL SENSOR

Component Description

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 Diagnostic Logic

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<br>0461 | 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Fuel level sensor</li> </ul> |

Overall Function Check

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-45, "FUEL PRESSURE RELEASE"](#).
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch "OFF" and wait at least 10 seconds then turn "ON".
6. Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT-II.
7. Check "FUEL LEVEL SE" output voltage and note it.
8. Select "FUEL PUMP" in "ACTIVE TEST" mode with CONSULT-II.
9. Touch "ON" and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
11. Check "FUEL LEVEL SE" output voltage and note it.

| DATA MONITOR  |        |
|---------------|--------|
| MONITOR       | NO DTC |
| FUEL T/TMP SE | XXX °C |
| FUEL LEVEL SE | XXX V  |

# DTC P0461 FUEL LEVEL SENSOR

[KA24DE]

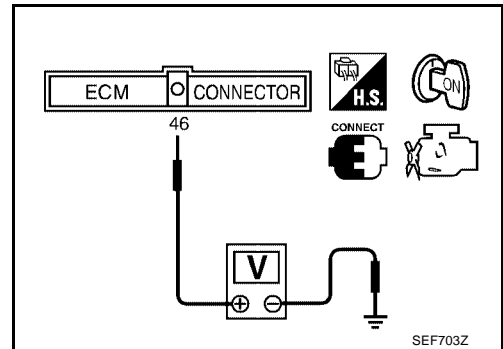
12. Check "FUEL LEVEL SE" output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 11.  
If NG, check the fuel level sensor, refer to [DI-18, "FUEL LEVEL SENSOR UNIT CHECK"](#) .

## 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-45, "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 ga, 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

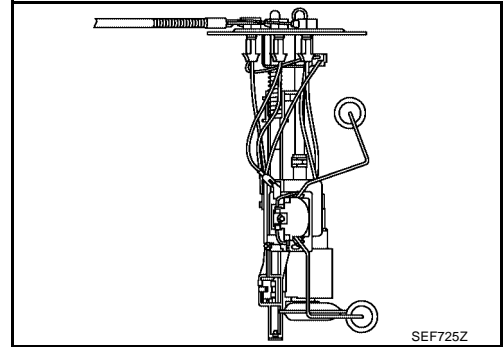
PFP:25060

Component Description

UBS005EZ

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

UBS005F0

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.  | <ul style="list-style-type: none"> <li>Fuel level sensor circuit (The sensor circuit is open or shorted)</li> <li>Fuel level sensor</li> </ul> |
| P0463   | Fuel level sensor circuit high input | An excessively high voltage is sent from the sensor is sent to ECM. |  |

DTC Confirmation Procedure

UBS005F2

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

- Turn ignition switch "ON".
- Select "DATA MONITOR" mode with CONSULT-II.
- Wait at least 5 seconds.
- If 1st trip DTC is detected, go to [EC-386. "Diagnostic Procedure"](#)

| DATA MONITOR  |        |
|---------------|--------|
| MONITOR       | NO DTC |
| FUEL T/TMP SE | XXX °C |
| FUEL LEVEL SE | XXX V  |

SEF195Y

WITH GST

Follow the procedure "WITH CONSULT-II" above.



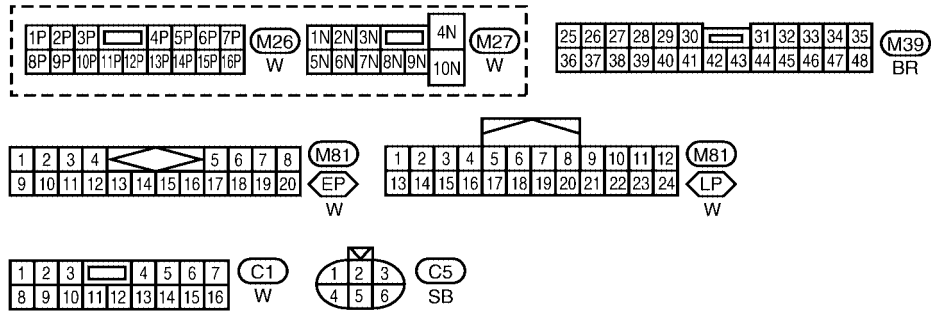
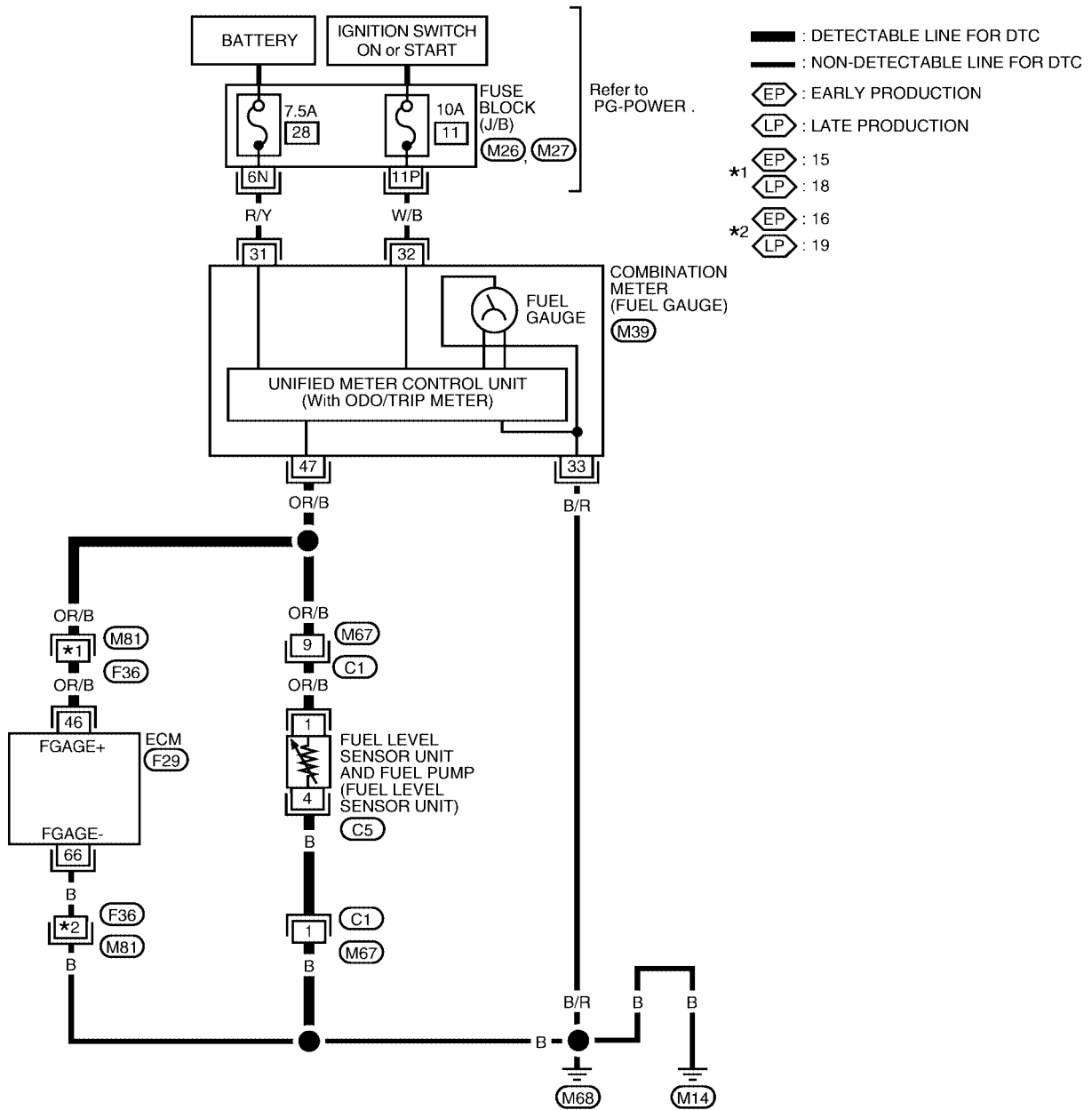
# DTC P0462, P0463 FUEL LEVEL SENSOR

[KA24DE]

UBS005F3

## Wiring Diagram

EC-FLS2-01



WBWA0053E

## Diagnostic Procedure

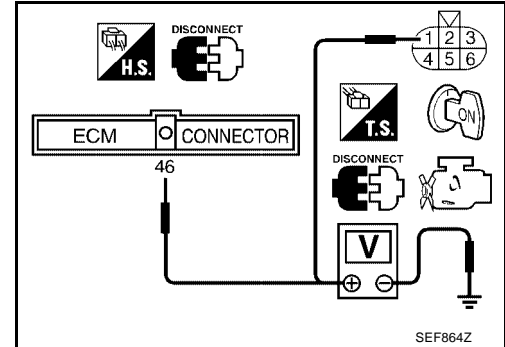
### 1. CHECK FUEL LEVEL SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Disconnect ECM harness connector.
4. Turn ignition switch "ON".
5. Check voltage between fuel level sensor unit terminal 1 and ground, ECM terminal 46 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 connectors M81, F36
- Harness for open or short between combination meter and fuel level sensor unit
- Harness for open or short between combination meter and ECM

>> 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 4 and body 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 and body 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. Check harness continuity between ECM terminal 46 and fuel level sensor unit terminal 1.  
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 M81, F36
- Harness connectors M67, C1
- Harness for open or short between ECM and fuel level sensor

>> 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**  
**FUEL LEVEL SENSOR**

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

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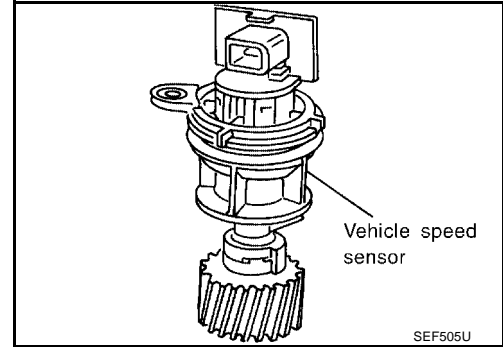
**DTC P0500 VSS**

PF3:32702

**Component Description**

UBS005F5

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**

UBS005F7

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The vehicle speed sensor circuit is open or shorted)</li> <li>● Vehicle speed sensor</li> </ul> |

**DTC Confirmation Procedure**

UBS005F8

**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-390, "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.

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| COOLAN TEMP/S | XXX °C   |
| B/FUEL SCHDL  | XXX msec |
| PW/ST SIGNAL  | OFF      |
| VHCL SPEED SE | XXX km/h |

SEF196Y

|                |  |
|----------------|--|
| ENG SPEED      | 1,800 - 6,000 rpm (M/T)<br>1,600 - 6,000 rpm (A/T) |
| COOLAN TEMP/S  | More than 70°C (158°F)                             |
| B/FUEL SCHDL   | 7 - 15 msec (M/T)<br>6 - 16 msec (A/T)             |
| Selector lever | Suitable position                                  |
| PW/ST SIGNAL   | OFF  |

7. If 1st trip DTC is detected, go to [EC-390, "Wiring Diagram"](#) .

**Overall Function Check**

UBS005F9

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-390, "Wiring Diagram"](#) .

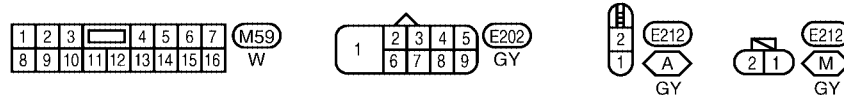
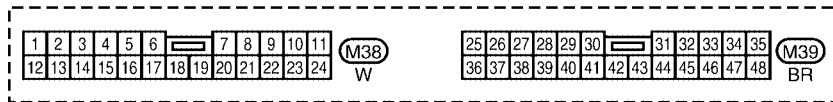
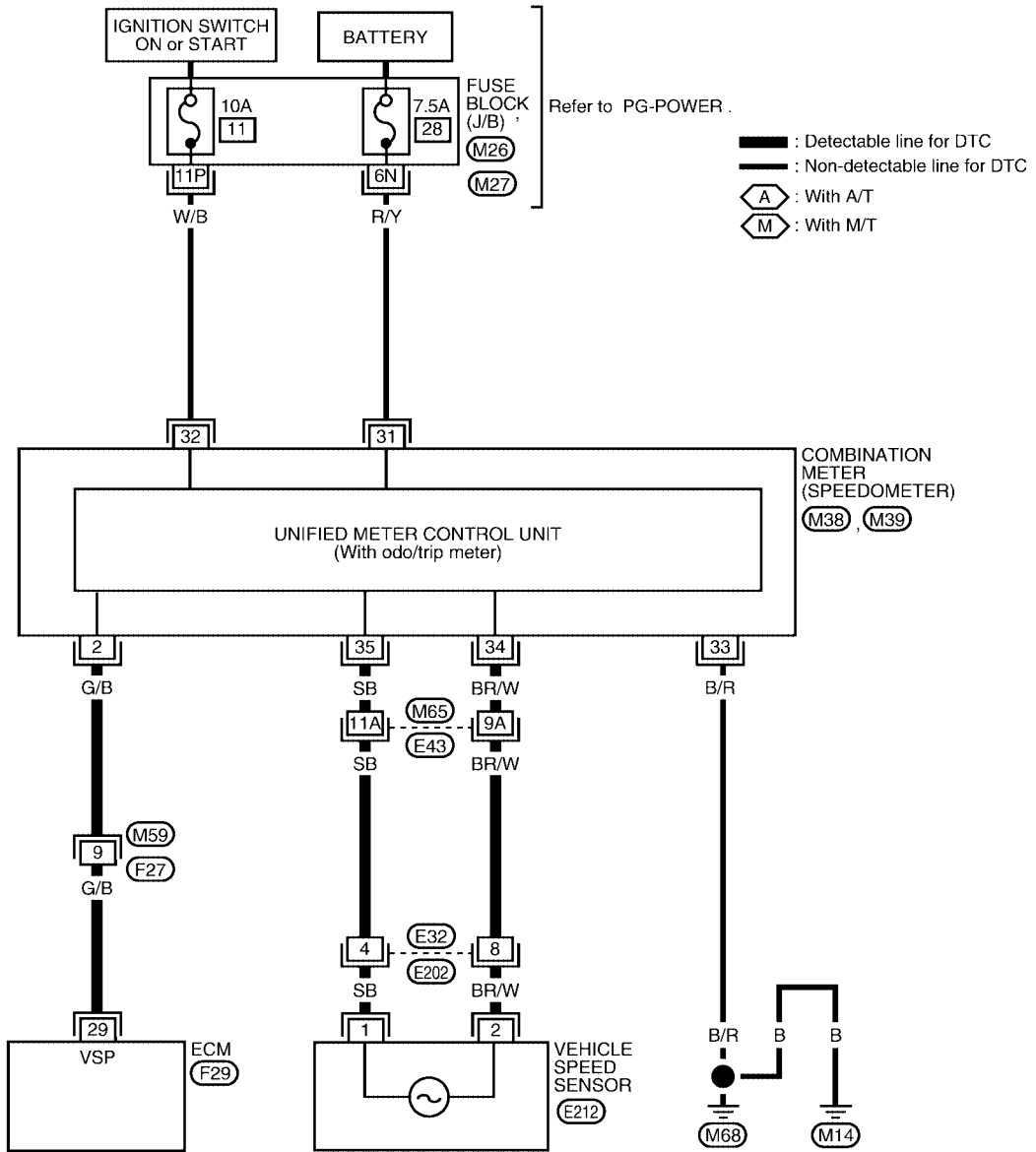
|                    |              |
|--------------------|--------------|
| FUEL SYS #1        | CLOSED       |
| FUEL SYS #2        | CLOSED       |
| CALC LOAD          | 19%          |
| COOLANT TEMP       | 93°C         |
| SHORT FT #1        | 1%           |
| LONG FT #1         | 0%           |
| SHORT FT #2        | 3%           |
| LONG FT #2         | 0%           |
| ENGINE SPD         | 2037RPM      |
| <b>VEHICLE SPD</b> | <b>12MPH</b> |
| IGN ADVANCE        | 38.0°        |
| INTAKE AIR         | 43°C         |

SEF568P

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

Wiring Diagram

EC-VSS-01



Refer to the following.

E43 - SUPER MULTIPLE JUNCTION (SMJ)

F29 - ELECTRICAL UNITS

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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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) |
|---------------|------------|----------------------|--|-------------------|
| 29            | G/B        | Vehicle speed sensor | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Lift up the vehicle</li> <li>● In 2nd gear position</li> <li>● Vehicle speed is 40 km/h (25 MPH)</li> </ul> | <p>1 - 4V★</p>    |

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

**Diagnostic Procedure**

UBS005FB

**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 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"](#).

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**5. CHECK INTERMITTENT INCIDENT**

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Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.



**DTC P0505 ISC SYSTEM**

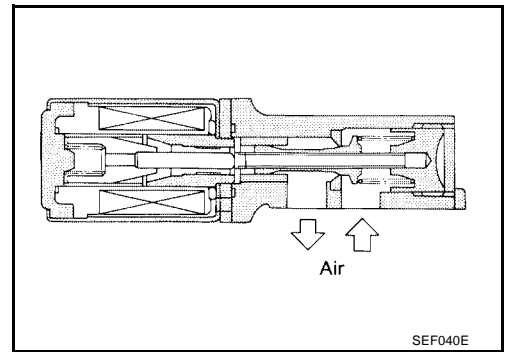
**Description  
SYSTEM DESCRIPTION**

| 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          |                  |                |
| 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**

| MONITOR ITEM | CONDITION  | SPECIFICATION |
|--------------|--|---------------|
| IACV-AAC/V   | ● Engine: After warming up<br>● Air conditioner switch: OFF<br>● Shift lever: "N"<br>● No-load | Idle          |
|              |  | 2,000 rpm     |
|              |  | Approx. 30%   |
|              |  | —             |

**On Board Diagnosis Logic**

UBS005FF

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The IACV-AAC valve circuit is open or shorted.)</li> <li>● IACV-AAC valve</li> </ul> |

**DTC Confirmation Procedure**

UBS007U9

**NOTE:**

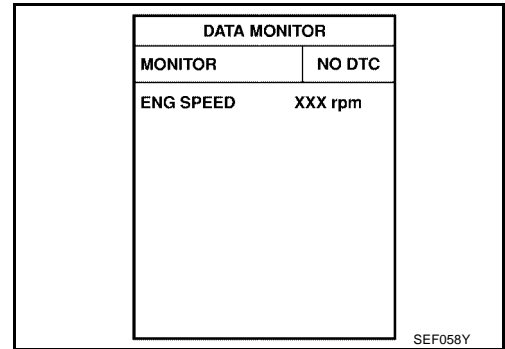
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**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-396, "Diagnostic Procedure"](#)



SEF058Y

 **WITH GST**

Follow the procedure “WITH CONSULT-II”.

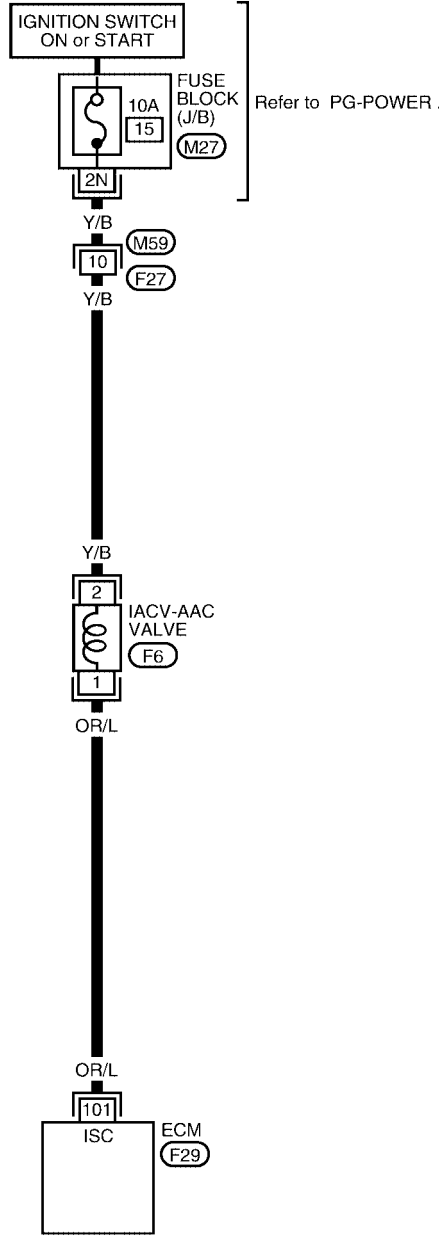
# DTC P0505 ISC SYSTEM

[KA24DE]

UBS005FH

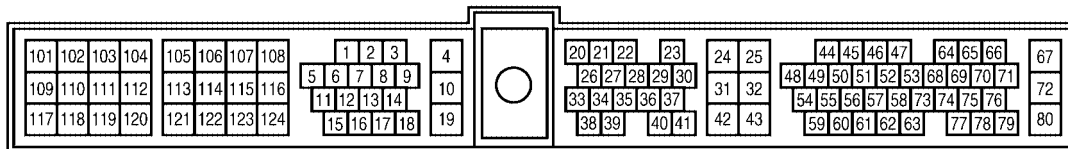
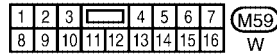
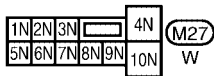
## Wiring Diagram

EC-AAC/V-01



Refer to PG-POWER .  
**—** : Detectable line for DTC  
**—** : Non-detectable line for DTC

A  
 EC  
 C  
 D  
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 I  
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 K  
 L  
 M

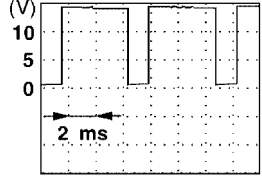
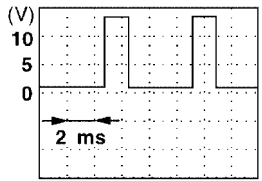


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Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

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

| TER-MINAL NO. | WIRE COLOR | ITEM           | CONDITION   | DATA (DC Voltage)  |
|---------------|------------|----------------|---|--|
| 101           | OR/L       | IACV-AAC valve | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>                | <p>10.5 - 11.5V★</p>  |
|               |            |                | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>1 - 13V★</p>       |

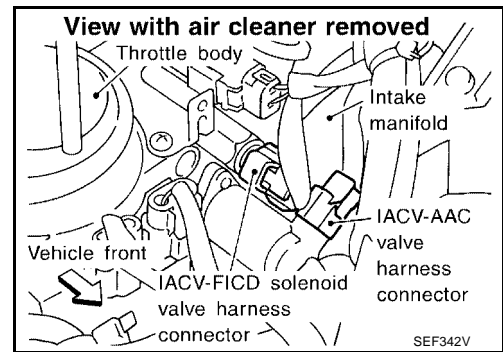
★ : Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnostic Procedure

UBS005FI

### 1. CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.
3. Turn ignition switch "ON".

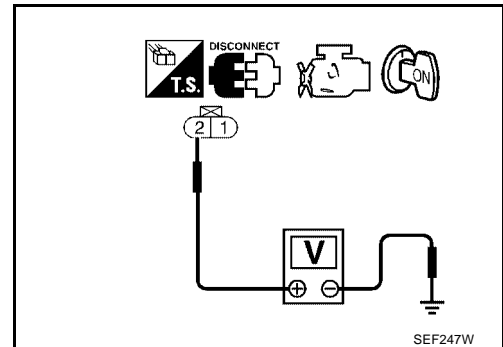


4. Check voltage between terminal 2 and ground with CONSULT-II or tester.

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 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 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

Disconnect IACV-AAC valve harness connector.

- Check IACV-AAC valve resistance.

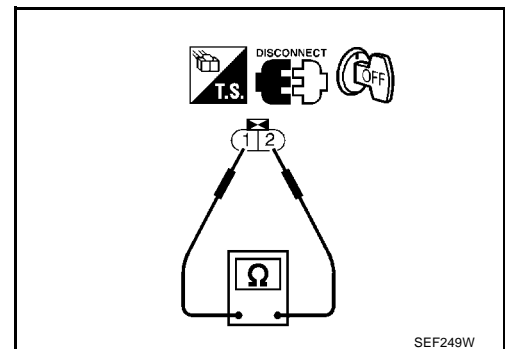
**Resistance : Approximately 10  $\Omega$  [at 25°C (77°F)]**

- 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**

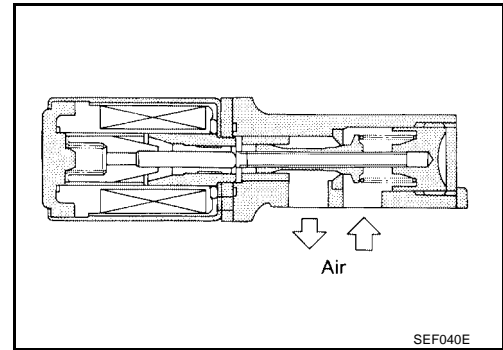
**Description  
SYSTEM DESCRIPTION**

| 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          |                  |                |
| 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**

| MONITOR ITEM | CONDITION  | SPECIFICATION       |
|--------------|--|---------------------|
| IACV-AAC/V   | ● Engine: After warming up<br>● Air conditioner switch: OFF<br>● Shift lever: "N"<br>● No-load | Idle<br>Approx. 30% |
|              |  | 2,000 rpm<br>—      |

**On Board Diagnosis Logic**

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The IACV-AAC valve circuit is open or shorted)</li> <li>● IACV-AAC valve</li> </ul> |

**DTC Confirmation Procedure**

**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-401, "Diagnostic Procedure"](#)

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

SEF174Y

**WITH GST**

Follow the procedure “WITH CONSULT-II”.

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

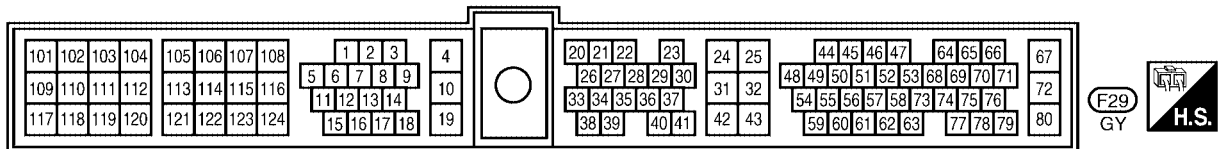
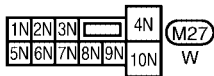
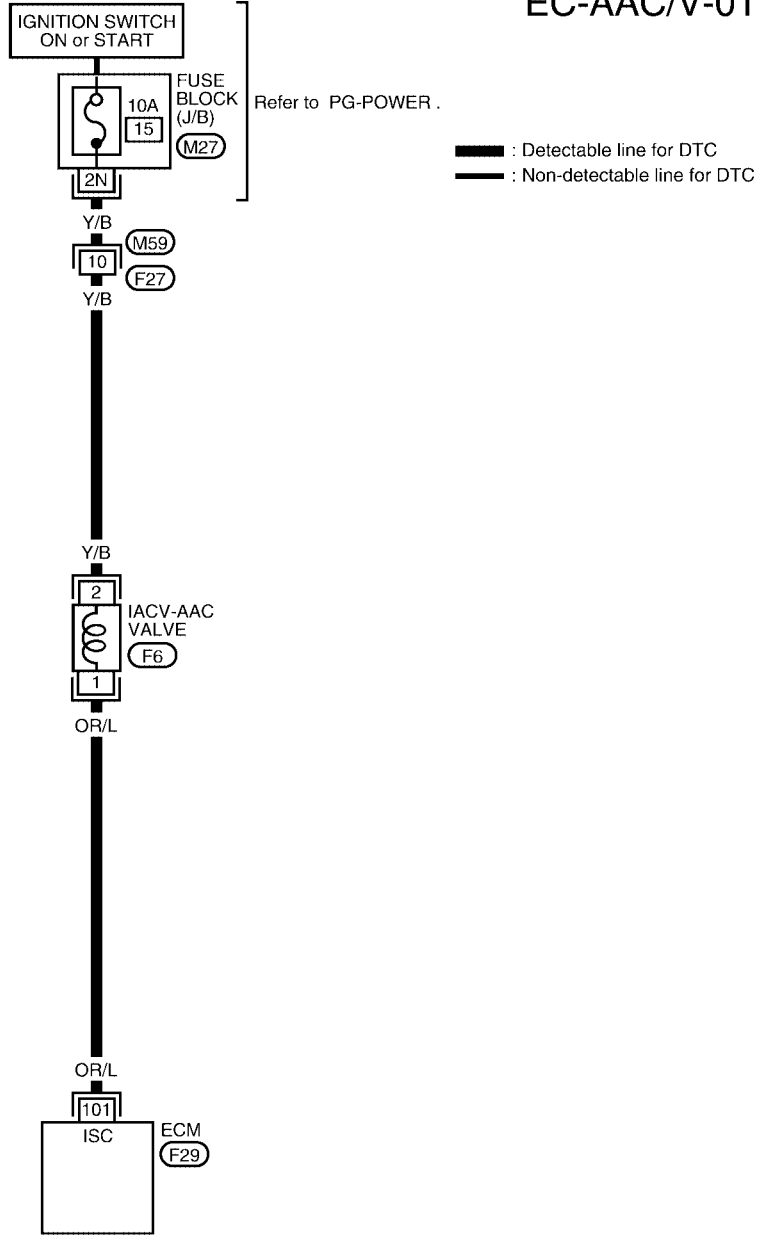
# DTC P0506 ISC SYSTEM

[KA24DE]

UBS007GZ

## Wiring Diagram

EC-AAC/V-01



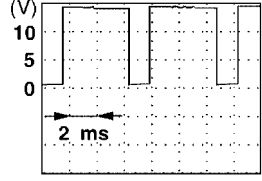
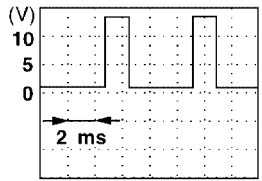
BBWA0449E



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.**

| TER-MINAL NO. | WIRE COLOR | ITEM           | CONDITION   | DATA (DC Voltage)  |
|---------------|------------|----------------|---|--|
| 101           | OR/L       | IACV-AAC valve | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>                | <p>10.5 - 11.5V★</p>  |
|               |            |                | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>1 - 13V★</p>       |

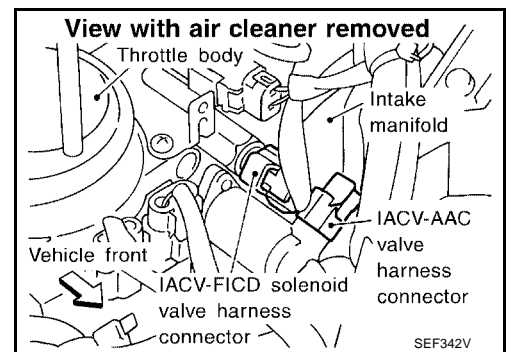
★ : Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnostic Procedure

UBS007H0

### 1. CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.
3. Turn ignition switch "ON".

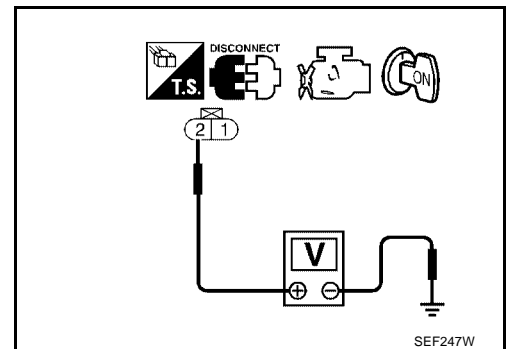


4. Check voltage between terminal 2 and ground with CONSULT-II or tester.

**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 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 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

Disconnect IACV-AAC valve harness connector.

- Check IACV-AAC valve resistance.

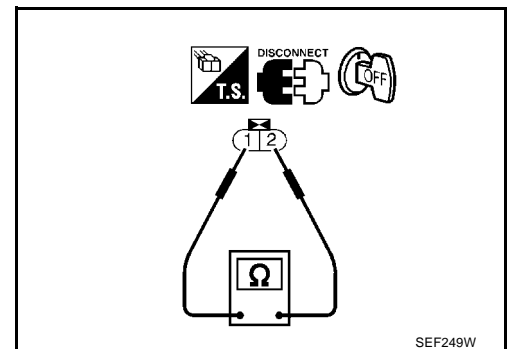
**Resistance : Approximately 10 Ω [at 25°C (77°F)]**

- 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

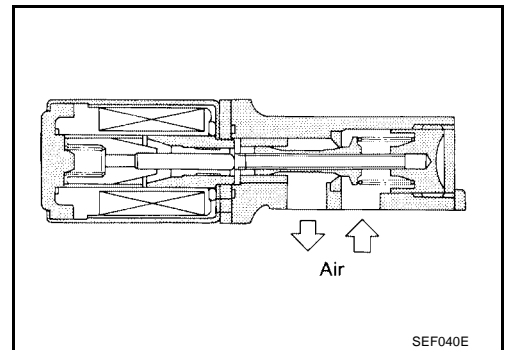
Description  
SYSTEM DESCRIPTION

| 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          |                  |                |
| 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

| MONITOR ITEM | CONDITION  | SPECIFICATION       |
|--------------|--|---------------------|
| IACV-AAC/V   | ● Engine: After warming up<br>● Air conditioner switch: OFF<br>● Shift lever: "N"<br>● No-load | Idle<br>Approx. 30% |
|              |  | 2,000 rpm<br>—      |

On Board Diagnosis Logic

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The IACV-AAC valve circuit is open or shorted)</li> <li>● IACV-AAC valve</li> <li>● Intake air leaks</li> <li>● PCV system</li> </ul> |

**DTC Confirmation Procedure**

**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-406, "Diagnostic Procedure"](#)

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |
| COOLANTEMP/S | XXX °C  |

SEF174Y

**WITH GST**

Follow the procedure “WITH CONSULT-II”.

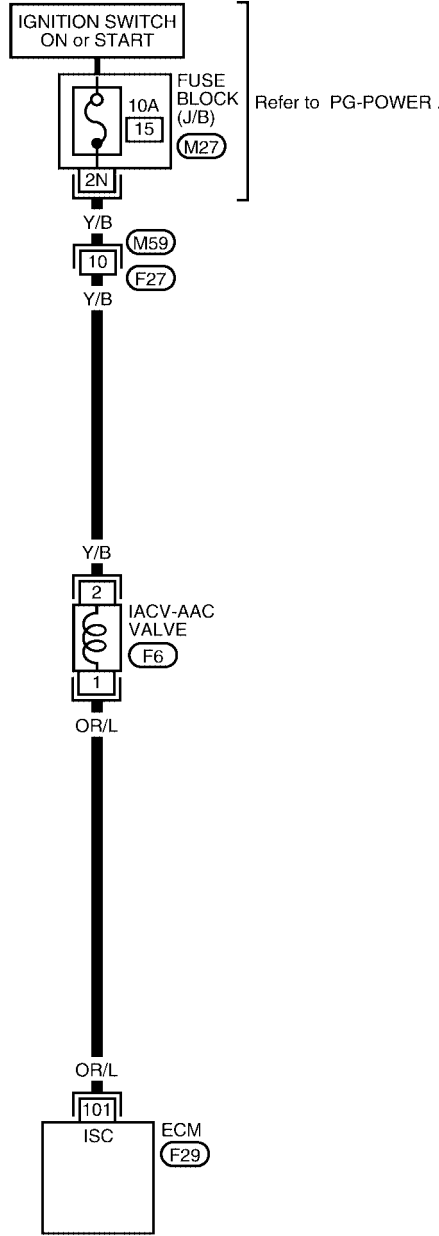
# DTC P0507 ISC SYSTEM

[KA24DE]

UBS007H7

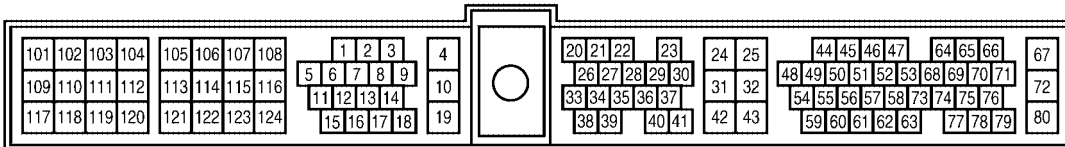
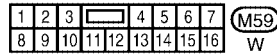
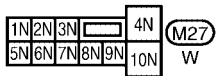
## Wiring Diagram

EC-AAC/V-01



Refer to PG-POWER .  
**—** : Detectable line for DTC  
**—** : Non-detectable line for DTC

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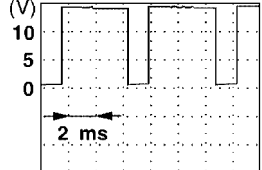
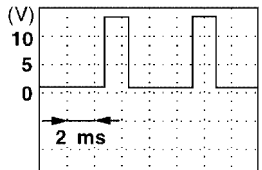


BBWA0449E

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.**

| TER-MINAL NO. | WIRE COLOR | ITEM           | CONDITION   | DATA (DC Voltage)  |
|---------------|------------|----------------|---|--|
| 101           | OR/L       | IACV-AAC valve | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>                | <p>10.5 - 11.5V★</p>  <p style="text-align: right; font-size: small;">SEF015W</p> |
|               |            |                | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>1 - 13V★</p>  <p style="text-align: right; font-size: small;">SEF016W</p>      |

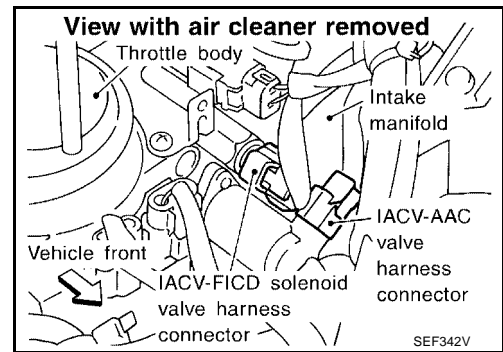
★ : Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnostic Procedure

UBS007H8

### 1. CHECK POWER SUPPLY

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.
3. Turn ignition switch ON.

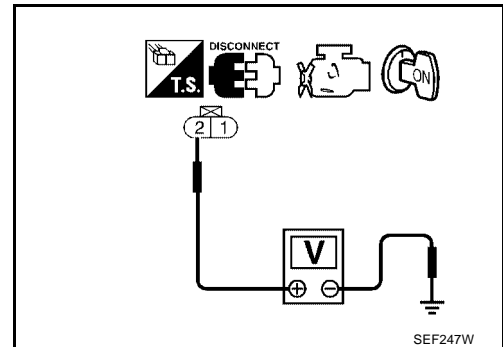


4. Check voltage between terminal 2 and ground with CONSULT-II or tester.

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 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 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

Disconnect IACV-AAC valve harness connector.

- Check IACV-AAC valve resistance.

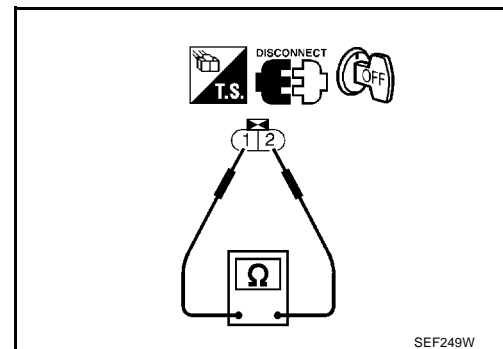
**Resistance : Approximately 10  $\Omega$  [at 25°C (77°F)]**

- 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.

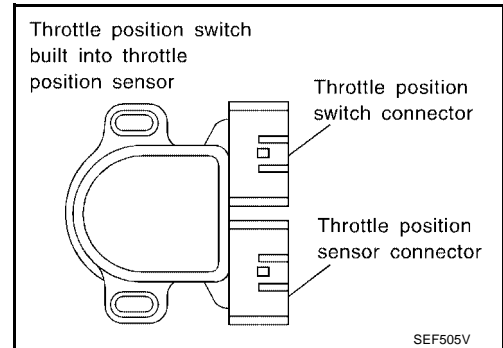
## DTC P0510 CTP SWITCH

PFP:22620

### Component Description

UBS005FJ

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

UBS005FL

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The closed throttle position switch circuit is shorted.)</li> <li>● Closed throttle position switch</li> <li>● Throttle position sensor</li> </ul> |

### DTC Confirmation Procedure

UBS005FM

**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-411, "Diagnostic Procedure"](#) .  
If OK, go to following step.

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |
| CLSD THL/P SW | ON      |

SEF197Y

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)   |
| Selector 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-411, "Diagnostic Procedure"](#)

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| COOLAN TEMP/S | XXX °C   |
| VHCL SPEED SE | XXX km/h |
| THRTL POS SEN | XXX V    |

SEF198Y



## Overall Function Check

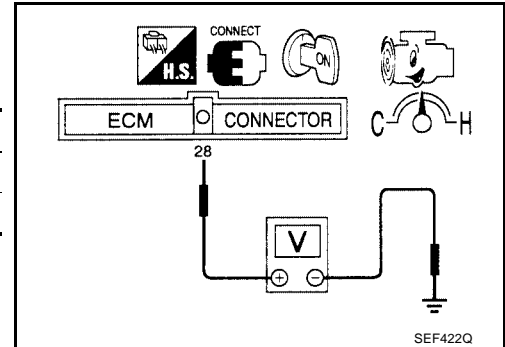
Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

**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-411, "Diagnostic Procedure"](#) .



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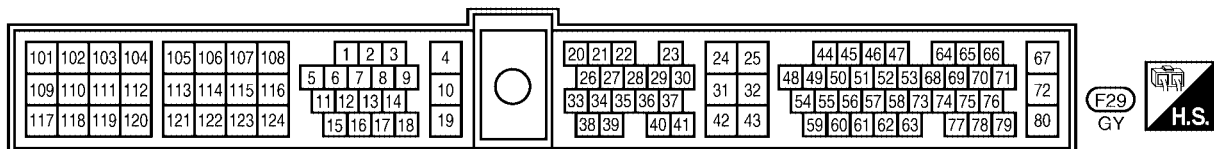
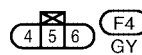
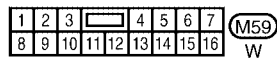
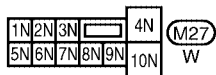
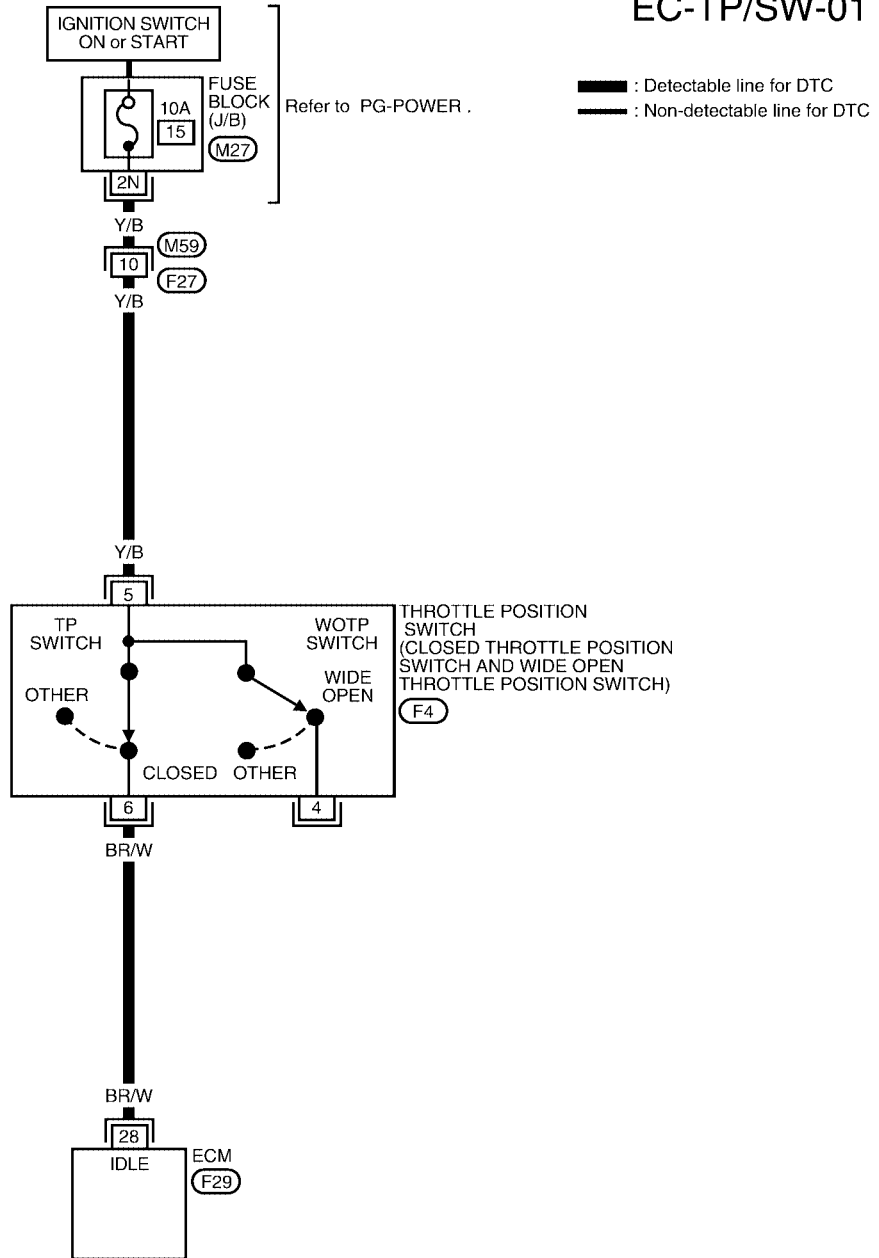
# DTC P0510 CTP SWITCH

[KA24DE]

UBS005FO

## Wiring Diagram

EC-TP/SW-01



BBWA0450E

# DTC P0510 CTP SWITCH

[KA24DE]

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

**CAUTION:**

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

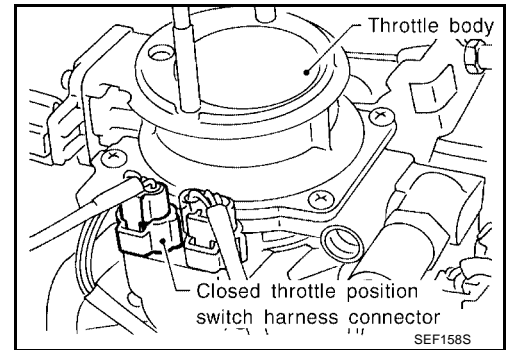
| TER-MINAL NO. | WIRE COLO R | ITEM                                       | CONDITION  | DATA (DC Voltage)          |
|---------------|-------------|--|--|----------------------------|
| 28            | BR/W        | Throttle position switch (Closed position) | <b>[Ignition switch ON]</b><br>● Warm-up condition<br>● Accelerator pedal released | BATTERY VOLTAGE (11 - 14V) |
|               |             |  | <b>[Ignition switch ON]</b><br>● Accelerator pedal depressed                       | Approximately 0V           |

## Diagnostic Procedure

UBS005FP

### 1. CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect throttle position switch harness connector.
3. Turn ignition switch "ON".

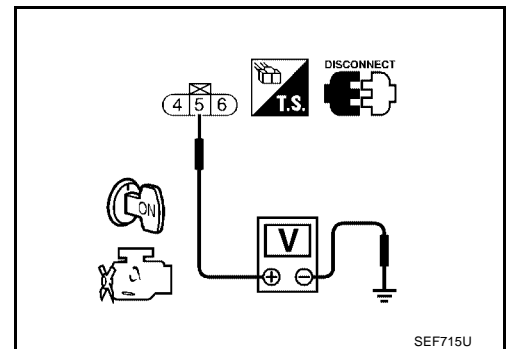


4. Check voltage between terminal 5 and engine ground with CONSULT-II or tester.

**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 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 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

Check the following items. Refer to [EC-73, "Basic Inspection"](#) .

| Items   | Specifications   |
|---|--|
| Ignition timing   | 20° ± 2° BTDC  |
| Base idle speed   | 750 ± 50 rpm (in P or N position)  |
| Closed throttle position switch<br>idle position adjustment | Feeler gauge thickness and switch condition<br>0.1 mm (0.004 in): ON<br>0.3 mm (0.012 in): OFF |
| Target idle speed   | 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-73, "Basic Inspection"](#) .

5. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace 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 throttle position switch harness connector.
4. Check continuity between terminals 5 and 6 under the following conditions.

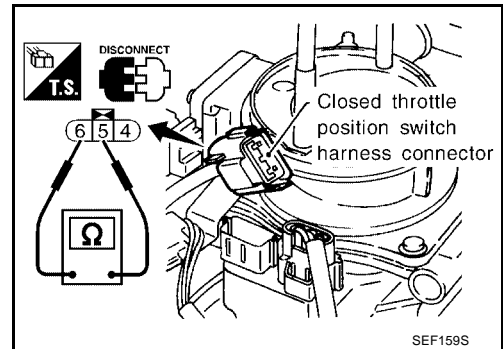
| Throttle valve conditions         | Continuity |
|-----------------------------------|------------|
| Completely closed                 | Yes        |
| Partially open or completely open | No         |

**NOTE:**

Continuity measurement must be made with closed throttle position switch installed in vehicle.

If NG, adjust closed throttle position switch. Refer to [EC-73, "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-73, "Basic Inspection"](#).

5. If it is impossible to adjust closed throttle position switch in "Basic Inspection", replace throttle position sensor.

| DATA MONITOR   |          |
|----------------|----------|
| MONITOR        | NO DTC   |
| COOLANT TEMP/S | XXX °C   |
| VHCL SPEED SE  | XXX km/h |
| THRTL POS SEN  | XXX V    |

SEF198Y

**Without CONSULT-II**

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:**

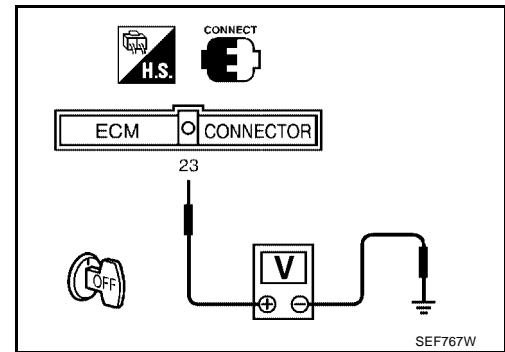
**Voltage measurement must be made with throttle position sensor installed in vehicle.**

If NG, adjust closed throttle position switch. Refer to [EC-73, "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.

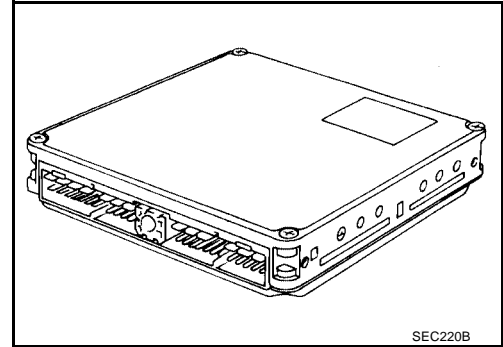
DTC P0605 ECM

PF2:23710

Component Description

UBS005FQ

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



On Board Diagnosis Logic

UBS005FR

| DTC No. | Trouble Diagnosis Name | DTC Detecting Condition                     | Possible Cause |
|---------|------------------------|---|----------------|
| P0605   | ECM                    | ECM calculation function is malfunctioning. | ● ECM          |

DTC Confirmation Procedure

UBS005FS

NOTE:

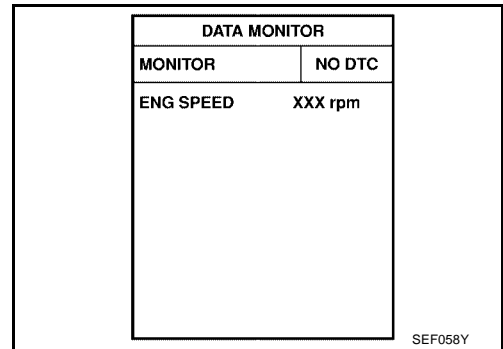
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

 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 30 seconds at idle speed.
5. If 1st trip DTC is detected, go to [EC-416, "Diagnostic Procedure"](#)

 WITH GST

Follow the procedure "WITH CONSULT-II".



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## Diagnostic Procedure

### 1. INSPECTION START

---

#### With CONSULT-II

1. Turn ignition switch ON.
2. Select "SELF DIAG RESULTS" mode with CONSULT-II.
3. Touch "ERASE".
4. Perform "DTC Confirmation Procedure".  
See previous page.
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 previous page.
5. Is the 1st trip DTC P0605 displayed again?

#### Yes or No

- Yes >> Replace ECM.  
No >> **INSPECTION END.**



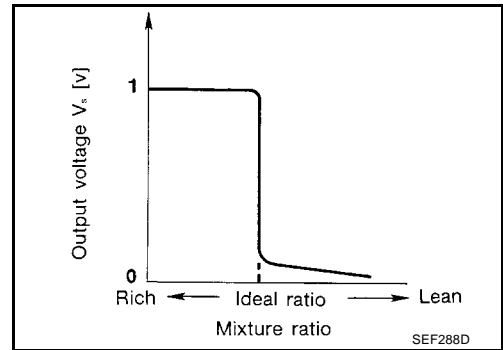
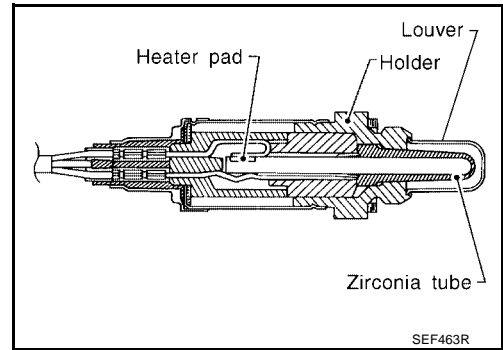
DTC P1143 HO2S1

PFP:22690

Component Description

UBS005FU

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

UBS005FV

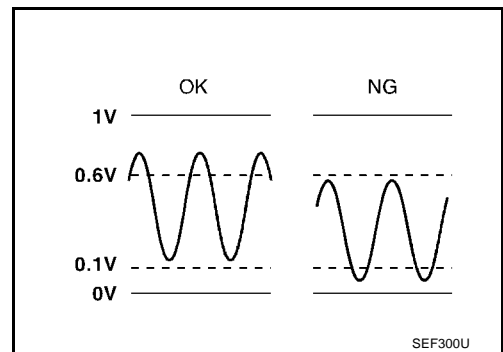
Specification data are reference values.

| MONITOR ITEM    | CONDITION  |                                       | SPECIFICATION   |
|-----------------|--|---------------------------------------|---|
| HO2S1 (B1)      | <ul style="list-style-type: none"> <li>Engine: After warming up</li> </ul> | Maintaining engine speed at 2,000 rpm | 0 - 0.3V ↔ Approx. 0.6 - 1.0V                               |
| HO2S1 MNTR (B1) |  |                                       | LEAN ↔ RICH<br>Changes more than 5 times during 10 seconds. |

On Board Diagnosis Logic

UBS005FX

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. | <ul style="list-style-type: none"> <li>Heated oxygen sensor 1</li> <li>Heated oxygen sensor 1 heater</li> <li>Fuel pressure</li> <li>Injectors</li> <li>Intake air leaks</li> </ul> |

**DTC Confirmation Procedure**

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

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

**TESTING CONDITION:**

- Always perform at a temperature above  $-10^{\circ}\text{C}$  ( $14^{\circ}\text{F}$ ).
- 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 3.0 minutes.

**NOTE:**

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

|                  |          |
|------------------|----------|
| HO2S1 (B1) P1143 |          |
| TESTING          |          |
| MONITOR          |          |
| ENG SPEED        | XXX rpm  |
| B/FUEL SCHDL     | XXX msec |
| THRTL POS SEN    | XXX V    |

LEC054A

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                         |
| Selector lever | Suitable position                     |

|                  |          |
|------------------|----------|
| HO2S1 (B1) P1143 |          |
| OUT OF CONDITION |          |
| MONITOR          |          |
| ENG SPEED        | XXX rpm  |
| B/FUEL SCHDL     | XXX msec |
| THRTL POS SEN    | XXX V    |

LEC053A

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-419. "Diagnostic Procedure"](#).

|                  |  |
|------------------|--|
| HO2S1 (B1) P1143 |  |
| COMPLETED        |  |

LEC055A

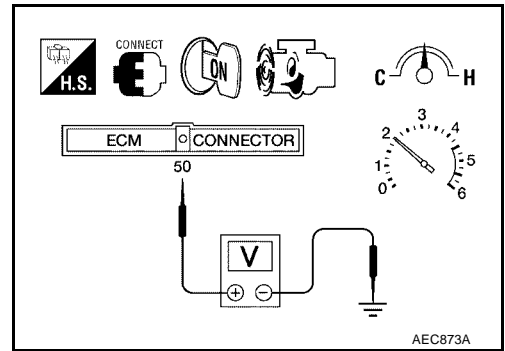
**Overall Function Check**

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

**WITH GST**

1. Start engine and warm it up to normal operating temperature.

2. Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and engine 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 least one time.
  - The minimum voltage is over 0.1V at least one time.
4. If NG, go to [EC-419, "Diagnostic Procedure"](#) .



UBS005G0

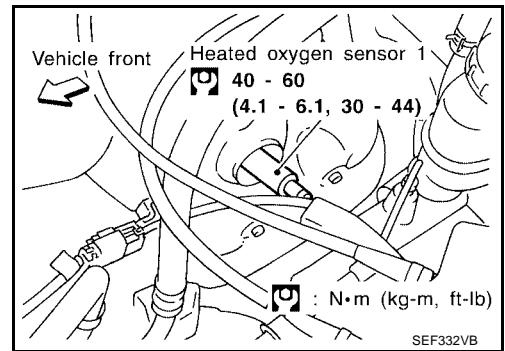
## Diagnostic Procedure

### 1. RETIGHTEN HEATED OXYGEN SENSOR 1

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

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

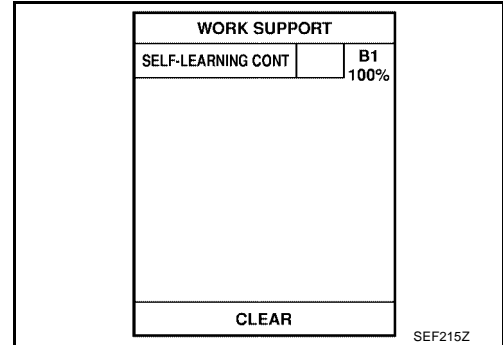
>> GO TO 2.



**2. CLEAR THE SELF-LEARNING DATA.**

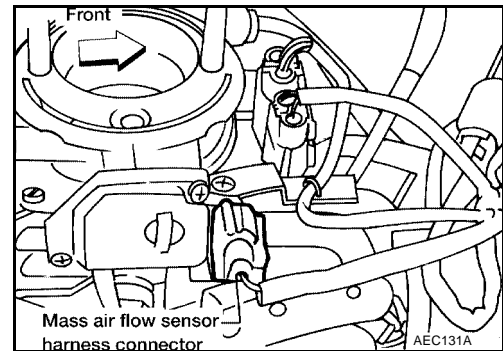
**With CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC P0171 detected?**  
**Is it difficult to start engine?**



**Without CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect 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-60, "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-225](#).
- No >> GO TO 3.

**3. CHECK HEATED OXYGEN SENSOR 1 HEATER**

Check resistance between terminals 3 and 1.

**Resistance : 2.3 - 4.3 Ω at 25°C (77°F)**

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

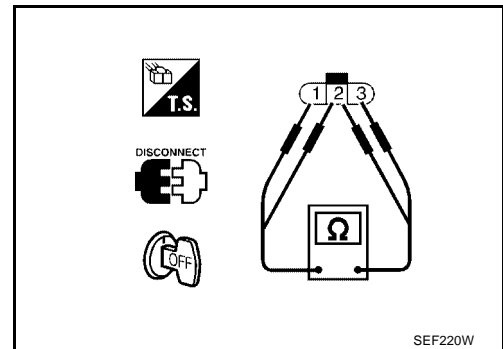
**Continuity should not exist.**

**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 4.
- NG >> Replace heated oxygen sensor 1.



---

**4. CHECK HEATED OXYGEN SENSOR 1**

---

A

Refer to [EC-207, "Component Inspection"](#) .

OK or NG

OK >> GO TO 6.

NG >> Replace heated oxygen sensor 1.

EC

---

**5. CHECK INTERMITTENT INCIDENT**

---

C

Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

Refer to [EC-205, "Wiring Diagram"](#) , for circuit.

D

>> INSPECTION END.

**Removal and Installation  
HEATED OXYGEN SENSOR 1**

UBS007GF

E

Refer to [EM-13, "OUTER COMPONENT PARTS"](#) .

F

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H

I

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M

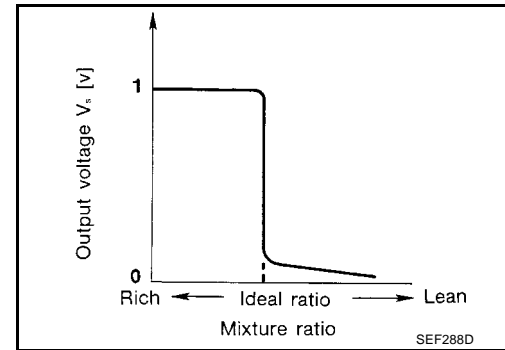
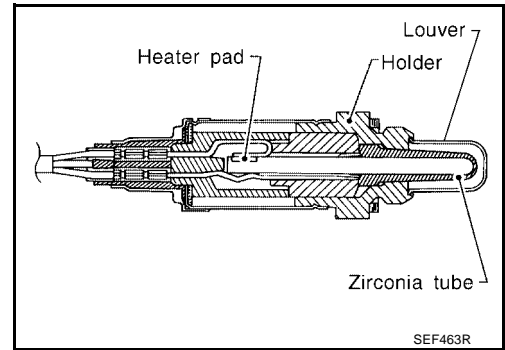
**DTC P1144 HO2S1**

PF2:22690

**Component Description**

UBS005G1

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**

UBS005G2

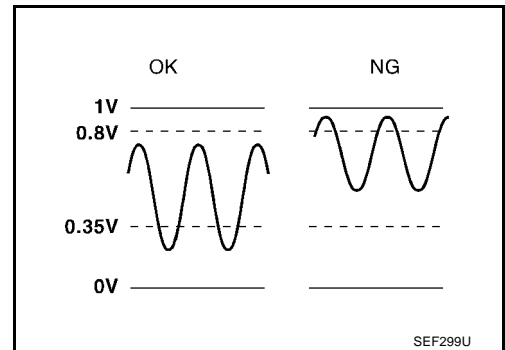
Specification data are reference values.

| MONITOR ITEM    | CONDITION  |                                       | SPECIFICATION   |
|-----------------|--|---------------------------------------|---|
| HO2S1 (B1)      | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> </ul> | Maintaining engine speed at 2,000 rpm | 0 - 0.3V ↔ Approx. 0.6 - 1.0V                               |
| HO2S1 MNTR (B1) |  |                                       | LEAN ↔ RICH<br>Changes more than 5 times during 10 seconds. |

**On Board Diagnosis Logic**

UBS005G4

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. | <ul style="list-style-type: none"> <li>● Heated oxygen sensor 1</li> <li>● Heated oxygen sensor 1 heater</li> <li>● Fuel pressure</li> <li>● Injectors</li> </ul> |

**DTC Confirmation Procedure**

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

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

**TESTING CONDITION:**

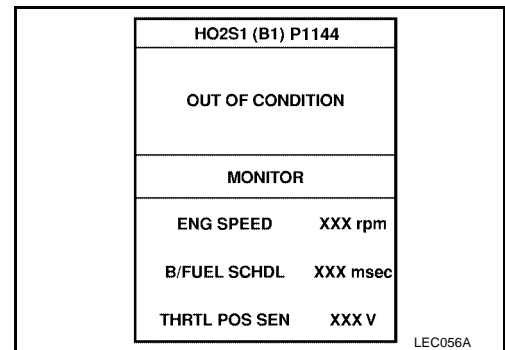
- Always perform at a temperature above  $-10^{\circ}\text{C}$  ( $14^{\circ}\text{F}$ ).
- Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

 **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 3.0 minutes.

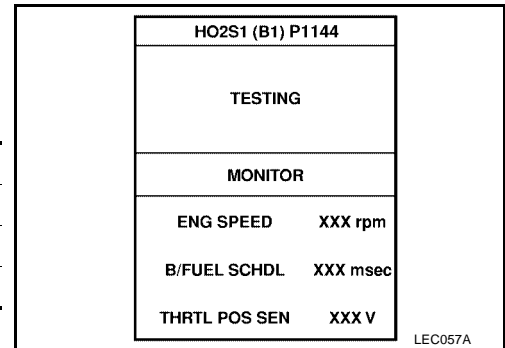
**NOTE:**

Never raise engine speed above 3,000 rpm after this step. If the engine speed limit is exceeded, return to step 5.



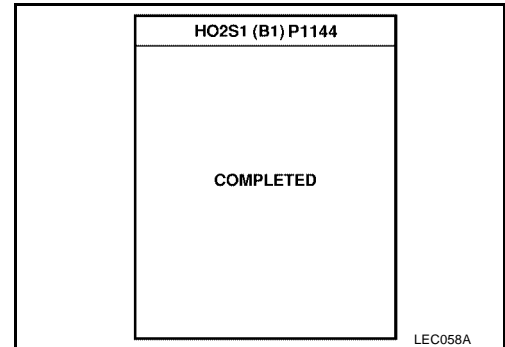
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

|                |                                       |
|----------------|---------------------------------------|
| 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                         |
| 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-424, "Diagnostic Procedure"](#).



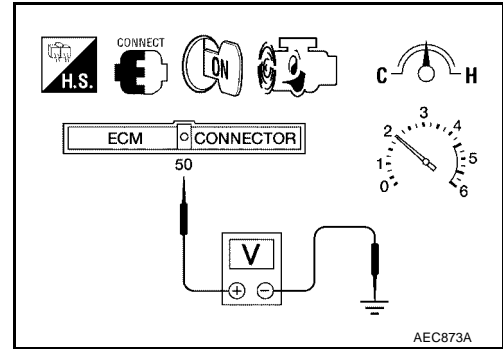
**Overall Function Check**

Use this procedure to check the overall function of the front heated oxygen sensor 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 (Heated oxygen sensor 1 signal) and ECM 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 one time.
  - The minimum voltage is below 0.35V at least one time.
4. If NG, go to [EC-424, "Diagnostic Procedure"](#) .



UBS005G7

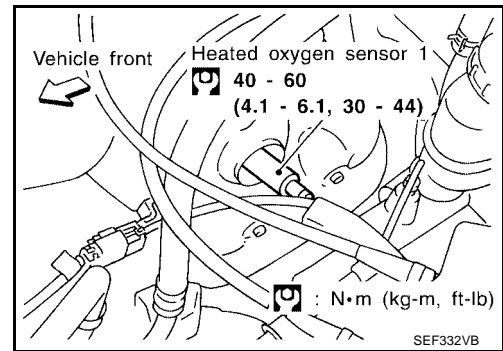
## Diagnostic Procedure

### 1. RETIGHTEN HEATED OXYGEN SENSOR 1

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

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

>> GO TO 2.

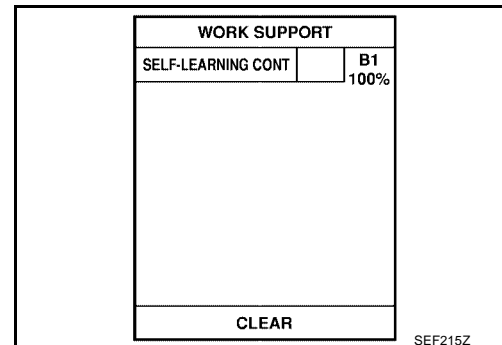




## 2. CLEAR THE SELF-LEARNING DATA

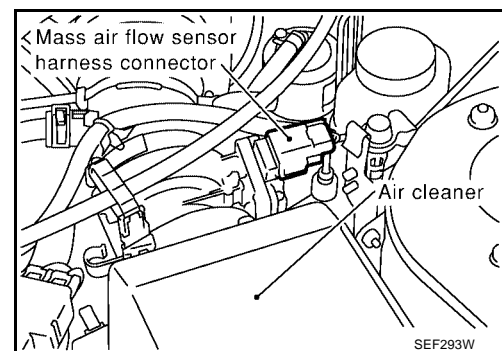
### ④ With CONSULT-II

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-60. "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 P0172. Refer to [EC-232](#).  
No >> GO TO 3.

## 3. 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 4.  
NG >> Repair or replace harness connector.

#### 4. CHECK HEATED OXYGEN SENSOR 1 HEATER

Check resistance between terminals 3 and 1.

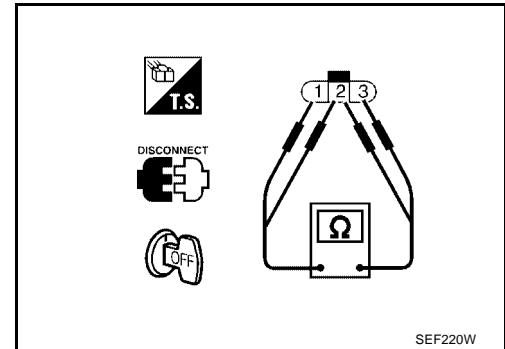
**Resistance** : 2.3 - 4.3  $\Omega$  at 25°C (77°F)

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 5.

NG >> Replace heated oxygen sensor 1.

#### 5. CHECK HEATED OXYGEN SENSOR 1

Refer to [EC-207, "Component Inspection"](#) .

OK or NG

OK >> GO TO 7.

NG >> Replace heated oxygen sensor 1.

#### 6. CHECK INTERMITTENT INCIDENT

Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

Refer to [EC-205, "Wiring Diagram"](#) , for circuit.

>> INSPECTION END.

#### Removal and Installation HEATED OXYGEN SENSOR 1

Refer to [EM-13, "OUTER COMPONENT PARTS"](#) .

UBS007GE

**DTC P1146 HO2S2**

PF2:226A0

**Component Description**

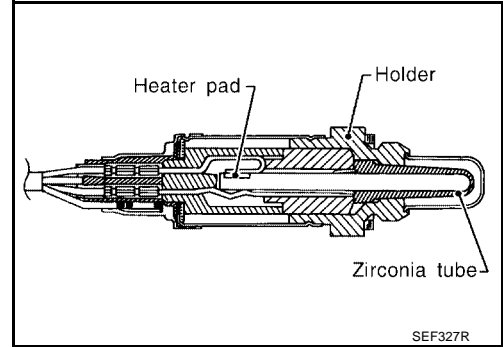
UBS005G8

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**

UBS005G9

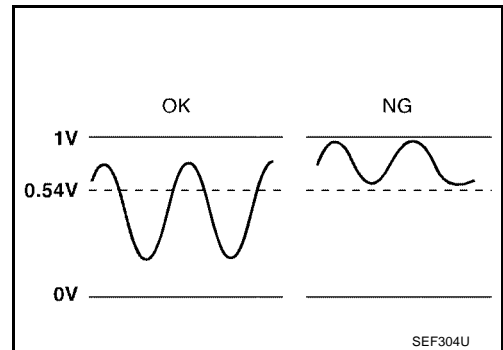
Specification data are reference values.

| MONITOR ITEM    | CONDITION  |   | SPECIFICATION                 |
|-----------------|--|---|-------------------------------|
| HO2S2 (B1)      | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load</li> </ul> | Revsing engine from idle up to 3,000 rpm quickly. | 0 - 0.3V ↔ Approx. 0.6 - 1.0V |
| HO2S2 MNTR (B1) | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load</li> </ul> | Revsing engine from idle up to 3,000 rpm quickly. | LEAN ↔ RICH                   |

**On Board Diagnosis Logic**

UBS005GB

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 | <ul style="list-style-type: none"> <li>● The minimum voltage from the sensor is not reached to the specified voltage.</li> </ul> | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Heated oxygen sensor 2</li> <li>● Fuel pressure</li> <li>● Injectors</li> </ul> |

## DTC Confirmation Procedure

### NOTE:

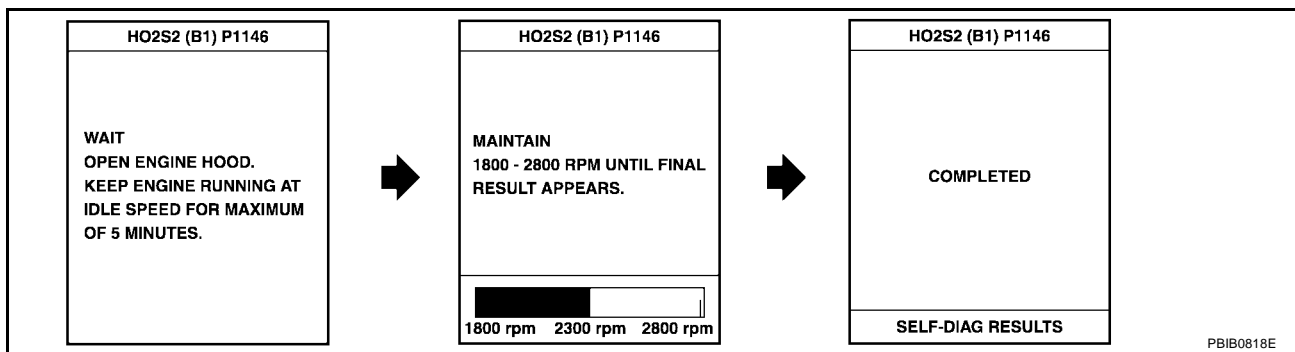
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

### TESTING CONDITION:

- For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).
- 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 engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II and follow the instruction of CONSULT-II.



6. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".  
If "NG" is displayed, refer to [EC-431, "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 "COOLANTTEMP/S" in "DATA MONITOR" mode with CONSULT-II.
  - c. Start engine and warm it up while monitoring "COOLANTTEMP/S" indication on CONSULT-II.
  - d. When "COOLANTTEMP/S" indication reaches to 70°C (158°F), go to step 3.

## Overall Function Check

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:

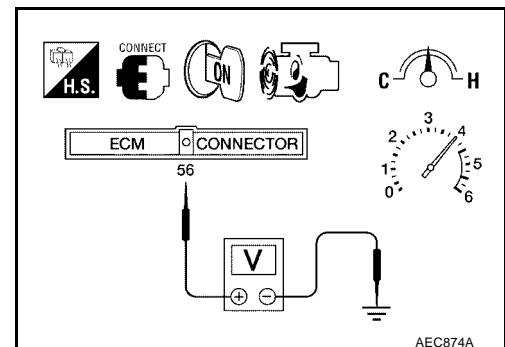
**Always drive vehicle at a safe speed.**

### WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF" and wait at least 5 seconds.
3. Start engine and keep engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and engine 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 0.54V at least once during this procedure.**

**If the voltage can be confirmed in step 4, step 5 is not necessary.**



# DTC P1146 HO2S2

[KA24DE]

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 0.54V at least once during this procedure.**
8. If NG, go to [EC-431, "Diagnostic Procedure"](#) .

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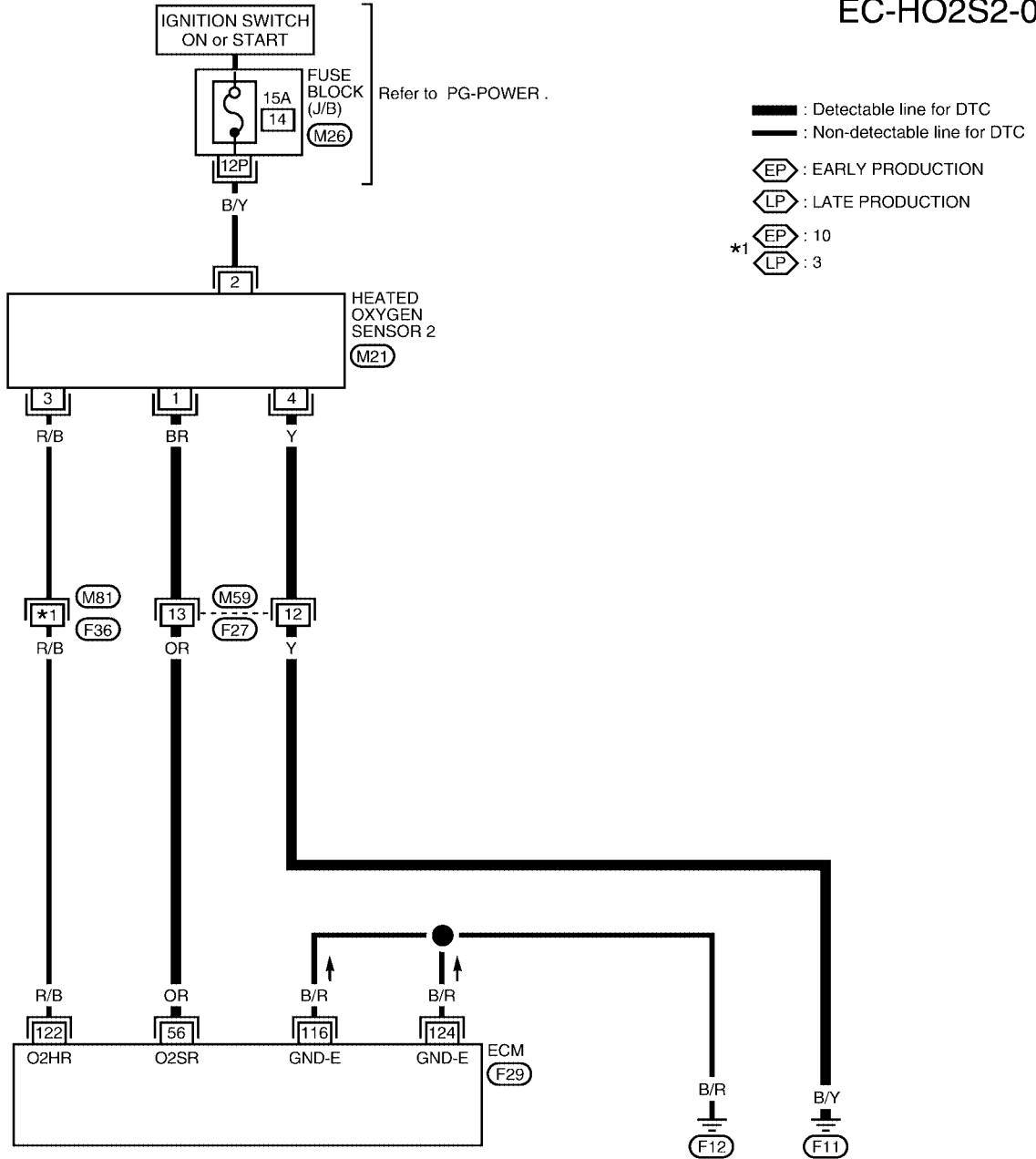
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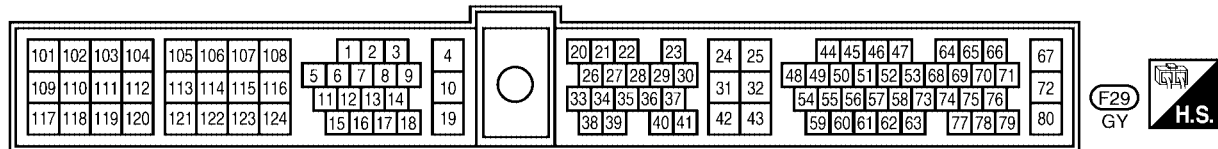
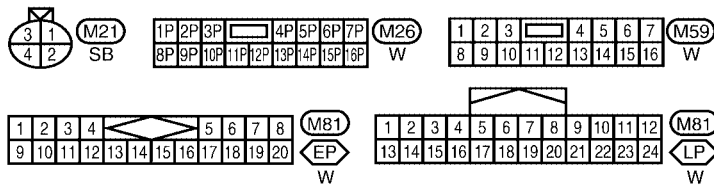
M

Wiring Diagram

EC-HO2S2-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- \*1 EP : 10
- LP : 3



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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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)      |
|---------------|------------|------------------------|--|------------------------|
| 56            | OR         | Heated oxygen sensor 2 | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● <b>Warm-up condition</b></li> <li>● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met.</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load</li> </ul> | 0 - Approximately 1.0V |

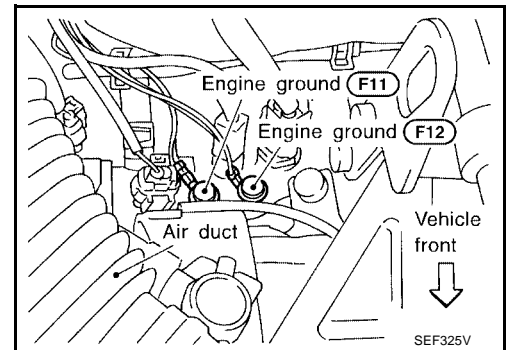
**Diagnostic Procedure**

UBS005GF

**1. RETIGHTEN GROUND SCREWS**

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

>> GO TO 2.

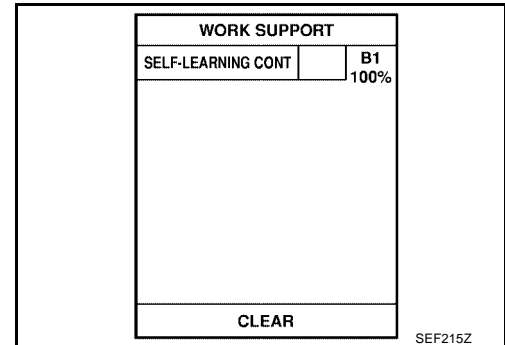


## 2. CLEAR THE SELF-LEARNING DATA

### Ⓜ With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.

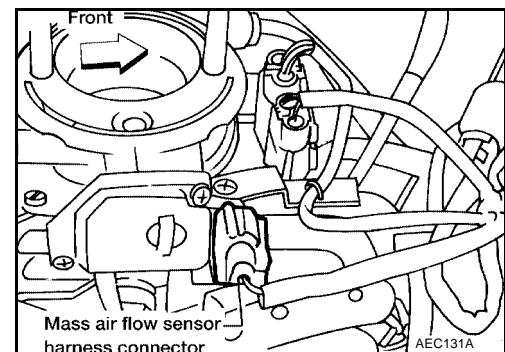
**Is the 1st trip DTC P0172 detected?  
Is it difficult to start engine?**



### ⊗ 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-60, "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-232](#) .  
 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 M58, F28
- 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 engine 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 M58, F28
- Harness for open or short between heated oxygen sensor 2 and engine ground

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

**7. CHECK HEATED OXYGEN SENSOR 2**

Refer to [EC-213, "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  
HEATED OXYGEN SENSOR 2**

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

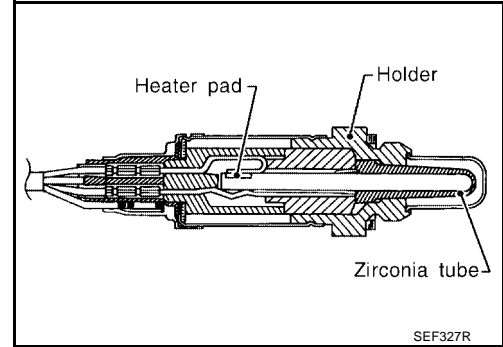
UBS007GD

**DTC P1147 HO2S2**

**Component Description**

UBS005GG

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**

UBS005GH

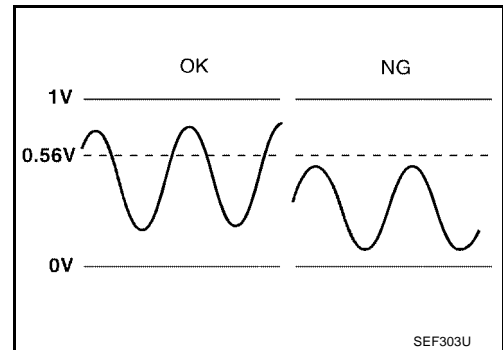
Specification data are reference values.

| MONITOR ITEM    | CONDITION  |   | SPECIFICATION                  |
|-----------------|--|---|--------------------------------|
| HO2S2 (B1)      | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load</li> </ul> | Revving engine from idle up to 3,000 rpm quickly. | 0 - 0.3V ←→ Approx. 0.6 - 1.0V |
| HO2S2 MNTR (B1) | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load</li> </ul> | Revving engine from idle up to 3,000 rpm quickly. | LEAN ←→ RICH                   |

**On Board Diagnosis Logic**

UBS005GJ

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 | <ul style="list-style-type: none"> <li>● The maximum voltage from the sensor is not reached to the specified voltage.</li> </ul> | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Heated oxygen sensor 2</li> <li>● Fuel pressure</li> <li>● Injectors</li> <li>● Intake air leaks</li> </ul> |

## DTC Confirmation Procedure

### NOTE:

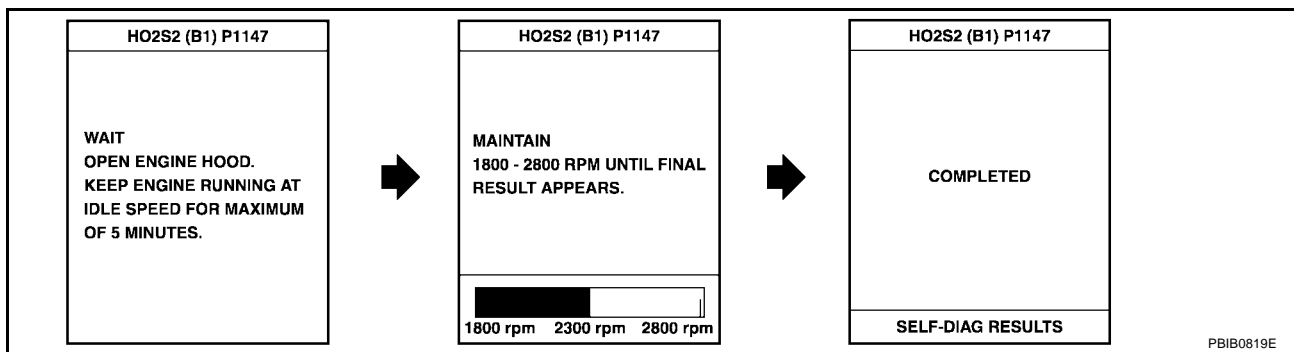
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

### TESTING CONDITION:

- For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).
- 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 engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II and follow the instruction of CONSULT-II.



6. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".  
If "NG" is displayed, refer to [EC-438, "Diagnostic Procedure"](#).  
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
  - a. Turn ignition switch "OFF" and leave the vehicle in a cool place (soak the vehicle).
  - b. Turn ignition switch "ON" and select "COOLANTEMP/S" in "DATA MONITOR" mode with CONSULT-II.
  - c. Start engine and warm it up while monitoring "COOLANTEMP/S" indication on CONSULT-II.
  - d. When "COOLANTEMP/S" indication reaches to 70°C (158°F), go to step 3.

## Overall Function Check

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

### CAUTION:

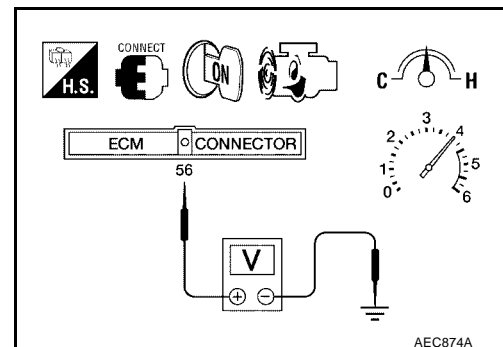
**Always drive vehicle at a safe speed.**

### WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF" and wait at least 5 seconds.
3. Start engine and keep engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between ECM terminals 56 (Heated oxygen sensor 2 signal) and engine 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 0.56V at least once during this procedure.**

**If the voltage can be confirmed in step 4, step 5 is not necessary.**

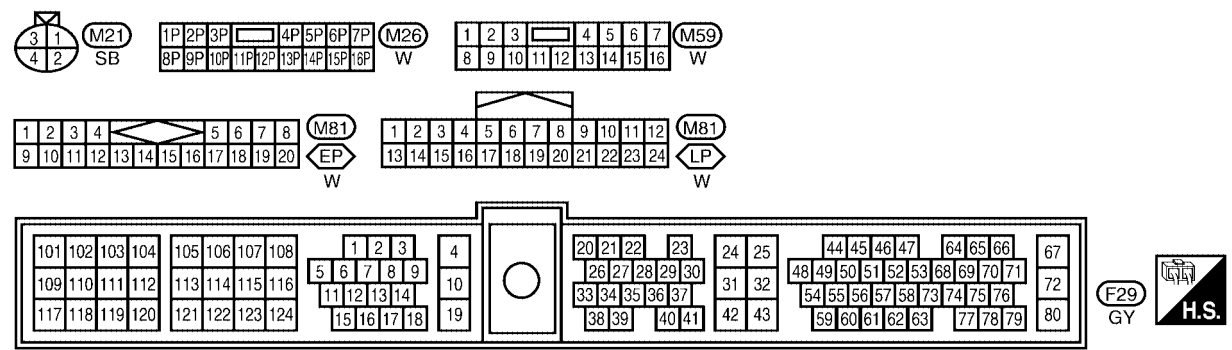
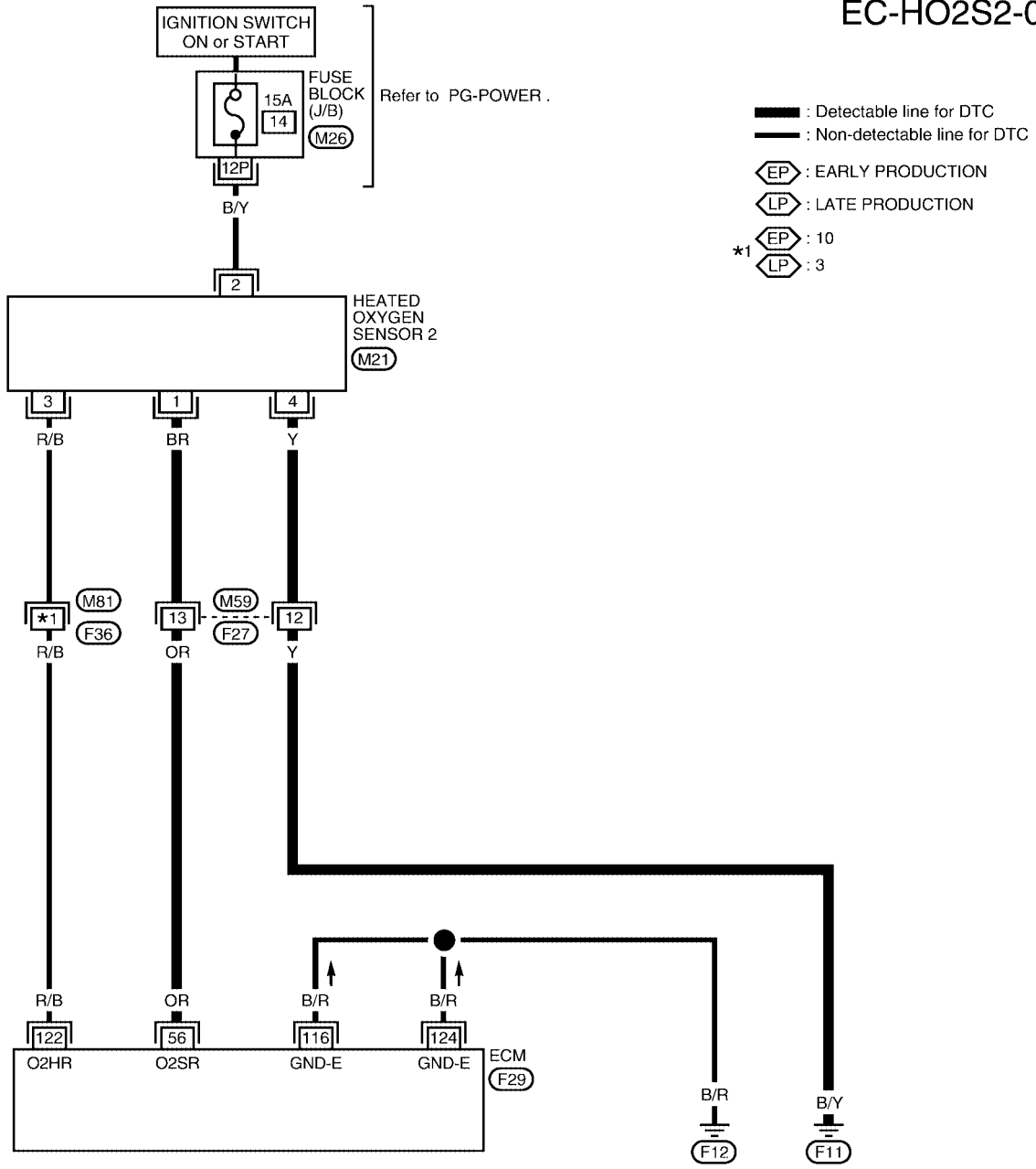


- 
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position (M/T), "D" position with "OD" OFF (A/T).  
**The voltage should be above 0.56V at least once during this procedure.**
  8. If NG, go to [EC-438, "Diagnostic Procedure"](#) .

Wiring Diagram

EC-HO2S2-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



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

**CAUTION:**

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

| TER-MINAL NO. | WIRE COLOR | ITEM                   | CONDITION  | DATA (DC Voltage)      |
|---------------|------------|------------------------|--|------------------------|
| 56            | OR         | Heated oxygen sensor 2 | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● <b>Warm-up condition</b></li> <li>● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met.</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load</li> </ul> | 0 - Approximately 1.0V |

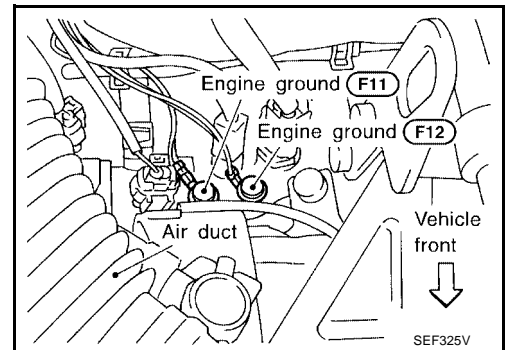
**Diagnostic Procedure**

UBS005GN

**1. RETIGHTEN GROUND SCREWS**

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

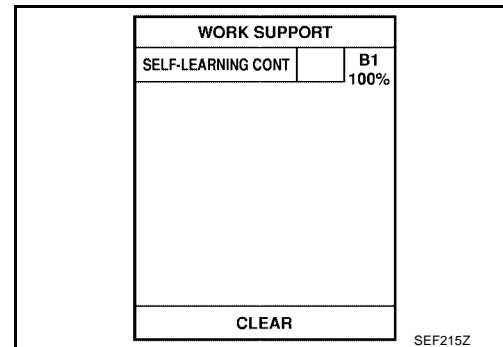
>> GO TO 2.



## 2. CLEAR THE SELF-LEARNING DATA

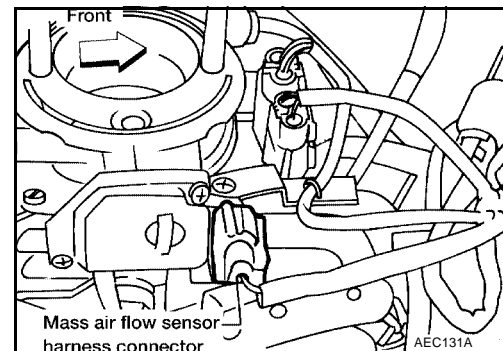
### ④ With CONSULT-II

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-60. "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-225](#).  
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 M58, F28
- 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 engine 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 M58, F28
- Harness for open or short between heated oxygen sensor 2 and engine ground

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

#### 7. CHECK HEATED OXYGEN SENSOR 2

---

Refer to [EC-213, "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 HEATED OXYGEN SENSOR 2

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

UBS007GC



## DTC P1148 CLOSED LOOP CONTROL

PFP:22690

### On Board Diagnosis Logic

UBS005GP

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. | <ul style="list-style-type: none"> <li>● The heated oxygen sensor 1 circuit is open or shorted.</li> <li>● Heated oxygen sensor 1</li> <li>● Heated oxygen sensor heater</li> </ul> |

### DTC Confirmation Procedure

UBS005GP

**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-442, "Diagnostic Procedure"](#). If the result is OK, perform the following step.
4. Let engine idle at least 3 minutes.
5. Maintain the following condition at least 50 consecutive seconds.

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| B/FUEL SCHDL  | XXX msec |
| COOLAN TEMP/S | XXX °C   |
| HO2S1 (B1)    | XXX V    |
| VHCL SPEED SE | XXX km/h |

SEF682Y

|                |                            |
|----------------|----------------------------|
| B/FUEL SCHDL   | 4.0 msec or more           |
| ENG SPEED      | 1,800 - 3,000 rpm          |
| Selector 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-442, "Diagnostic Procedure"](#).

### Overall Function Check

UBS005GQ

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

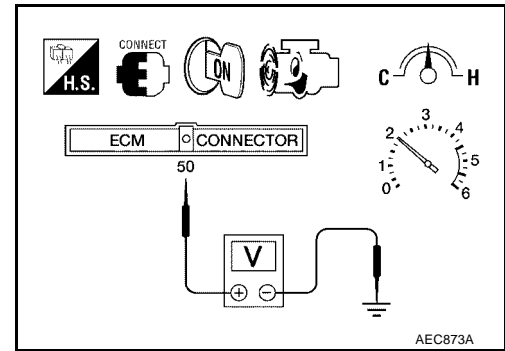
**WITH GST**

1. Start engine and warm it up to normal operating temperature.

## DTC P1148 CLOSED LOOP CONTROL

[KA24DE]

2. Set voltmeter probes between ECM terminal 50 (Heated oxygen sensor 1 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
  - The voltage should go above 0.70V at least once.
  - The voltage should go below 0.21V at least once.
4. If NG, go to [EC-442, "Diagnostic Procedure"](#) .



### Diagnostic Procedure

Refer to "Diagnostic Procedure" for DTC P0133, [EC-206](#) .

UBS005GR

## DTC P1217 ENGINE OVER TEMPERATURE

PFP:00000

### On Board Diagnosis Logic

UBS005GS

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) | <ul style="list-style-type: none"> <li>● Cooling fan does not operate properly (Overheat).</li> <li>● Cooling fan system does not operate properly (Overheat).</li> <li>● Engine coolant was not added to the system using the proper filling method.</li> </ul> | <ul style="list-style-type: none"> <li>● Cooling fan (crankshaft driven)</li> <li>● Radiator hose</li> <li>● Radiator</li> <li>● Radiator cap</li> <li>● Water pump</li> <li>● Thermostat</li> <li>● Engine coolant temperature sensor</li> </ul> <p>For more information, refer to <a href="#">EC-445, "Main 11 Causes of Overheating"</a>.</p> |

**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

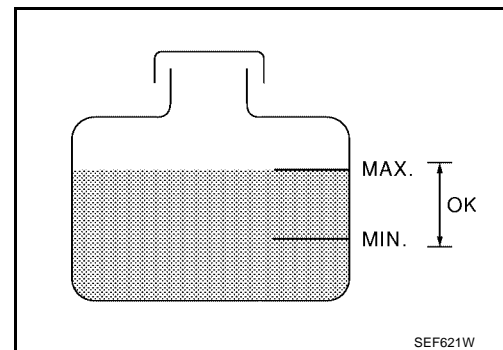
UBS005GT

**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.

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-444, "Diagnostic Procedure"](#).
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-444, "Diagnostic Procedure"](#).



## Diagnostic Procedure

### 1. 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<sup>2</sup> , 23 psi)

#### CAUTION:

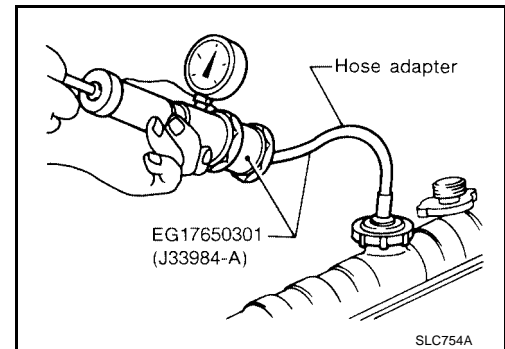
Higher than the specified pressure may cause radiator damage. Pressure should not drop.

OK or NG

OK >> GO TO 2.

NG >> Check the following for leak.

- Hose
  - Radiator
  - Water pump
- Refer to [CO-10, "WATER PUMP"](#) .



### 2. CHECK RADIATOR CAP

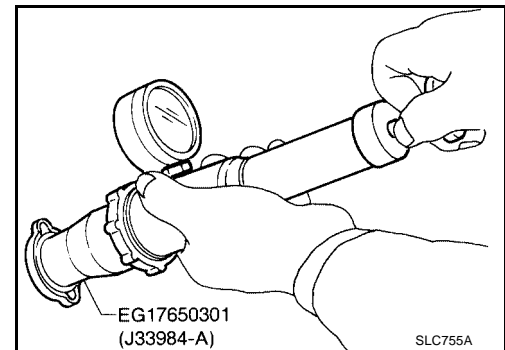
Apply pressure to cap with a tester.

**Radiator cap relief pressure** : 78 - 98 kPa  
(0.8 - 1.0 kg/cm<sup>2</sup> , 11 - 14 psi)

OK or NG

OK >> GO TO 3.

NG >> Replace radiator cap.



### 3. 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)

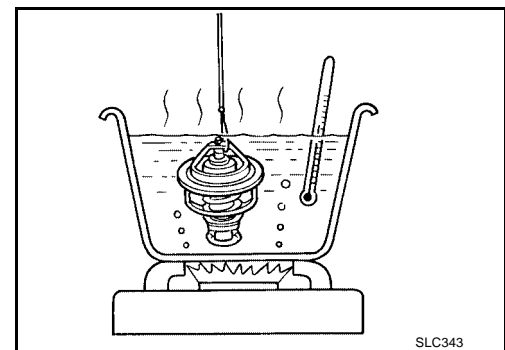
3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer to [CO-13, "THERMOSTAT"](#) .

OK or NG

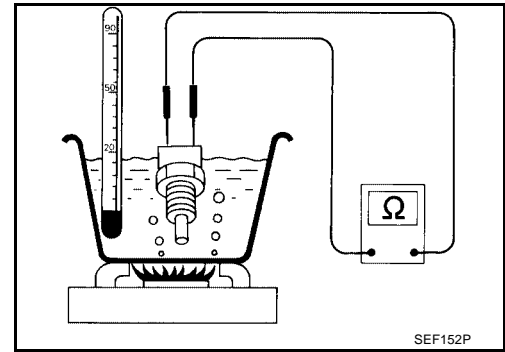
OK >> GO TO 4.

NG >> Replace thermostat.



## 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

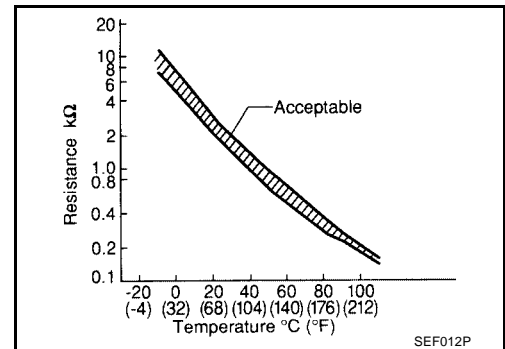


<Reference data>

| 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.



## 5. CHECK MAIN 11 CAUSES

If the cause cannot be isolated, go to [EC-445, "Main 11 Causes of Overheating"](#) .

>> **INSPECTION END**

**Perform FINAL CHECK by the following procedure after repair is completed.**

- 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.
- Stop vehicle and let engine idle. Check the intake and exhaust systems for leaks by listening for noise or visually inspecting the components.
- Allow engine to cool and visually check for oil and coolant leaks. Then, perform "Overall Function Check".

### Main 11 Causes of Overheating

UBS005GV

| Engine | Step | Inspection item  | Equipment         | Standard  | Reference page   |
|--------|------|--|-------------------|---|--|
| OFF    | 1    | <ul style="list-style-type: none"> <li>● Blocked radiator</li> <li>● Blocked condenser</li> <li>● Blocked radiator grille</li> <li>● Blocked bumper</li> </ul> | ● Visual          | No blocking   | —  |
|        | 2    | ● Coolant mixture  | ● Coolant tester  | 50 - 50% coolant mixture  | See <a href="#">MA-12, "Recommended Fluids and Lubricants"</a> . |
|        | 3    | ● Coolant level  | ● Visual          | Coolant up to MAX level in reservoir tank and radiator filler neck  | See <a href="#">MA-16</a> , "Changing Engine Coolant".           |
|        | 4    | ● Radiator cap   | ● Pressure tester | 78 - 98 kPa (0.8 - 1.0 kg/cm <sup>2</sup> , 11 - 14 psi)<br>59 - 98 kPa (0.6 - 1.0 kg/cm <sup>2</sup> , 9 - 14 psi) (Limit) | See <a href="#">CO-8, "System Check"</a> .                       |

# DTC P1217 ENGINE OVER TEMPERATURE

[KA24DE]

| Engine | Step | Inspection item                                  | Equipment                                      | Standard                                       | Reference page  |
|--------|------|--|--|--|---|
| ON*2   | 5    | ● Coolant leaks                                  | ● Visual                                       | No leaks                                       | See <a href="#">CO-8, "System Check"</a> .                                      |
| ON*2   | 6    | ● Thermostat                                     | ● Touch the upper and lower radiator hoses     | Both hoses should be hot                       | See <a href="#">CO-13, "THERMOSTAT"</a> and <a href="#">CO-14, "RADIATOR"</a> . |
| 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 <a href="#">MA-16</a> , "Changing Engine Coolant".                          |
| OFF*4  | 9    | ● Coolant return from reservoir tank to radiator | ● Visual                                       | Should be initial level in reservoir tank      | See <a href="#">CO-8, "System Check"</a> .                                      |
| OFF    | 10   | ● Cylinder head                                  | ● Straight gauge feeler gauge                  | 0.1 mm (0.004 in) Maximum distortion (warping) | See <a href="#">EM-32, "CYLINDER HEAD"</a> .                                    |
|        | 11   | ● Cylinder block and pistons                     | ● Visual                                       | No scuffing on cylinder walls or piston        | See <a href="#">EM-48, "CYLINDER BLOCK"</a> .                                   |

\*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, "Troubleshooting Chart"](#).

## DTC P1336 CKP SENSOR (OBD)

PFP:23731

UBS005GW

### Component Description

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.

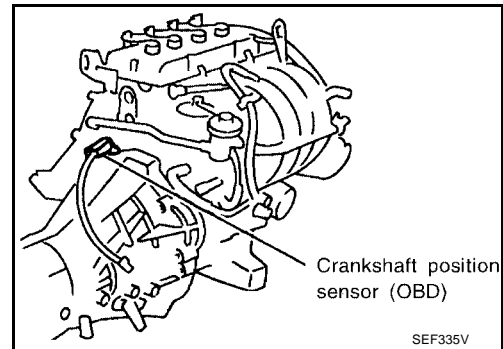
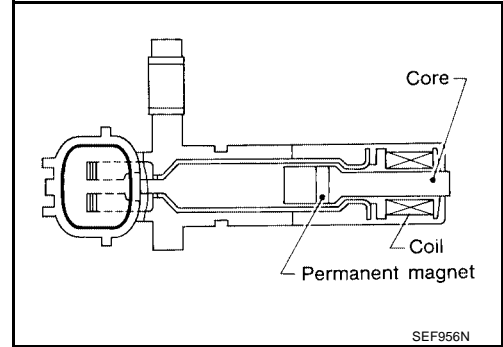
The changing gap causes the magnetic field near the sensor to change.

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

UBS005GY

| DTC No. | Trouble Diagnosis Name                 | DTC Detecting Condition  | Possible Cause  |
|---------|--|--|---|
| P1336   | Crankshaft position sensor (OBD) (COG) | <ul style="list-style-type: none"> <li>A chipping of the flywheel or drive plate gear tooth (cog) is detected by the ECM.</li> </ul> | <ul style="list-style-type: none"> <li>Harness or connectors</li> <li>Crankshaft position sensor (OBD)</li> <li>Drive plate/Flywheel</li> </ul> |

### DTC Confirmation Procedure

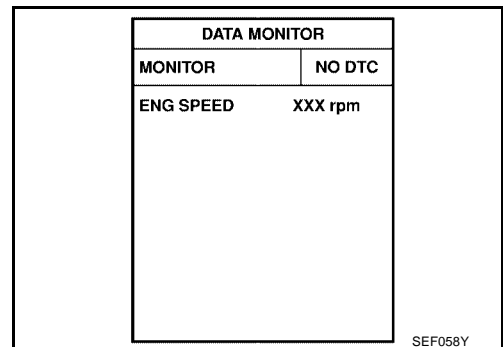
UBS005GZ

**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**

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 2 minutes at idle speed.
- If 1st trip DTC is detected, go to [EC-449, "Diagnostic Procedure"](#)



**WITH GST**

Follow the procedure "WITH CONSULT-II".

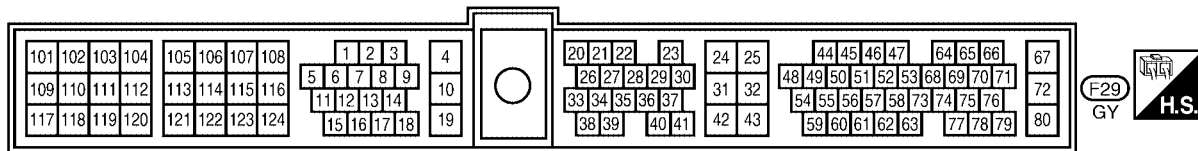
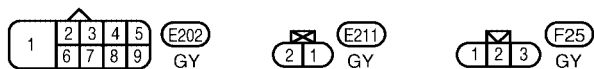
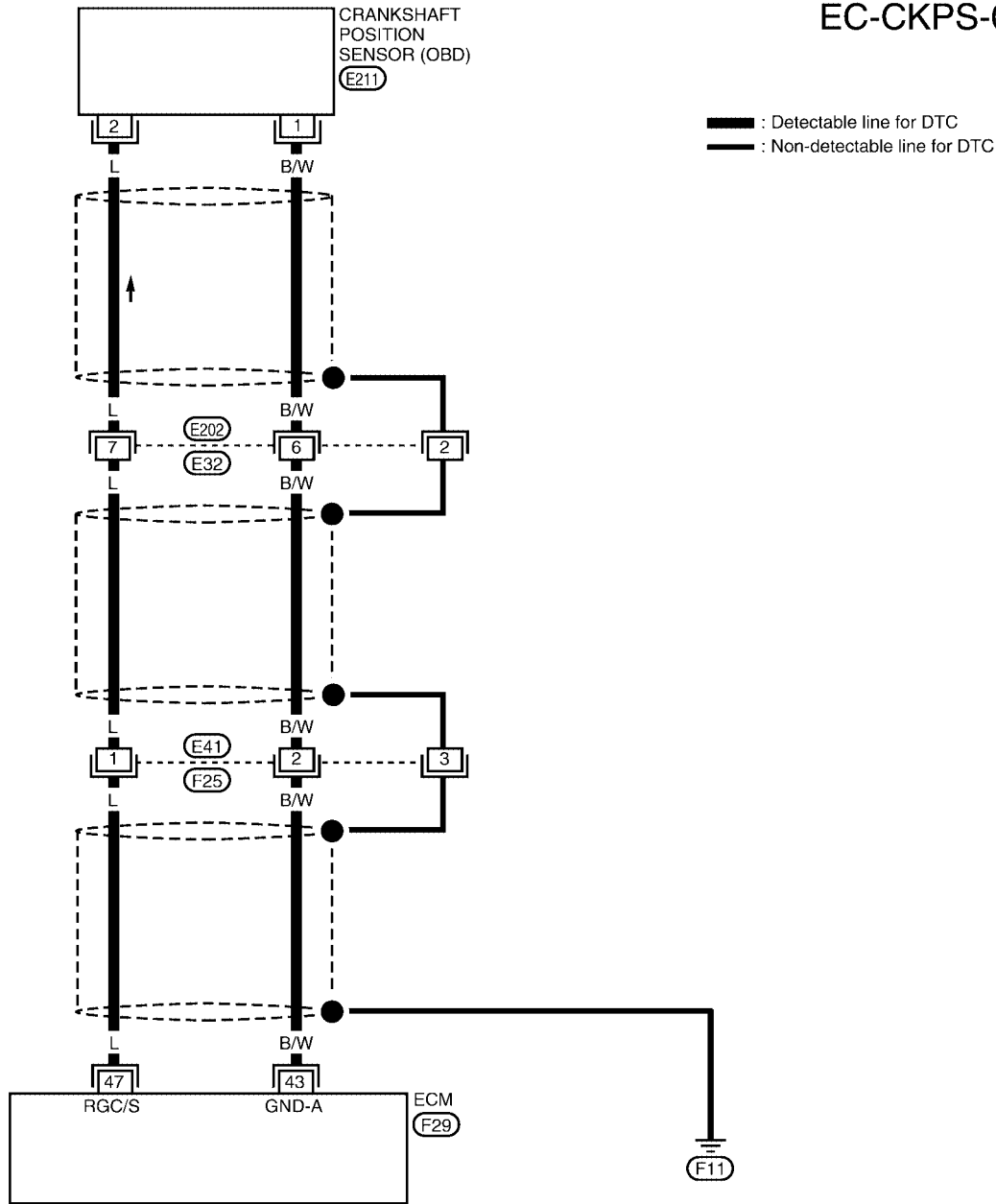
# DTC P1336 CKP SENSOR (OBD)

[KA24DE]

UBS005H0

## Wiring Diagram

EC-CKPS-01



BBWA0548E



# DTC P1336 CKP SENSOR (OBD)

[KA24DE]

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

**CAUTION:**

Do not use ECM ground terminals when measuring input/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 (AC Voltage)      |
|---------------|------------|----------------------------------|--|------------------------|
| 43            | B/W        | Sensors' ground                  | [Engine is running]<br>● Warm-up condition<br>● Idle speed | Approximately 0V       |
| 47            | L          | Crankshaft position sensor (OBD) | [Engine is running]<br>● Warm-up condition<br>● Idle speed | Approx. 0V★<br>(V)<br> |
|               |            |                                  | [Engine is running]<br>● Engine speed is 2,000 rpm         | Approx. 0V★<br>(V)<br> |

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

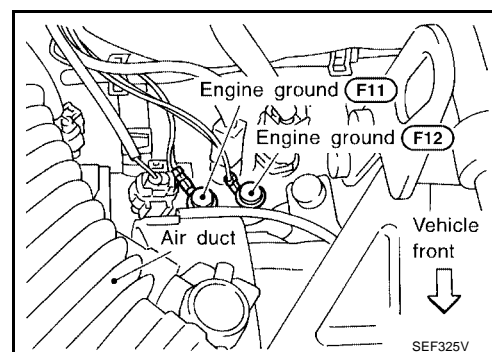
## Diagnostic Procedure

UBS005H1

### 1. RETIGHTEN GROUND SCREWS

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

>> GO TO 2.



### 2. CHECK INPUT SIGNAL CIRCUIT

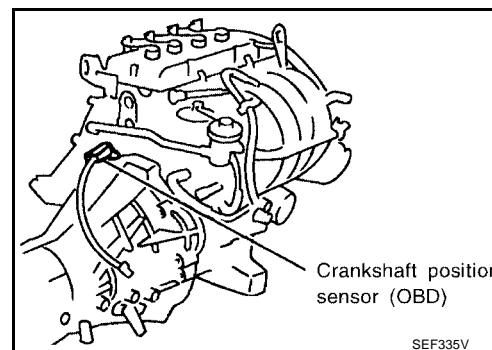
1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.
2. Check harness continuity between ECM terminal 47 and crankshaft position sensor (OBD) terminal 2. Refer to Wiring Diagram.

**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.



---

## 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. Reconnect ECM harness connectors.
2. Check harness continuity between crankshaft position sensor (OBD) terminal 1 and engine ground. Refer to wiring diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

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

---

## 5. DETECT MALFUNCTIONING PART

---

Check the following.

- Harness connectors E202, E32
- Harness connectors E41, F25
- Harness for open or short between crankshaft position sensor (OBD) and ECM

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

## 6. CHECK SHIELD CIRCUIT

---

1. Turn ignition switch "OFF.
2. Disconnect harness connectors E202, E32.
3. Check harness continuity between harness connector E32 terminal 2 and ground. Refer to wiring diagram.

**Continuity should exist**

4. Also check harness for short to power.
5. 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 engine 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-447, "DTC Confirmation Procedure"](#) again.

OK or NG

- OK >> **INSPECTION END**  
NG >> GO TO 9.

---

**9. CHECK CRANKSHAFT POSITION SENSOR (OBD)**

---

Refer to [EC-267, "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.**

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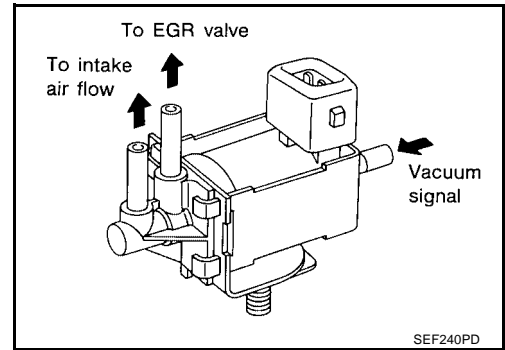
M

**DTC P1400 EGRC-SOLENOID VALVE**

**Component Description**

UBS005H2

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.



SEF240PD

**CONSULT-II Reference Value in Data Monitor Mode**

UBS005H3

Specification data are reference values.

| MONITOR ITEM | CONDITION   |   | SPECIFICATION |
|--------------|---|---|---------------|
| EGRC SOL/V   | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: "OFF"</li> <li>● Shift lever: "N" (A/T models)</li> <li>● No-load</li> </ul> | Idle  | ON            |
|              |   | Rev engine up from idle to 3,000 rpm quickly. | OFF           |

**On Board Diagnosis Logic**

UBS005H5

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The EGRC solenoid valve circuit is open or shorted.)</li> <li>● EGRC solenoid valve</li> </ul> |

**DTC Confirmation Procedure**

UBS005H6

**NOTE:**

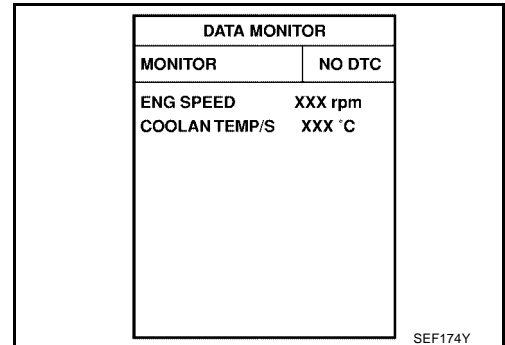
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

**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.



SEF174Y

# DTC P1400 EGRC-SOLENOID VALVE

[KA24DE]

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-455, "Diagnostic Procedure"](#)

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| COOLAN TEMP/S | XXX °C   |
| VHCL SPEED SE | XXX km/h |
| THRTL POS SEN | XXX V    |
| B/FUEL SCHDL  | XXX msec |

SEF201Y

## Overall Function Check

UBS005H7

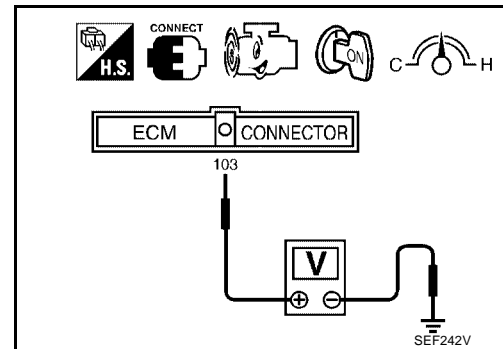
Use this procedure to check the overall function of the EGR temperature sensor. During this check, a 1st trip DTC might not be confirmed.

### 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-455, "Diagnostic Procedure"](#) .



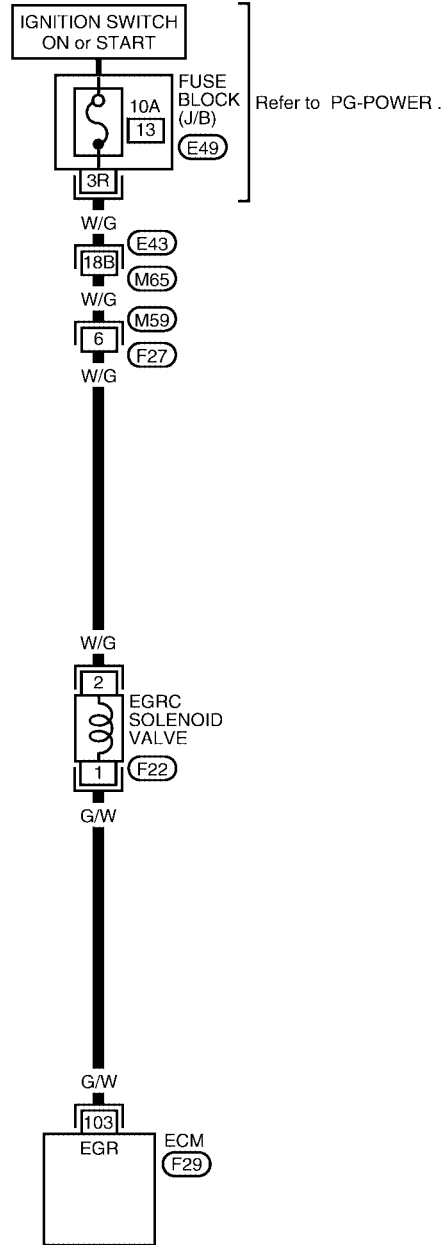
# DTC P1400 EGRC-SOLENOID VALVE

[KA24DE]

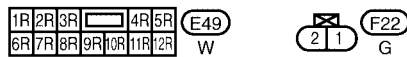
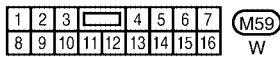
UBS005H8

## Wiring Diagram

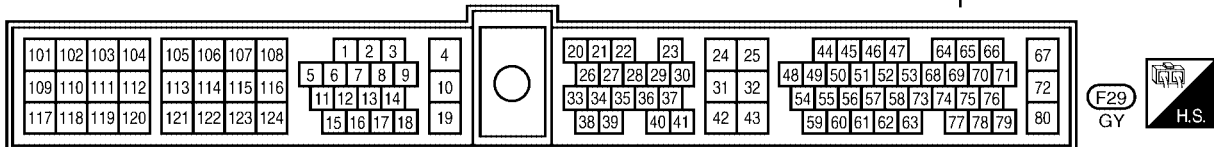
EC-EGRC/V-01



Refer to PG-POWER.  
 — : Detectable line for DTC  
 — : Non-detectable line for DTC



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



BBWA0452E

# DTC P1400 EGRC-SOLENOID VALVE

[KA24DE]

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

**CAUTION:**

Do not use ECM ground terminals when measuring input/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 COLO R | ITEM                | CONDITION  | DATA (DC Voltage)          |
|---------------|-------------|---------------------|--|----------------------------|
| 103           | G/W         | EGRC solenoid valve | [Engine is running]<br>● Warm-up condition<br>● Idle speed   | 0 - 1V                     |
|               |             |                     | [Engine is running]<br>● Warm-up condition<br>● M/T models: Lift up drive wheels and shift to 1st gear position.<br>● Rev engine up from 2,000 to 4,000 rpm. | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

UBS005H9

### 1. CHECK EGRC SOLENOID VALVE

 **With CONSULT-II**

- Turn ignition switch "ON".
- Turn EGRC solenoid valve "ON" and "OFF" in "ACTIVE TEST" mode with CONSULT-II and check operating sound.

| ACTIVE TEST |         |
|-------------|---------|
| EGRC SOL/V  | ON      |
| MONITOR     |         |
| ENG SPEED   | XXX rpm |
|             |         |
|             |         |
|             |         |
|             |         |
|             |         |
|             |         |

SEF722Z

 **Without CONSULT-II**

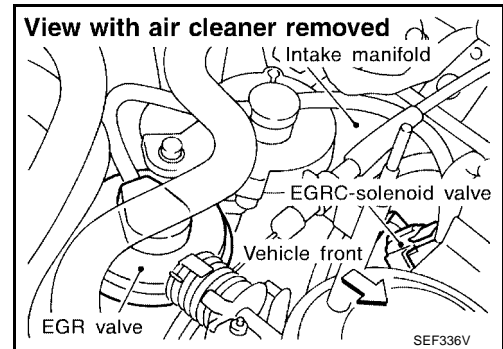
- Start engine and rev engine up to 3,000 rpm quickly.
- When disconnecting and reconnecting the EGRC solenoid valve harness connector, make sure that the EGRC solenoid valve makes operating sound. (The DTC or the 1st trip DTC for the EGRC solenoid valve will be displayed, however, ignore it.)

**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".

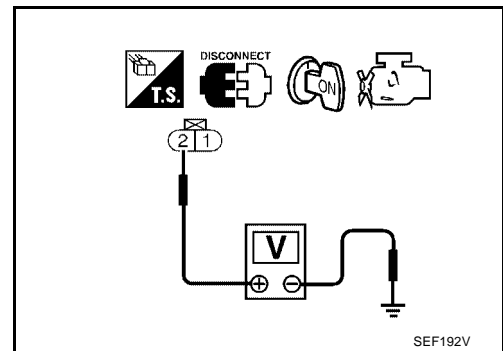


4. Check voltage between terminal 2 and ground with CONSULT-II or tester.

**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 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 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.

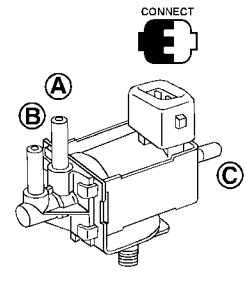
>> Repair open circuit or short to ground or short to power in harness or connectors.



**6. CHECK EGRC SOLENOID VALVE**

**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<br>EGRC SOLENOID<br>VALVE | Air passage continuity<br>between A and B | Air passage continuity<br>between A and C |
|-------------------------------------|---|---|
| ON                                  | Yes                                       | No  |
| OFF                                 | No  | Yes                                       |

Operation takes less than 1 second.

LEC036A

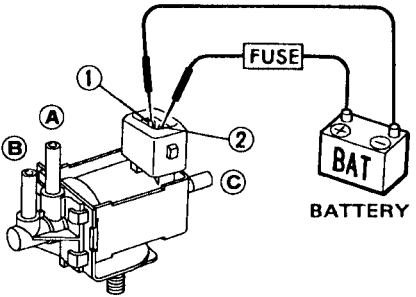
OK or NG

- OK >> GO TO 8.
- NG >> Replace EGRC solenoid valve.

**7. CHECK EGRC SOLENOID VALVE**

**Without CONSULT-II**

Check air passage continuity shown in the figure.



| Condition   | Air passage continuity<br>between A and B | Air passage continuity<br>between A and C |
|---|---|---|
| 12V direct current<br>supply between<br>terminals 1 and 2 | Yes                                       | No  |
| No supply   | No  | Yes                                       |

Operation takes less than 1 second.

LEC037A

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

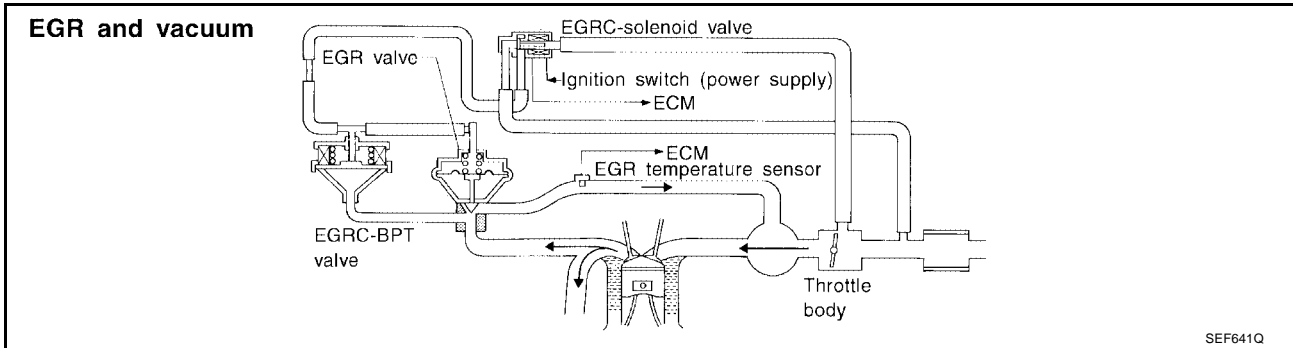
### Description SYSTEM DESCRIPTION

UBS005HA

| 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.

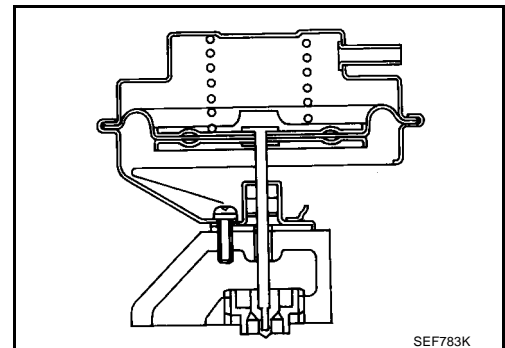
- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction



### COMPONENT DESCRIPTION

#### Exhaust Gas Recirculation (EGR) Valve

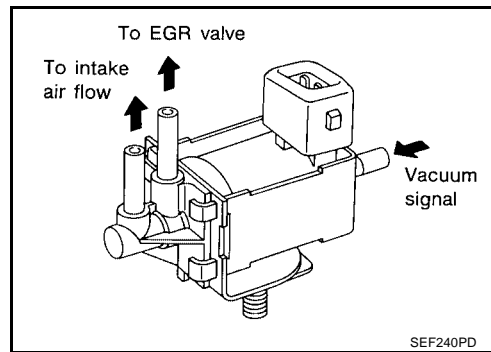
The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.



**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. A plunger will then move to cut the vacuum signal (from the throttle body to 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.



SEF240PD

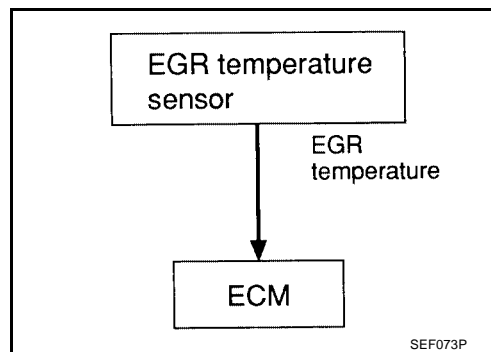
UBS005HB

**On Board Diagnosis Logic**

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.



SEF073P

| 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. | <ul style="list-style-type: none"> <li>● EGRC solenoid valve</li> <li>● EGR valve leaking or stuck open</li> <li>● EGR temperature sensor</li> <li>● EGRC-BPT valve</li> </ul> |

**DTC Confirmation Procedure**

UBS005HC

**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.

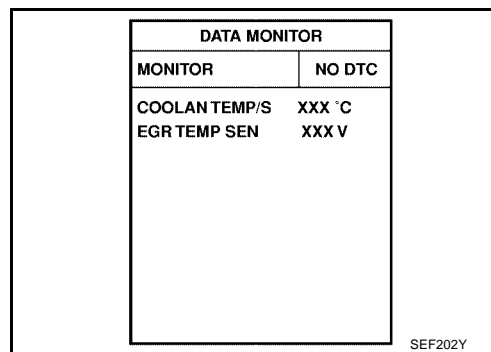
**TESTING CONDITION:**

- 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 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.



SEF202Y

\*: Although CONSULT-II screen displays "-10 to 40°C (14 to 104°F)" as a range of engine coolant temperature, ignore it.

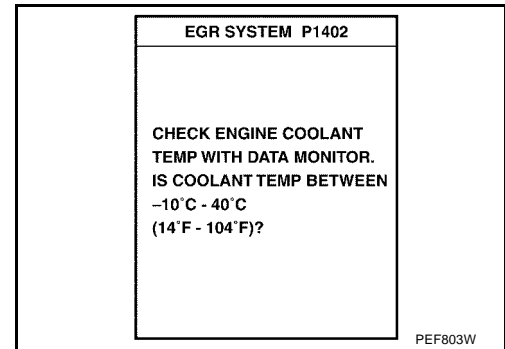
**WITH CONSULT-II**

1. Turn ignition switch OFF and wait at least 5 seconds, then turn ignition switch ON.

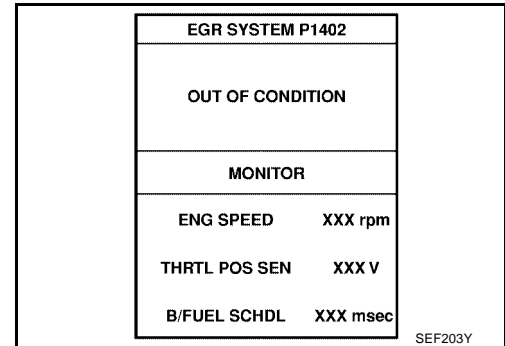
# DTC P1402 EGR FUNCTION

[KA24DE]

2. Select "EGR SYSTEM P1402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.

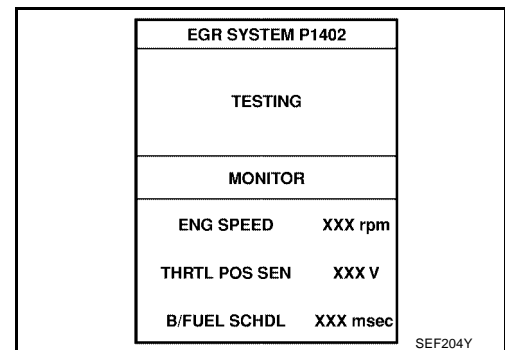


3. Touch "START". Follow instruction of CONSULT-II.

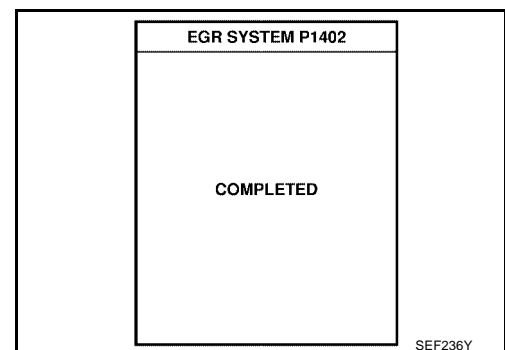


4. Start engine and let it idle until "TESTING" on CONSULT-II screen is turned to "COMPLETED". (It will take 60 seconds or more.)

**If "TESTING" is not displayed after 5 minutes, turn ignition "OFF" and cool the engine coolant temperature to the range of -10 to 60°C (14 to 140°F). Retry from step 1.**



5. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to [EC-463, "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 35°C (14 to 95°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.

# DTC P1402 EGR FUNCTION

[KA24DE]

- 
8. If DTC is detected, go to [EC-463, "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.**

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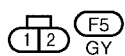
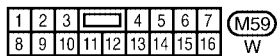
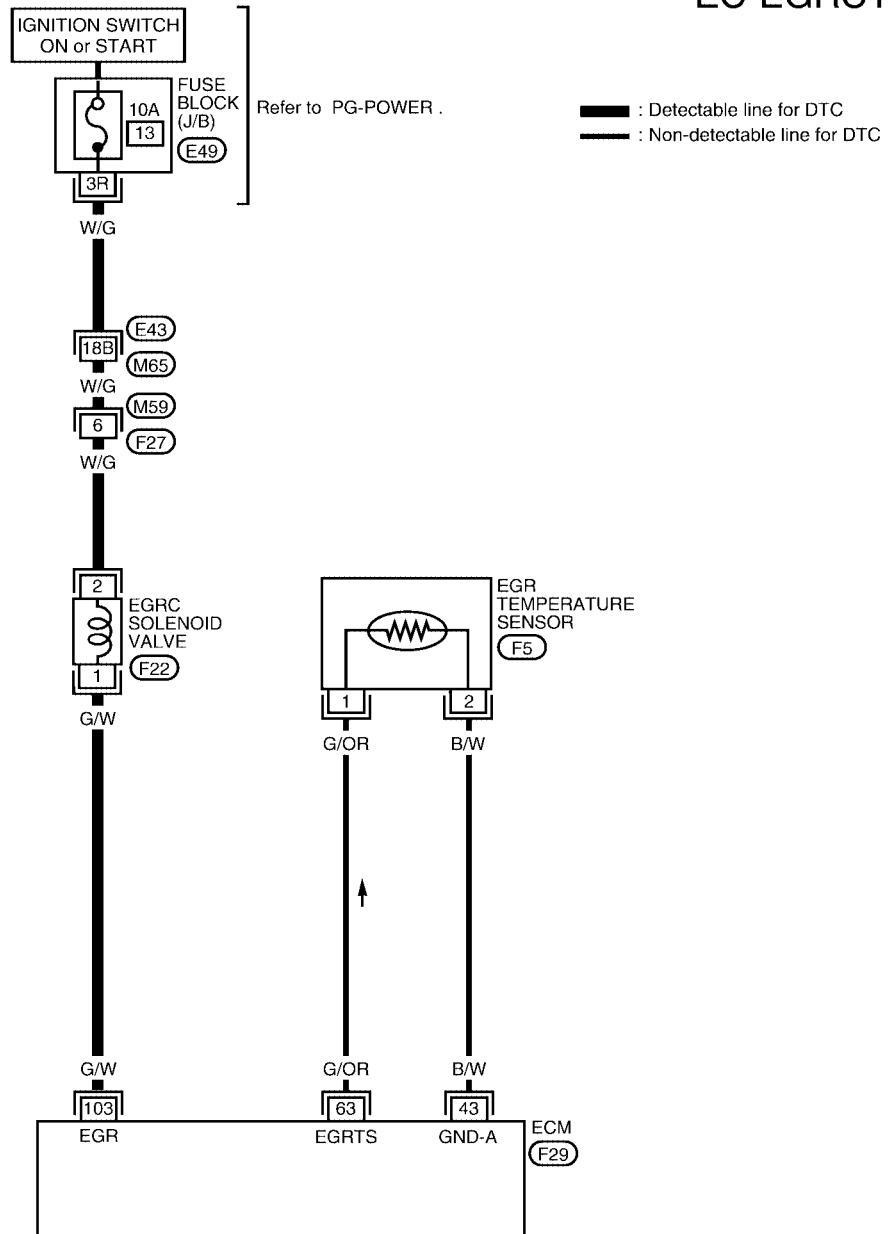
# DTC P1402 EGR FUNCTION

[KA24DE]

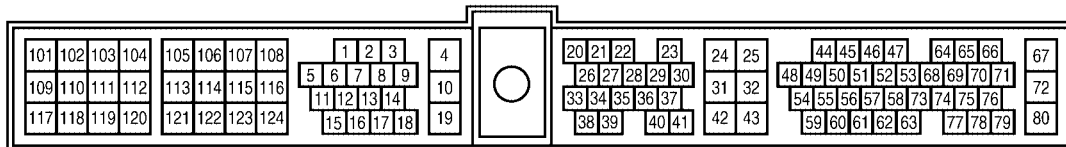
UBS005HD

## Wiring Diagram

EC-EGRC1-01



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



BBWA0453E

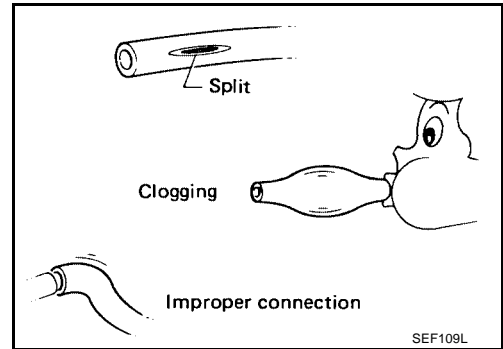
**Diagnostic Procedure**

**1. CHECK VACUUM HOSE**

Check vacuum hose for clogging, cracks or improper connection.  
Refer to [EC-29. "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.

| ACTIVE TEST |         |
|-------------|---------|
| EGRC SOL/V  | ON      |
| (EGR)       | CUT     |
| MONITOR     |         |
| ENG SPEED   | XXX rpm |
|             |         |
|             |         |
|             |         |
|             |         |
|             |         |

The table is identified by the code SEF716Z.

**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.

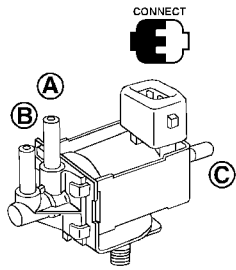
NG >> Repair open circuit or short to power in harness or connector.

#### 5. CHECK EGRC SOLENOID VALVE

**Ⓜ With CONSULT-II**

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 | 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

OK or NG

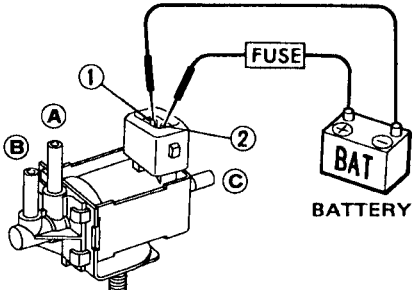
OK >> GO TO 7.

NG >> Replace EGRC solenoid valve.

#### 6. CHECK EGRC SOLENOID VALVE

**⊗ 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

OK or NG

OK >> GO TO 7.

NG >> Replace EGRC solenoid valve.

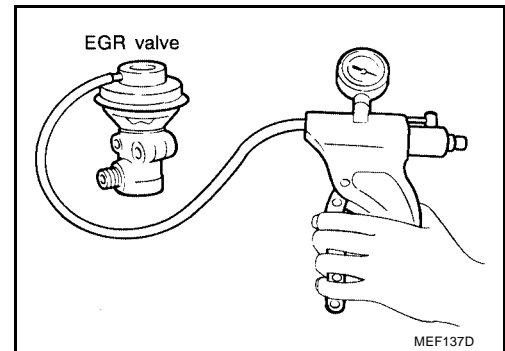


## 7. CHECK EGR VALVE

- 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.

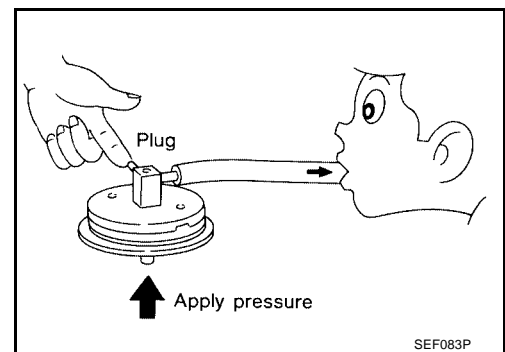


## 8. CHECK EGRC-BPT VALVE

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 mmHg O, 3.94 inHg O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.

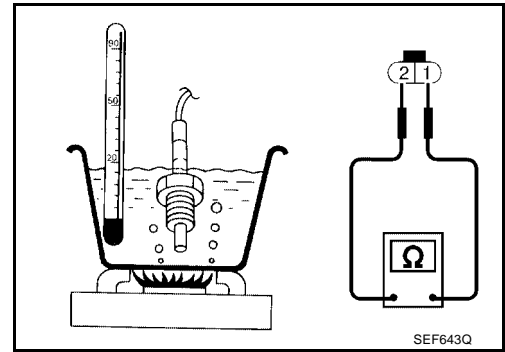
OK or NG

- OK >> GO TO 9.  
NG >> Replace EGRC-BPT valve.



**9. CHECK EGR TEMPERATURE SENSOR**

Check resistance change and resistance value.

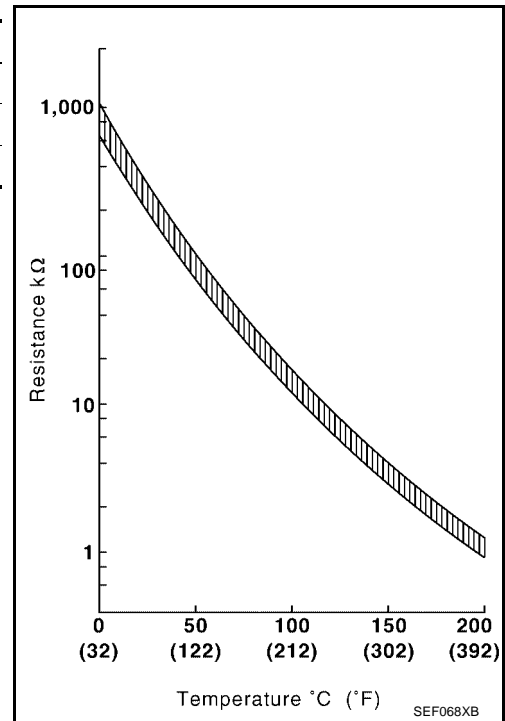


<Reference data>

| EGR temperature C (F) | Voltage [V] | Resistance M  |
|-----------------------|-------------|---------------|
| 0 (32)                | 4.56        | 0.62 - 1.05   |
| 50 (122)              | 2.25        | 0.065 - 0.094 |
| 100 (212)             | 0.59        | 0.011 - 0.015 |

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

PF0:14950

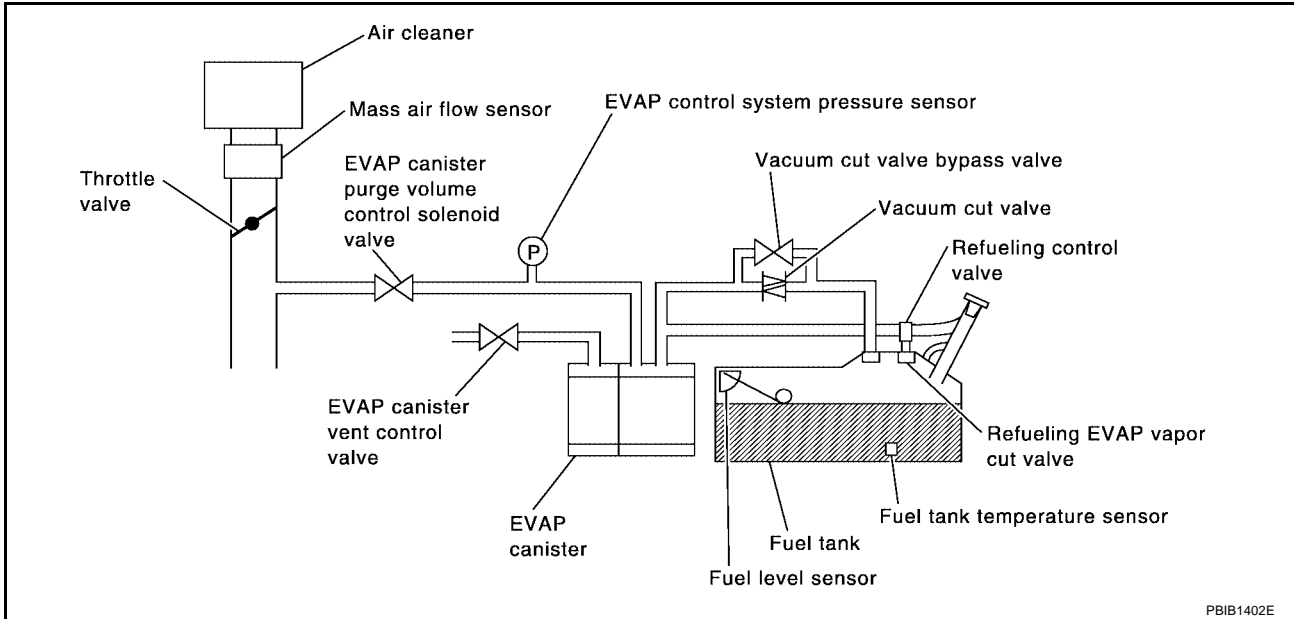
On Board Diagnosis Logic

UBS007G0

NOTE:

If DTC P0442 is displayed with DTC P1448, perform trouble diagnosis for DTC P1448 first. (See [EC-483](#).)

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.



PBIB1402E

# DTC P1442 EVAP CONTROL SYSTEM

[KA24DE]

| DTC No. | Trouble diagnosis name                                      | DTC detecting condition   | Check Items (Possible Cause)   |
|---------|---|---|--|
| P1442   | EVAP control system small leak detected (positive pressure) | <ul style="list-style-type: none"> <li>● EVAP control system has a leak.</li> <li>● EVAP control system does not operate properly.</li> </ul> | <ul style="list-style-type: none"> <li>● Incorrect fuel tank vacuum relief valve</li> <li>● Incorrect fuel filler cap used</li> <li>● Fuel filler cap remains open or fails to close.</li> <li>● Foreign matter caught in fuel filler cap.</li> <li>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>● Foreign matter caught in EVAP canister vent control valve.</li> <li>● EVAP canister or fuel tank leaks</li> <li>● EVAP purge line (pipe and rubber tube) leaks</li> <li>● EVAP purge line rubber tube bent.</li> <li>● Blocked or bent rubber tube to EVAP control system pressure sensor</li> <li>● Loose or disconnected rubber tube</li> <li>● EVAP canister vent control valve and the circuit</li> <li>● EVAP canister purge volume control solenoid valve and the circuit</li> <li>● Fuel tank temperature sensor</li> <li>● O-ring of EVAP canister vent control valve is missing or damaged.</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water.</li> <li>● EVAP control system pressure sensor</li> <li>● Fuel level sensor and the circuit</li> <li>● Refueling control valve</li> <li>● ORVR system leaks</li> </ul> |

## 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

UBS007G1

Refer to "DTC P0442 EVAP CONTROL SYSTEM", [EC-468, "DTC Confirmation Procedure"](#) .

## Diagnostic Procedure

UBS007G2

Refer to "DTC P0442 EVAP CONTROL SYSTEM", [EC-468, "Diagnostic Procedure"](#) .

# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [KA24DE]

## DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

### Description SYSTEM DESCRIPTION

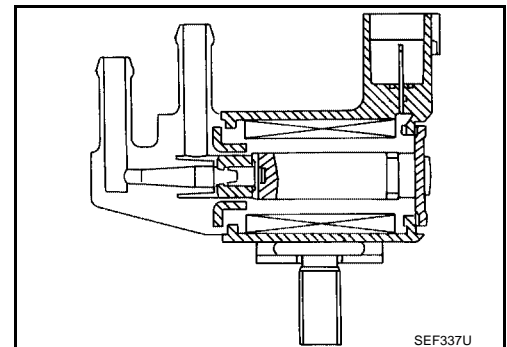
UBS005HF

| Sensor                            | Input Signal to ECM   | ECM function                        | Actuator   |
|-----------------------------------|---|-------------------------------------|--|
| Camshaft position sensor          | Engine speed  | EVAP canister<br>purge flow control | EVAP canister purge volume<br>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<br>(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

UBS005HG

Specification data are reference values.

| MONITOR ITEM | CONDITION   | SPECIFICATION                |
|--------------|---|------------------------------|
| PURG VOL C/V | ● Engine: After warming up<br>● Air conditioner switch "OFF"<br>● Shift lever: "N"<br>● No-load | Idle (Vehicle stopped)<br>0% |
|              | 2,000 rpm (200 seconds after starting engine)   | —                            |

# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [KA24DE]

UBS005HI

## On Board Diagnosis Logic

| 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. | <ul style="list-style-type: none"> <li>● EVAP control system pressure sensor</li> <li>● EVAP canister purge volume control solenoid valve<br/>(The valve is stuck open.)</li> <li>● EVAP canister vent control valve</li> <li>● EVAP canister</li> <li>● Hoses<br/>(Hoses are connected incorrectly or clogged.)</li> </ul> |

## DTC Confirmation Procedure

UBS005HJ

### 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. Check that “FUEL T/TMP SE” is 0°C (32°F) or more.
6. Select “PURG VOL C/V P1444” of “EVAP SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
7. Touch “START”.

|                     |          |
|---------------------|----------|
| PURG VOL CN/V P1444 |          |
| OUT OF CONDITION    |          |
| MONITOR             |          |
| ENG SPEED           | XXX rpm  |
| THRTL POS SEN       | XXX V    |
| B/FUEL SCHDL        | XXX msec |

SEF205Y

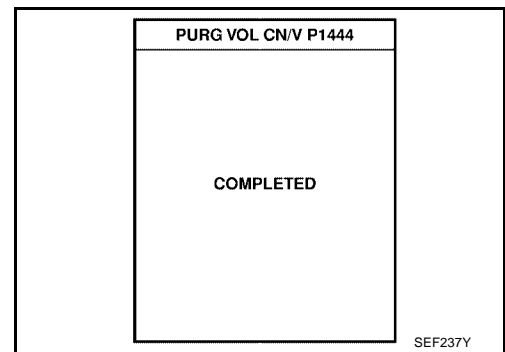
8. Start engine and let it idle until “TESTING” on CONSULT-II changes to “COMPLETED”. (It will take for at least 10 seconds.)  
**If “TESTING” is not displayed after 5 minutes, retry from step 2.**

|                     |          |
|---------------------|----------|
| PURG VOL CN/V P1444 |          |
| TESTING             |          |
| MONITOR             |          |
| ENG SPEED           | XXX rpm  |
| THRTL POS SEN       | XXX V    |
| B/FUEL SCHDL        | XXX msec |

SEF206Y

# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [KA24DE]

9. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".  
If "NG" is displayed, refer to [EC-474, "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-474, "Diagnostic Procedure"](#) .

A

EC

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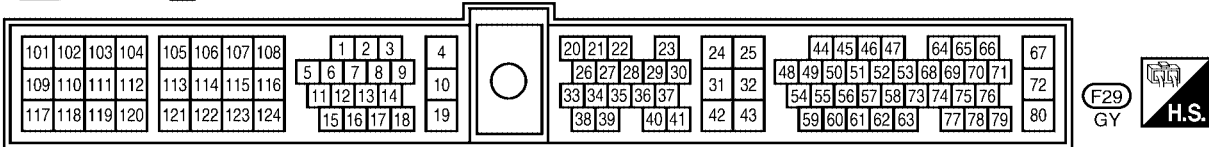
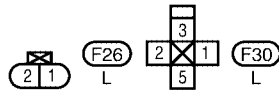
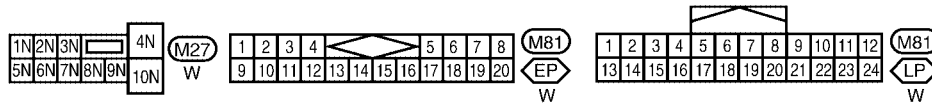
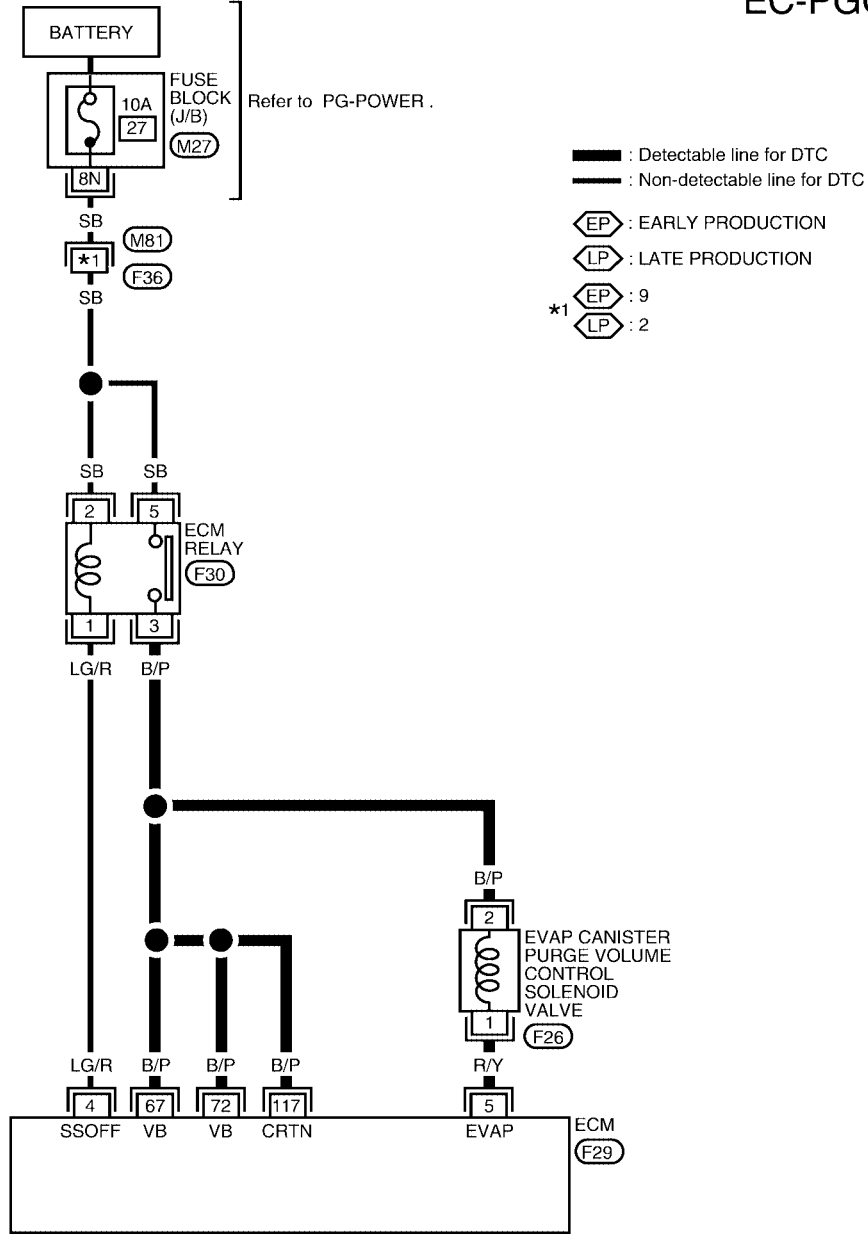
M

# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [KA24DE]

UBS005HK

## Wiring Diagram

EC-PGC/V-01



WBWA0015E

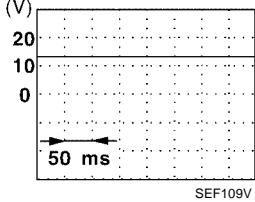
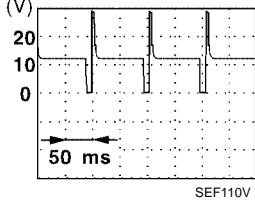


# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [KA24DE]

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

**CAUTION:**

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

| TER-MINAL NO. | WIRE COLOR | ITEM  | CONDITION   | DATA (DC Voltage)   |
|---------------|------------|---|---|---|
| 4             | LG/R       | ECM relay (Self-shutoff)                          | [Engine is running]<br>[Ignition switch "OFF"]<br>● For a few seconds after turning ignition switch "OFF" | 0 - 1V  |
|               |            |   | [Ignition switch "OFF"]<br>● A few seconds passed after turning ignition switch "OFF"                     | BATTERY VOLTAGE (11 - 14V)  |
| 5             | R/Y        | EVAP canister purge volume control solenoid valve | [Engine is running]<br>● Idle speed   | BATTERY VOLTAGE (11 - 14V)★<br>  |
|               |            |   | [Engine is running]<br>● Engine speed is 2,000 rpm  | BATTERY VOLTAGE (11 - 14V)★<br> |
| 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]<br>● Idle speed   | BATTERY VOLTAGE (11 - 14V)  |

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

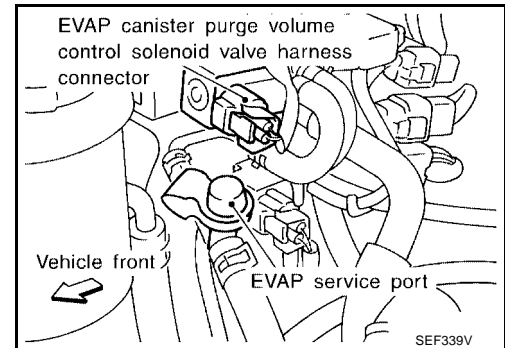
# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [KA24DE]

UBS005HL

## Diagnostic Procedure

### 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".

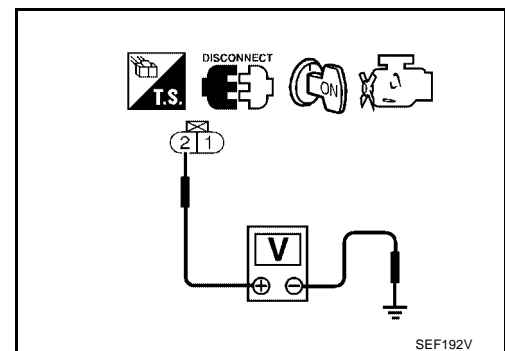


4. Check voltage between EVAP canister purge volume control solenoid valve terminal 2 and engine ground with CONSULT-II or tester.

**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

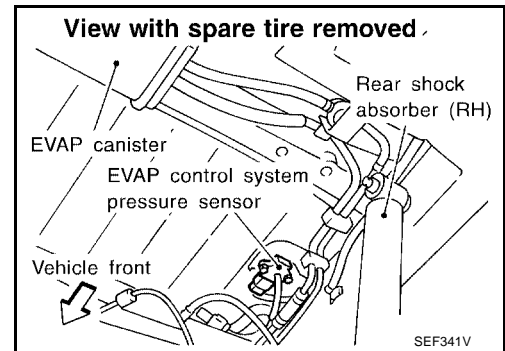
Check the harness for open or short between EVAP canister purge volume control solenoid valve and ECM.

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

# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [KA24DE]

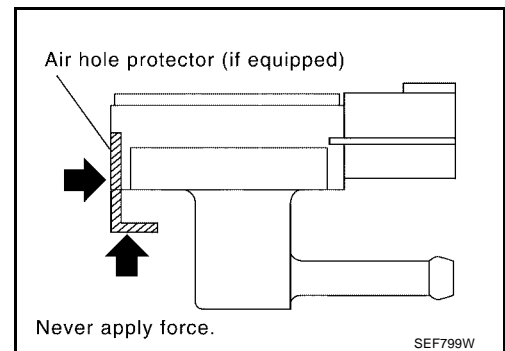
## 5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



**CAUTION:**

Never apply force to the air hole protector of the sensor, if equipped.



2. Remove hose from EVAP control system pressure sensor.
3. Use pump to apply vacuum and pressure to EVAP control system pressure sensor as shown in figure.

**CAUTION:**

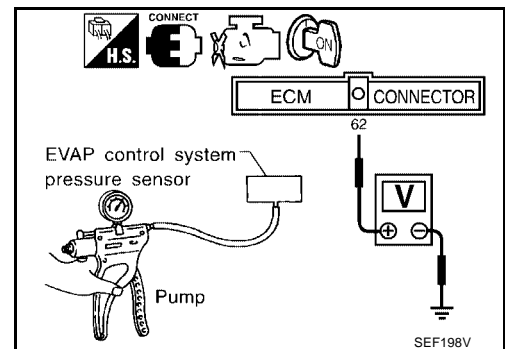
- Always calibrate the vacuum pump gauge when using it.
- Do not apply below  $-93.3 \text{ kPa}$  ( $-700 \text{ mmHg}$ ,  $-27.56 \text{ inHg}$ ) or over  $101.3 \text{ kPa}$  ( $760 \text{ mmHg}$ ,  $29.56 \text{ inHg}$ ) of pressure.

4. Check output voltage between ECM terminal 62 and engine 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.

# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [KA24DE]

## 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.

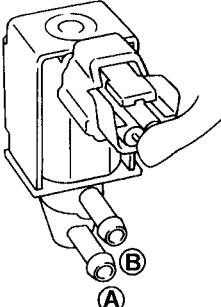
| ACTIVE TEST     |         |
|-----------------|---------|
| PURG VOL CONT/V | XXX %   |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| HO2S1 MNTR (B1) | LEAN    |
| THRTL POS SEN   | XXX V   |
|                 |         |
|                 |         |
|                 |         |

SEF801Y

## 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.

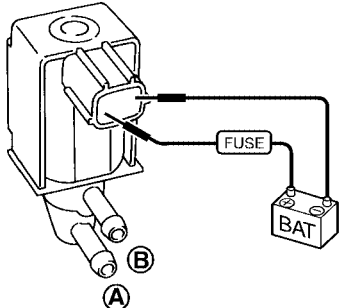


| Condition<br>PURG VOL CONT/V value | Air passage continuity<br>between A and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |

SEF334X

### Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



| Condition  | Air passage continuity<br>between A and B |
|--|---|
| 12V direct current supply between<br>terminals 1 and 2 | Yes                                       |
| No supply  | No  |

SEF335X

#### OK or NG

- OK >> GO TO 8.  
 NG >> Replace EVAP canister purge volume control solenoid valve.

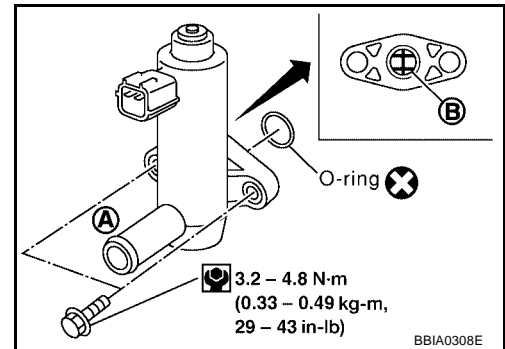
# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [KA24DE]

## 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**

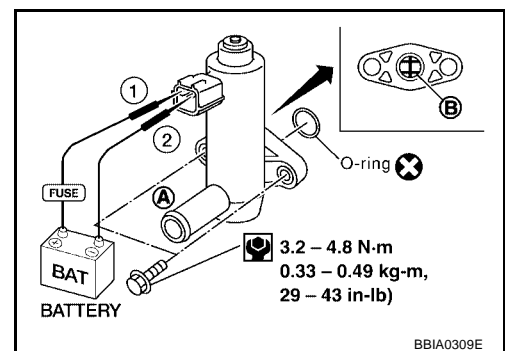
Check air passage continuity and operation delay time under the following condition.

| 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.

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.

# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [KA24DE]

## 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.

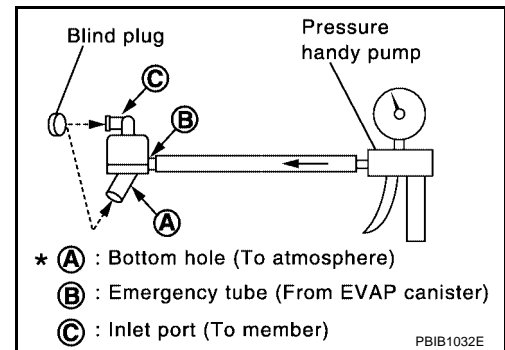
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG 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.



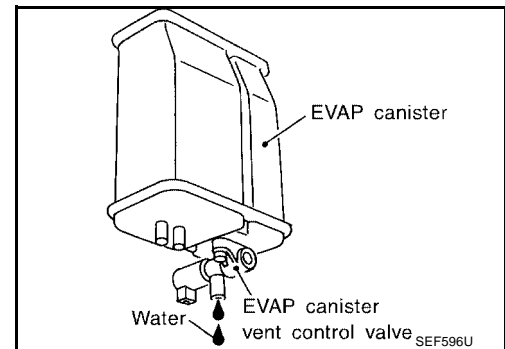
## 12. CHECK IF EVAP CANISTER SATURATED WITH WATER

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-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

## DTC P1446 EVAP CANISTER VENT CONTROL VALVE

PFP:14935

### Component Description

UBS005HM

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.

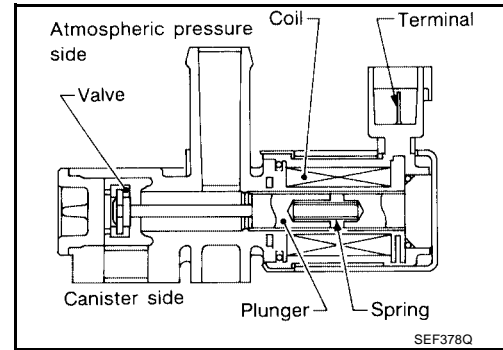
This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.

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

UBS005HN

Specification data are reference values.

| MONITOR ITEM | CONDITION             | SPECIFICATION |
|--------------|-----------------------|---------------|
| VENT CONT/V  | ● Ignition switch: ON | OFF           |

### On Board Diagnosis Logic

UBS005HP

| 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. | <ul style="list-style-type: none"> <li>● EVAP canister vent control valve</li> <li>● EVAP control system pressure sensor and the circuit</li> <li>● Blocked rubber tube to EVAP canister vent control valve</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water</li> </ul> |

### DTC Confirmation Procedure

UBS005HQ

#### 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-480, "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.

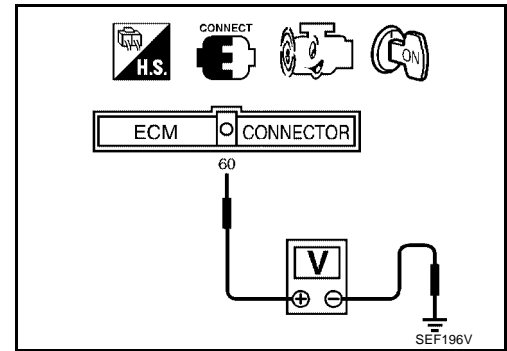
| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| COOLAN TEMP/S | XXX °C   |
| VHCL SPEED SE | XXX km/h |
| B/FUEL SCHDL  | XXX msec |

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# DTC P1446 EVAP CANISTER VENT CONTROL VALVE

[KA24DE]

2. Check that voltage between ECM terminal 60 (fuel tank temperature sensor signal) and ground is less than 4.2V.
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-480, "Diagnostic Procedure"](#)



UBS005HR

## Diagnostic Procedure

### 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.

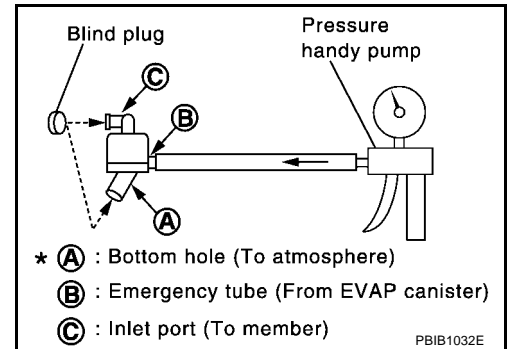
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG 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.



PBIB1032E

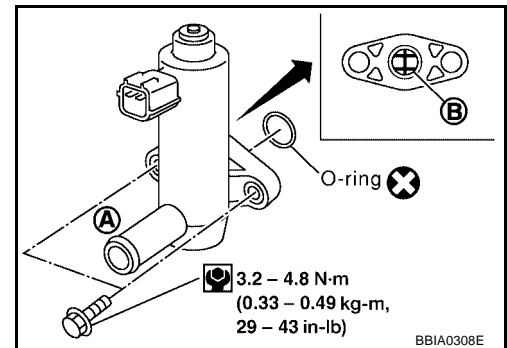
### 2. CHECK EVAP CANISTER VENT CONTROL VALVE-I

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.



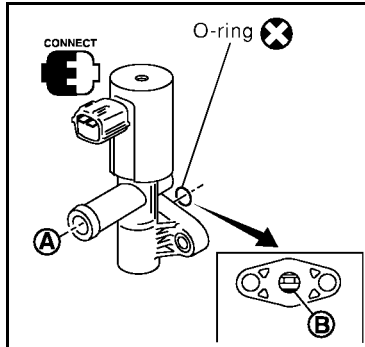
BBIA0308E



## 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<br>VENT CONTROL/V | Air passage continuity<br>between A and B |
|-----------------------------|---|
| ON                          | No  |
| OFF                         | Yes                                       |

**Operation takes less than 1 second.**

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### Without CONSULT-II

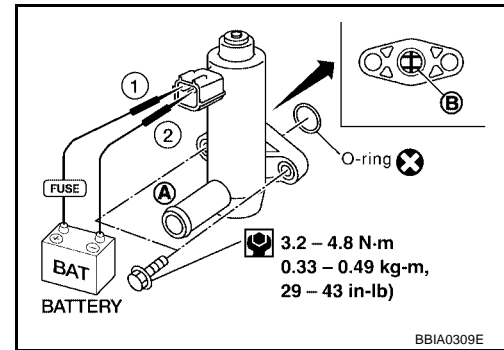
Check air passage continuity and operation delay time under the following condition.

| Condition  | Air passage continuity between<br>A and B |
|--|---|
| 12V direct current supply between<br>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

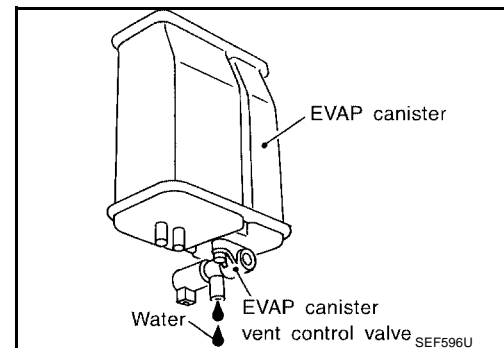
- OK >> GO TO 5.
- NG >> Replace EVAP canister vent control valve.

## 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-338](#) and DTC P0453, [EC-345](#) .

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

### Component Description

**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.

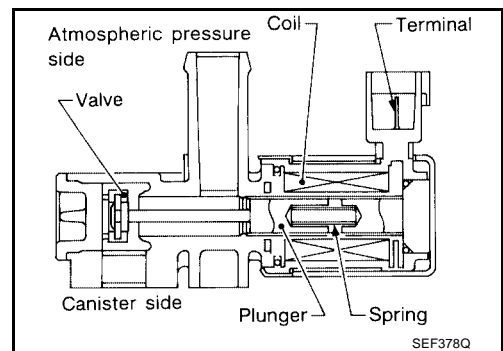
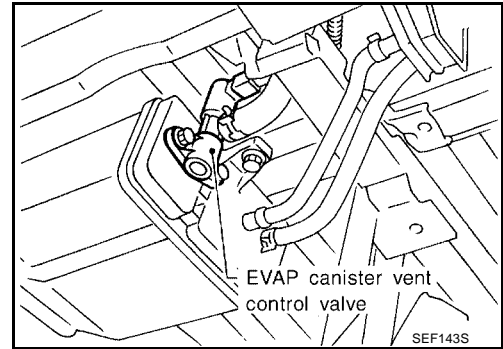
This solenoid (the EVAP canister vent control valve) responds to signals from the ECM.

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

Specification data are reference values.

| MONITOR ITEM | CONDITION             | SPECIFICATION |
|--------------|-----------------------|---------------|
| VENT CONT/V  | ● Ignition switch: ON | OFF           |

### On Board Diagnosis Logic

| 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. | <ul style="list-style-type: none"> <li>● EVAP canister vent control valve</li> <li>● EVAP control system pressure sensor and the circuit</li> <li>● Blocked rubber tube to EVAP canister vent control valve</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water</li> <li>● Vacuum cut valve</li> </ul> |

## DTC Confirmation Procedure

**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.

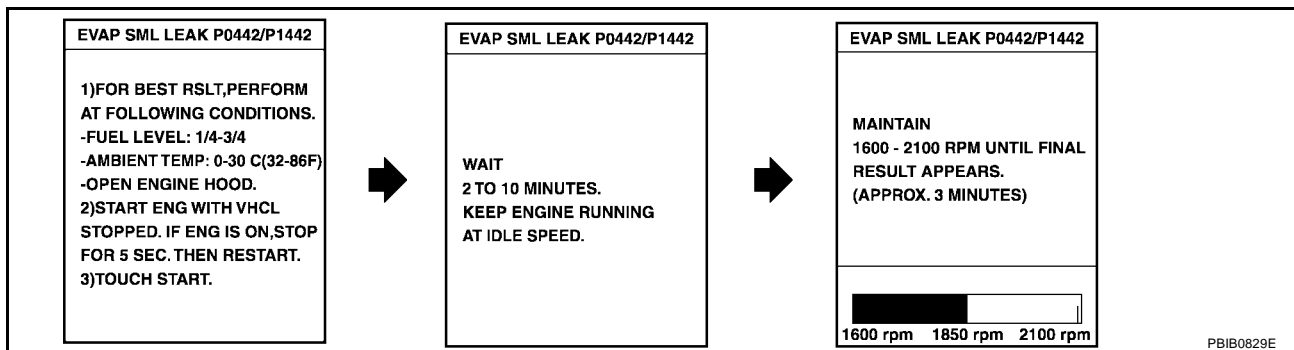
**WITH CONSULT-II  
TESTING CONDITION:**

- 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.

|                |                       |
|----------------|-----------------------|
| COOLANT 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:**

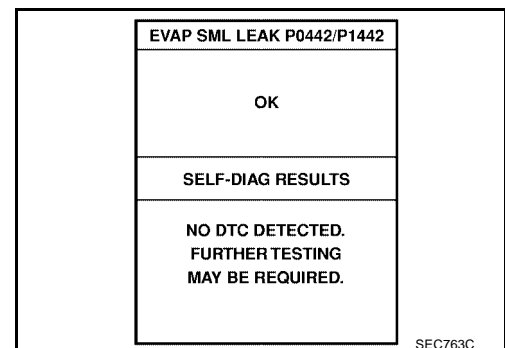
- If “CAN NOT BE DIAGNOSED” is displayed on the CONSULT-II screen, stop the engine and stabilize the vehicle temperature at 25°C (77°F) or cooler. After “FUEL T/TMP SE” becomes less than 30°C (86°F), retest. (Use a fan to reduce the stabilization time.)
- If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to [EC-73. "Basic Inspection"](#).
- The engine idle portion of this test (See illustration.) will take approximately 5 minutes.

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 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.



# DTC P1448 EVAP CANISTER VENT CONTROL VALVE

[KA24DE]

11. Make sure of the following.

| Condition      | Air passage continuity between <b>A</b> and <b>B</b> |
|----------------|--|
| Touching "ON"  | No   |
| Touching "OFF" | Yes  |

If the result is NG, go to [EC-485, "Diagnostic Procedure"](#) .  
 If the result is OK, go to "Diagnostic Procedure" for DTC P0442, [EC-314](#) .

| 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   |
|                |         |
|                |         |
|                |         |

UBS005HX

## Overall Function Check

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-485, "Diagnostic Procedure"](#) .  
 If the result is OK, perform trouble diagnosis for DTC P0442. Refer to [EC-314](#) .

UBS005HY

## Diagnostic Procedure

### 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.

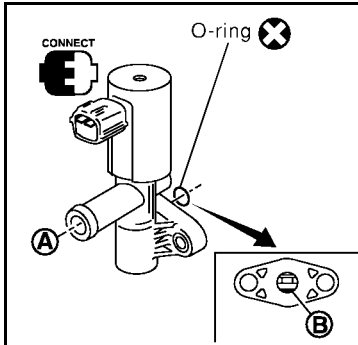
OK or NG

- 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<br>VENT CONTROL/V | Air passage continuity<br>between A and B |
|-----------------------------|---|
| ON                          | No  |
| OFF                         | Yes                                       |

**Operation takes less than 1 second.**

SEF991Y

### Without CONSULT-II

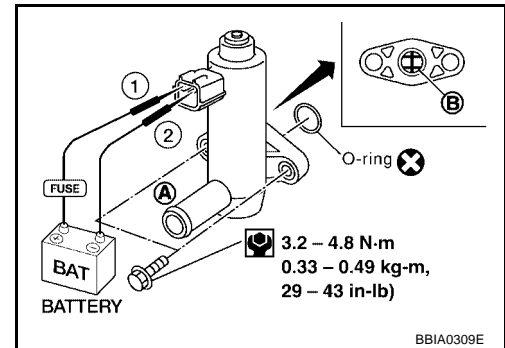
Check air passage continuity and operation delay time under the following condition.

| Condition  | Air passage continuity between<br>A and B |
|--|---|
| 12V direct current supply between<br>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.

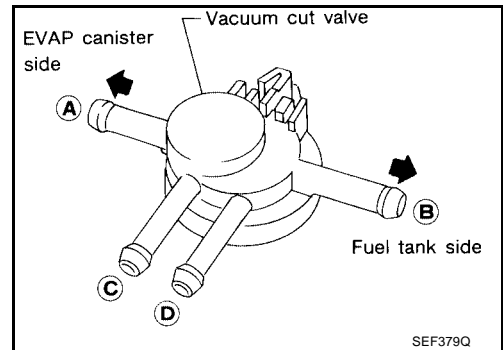
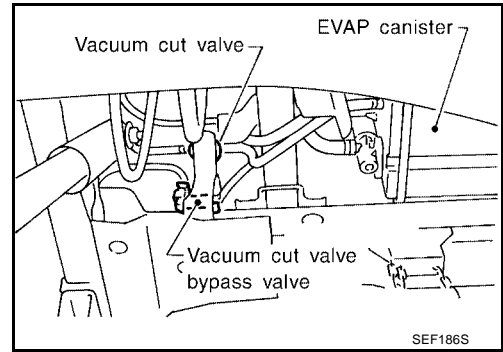
**5. CHECK VACUUM CUT VALVE**

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.

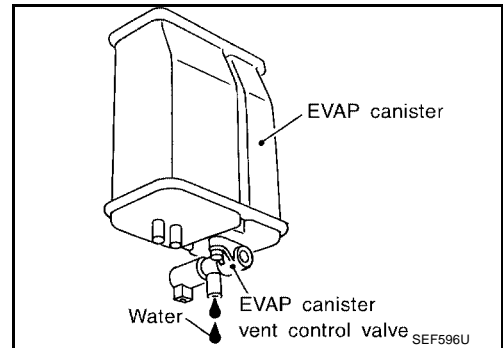


**6. CHECK IF EVAP CANISTER IS SATURATED WITH WATER**

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

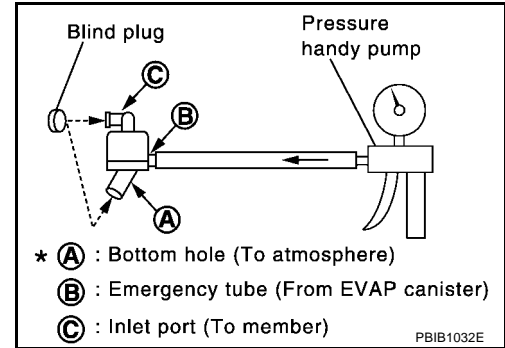
- OK >> GO TO 9.
- NG >> GO TO 8.

## 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-338](#) and DTC P0453, [EC-345](#) .

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**

UBS006HU

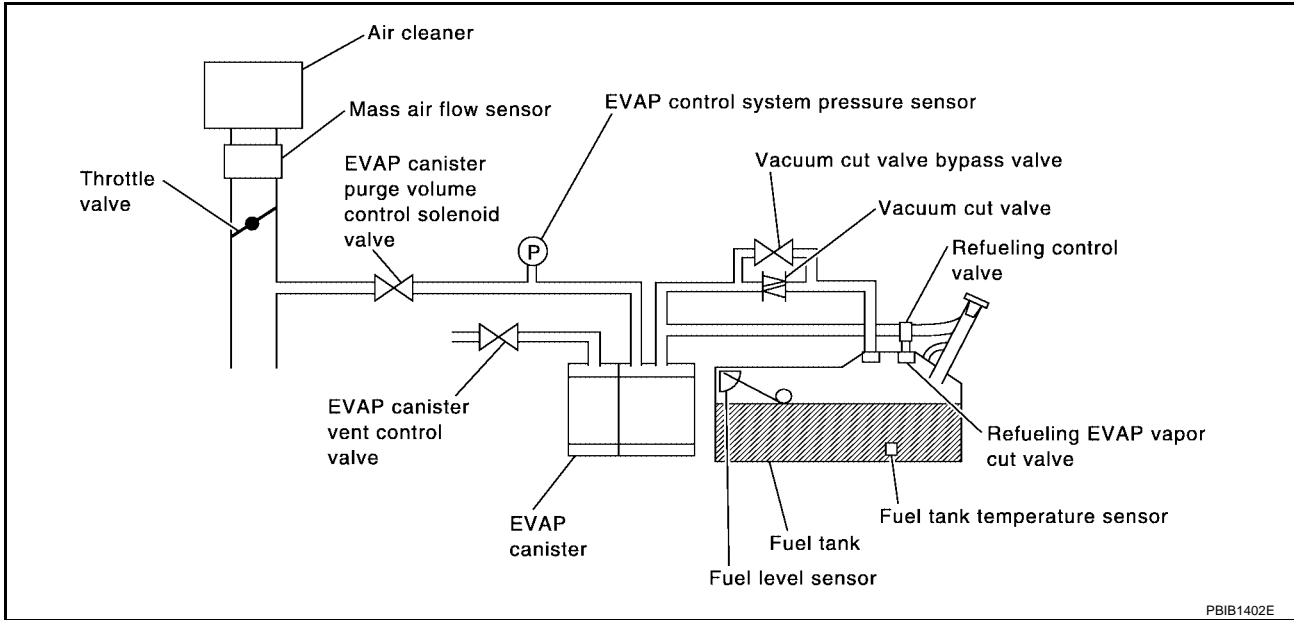
This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using of vapor pressure in the fuel tank.

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.



PBIB1402E

# DTC P1456 EVAP CONTROL SYSTEM

[KA24DE]

| DTC No. | Trouble diagnosis name  | DTC detecting condition  | Possible cause  |
|---------|---|--|---|
| P1456   | Evaporative emission control system very small leak (positive pressure check) | <ul style="list-style-type: none"> <li>● EVAP system has a very small leak.</li> <li>● EVAP system does not operate properly.</li> </ul> | <ul style="list-style-type: none"> <li>● Incorrect fuel tank vacuum relief valve</li> <li>● Incorrect fuel filler cap used</li> <li>● Fuel filler cap remains open or fails to close.</li> <li>● Foreign matter caught in fuel filler cap.</li> <li>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>● Foreign matter caught in EVAP canister vent control valve.</li> <li>● EVAP canister or fuel tank leaks</li> <li>● EVAP purge line (pipe and rubber tube) leaks</li> <li>● EVAP purge line rubber tube bent</li> <li>● Blocked or bent rubber tube to EVAP control system pressure sensor</li> <li>● Loose or disconnected rubber tube</li> <li>● EVAP canister vent control valve and the circuit</li> <li>● EVAP canister purge volume control solenoid valve and the circuit</li> <li>● Fuel tank temperature sensor</li> <li>● O-ring of EVAP canister vent control valve is missing or damaged</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water</li> <li>● EVAP control system pressure sensor</li> <li>● Refueling control valve</li> <li>● ORVR system leaks</li> <li>● Fuel level sensor and the circuit</li> <li>● Foreign matter caught in EVAP canister purge volume control solenoid valve</li> </ul> |

**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

UBS006HW

**NOTE:**

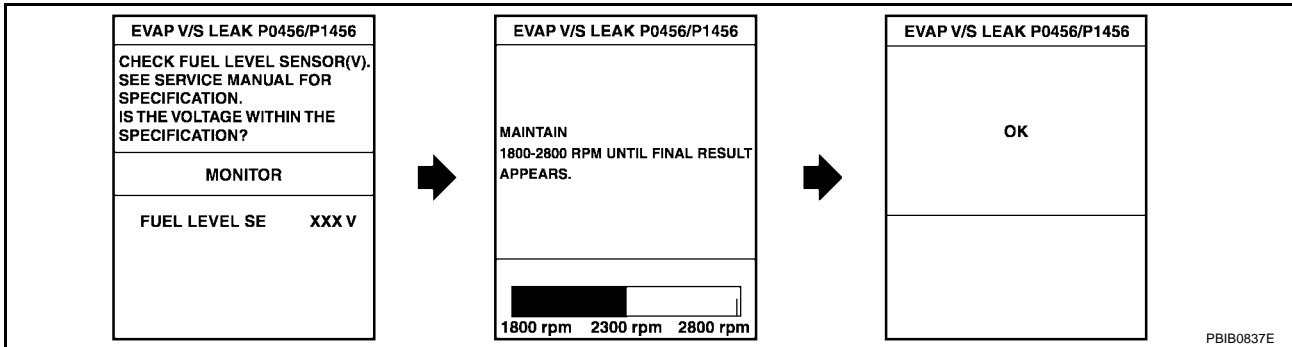
- If DTC P0456 or P1456 is displayed with P0442, first perform trouble diagnosis for DTC P0456 or P1456.
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
- After repair, make sure that the hoses and clips are installed properly.
- If “DTC Confirmation 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-492, "Diagnostic Procedure"](#).

**NOTE:**

- If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to [EC-73, "Basic Inspection"](#).

## Overall Function Check

UBS007FV

**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<sup>2</sup>, 0.6 psi).

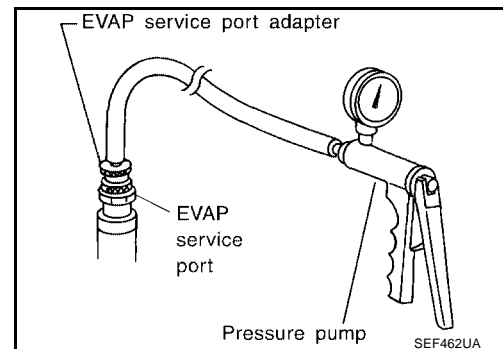
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Set the pressure pump and a hose.
3. Also set a vacuum gauge via 3-way connector and a hose.
4. Turn ignition switch "ON".
5. Connect GST and select mode 8.
6. Using mode 8 control the EVAP canister vent control valve (close) 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-492, "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

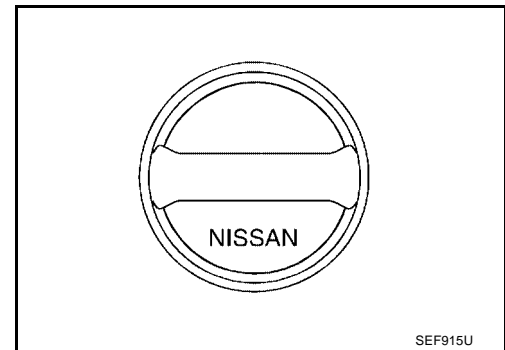
UBS006HX

### 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

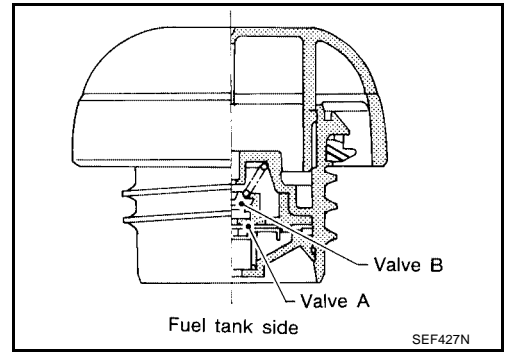
- Check for air releasing sound while opening the fuel filler cap.

OK or NG

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

**4. CHECK FUEL TANK VACUUM RELIEF VALVE**

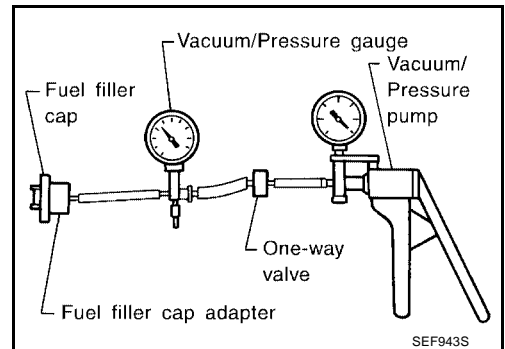
1. Wipe clean valve housing.



2. Check valve opening pressure and vacuum.

**Pressure** : 15.3 - 20.0 kPa  
 (0.156 - 0.204 kg/cm<sup>2</sup> , 2.22 - 2.90 psi)  
**Vacuum** : -6.0 to -3.3 kPa  
 (-0.061 to -0.034 kg/cm<sup>2</sup> , -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.

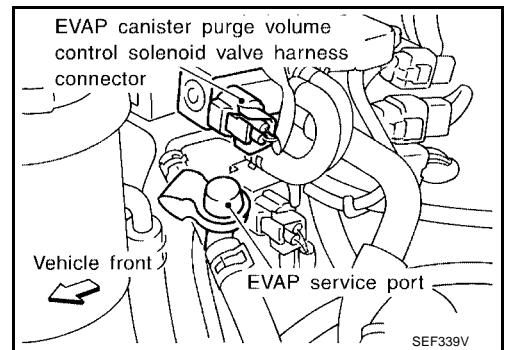


OK or NG

- OK >> GO TO 5.
- NG >> Replace fuel filler cap with a genuine one.

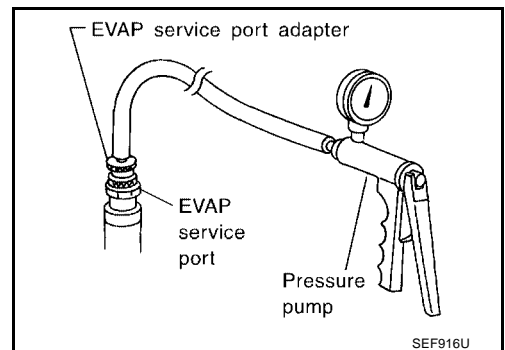
**5. INSTALL THE PRESSURE PUMP**

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.



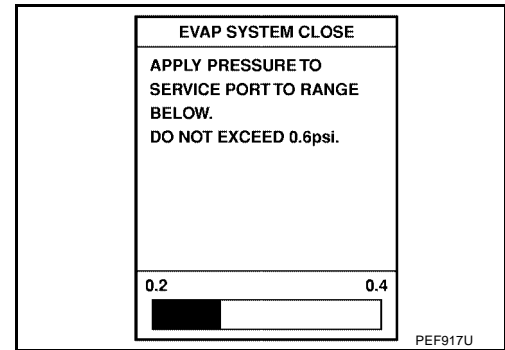
**6. CHECK FOR EVAP LEAK**

**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:**

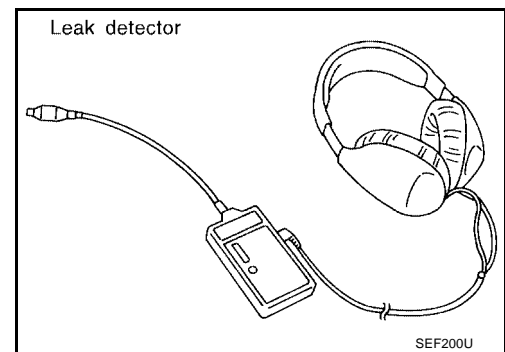
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-568, "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.

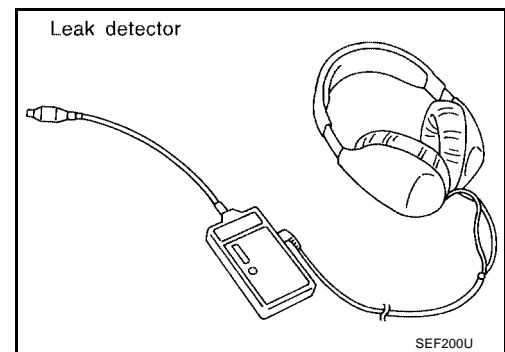
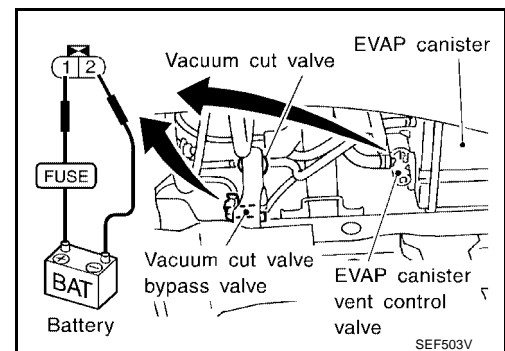
**NOTE:**

- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 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-568, "EVAPORATIVE EMISSION LINE DRAWING"](#) .

**OK or NG**

- OK >> GO TO 8.
- NG >> Repair or replace.



## 8. CHECK WATER SEPARATOR

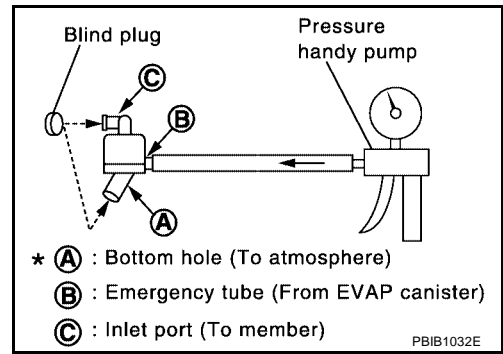
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG 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-484, "DTC Confirmation Procedure"](#) .

OK or NG

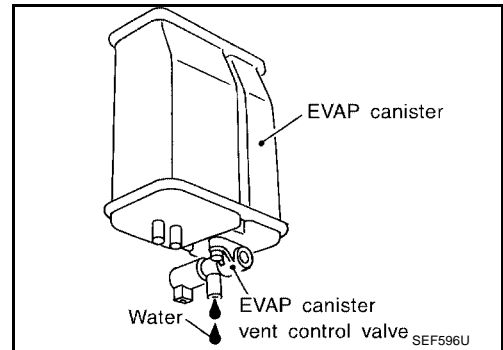
- OK >> GO TO 10.  
 NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

## 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 100.0%.
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.

| ACTIVE TEST     |         |
|-----------------|---------|
| PURG VOL CONT/V | XXX %   |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XX %    |
| HO2S1 MNTR (B1) | LEAN    |
|                 |         |
|                 |         |
|                 |         |
|                 |         |

PBIB0828E

**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-29, "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.

| 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   |
|                 |         |

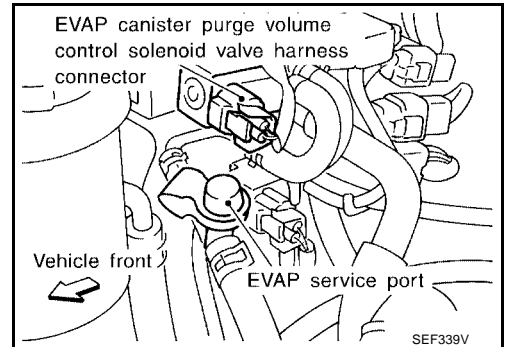
SEF985Y

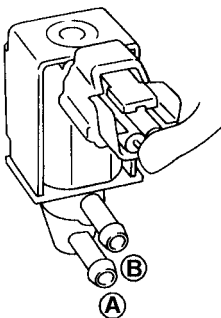


17. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

 With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



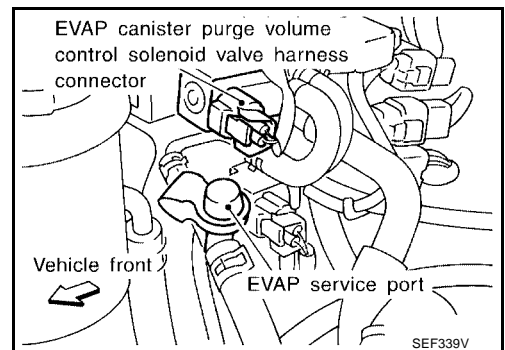


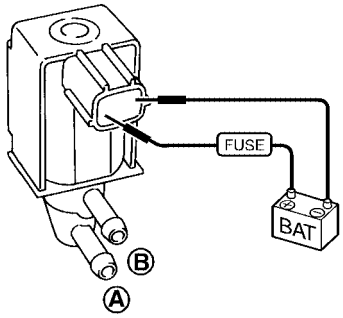
| Condition<br>PURG VOL CONT/V value | Air passage continuity<br>between A and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |

SEF334X

 Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.





| Condition  | Air passage continuity<br>between A and B |
|--|---|
| 12V direct current supply between<br>terminals 1 and 2 | Yes                                       |
| No supply  | No  |

SEF335X

OK or NG

OK >> GO TO 18.

NG >> Replace EVAP canister purge volume control solenoid valve.

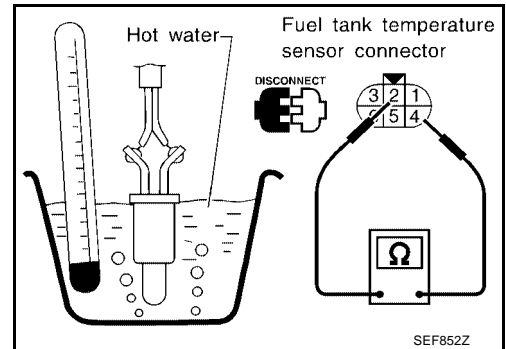
**18. CHECK FUEL TANK TEMPERATURE SENSOR**

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   |

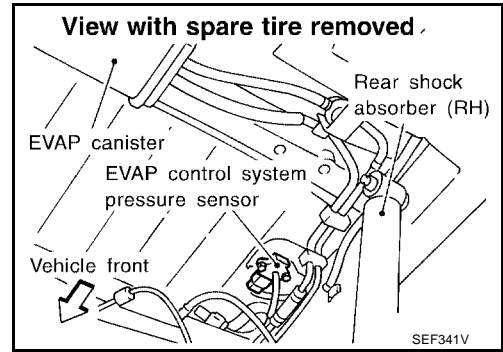
**OK or NG**

- OK >> GO TO 19.  
 NG >> Replace fuel level sensor unit.



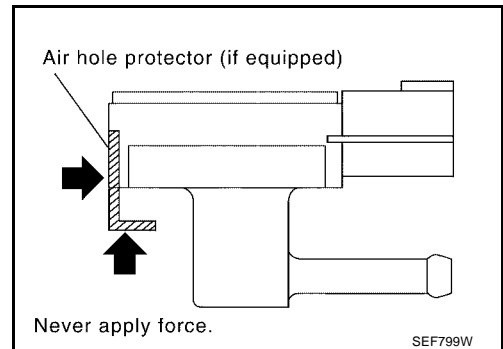
19. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected.



**CAUTION:**

Never apply force to the air hole protector of the sensor, if equipped.



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:**

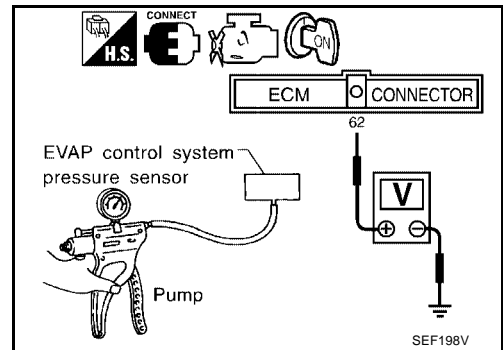
- Always calibrate the vacuum pump gauge when using it.
- Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or over 101.3 kPa (760 mmHg, 29.56 inHg) of pressure.

4. Check output voltage between ECM terminal 62 and engine 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-568, "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 FUEL LEVEL SENSOR

---

Refer to [DI-18, "FUEL LEVEL SENSOR UNIT CHECK"](#) .

OK or NG

OK >> GO TO 23.

NG >> Replace fuel level sensor unit.

## 23. CHECK INTERMITTENT INCIDENT

---

- Refer to [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**DTC P1464 FUEL LEVEL SENSOR**

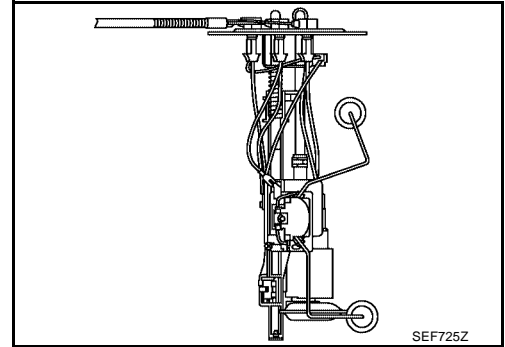
PF2:25060

**Component Description**

UBS005HZ

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



UBS00510

**On Board Diagnostic Logic**

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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> </ul> |

**DTC Confirmation Procedure**

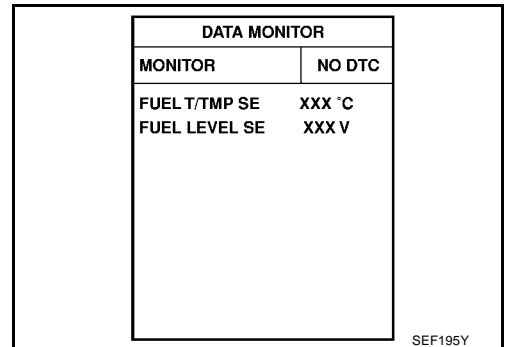
UBS00512

**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-503, "Diagnostic Procedure"](#)



**WITH GST**

Follow the procedure "WITH CONSULT-II" above.

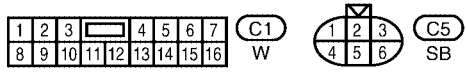
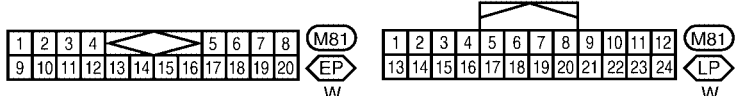
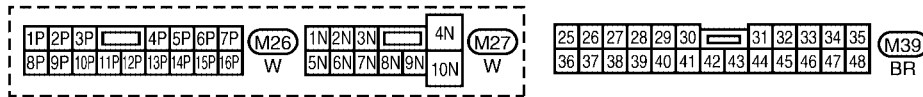
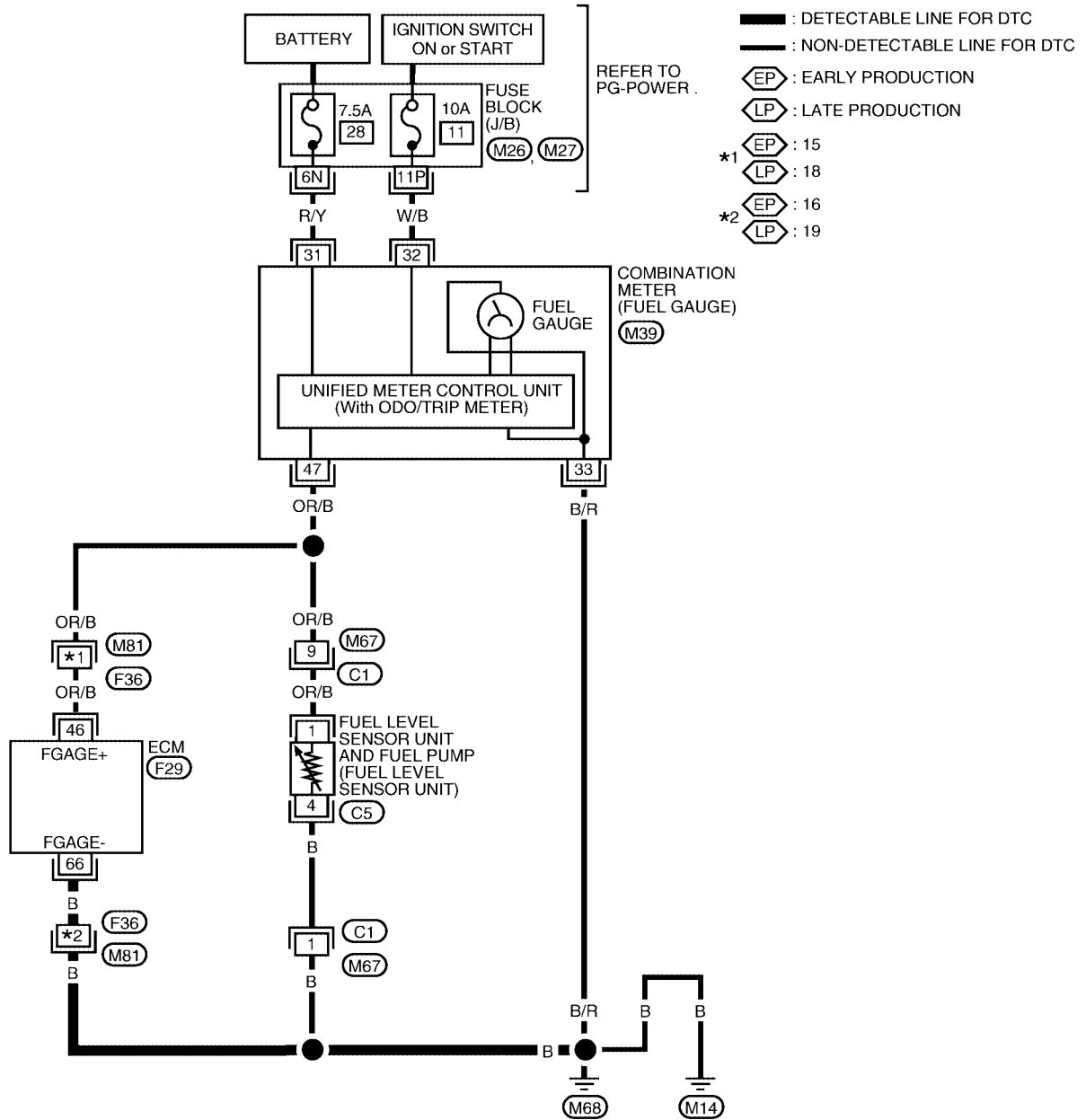
# DTC P1464 FUEL LEVEL SENSOR

[KA24DE]

UBS00513

## Wiring Diagram

### EC-FLS3-01



WBWA0054E

## Diagnostic Procedure

### 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 body 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 body 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

### FUEL LEVEL SENSOR UNIT

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

A

EC

C

D

E

F

G

H

I

J

K

L

M

## DTC P1490 VACUUM CUT VALVE BYPASS VALVE

PFP:17372

### Description

UBS00515

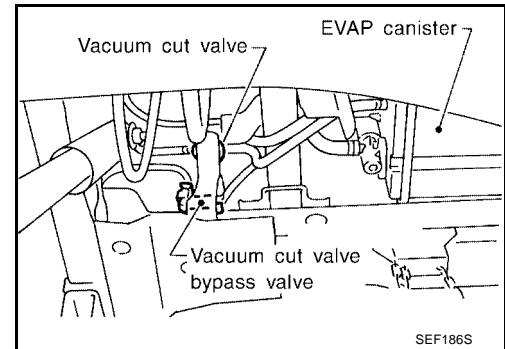
#### COMPONENT DESCRIPTION

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.

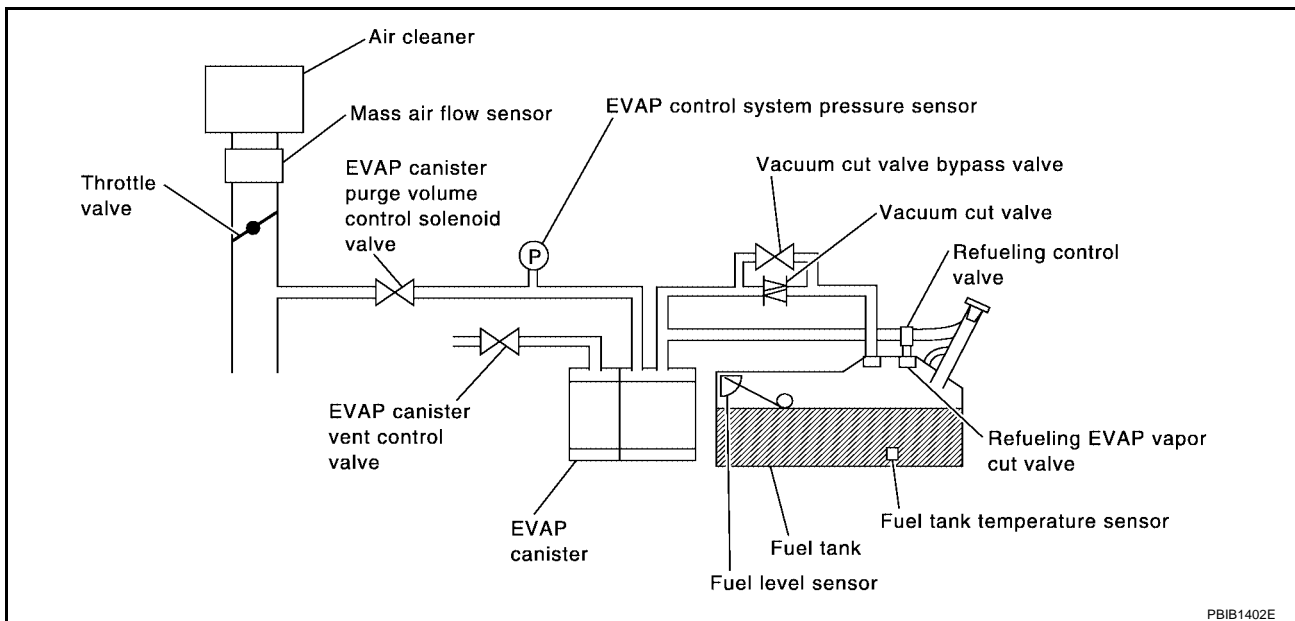
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

UBS00516

Specification data are reference values.

| MONITOR ITEM  | CONDITION             | SPECIFICATION |
|---------------|-----------------------|---------------|
| VC/V BYPASS/V | ● Ignition switch: ON | OFF           |

#### On Board Diagnosis Logic

UBS00518

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted)</li> <li>● Vacuum cut valve bypass valve</li> </ul> |



## DTC Confirmation Procedure

**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-507, "Diagnostic Procedure"](#)

 **WITH GST**

Follow the procedure "WITH CONSULT-II".

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

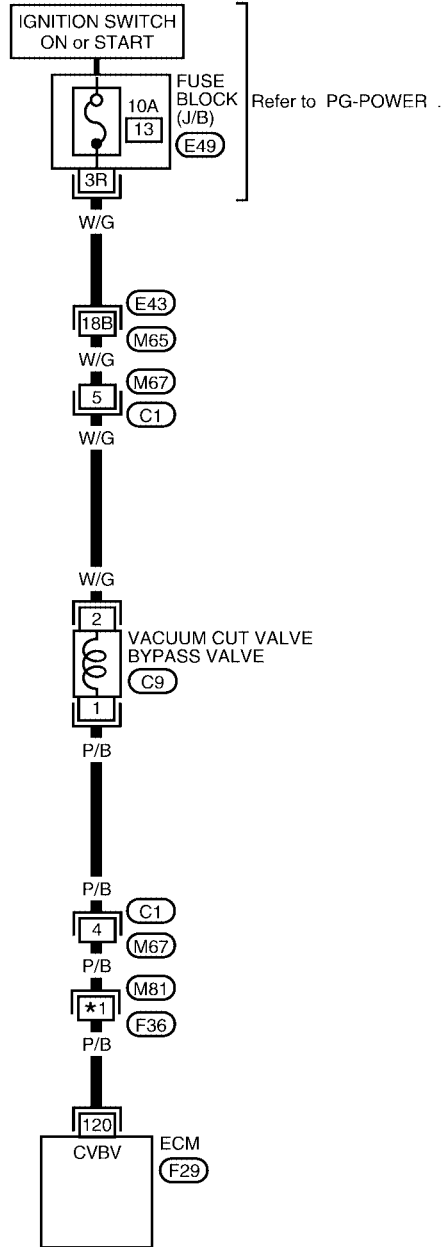
# DTC P1490 VACUUM CUT VALVE BYPASS VALVE

[KA24DE]

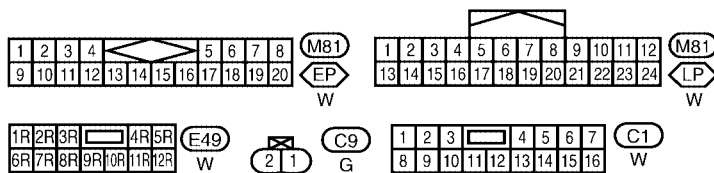
UBS0051A

## Wiring Diagram

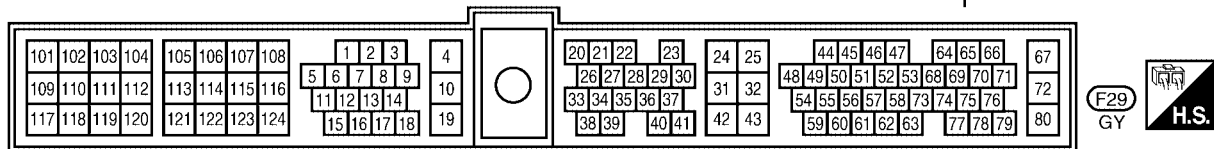
### EC-BYPS/V-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- \*1 EP : 12
- LP : 15



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



WBWA0055E

# DTC P1490 VACUUM CUT VALVE BYPASS VALVE

[KA24DE]

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

**CAUTION:**

Do not use ECM ground terminals when measuring input/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 COLO R | ITEM                          | CONDITION              | DATA (DC Voltage)          |
|---------------|-------------|-------------------------------|------------------------|----------------------------|
| 120           | P/B         | Vacuum cut valve bypass valve | [Ignition switch "ON"] | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

UBS0051B

### 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

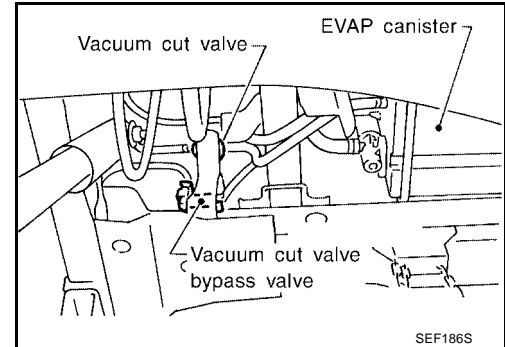
- OK >> GO TO 7.
- NG >> GO TO 3.

| 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   |
|                 |         |
|                 |         |
|                 |         |

SEF806Y

## 3. CHECK POWER SUPPLY

1. Turn ignition switch "OFF".
2. Disconnect vacuum cut valve bypass valve harness connector.
3. Turn ignition switch "ON".

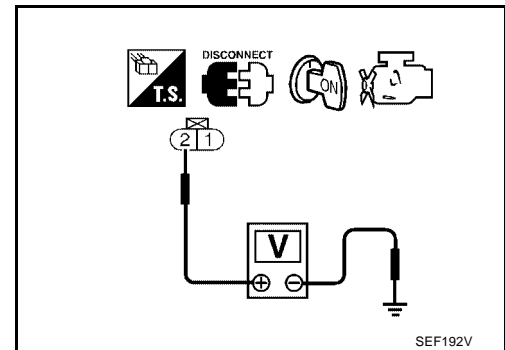


4. Check voltage between terminal 2 and ground with CONSULT-II or tester.

**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 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

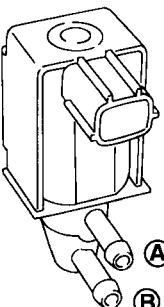
>> Repair open circuit or short to ground or short to power in harness or connectors.

## 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   |
|                 |         |
|                 |         |
|                 |         |

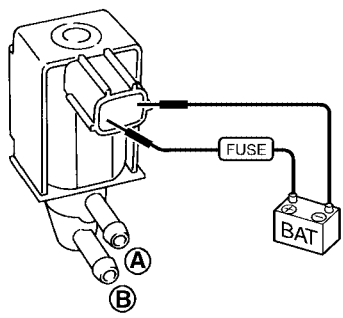
| Condition<br>VC/V BYPASS/V | Air passage continuity<br>between A and B |
|----------------------------|---|
| ON                         | Yes                                       |
| OFF                        | No  |

Operation takes less than 1 second.

SEF807Y

### ⊗ Without CONSULT-II

Check air passage continuity shown in the figure.



| Condition   | Air passage continuity<br>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

PF17372

Description

UBS0051C

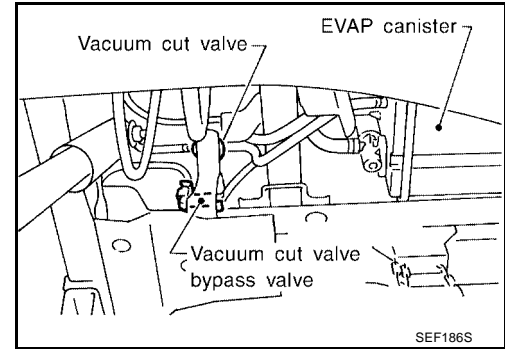
COMPONENT DESCRIPTION

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.

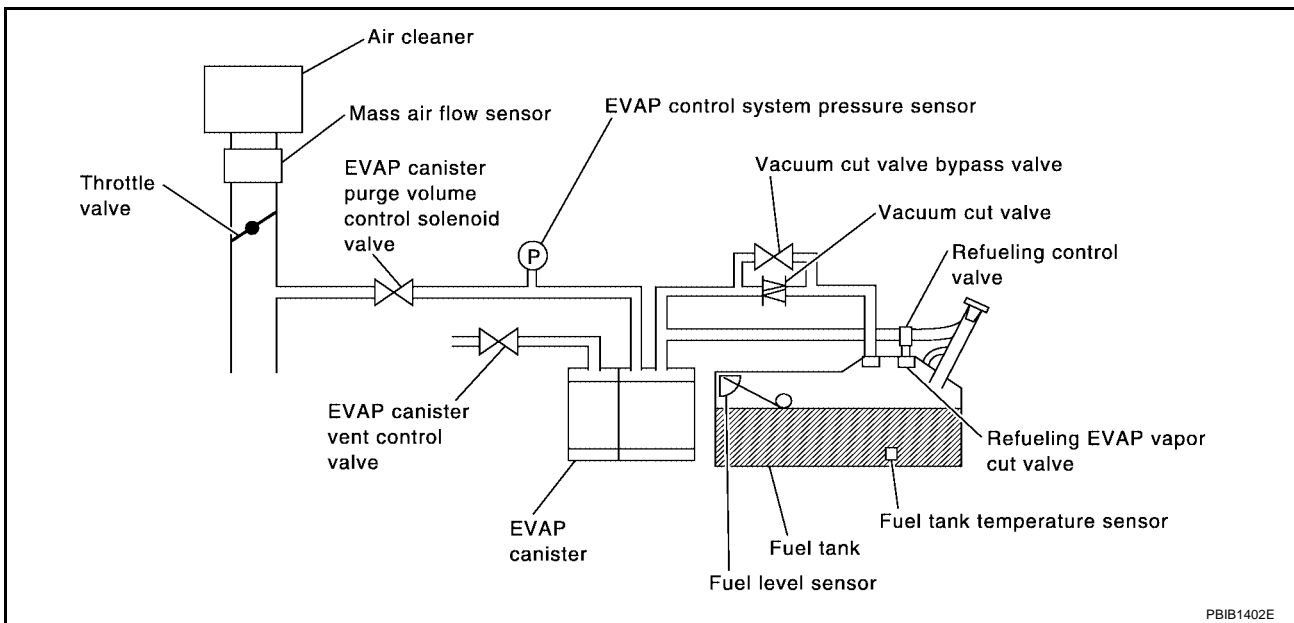
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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



PBIB1402E

CONSULT-II Reference Value in Data Monitor Mode

UBS0051D

Specification data are reference values.

| MONITOR ITEM  | CONDITION             | SPECIFICATION |
|---------------|-----------------------|---------------|
| VC/V BYPASS/V | ● Ignition switch: ON | OFF           |

## On Board Diagnosis Logic

UBS0051F

| 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. | <ul style="list-style-type: none"> <li>● Vacuum cut valve bypass valve</li> <li>● Vacuum cut valve</li> <li>● Bypass hoses for clogging</li> <li>● EVAP control system pressure sensor and circuit</li> <li>● EVAP canister vent control valve</li> <li>● Hose between fuel tank and vacuum cut valve clogged</li> <li>● Hose between vacuum cut valve and EVAP canister clogged</li> <li>● EVAP canister</li> <li>● EVAP purge port of fuel tank for clogging</li> <li>● Refueling control valve</li> <li>● Refueling EVAP vapor cut valve</li> </ul> |

## DTC Confirmation Procedure

UBS0051G

**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:**

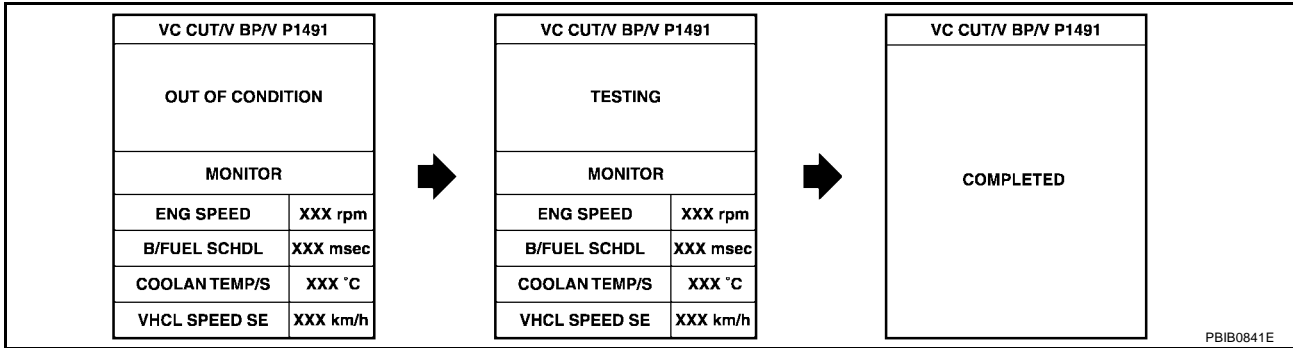
- **Always perform test at a temperature of 5 to 30°C (41 to 86°F).**
- **This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.**
- **Before performing the following procedure, confirm 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      | More than 1,000 rpm         |
| Selector 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-514, "Diagnostic Procedure"](#)

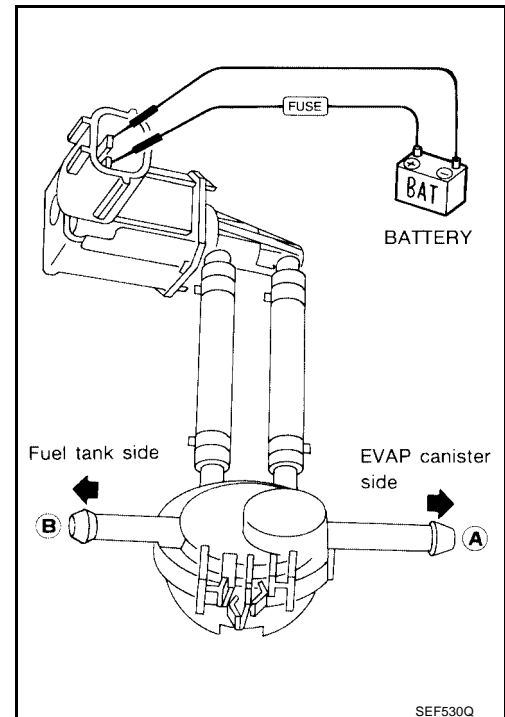
## Overall Function Check

UBS0051H

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-514, "Diagnostic Procedure"](#).





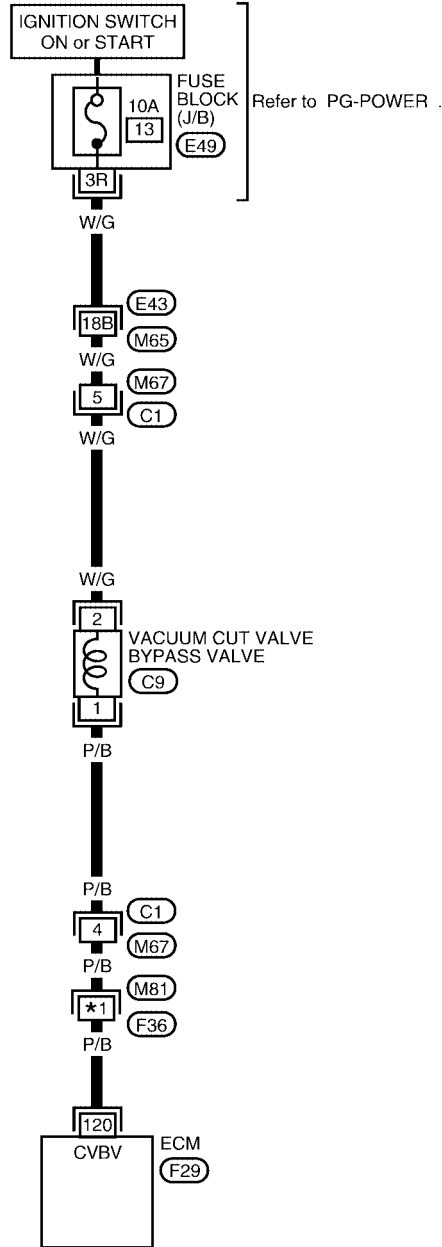
# DTC P1491 VACUUM CUT VALVE BYPASS VALVE

[KA24DE]

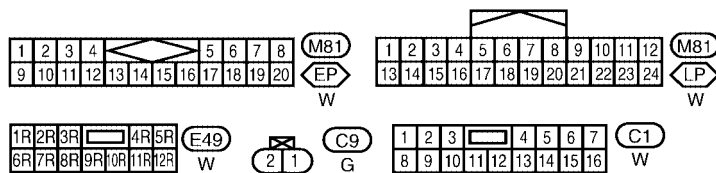
## Wiring Diagram

UBS00511

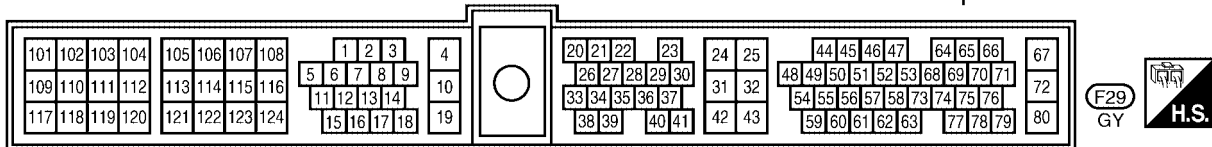
### EC-BYPS/V-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- \*1 EP : 12
- LP : 15



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



WBWA0055E

# DTC P1491 VACUUM CUT VALVE BYPASS VALVE

[KA24DE]

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

**CAUTION:**

Do not use ECM ground terminals when measuring input/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 COLO R | ITEM                          | CONDITION              | DATA (DC Voltage)          |
|---------------|-------------|-------------------------------|------------------------|----------------------------|
| 120           | P/B         | Vacuum cut valve bypass valve | [Ignition switch "ON"] | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

UBS0051J

### 1. INSPECTION START

Do you have CONSULT-II?

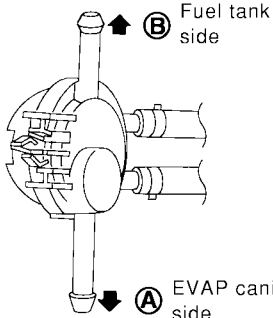
Yes or No

- 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   |
|                 |         |
|                 |         |
|                 |         |

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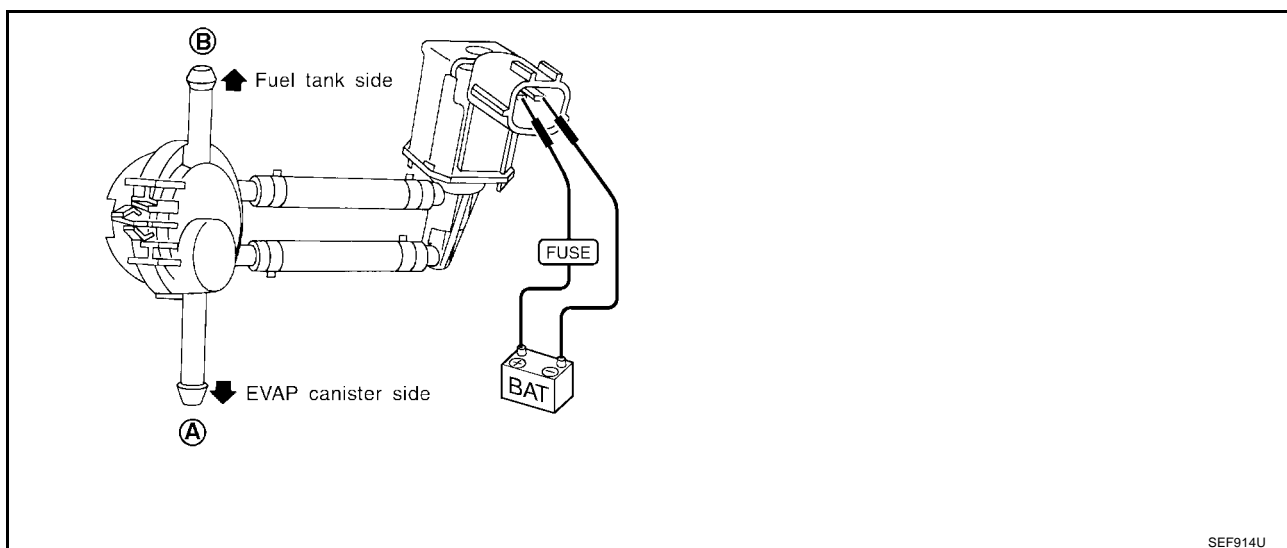
OK or NG

- 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-570, "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

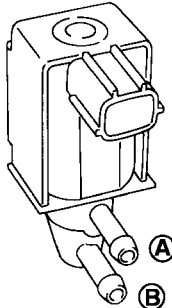
- OK >> GO TO 6.  
 NG >> Repair or replace hoses.

## 6. CHECK VACUUM CUT VALVE BYPASS VALVE


### With CONSULT-II

Check air passage continuity.

Perform "VC/V BYPASS/V" in "ACTIVE TEST" mode.



CONNECT



| 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   |
|                 |         |
|                 |         |
|                 |         |

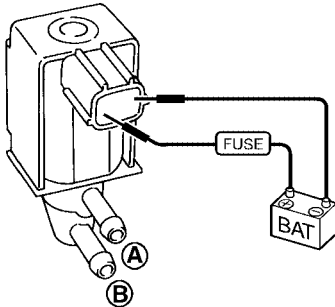
| Condition<br>VC/V BYPASS/V | Air passage continuity<br>between A and B |
|----------------------------|---|
| ON                         | Yes                                       |
| OFF                        | No  |

Operation takes less than 1 second.

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### Without CONSULT-II

Check air passage continuity shown in the figure.



| Condition   | Air passage continuity<br>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

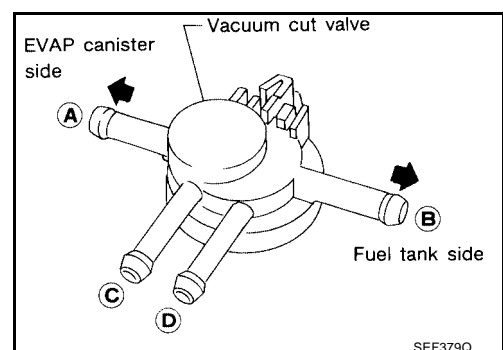
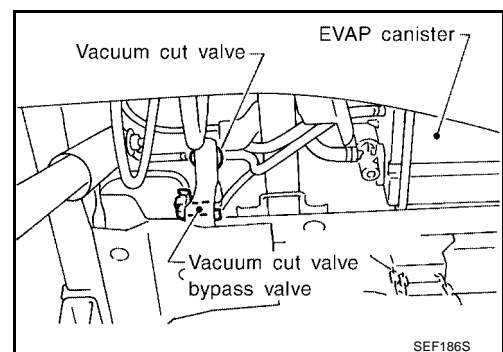
Check vacuum cut valve as follows:

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.



**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

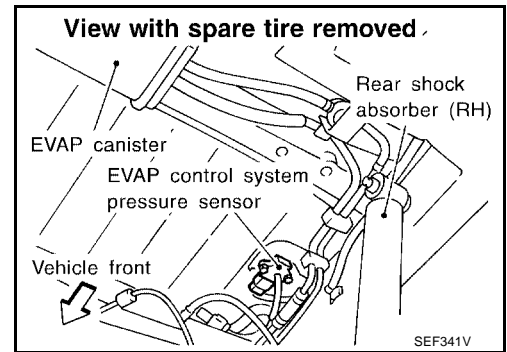
- OK >> GO TO 9.
- NG >> Repair it

**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-338](#) and DTC P0453, [EC-345](#).

OK or NG

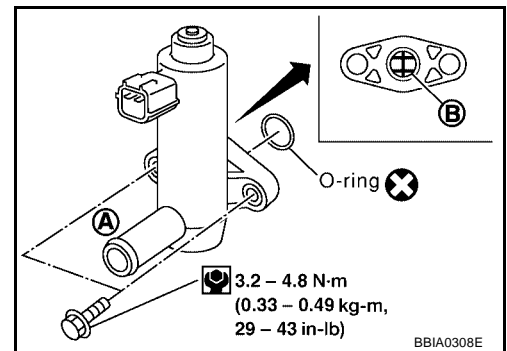
- OK >> GO TO 11.
- NG >> Replace EVAP control system pressure sensor.

**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

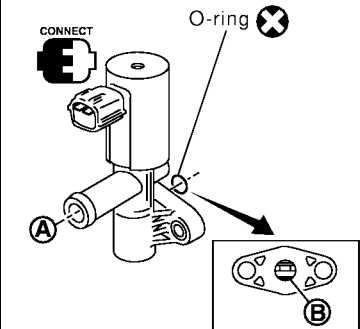
- OK >> GO TO 12.
- NG >> Replace EVAP canister vent control valve.



## 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

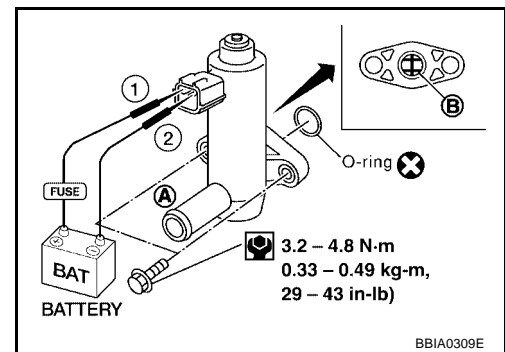
Check air passage continuity and operation delay time under the following condition.

| 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.

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-573, "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-573, "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

A

EC

C

D

E

F

G

H

I

J

K

L

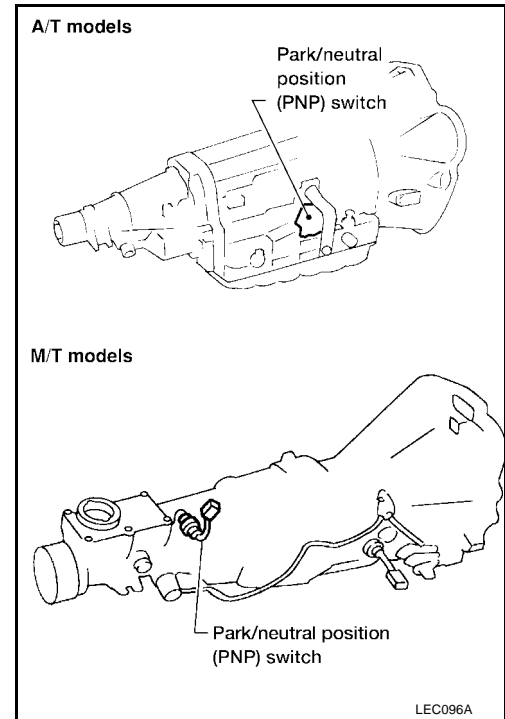
M

## DTC P1706 PNP SWITCH

### Component Description

When the gear position is “N” or “P”, 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

Specification data are reference values.

| MONITOR ITEM | CONDITION             |   | SPECIFICATION |
|--------------|-----------------------|---|---------------|
| P/N POSI SW  | ● Ignition switch: ON | Shift lever:<br>P or N (A/T model)<br>Neutral (M/T model) | ON            |
|              |                       | Shift lever: Except above                                 | OFF           |

### On Board Diagnosis Logic

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors<br/>[The park/neutral position (PNP) switch circuit is open or shorted.]</li> <li>● Park/neutral position (PNP) switch</li> </ul> |



## DTC Confirmation Procedure

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 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"                | ON                |
| Except the above position | OFF               |

If NG, go to [EC-523, "Diagnostic Procedure For M/T Models"](#) or [EC-524, "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 - 4,000 rpm                    |
| COOLAN TEMP/S  | More than 70°C (158°F)               |
| B/FUEL SCHDL   | 3.5 - 17 msec                        |
| VHCL SPEED SE  | More than 64 km/h (More than 40 MPH) |
| Selector lever | Suitable position                    |

6. If 1st trip DTC is detected, go to [EC-523, "Diagnostic Procedure For M/T Models"](#) or [EC-524, "Diagnostic Procedure For A/T Models"](#) .

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| COOLAN TEMP/S | XXX °C   |
| VHCL SPEED SE | XXX km/h |
| P/N POSI SW   | OFF      |
| B/FUEL SCHDL  | XXX msec |

SEF213Y

## Overall Function Check

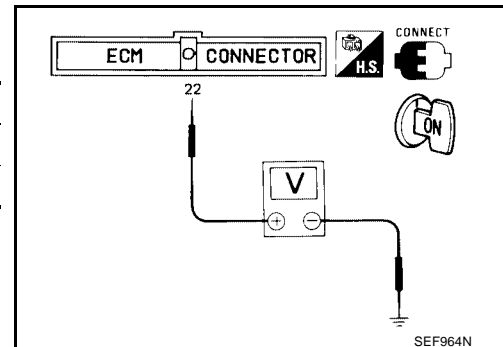
Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a 1st trip DTC might not be confirmed.

**WITH GST**

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 22 (PNP switch signal) and body ground under the following conditions.

| Condition (Gear position) | Voltage (V) (Known-good data) |
|---------------------------|-------------------------------|
| "N" or "P" position       | Approx. 0                     |
| Except the above position | Approx. 5                     |

3. If NG, go to [EC-523, "Diagnostic Procedure For M/T Models"](#) or [EC-524, "Diagnostic Procedure For A/T Models"](#) .



# DTC P1706 PNP SWITCH

[KA24DE]

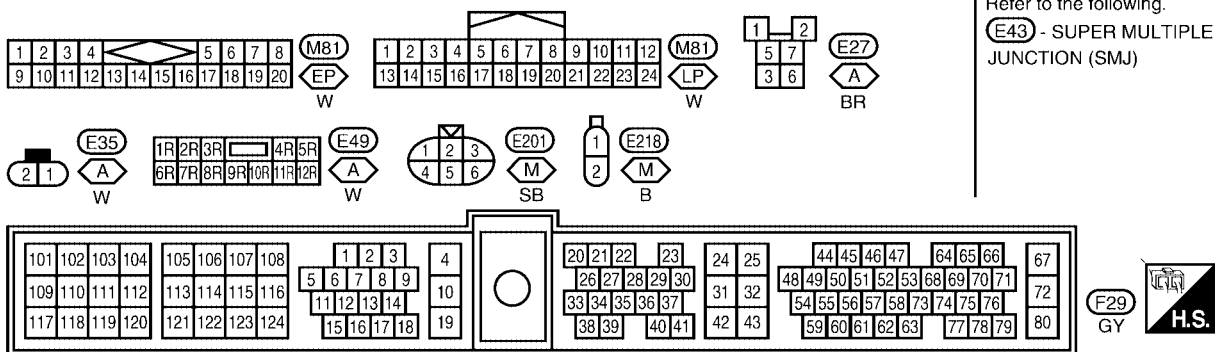
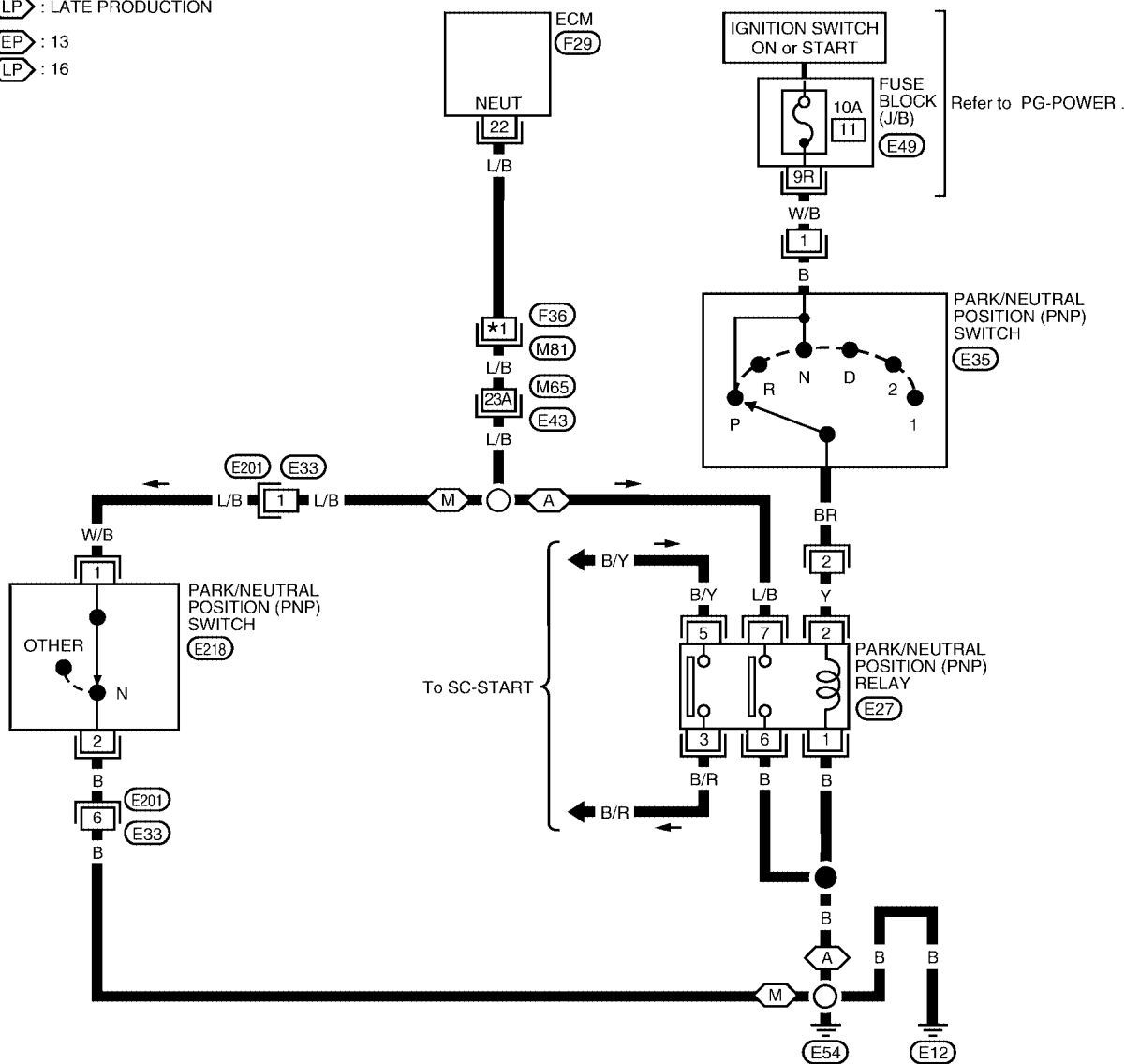
UBS0051Q

## Wiring Diagram

EC-PNP/SW-01

- : With A/T
- : With M/T
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 13
- \*1 : 16

: Detectable line for DTC  
 : Non-detectable line for DTC



WBWA0056E

# DTC P1706 PNP SWITCH

[KA24DE]

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

## CAUTION:

Do not use ECM ground terminals when measuring input/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 COLO R | ITEM       | CONDITION  | DATA (DC Voltage) |
|---------------|-------------|------------|--|-------------------|
| 22            | L/B         | PNP switch | [Ignition switch "ON"]<br>● Gear position is "N" or "P"    | Approximately 0V  |
|               |             |            | [Ignition switch "ON"]<br>● Except the above gear position | Approximately 5V  |

## Diagnostic Procedure For M/T Models

UBS0051R

### 1. CHECK GROUND CIRCUIT

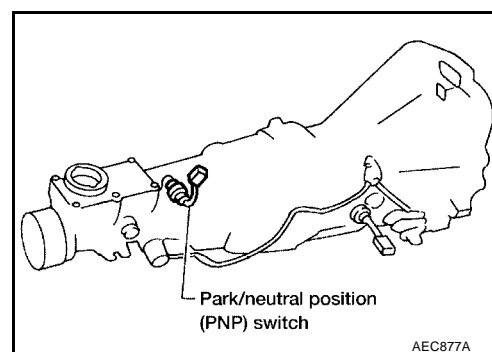
1. Turn ignition switch OFF.
2. Disconnect neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and body ground.  
Refer to Wiring Diagram.

**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 body 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"](#) .

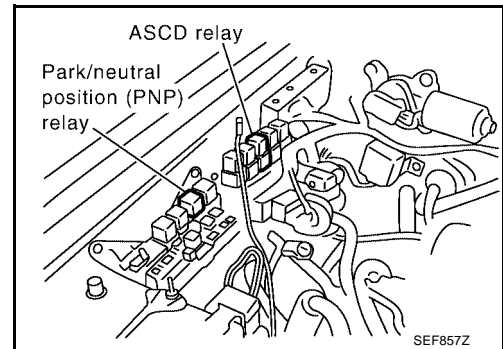
>> INSPECTION END.

### Diagnostic Procedure For A/T Models

UBS005IS

#### 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.

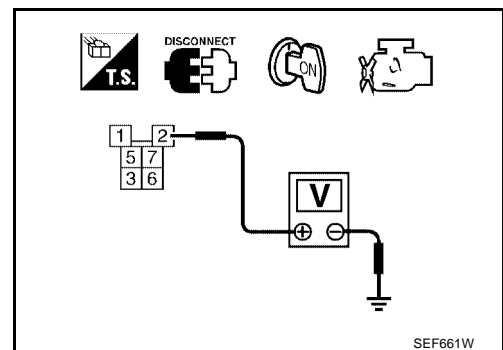


5. Check voltage between PNP relay terminal 2 and ground with CONSULT-II or tester.

**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

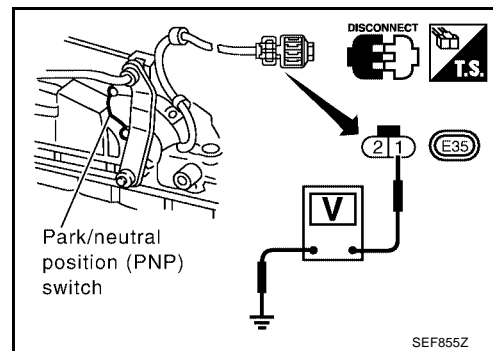
1. Turn ignition switch "ON".
2. Check voltage between park/neutral position (PNP) switch terminal 1 and ground with CONSULT-II or tester.

**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 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 body 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 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.

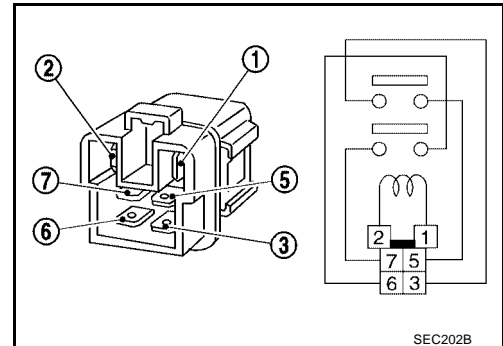
## 9. CHECK PARK/NEUTRAL POSITION (PNP) RELAY

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

UBS005IT

| 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

UBS005IU

| MONITOR ITEM | CONDITON                   | SPECIFICATION    |
|--------------|----------------------------|------------------|
| TCC SOL/V    | ● Engine: After warming up | Idle<br>ON       |
|              |                            | 2,000 rpm<br>OFF |

### On Board Diagnosis Logic

UBS005IW

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The circuit is open or shorted).</li> <li>● Torque converter clutch solenoid valve</li> </ul> |

### DTC Confirmation Procedure

UBS005IX

#### 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-529, "Diagnostic Procedure"](#).

#### WITH GST

Follow the procedure "WITH CONSULT-II".

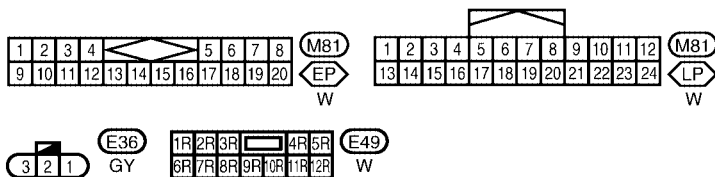
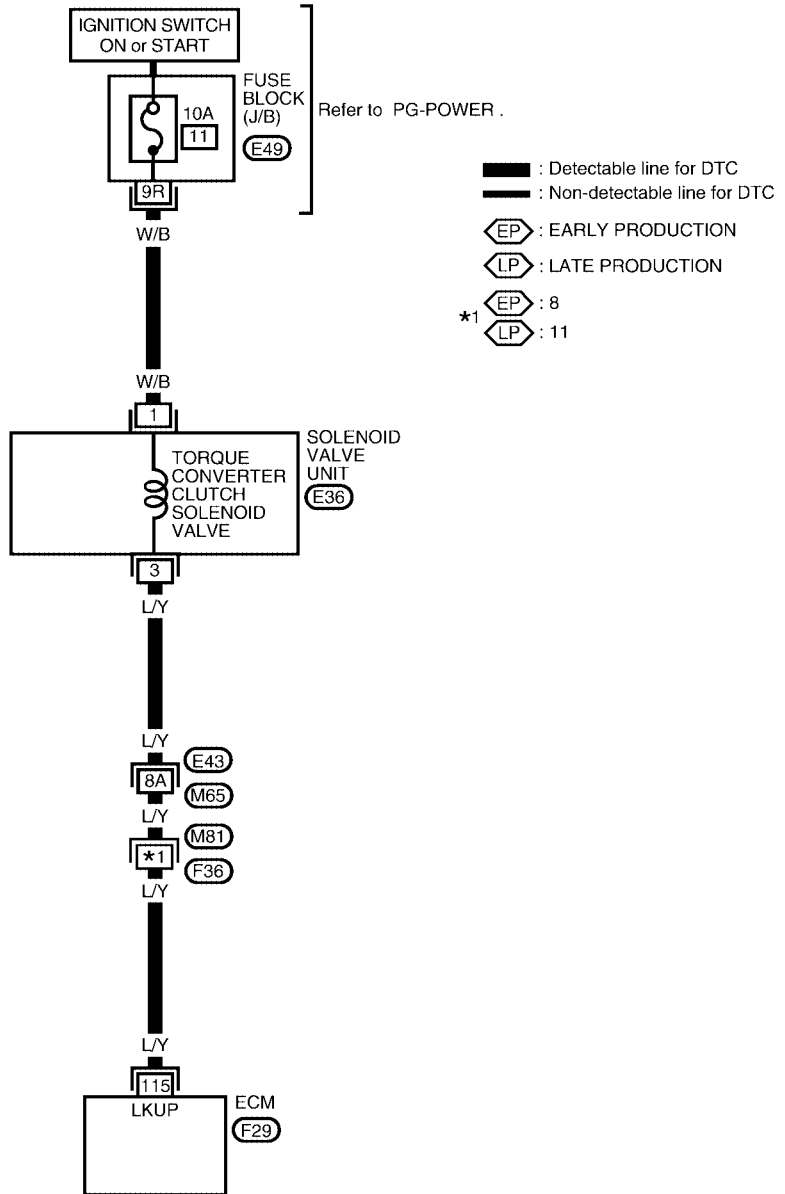
# DTC P1775 TCC SOLENOID VALVE

[KA24DE]

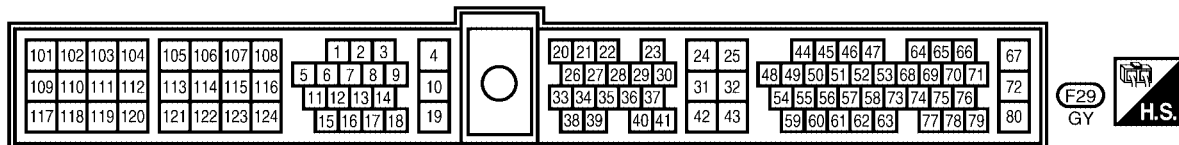
UBS0051Y

## Wiring Diagram

EC-LKUP-01



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



WBWA0057E



# DTC P1775 TCC SOLENOID VALVE

[KA24DE]

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.**

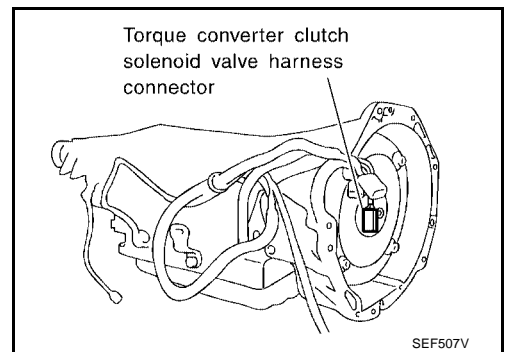
| TERMI-NAL NO. | WIRE COLOR | ITEM   | CONDITION   | DATA (DC Voltage)          |
|---------------|------------|--|---|----------------------------|
| 115           | L/Y        | Torque converter clutch solenoid valve (A/T models only) | [Engine is running]   | Approximately 1V           |
|               |            |  | <ul style="list-style-type: none"> <li>● Idle Speed</li> <li>● [Engine is running]</li> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

UBS005IZ

### 1. CHECK POWER SUPPLY

1. Disconnect torque converter clutch (TCC) solenoid valve harness connector.
2. Turn ignition switch "ON".

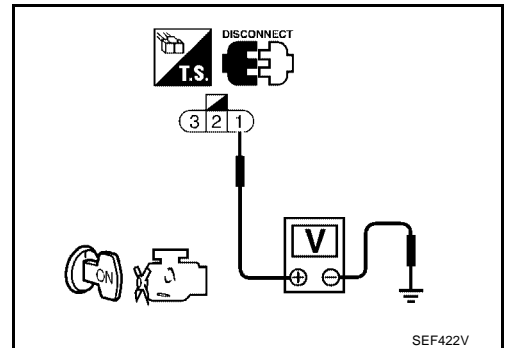


3. Check voltage between TCC solenoid valve terminal 1 and ground with CONSULT-II or tester.

**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 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 or short to power.

OK or NG

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

### 4. DETECT MALFUNCTIONING PART

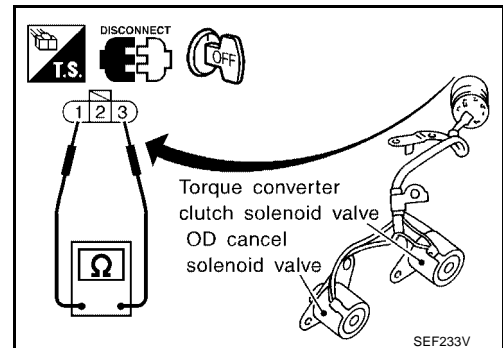
Check the following.

- 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"](#).

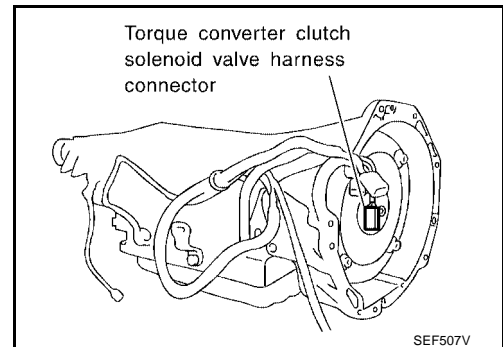


3. Supply the solenoid valve terminals 1 and 3 with battery voltage and check the solenoid valve operation.

**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 TORQUE CONVERTER CLUTCH SOLENOID VALVE

Refer to [AT-58, "REMOVAL"](#).

**DTC P1776 TCC SOLENOID VALVE**

**System Description**

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 *1           | Vehicle speed              |                                  |  |

\*1: 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**

| MONITOR ITEM | CONDITON                   | SPECIFICATION |
|--------------|----------------------------|---------------|
| TCC SOL/V    | ● Engine: After warming up | Idle          |
|              |                            | 2,000 rpm     |

**On Board Diagnosis Logic**

| 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. | <ul style="list-style-type: none"> <li>● Torque converter clutch solenoid valve</li> <li>● A/T hydraulic control system</li> <li>● Torque converter</li> </ul> |

**DTC Confirmation Procedure**

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

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

**TESTING CONDITION:**

Always perform at a temperature above -10°C (14°F).

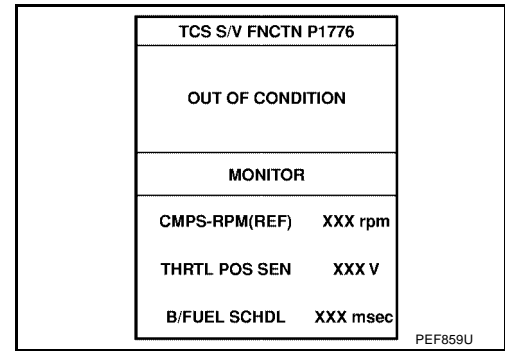
**WITH CONSULT-II**

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.

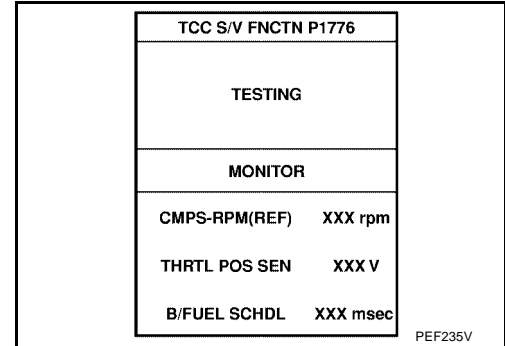
# DTC P1776 TCC SOLENOID VALVE

[KA24DE]

4. Select "TCC S/V FNCTN P1776" of "A/T (TCC S/V) in DTC WORK SUPPORT" mode with CONSULT-II.

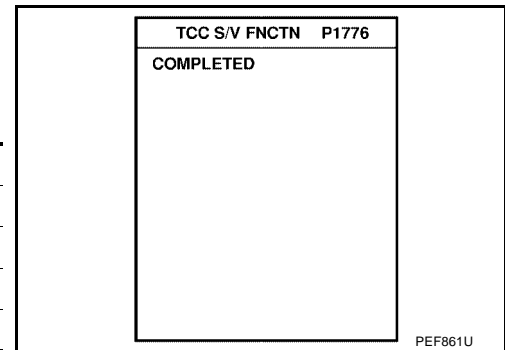


5. Touch "START".



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-533, "Diagnostic Procedure"](#).



### WITH GST

Follow the procedure "WITH CONSULT-II".

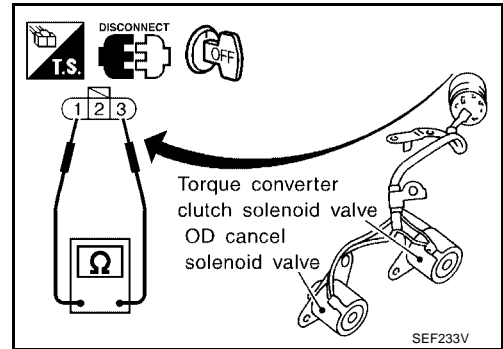
**Diagnostic Procedure**

**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)]**

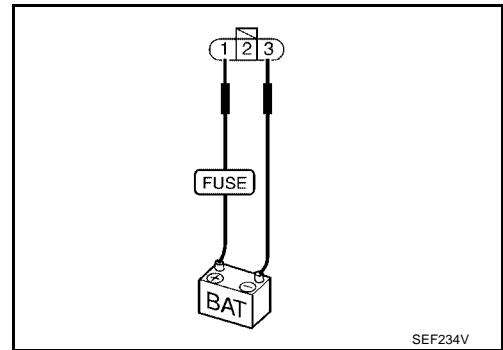
2. Remove torque converter clutch solenoid valve. Refer to , [AT-58, "Control Valve Assembly and Accumulators"](#) .



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.

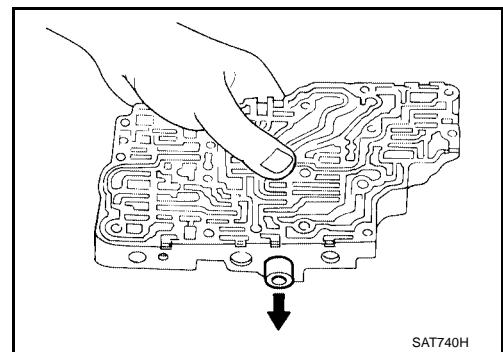


**2. CHECK TORQUE CONVERTER CLUTCH CONTROL VALVE**

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 SIGNAL**

Check vehicle speed signal with CONSULT-II or speedometer if it 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**  
**TORQUE CONVERTER CLUTCH SOLENOID VALVE**

UBS007FR

Refer to [AT-58, "Control Valve Assembly and Accumulators"](#) .

**IGNITION SIGNAL**

**Component Description**

**IGNITION COIL & POWER TRANSISTOR**

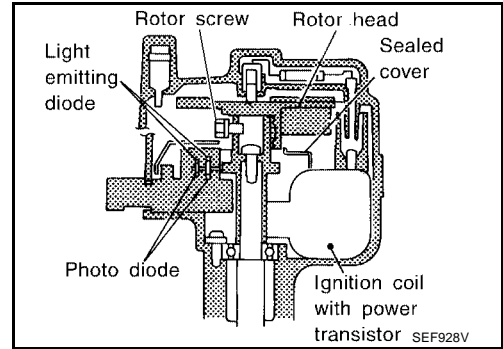
The ignition signal from the ECM is sent to the power transistor. The power transistor switches the ignition coil primary circuit on and off. As the primary circuit is turned on and off, the proper high voltage is induced in the coil secondary circuit.

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**

| MONITOR ITEM | CONDITION  |           | SPECIFICATION      |
|--------------|--|-----------|--------------------|
| IGN TIMING   | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | Approx. 20° BTDC   |
|              |  | 2,000 rpm | More than 25° BTDC |

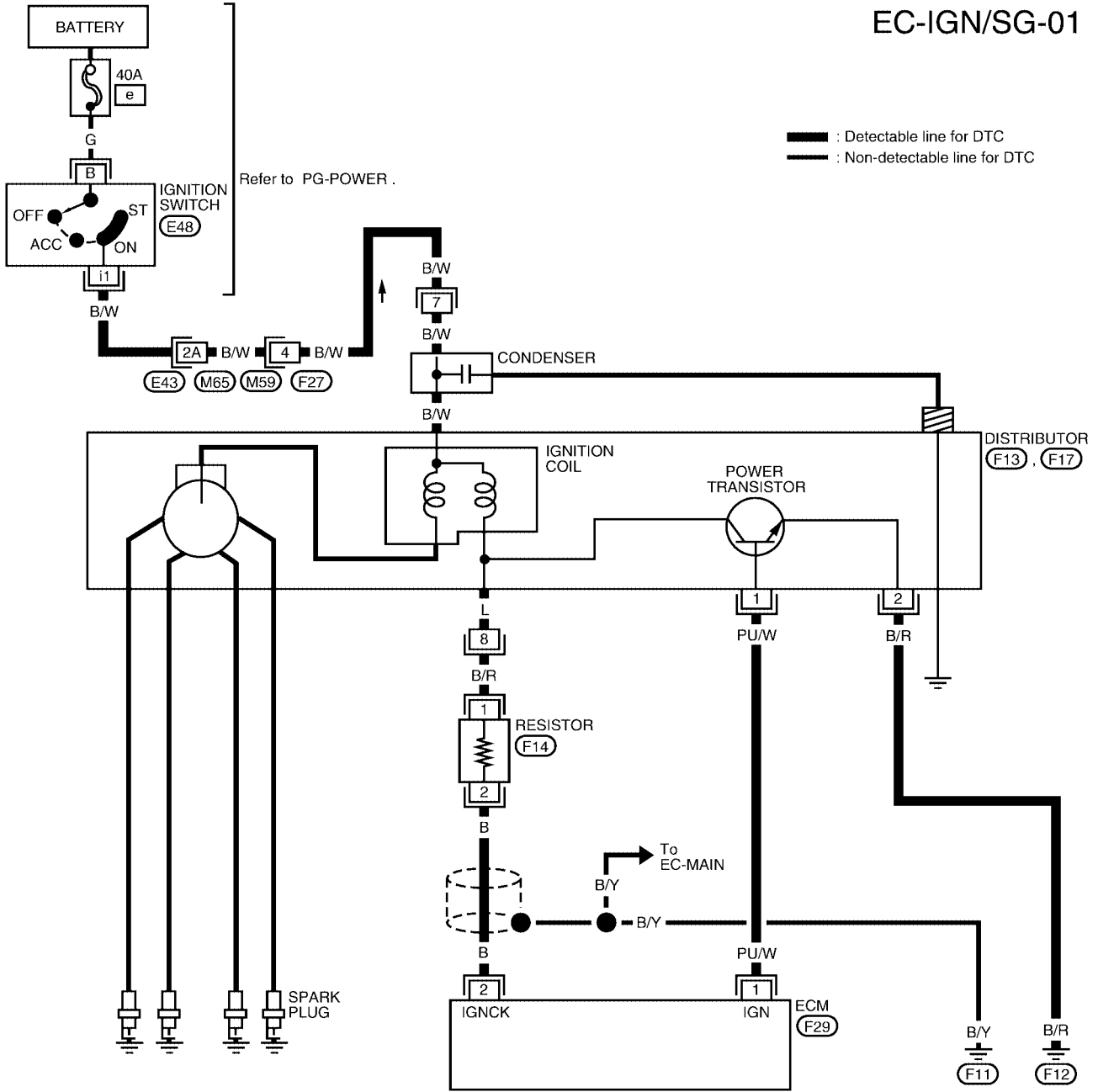
# IGNITION SIGNAL

[KA24DE]

UBS005J9

## Wiring Diagram

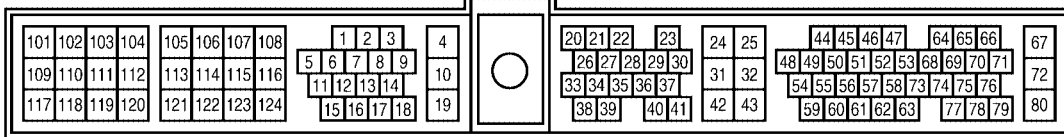
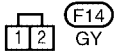
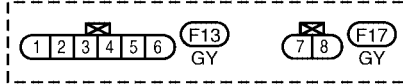
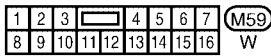
EC-IGN/SG-01



: Detectable line for DTC  
 : Non-detectable line for DTC

Refer to PG-POWER .

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



BBWA0458E



# IGNITION SIGNAL

[KA24DE]

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

**CAUTION:**

Do not use ECM ground terminals when measuring input/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 | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul> | <p>0 - 0.5V★</p>   |
|               |            |                 | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>               | <p>0.2 - 1.0V★</p> |
| 2             | B          | Ignition check  | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul> | <p>12 - 14V★</p>   |
|               |            |                 | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>               | <p>12 - 13V★</p>   |

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

## Diagnostic Procedure

UBS005JA

### 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

**④ 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.

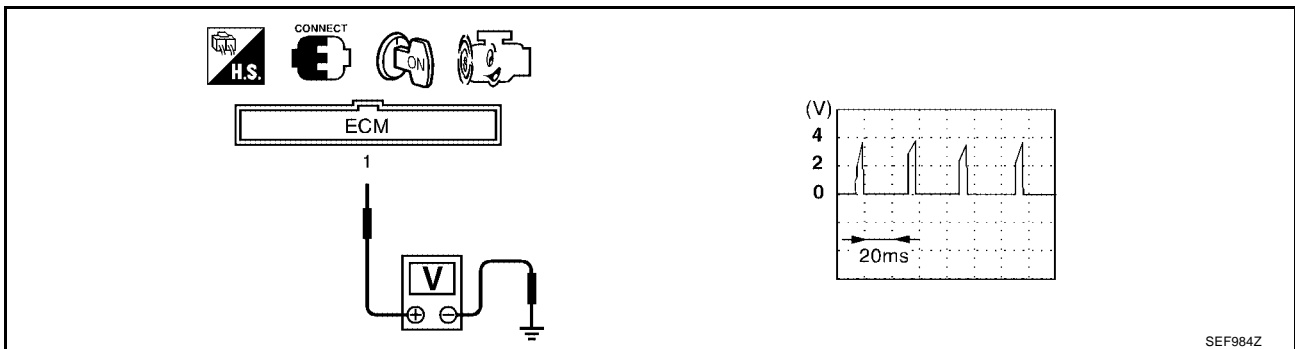
|                      |         |
|----------------------|---------|
| <b>ACTIVE TEST</b>   |         |
| <b>POWER BALANCE</b> |         |
| <b>MONITOR</b>       |         |
| ENG SPEED            | XXX rpm |
| MAS A/F SE-B1        | XXX V   |
| IACV-AAC/V           | XXX %   |
|                      |         |
|                      |         |

SEF981Z

## 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.

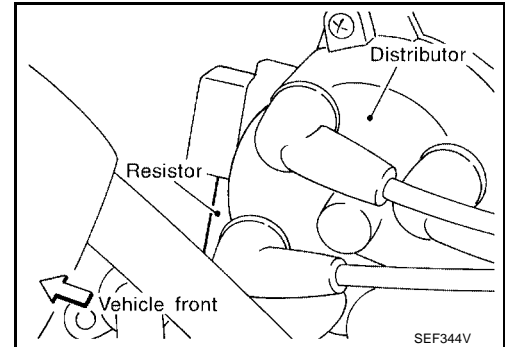


OK or NG

- 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".

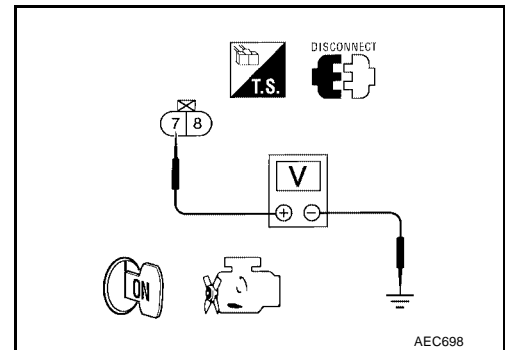


4. Check voltage between ignition coil terminal 7 and ground with CONSULT-II or tester.

**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 harness or connectors.

## 6. CHECK GROUND CIRCUIT

1. Turn ignition switch "OFF".
2. Disconnect distributor harness connector F13.
3. Check harness continuity between power transistor terminal 2 and engine 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 OUTPUT SIGNAL CIRCUIT

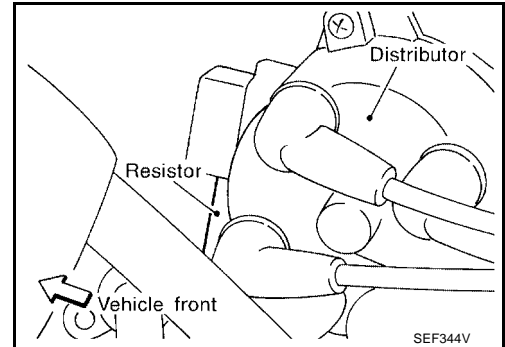
1. Stop engine.
2. Disconnect distributor harness connector F13.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 1 and power transistor terminal 1.  
Refer to Wiring Diagram.

**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.



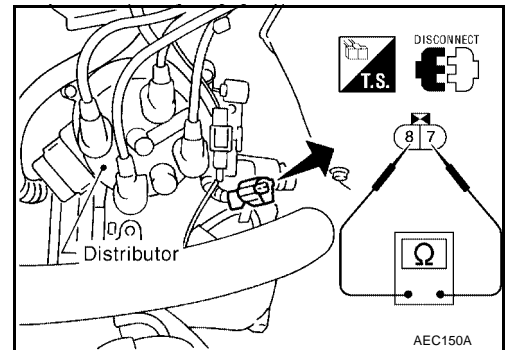
## 8. CHECK IGNITION COIL

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.



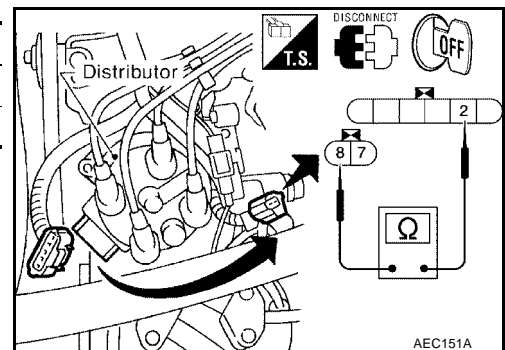
## 9. CHECK POWER TRANSISTOR

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**

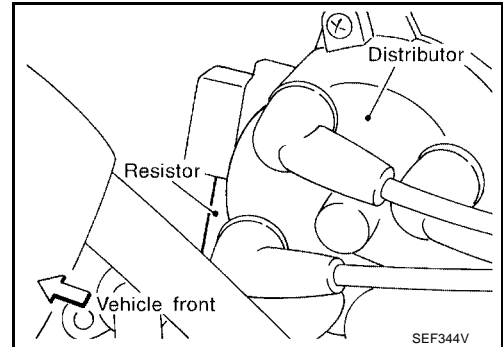
1. Strip tape covering resistor.
2. Disconnect resistor harness connector.
3. Check harness continuity between ignition coil terminal 8 and resistor terminal 1, resistor terminal 2 and ECM terminal 2.

**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.



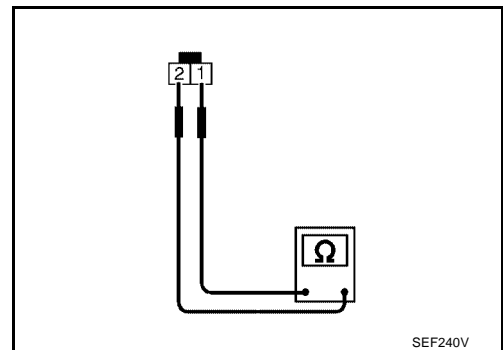
**11. CHECK RESISTOR**

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  
DISTRIBUTOR**

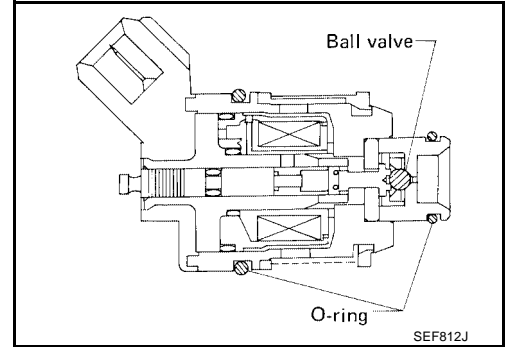
Refer to [EM-13, "OUTER COMPONENT PARTS"](#) .

UBS007FM

## INJECTOR CIRCUIT

### Component Description

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

Specification data are reference values.

| MONITOR ITEM | CONDITION  | SPECIFICATION |
|--------------|--|---------------|
| INJ PULSE-B1 | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: Neutral</li> <li>● No-load</li> </ul> | Idle          |
|              |  | 2,000 rpm     |
| B/FUEL SCHDL | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: Neutral</li> <li>● No-load</li> </ul> | Idle          |
|              |  | 2,000 rpm     |

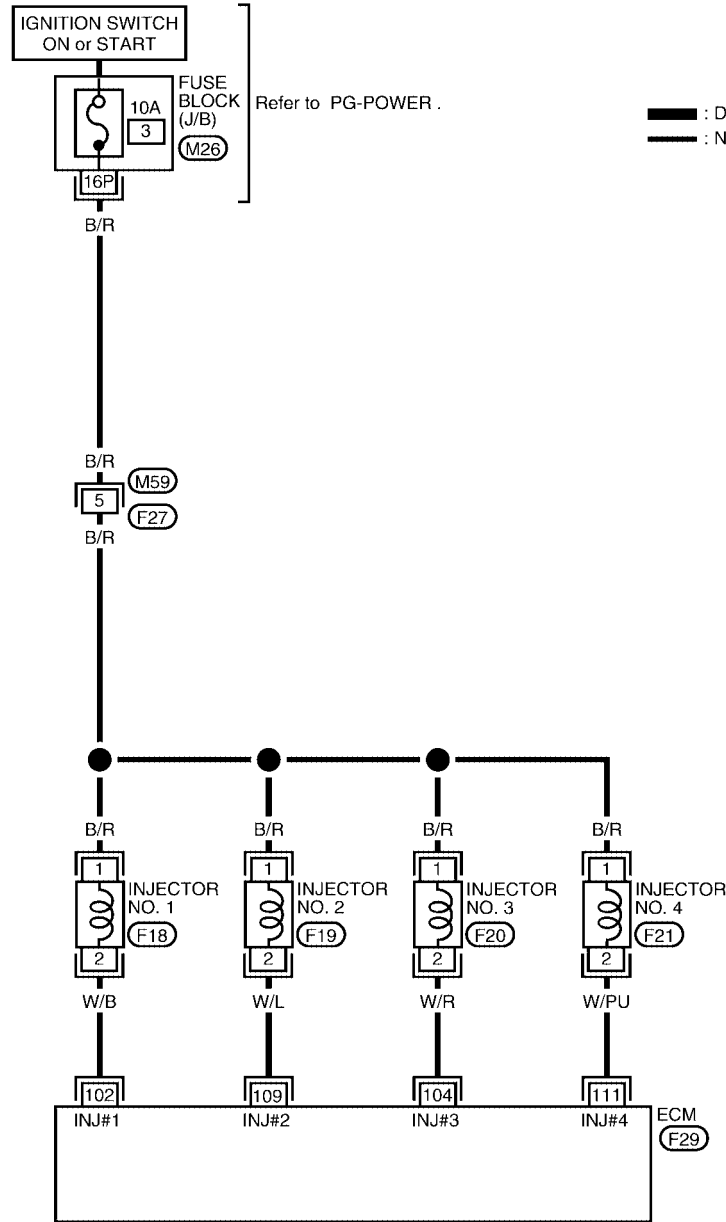
# INJECTOR CIRCUIT

[KA24DE]

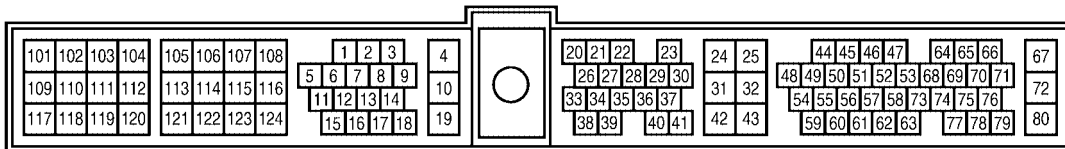
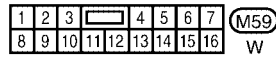
UBS005JD

## Wiring Diagram

EC-INJECT-01



— : Detectable line for DTC  
 - - - : Non-detectable line for DTC



BBWA0459E

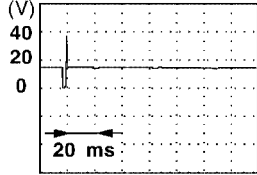
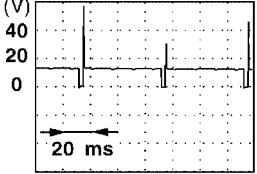
# INJECTOR CIRCUIT

[KA24DE]

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

**CAUTION:**

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

| TER-MINAL NO.            | WIRE COLOR                | ITEM   | CONDITION   | DATA (DC Voltage)  |
|--------------------------|---------------------------|--|---|--|
| 102<br>104<br>109<br>111 | W/B<br>W/R<br>W/L<br>W/PU | Injector No. 1<br>Injector No. 3<br>Injector No. 2<br>Injector No. 4 | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>                | <p>BATTERY VOLTAGE<br/>(11 - 14V)★</p>  <p style="text-align: right; font-size: small;">SEF011W</p> |
|                          |                           |  | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>BATTERY VOLTAGE<br/>(11 - 14V)★</p>  <p style="text-align: right; font-size: small;">SEF012W</p> |

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



## Diagnostic Procedure

### 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-AACV     | XXX %   |
|               |         |
|               |         |

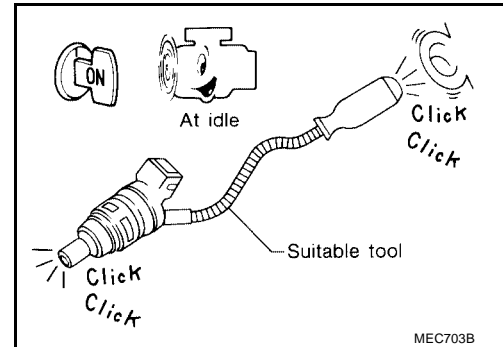
SEF981Z

#### 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.



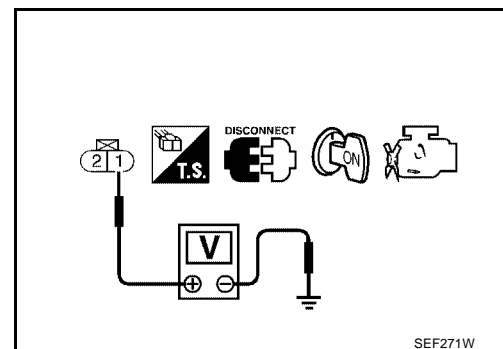
### 2. CHECK POWER SUPPLY

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.



## 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 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.

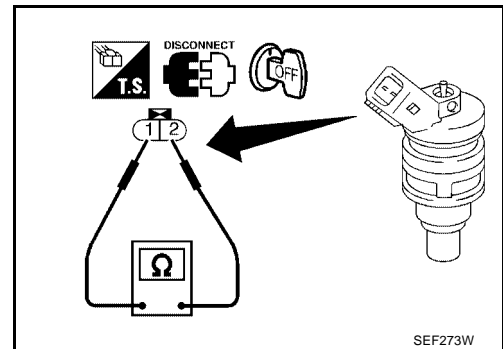
## 6. CHECK INJECTOR

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

Resistance : 7.3 - 9.9Ω [at 25°C (77°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 INJECTOR

Refer to [EM-13, "OUTER COMPONENT PARTS"](#) .

# START SIGNAL

[KA24DE]

PFP:48750

## START SIGNAL

### CONSULT-II Reference Value in Data Monitor Mode

UBS005JG

Specification data are reference values.

| MONITOR ITEM | CONDITION                          | SPECIFICATION  |
|--------------|------------------------------------|----------------|
| START SIGNAL | ● Ignition switch: ON → START → ON | OFF → ON → OFF |

A

EC

C

D

E

F

G

H

I

J

K

L

M

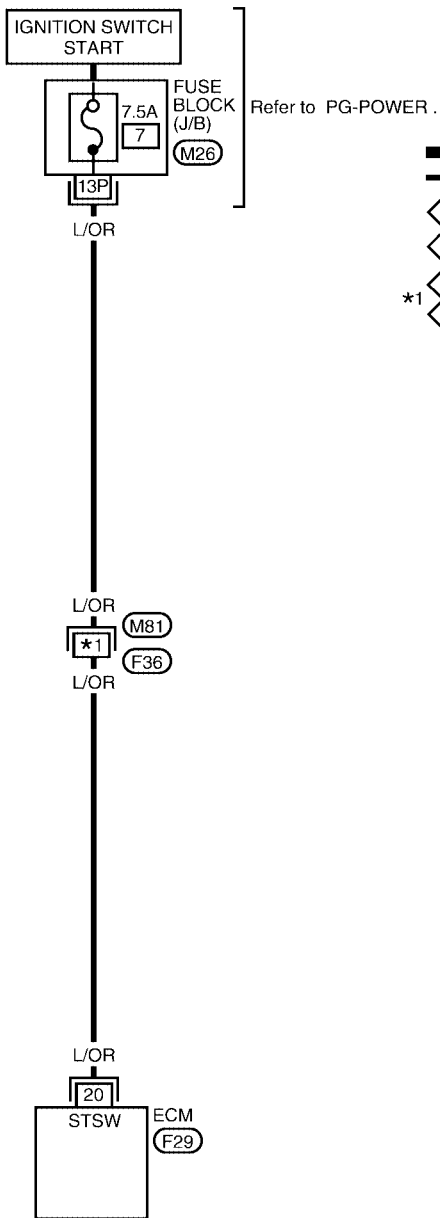
# START SIGNAL

[KA24DE]

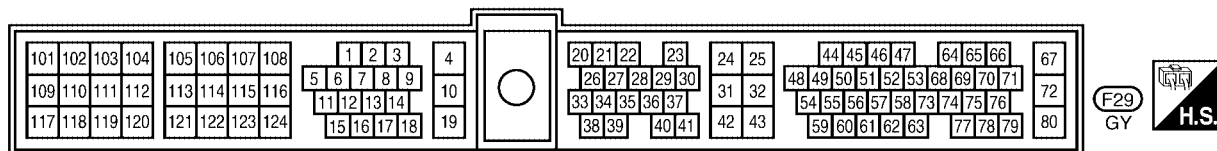
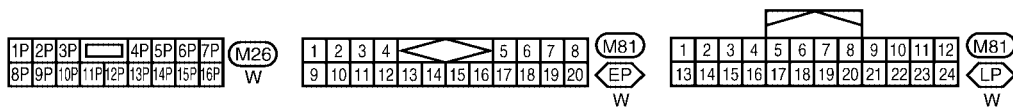
## Wiring Diagram

UBS005/JI

### EC-S/SIG-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 2
- : 5



WBWA0022E

# START SIGNAL

[KA24DE]

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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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 COLO R | ITEM         | CONDITION                 | DATA (DC Voltage)          |
|---------------|-------------|--------------|---------------------------|----------------------------|
| 20            | L/OR        | Start signal | [Ignition switch "ON"]    | Approximately 0V           |
|               |             |              | [Ignition switch "START"] | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

UBS005JJ

### 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**

- Turn ignition switch ON.
- 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

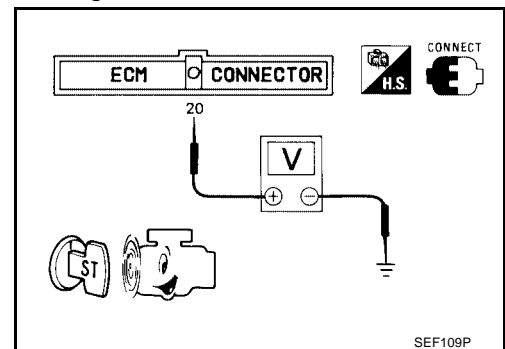
 **Without CONSULT-II**

- Turn ignition switch to START.
- Check voltage between ECM terminal 20 and ground under the following conditions.

| Condition             | Voltage         |
|-----------------------|-----------------|
| Ignition switch START | Battery voltage |
| Except above          | Approx. 0V      |

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

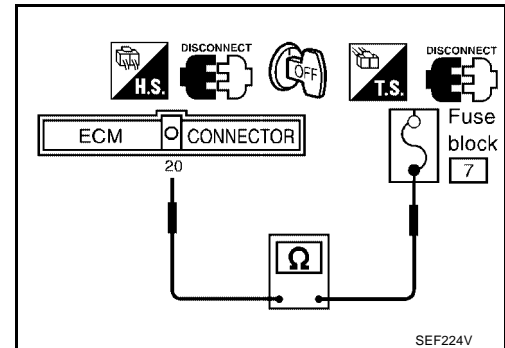
1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and 7.5A fuse.
3. Check harness continuity between ECM terminal 20 and fuse block.

**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

[KA24DE]

## FUEL PUMP CIRCUIT

PF:17042

### Description SYSTEM DESCRIPTION

UBS005JK

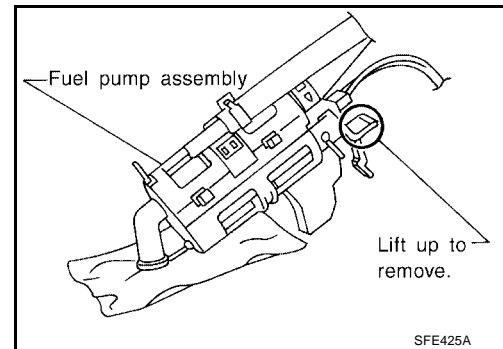
| Sensor                   | Input Signal to ECM | ECM function      | Actuator        |
|--------------------------|---------------------|-------------------|-----------------|
| Camshaft position sensor | Engine speed        | Fuel pump control | Fuel pump relay |
| Ignition switch          | Start 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

UBS005JM

| MONITOR ITEM  | CONDITION   | SPECIFICATION |
|---------------|---|---------------|
| FUEL PUMP RLY | <ul style="list-style-type: none"> <li>● Ignition switch is turned to ON (Operates for 5 seconds)</li> <li>● Engine running and cranking</li> </ul> | ON            |
|               | <ul style="list-style-type: none"> <li>● Except as shown above</li> </ul>   | OFF           |

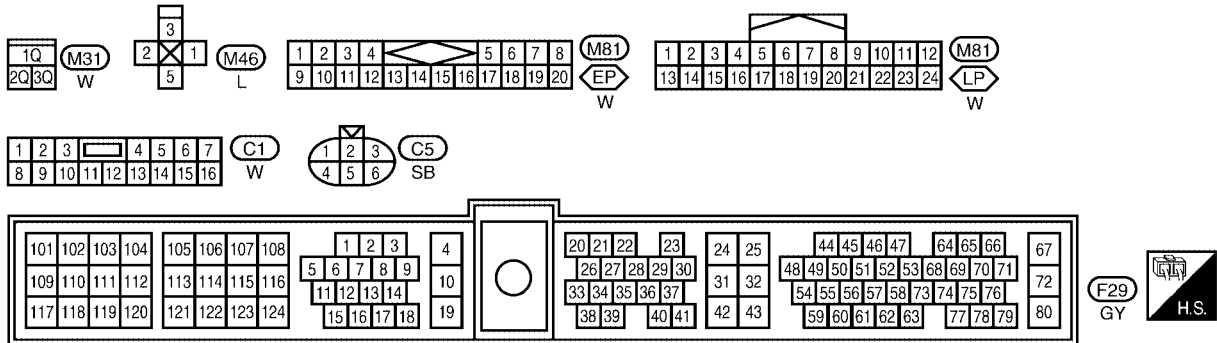
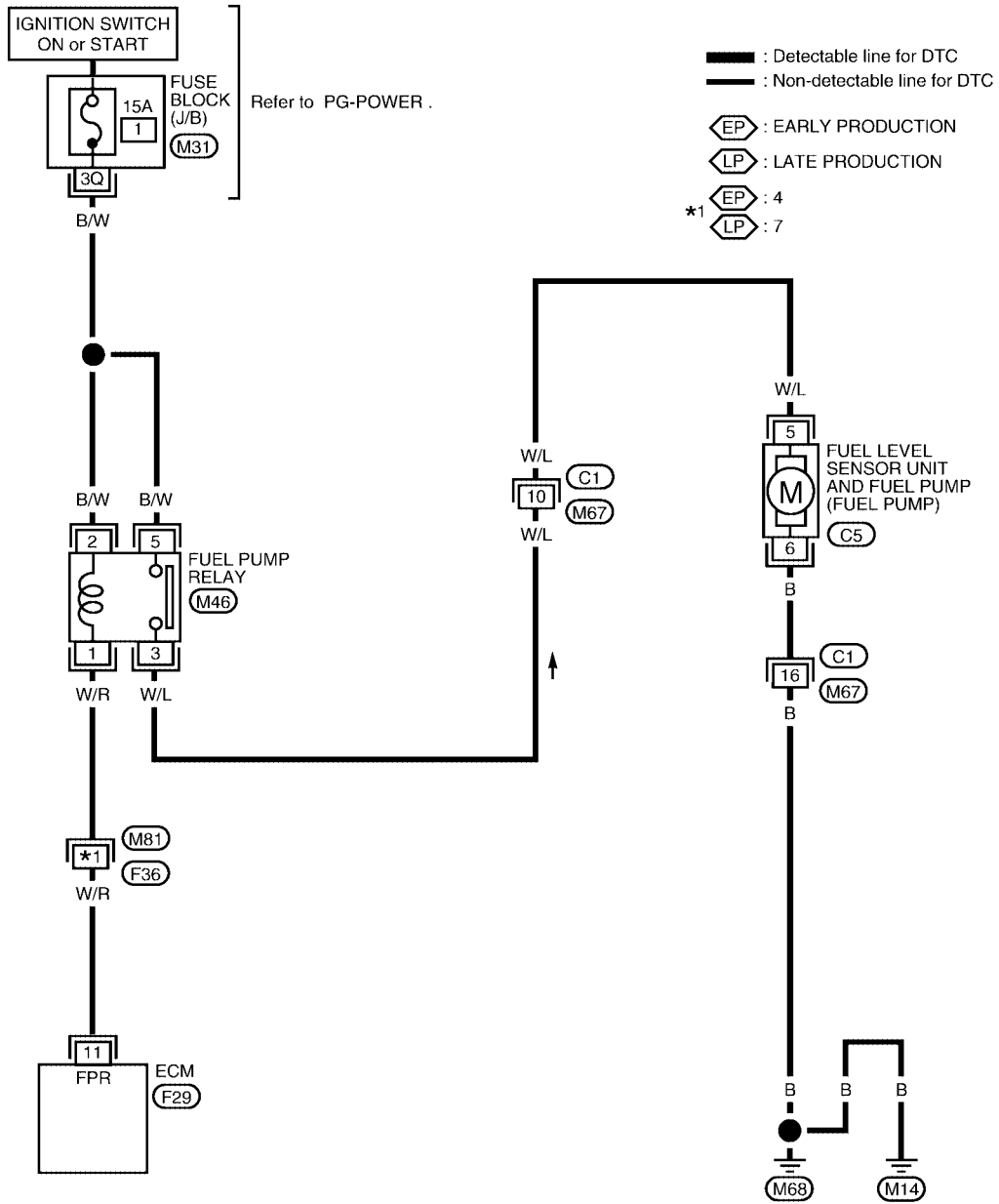
# FUEL PUMP CIRCUIT

[KA24DE]

UBS005JO

## Wiring Diagram

EC-F/PUMP-01



WBWA0058E



# FUEL PUMP CIRCUIT

[KA24DE]

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

**CAUTION:**

Do not use ECM ground terminals when measuring input/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 COLO R | ITEM            | CONDITION  | DATA (DC Voltage)             |
|---------------|-------------|-----------------|--|-------------------------------|
| 11            | W/R         | Fuel pump relay | [Ignition switch "ON"]<br>● For 5 seconds after turning ignition switch "ON"       | 0 - 1V                        |
|               |             |                 | [Engine is running]  |                               |
|               |             |                 | [Ignition switch "ON"]<br>● More than 5 seconds after turning ignition switch "ON" | BATTERY VOLTAGE<br>(11 - 14V) |

## Diagnostic Procedure

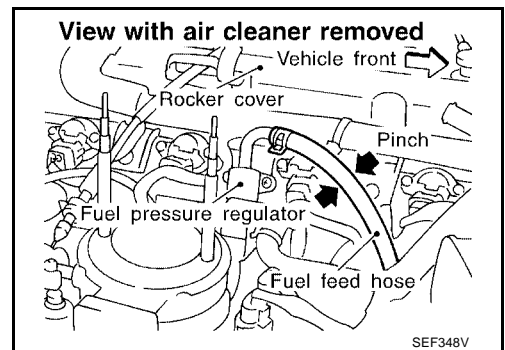
UBS005JP

### 1. CHECK OVERALL FUNCTION

- Turn ignition switch ON.
- Pinch fuel feed hose with two fingers.  
**Fuel pressure pulsation should be felt on the fuel feed hose for 5 seconds after ignition switch is turned "ON".**

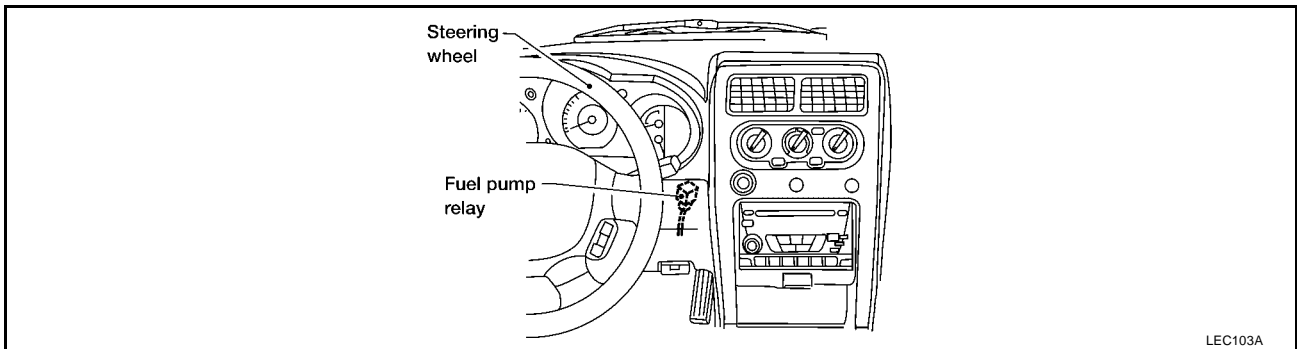
OK or NG

- OK >> **INSPECTION END**  
 NG >> GO TO 2.



### 2. CHECK POWER SUPPLY

- Turn ignition switch "OFF".
- Disconnect fuel pump relay.

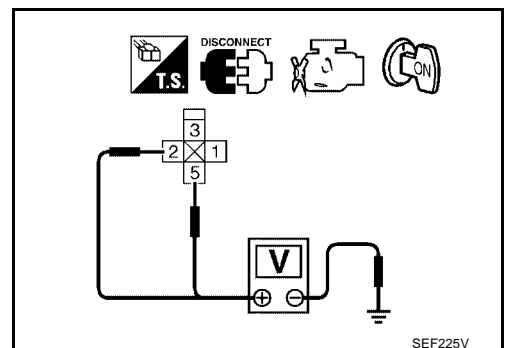


- Turn ignition switch "ON".
- Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.

**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 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 fuel pump terminal 6 and body ground, fuel pump terminal 5 and fuel pump relay terminal 3.

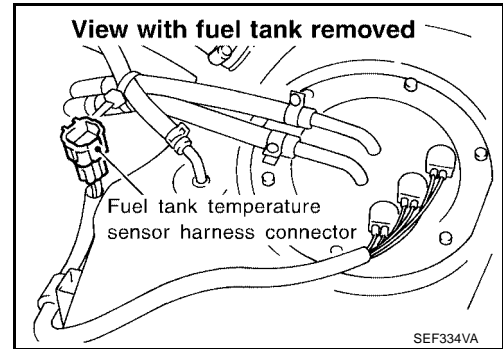
Refer to Wiring Diagram.

**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 body 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.

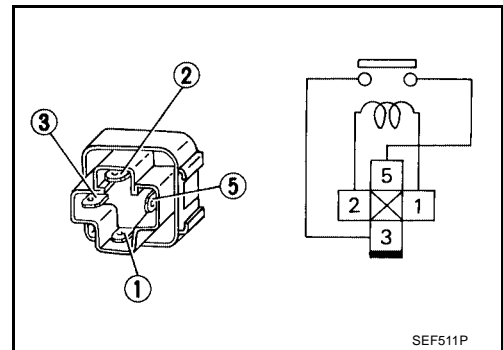
| ACTIVE TEST     |         |
|-----------------|---------|
| FUEL PUMP RELAY | ON      |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
|                 |         |
|                 |         |
|                 |         |
|                 |         |
|                 |         |
|                 |         |

SEF724Z

### Without CONSULT-II

Check continuity between terminals 3 and 5.

| Conditions  | Continuity |
|---|------------|
| 12V direct current supply between terminals 1 and 2 | Yes        |
| No current supply                                   | No         |

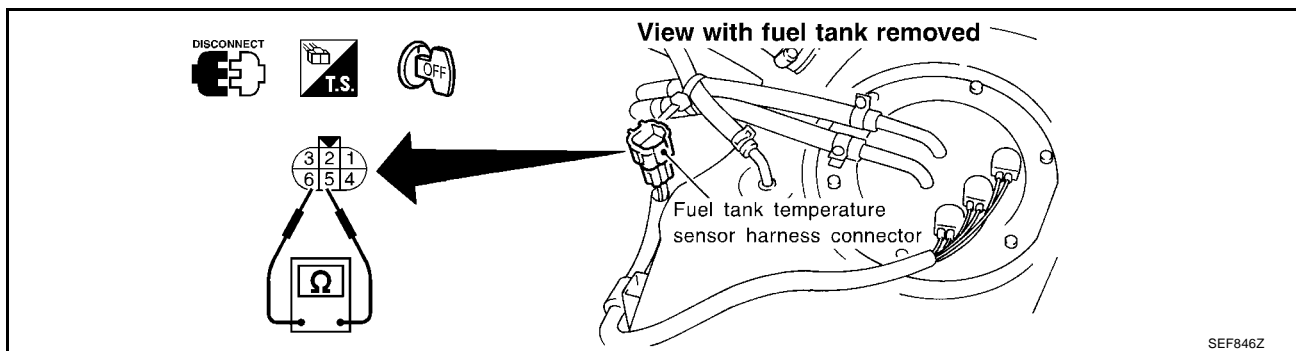


OK or NG

- OK >> GO TO 9.
- NG >> Replace fuel pump relay.

## 9. CHECK FUEL PUMP

1. Disconnect fuel level sensor and fuel pump harness connector.



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 FUEL PUMP

UBS007FI

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

# POWER STEERING OIL PRESSURE SWITCH

[KA24DE]

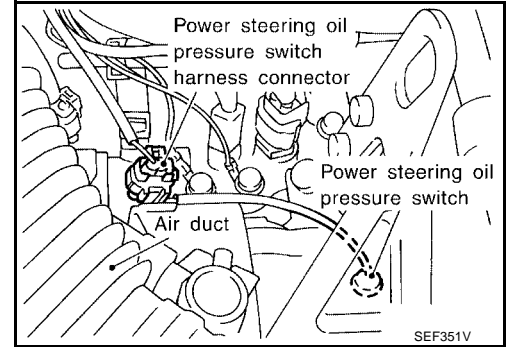
PF:49761

UBS005JQ

## POWER STEERING OIL PRESSURE SWITCH

### Component Description

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

UBS005JR

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)<br>OFF |
|              |   | The steering wheel is fully turned<br>ON                      |

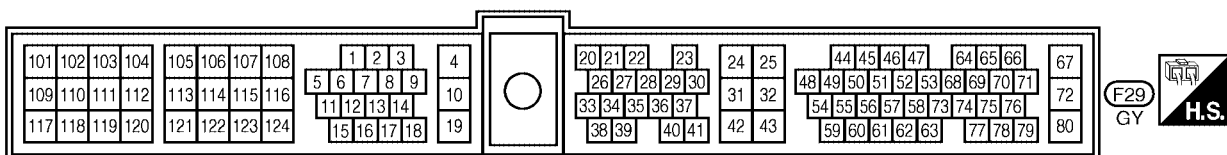
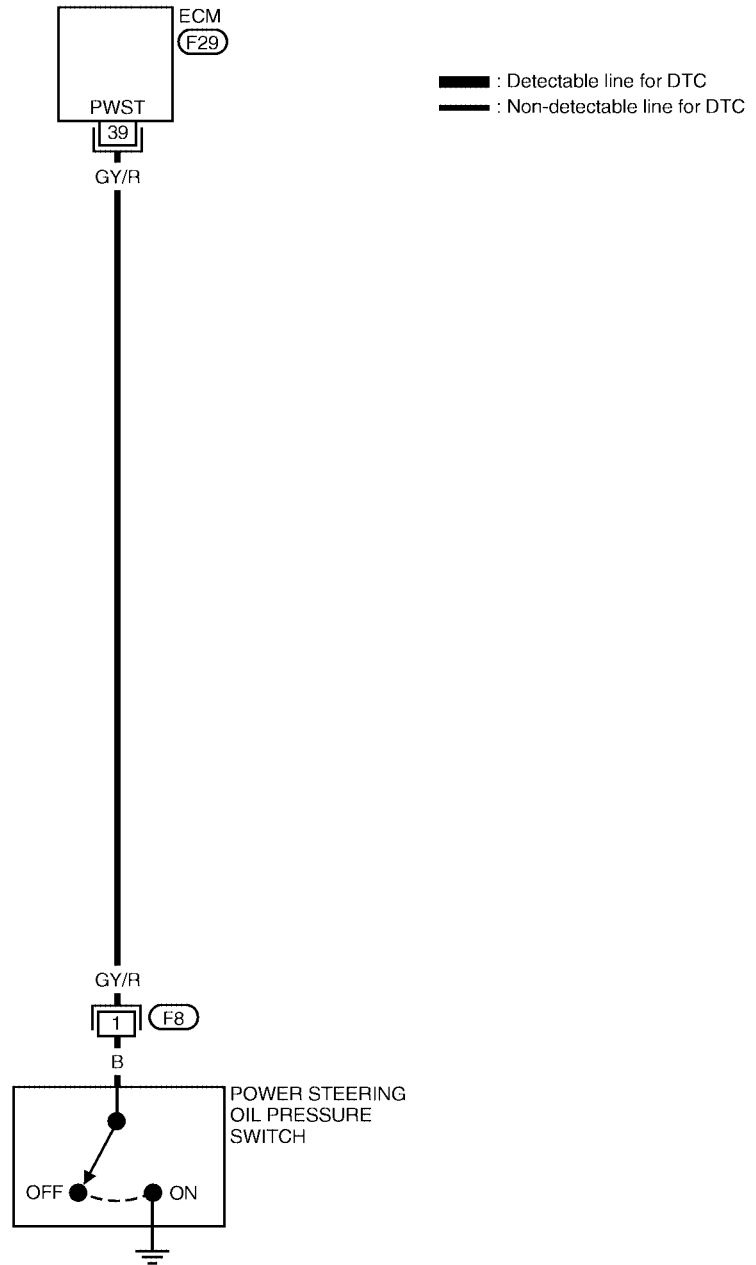
# POWER STEERING OIL PRESSURE SWITCH

[KA24DE]

## Wiring Diagram

UBS005JT

EC-PST/SW-01



AEC012B

# POWER STEERING OIL PRESSURE SWITCH

[KA24DE]

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

**CAUTION:**

Do not use ECM ground terminals when measuring input/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 COLO R | ITEM                               | CONDITION   | DATA (DC Voltage) |
|---------------|-------------|------------------------------------|---|-------------------|
| 39            | GY/R        | Power steering oil pressure switch | [Engine is running]<br>● Steering wheel is fully turned | Approximately 0V  |
|               |             |                                    | [Engine is running]<br>● Steering wheel is not turned   | Approximately 5V  |

## Diagnostic Procedure

UBS005JU

### 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**

- Start engine.
- 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

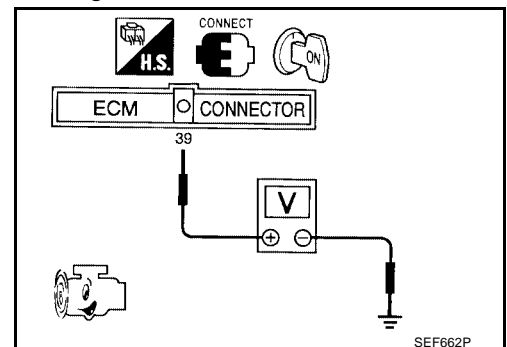
**Without CONSULT-II**

- Start engine.
- Check voltage between ECM terminal 39 and ground under the following conditions.

| Condition                             | Voltage [V] |
|---------------------------------------|-------------|
| When steering wheel is turned quickly | Approx. 0   |
| Except above                          | Approx. 5   |

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. Check harness continuity between ECM terminal 39 and terminal 1.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK >> GO TO 5.

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

**5. CHECK POWER STEERING OIL PRESSURE SWITCH**

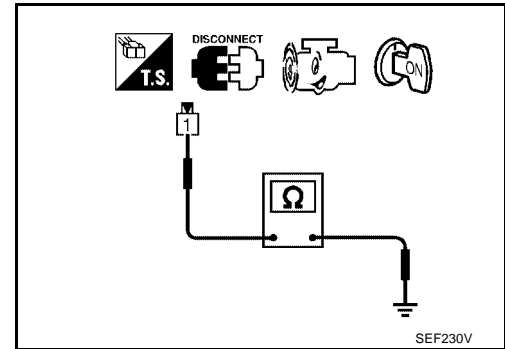
1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between terminals 1 and ground.

| 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"](#) .

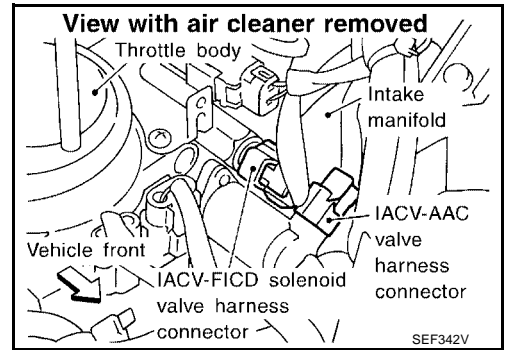
**>> INSPECTION END**



## IACV-FICD SOLENOID VALVE

### Component Description

When the air conditioner is on, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load.



A

EC

C

D

E

F

G

H

I

J

K

L

M

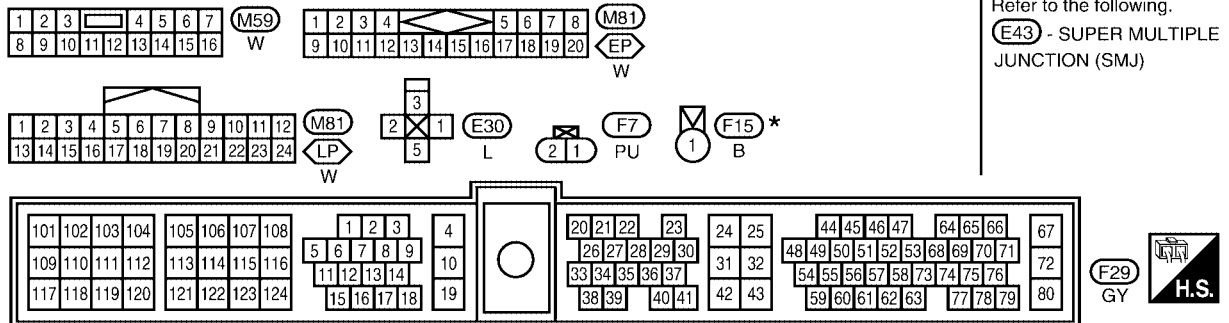
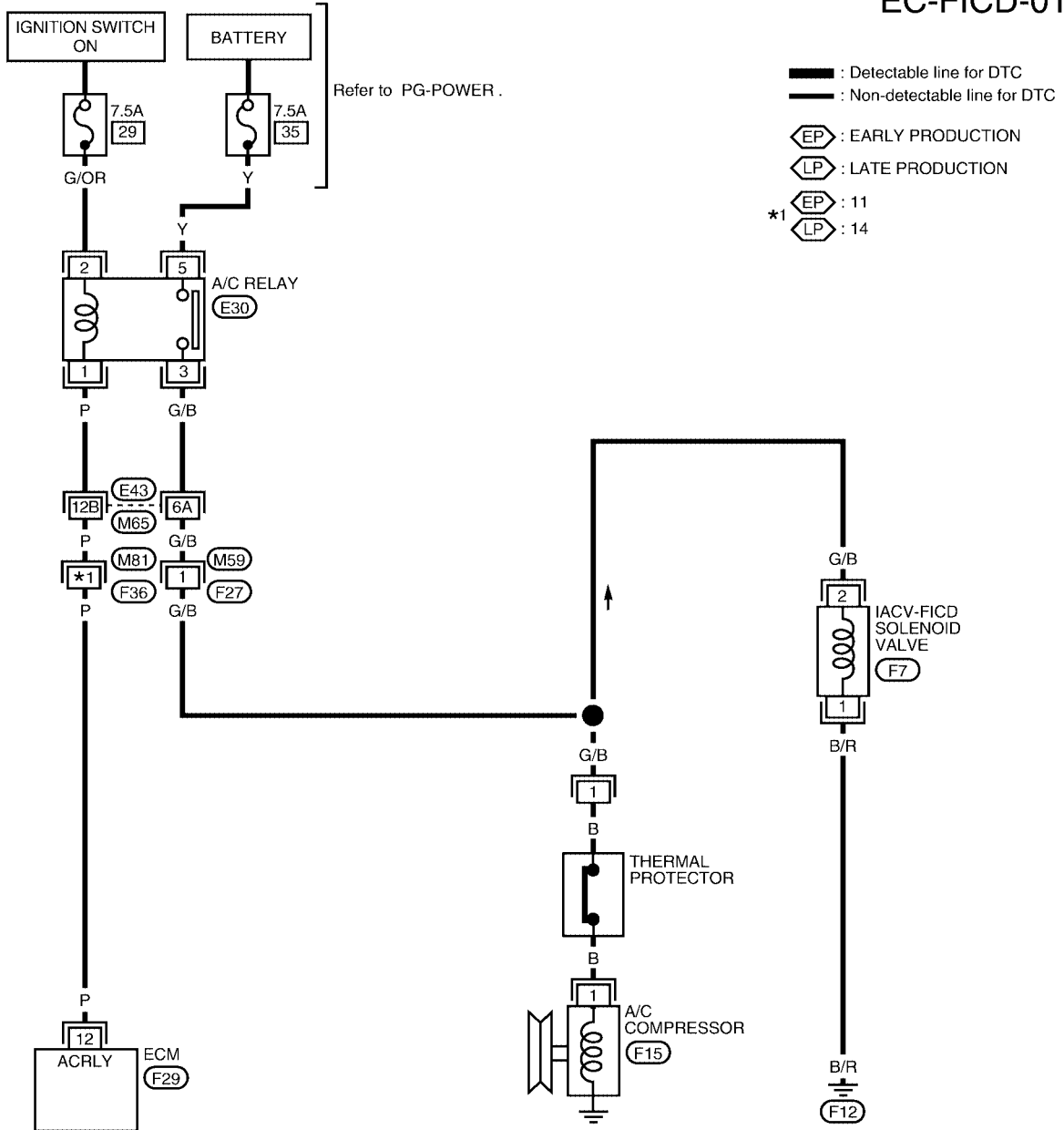
# IACV-FICD SOLENOID VALVE

[KA24DE]

UBS005JX

## Wiring Diagram

EC-FICD-01



\* : This connector is not shown in HARNESS LAYOUT of PG section.

WBWA0024E

# IACV-FICD SOLENOID VALVE

[KA24DE]

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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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 COLO R | ITEM                  | CONDITION  | DATA (DC Voltage)             |
|---------------|-------------|-----------------------|--|-------------------------------|
| 12            | P           | Air conditioner relay | [Engine is running]<br>● Both A/C switch and blower switch are ON★ | Approximately 0V              |
|               |             |                       | [Engine is running]<br>● A/C switch is OFF                         | BATTERY VOLTAGE<br>(11 - 14V) |

★ : Ambient air temperature above 10°C (50°F) and in any mode except OFF.

## Diagnostic Procedure

UBS005JY

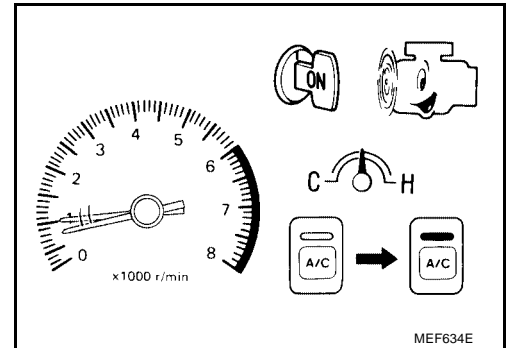
### 1. CHECK OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.  
**800±50 rpm**  
If NG, adjust idle speed.
3. Push air conditioner switch ON and turn fan switch to 4-speed.
4. Recheck idle speed.

**875 rpm or more**

OK or NG

- OK >> **INSPECTION END.**  
 NG >> GO TO 2.



### 2. CHECK AIR CONDITIONER FUNCTION

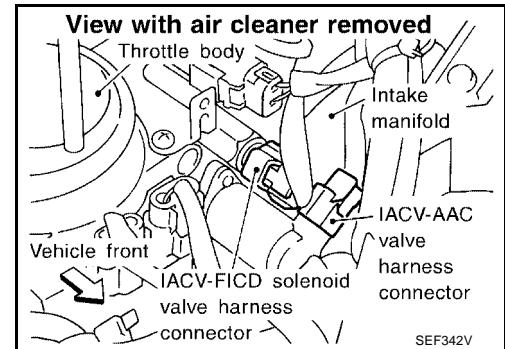
Check if air conditioner compressor functions normally.

OK or NG

- OK >> GO TO 3.  
 NG >> Refer to [MTC-24, "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.

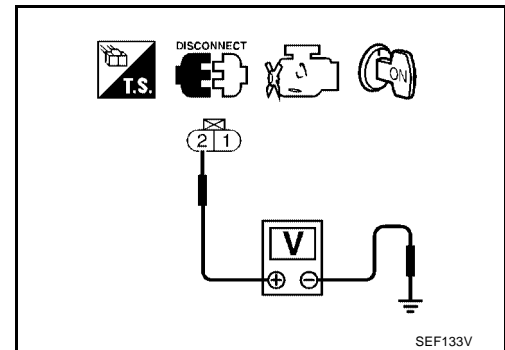


4. Check voltage between terminal 2 and ground with CONSULT-II or tester.

**Voltage : Battery voltage**

OK or NG

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



## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between IACV-FICD solenoid valve and harness connector F27  
 >> 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 body 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

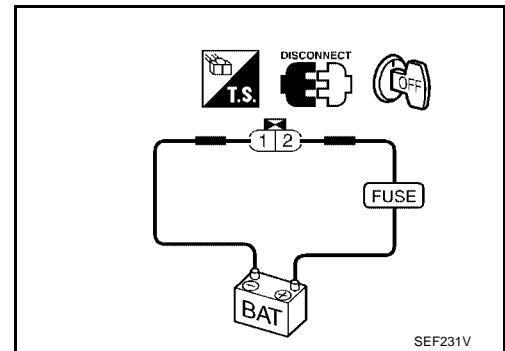
Check the harness for open or short between IACV-FICD solenoid valve and body ground.

- >> 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.

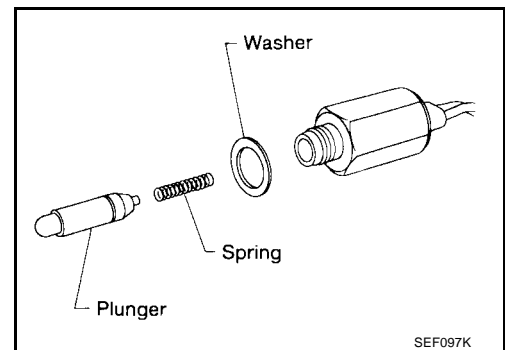


- Check for broken spring.

OK or NG

OK >> GO TO 8.

NG >> Replace IACV-FICD solenoid valve.



## 8. CHECK INTERMITTENT INCIDENT

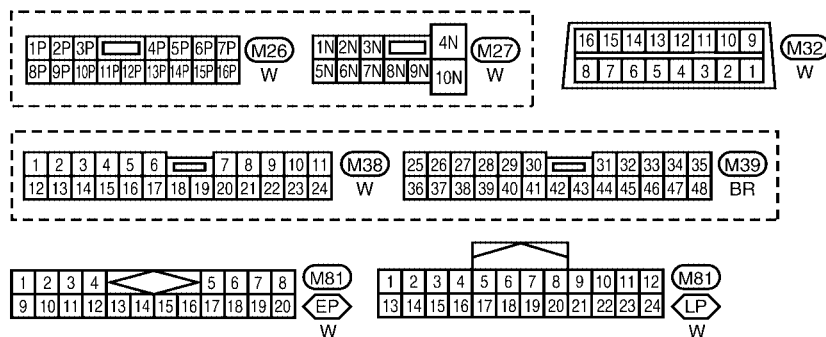
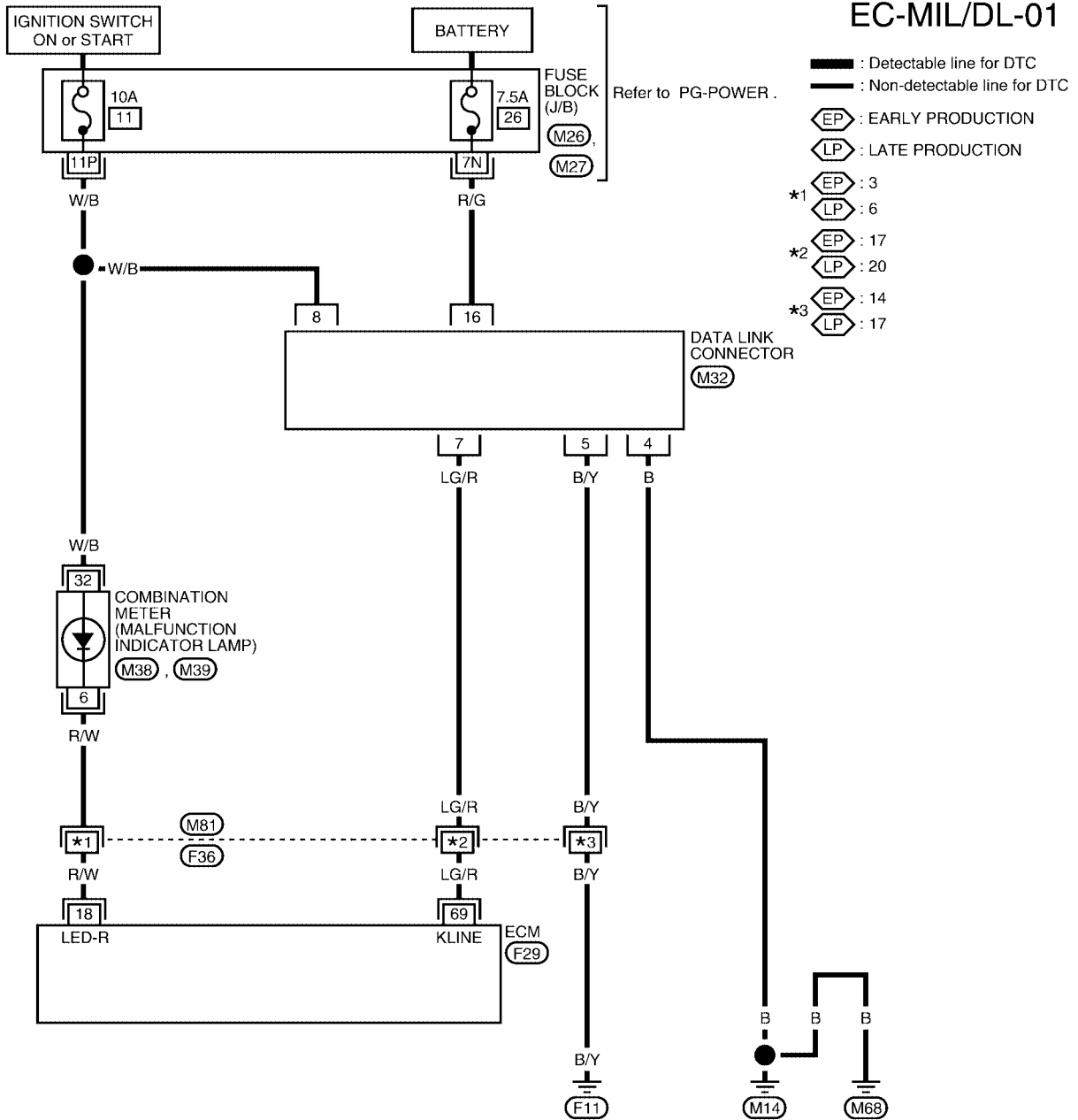
Perform [EC-120, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

## DATA LINK CONNECTOR

### Wiring Diagram

### EC-MIL/DL-01



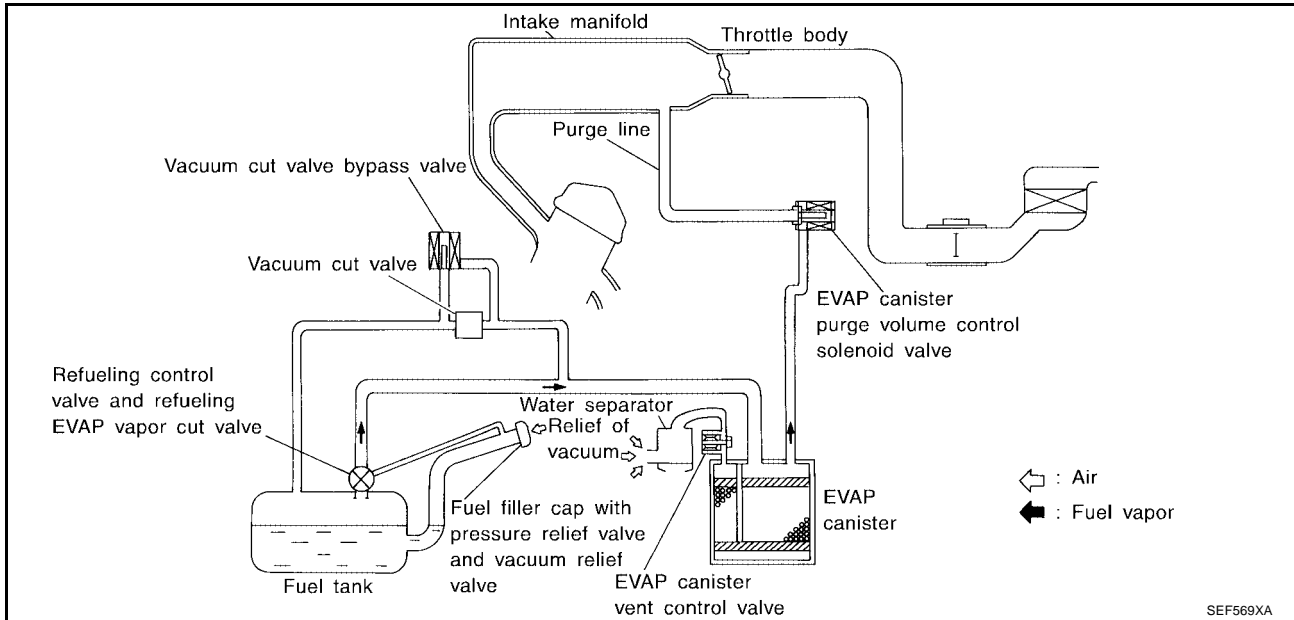
Refer to the following.  
 (F29) - ELECTRICAL UNITS

## EVAPORATIVE EMISSION SYSTEM

PFP:14950

UBS005K0

### Description SYSTEM DESCRIPTION



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

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

The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating.

EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

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

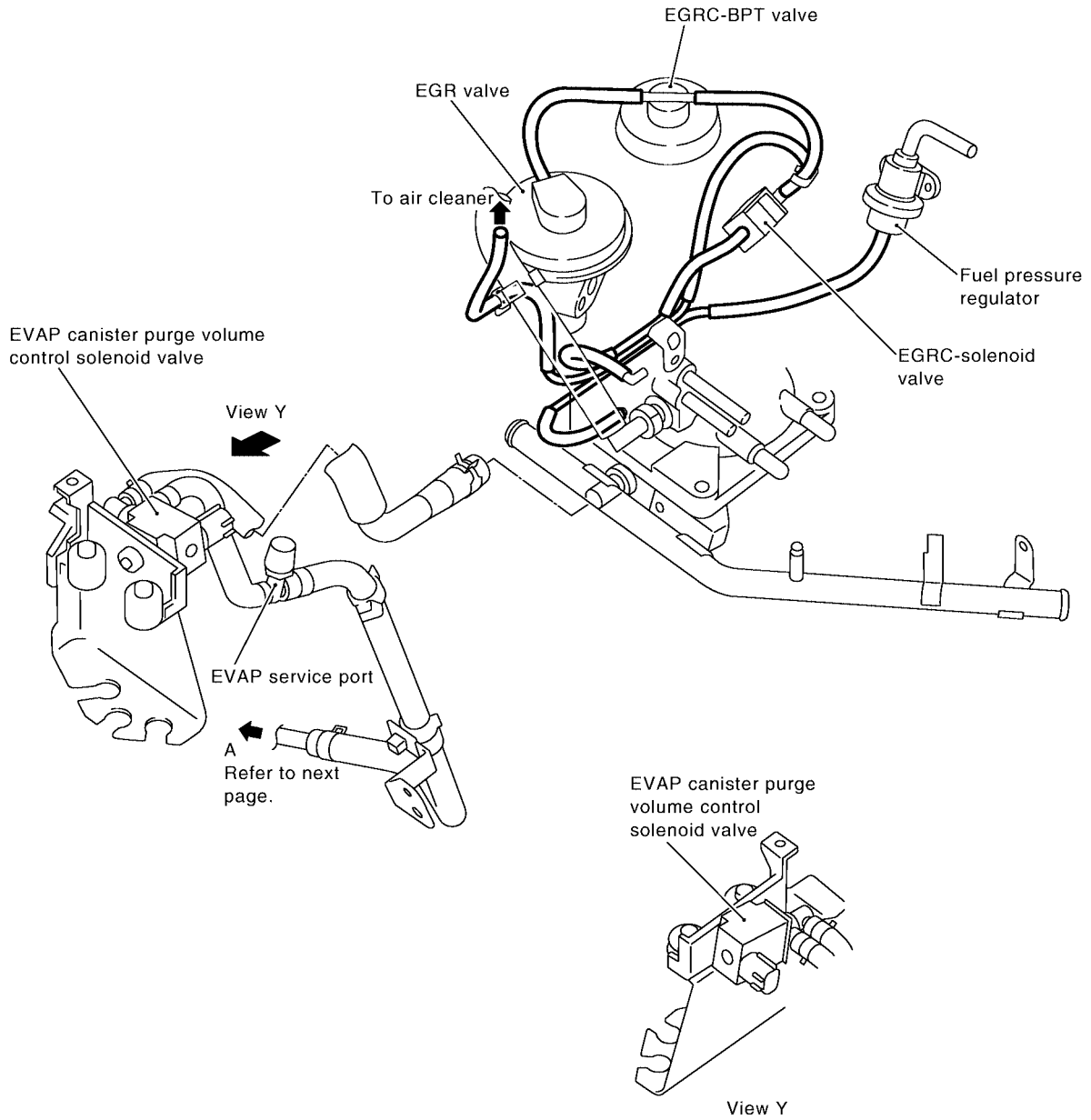
# EVAPORATIVE EMISSION SYSTEM

[KA24DE]

## EVAPORATIVE EMISSION LINE DRAWING

### NOTE:

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

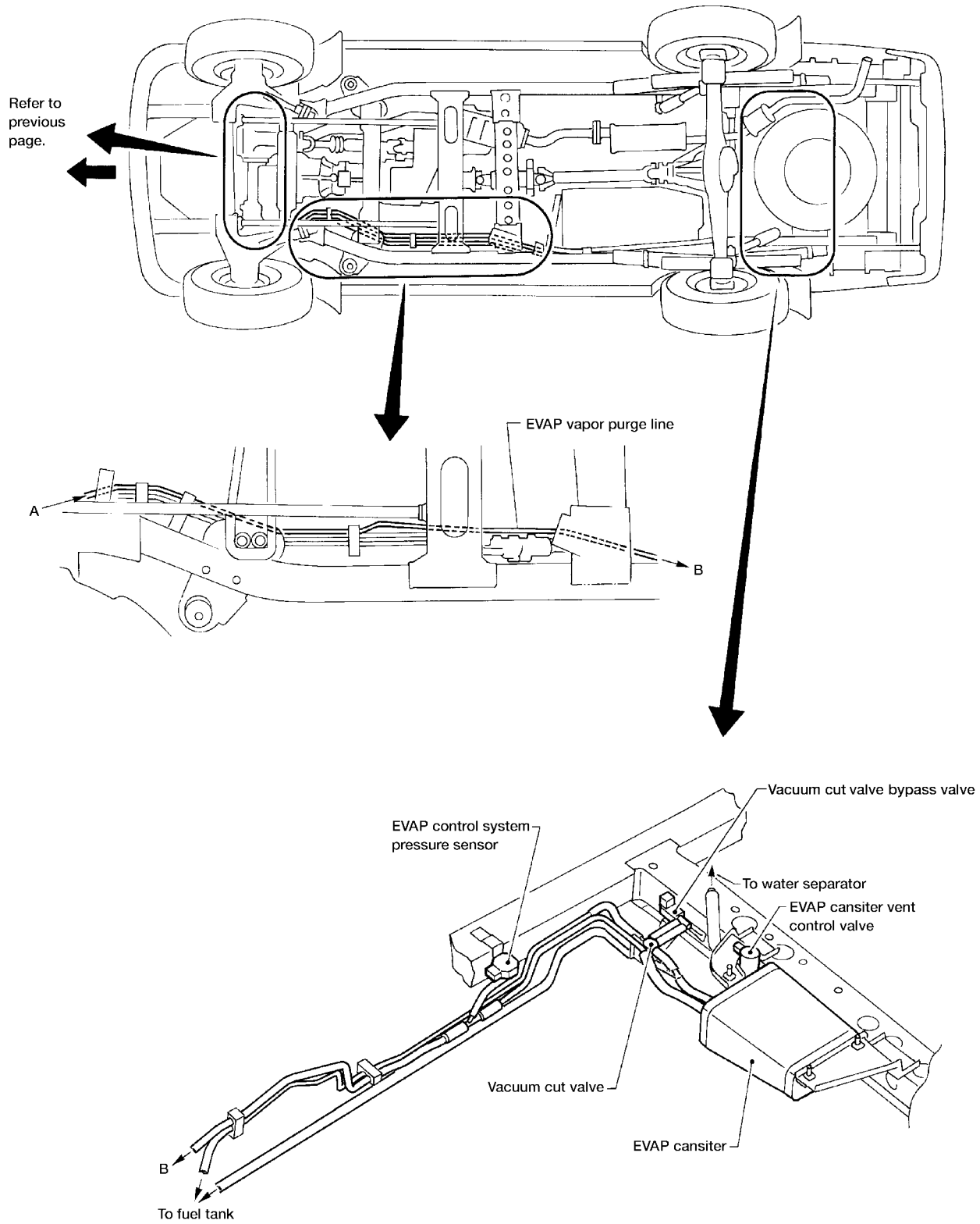


SEF712Z



# EVAPORATIVE EMISSION SYSTEM

[KA24DE]



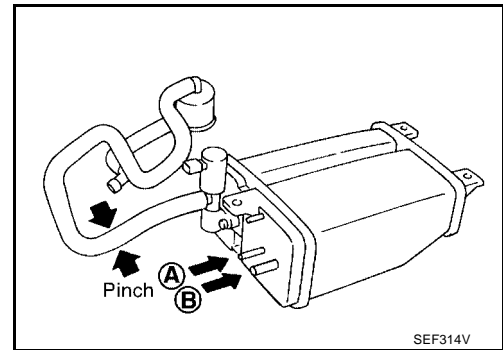
A  
EC  
C  
D  
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WEC555

## Component Inspection EVAP CANISTER

Check EVAP canister as follows:

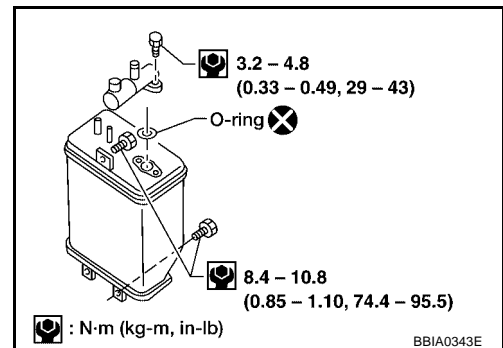
1. Pinch the fresh air hose.
2. Blow air into port **A** and check that air flows freely through port **B**.



## Tightening Torque

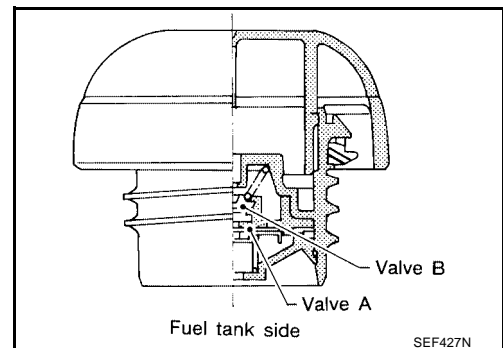
Tighten EVAP canister as shown in the figure.

**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.

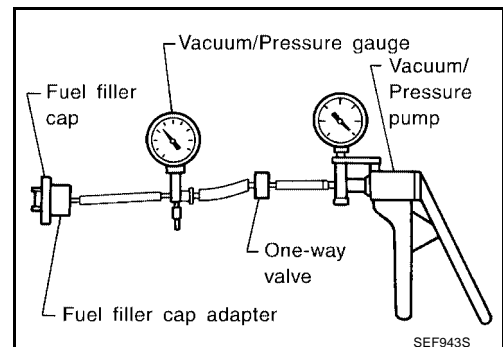
**Pressure** : 16.0 - 20.0 kPa  
(0.163 - 0.204 kg/cm<sup>2</sup> , 2.32 - 2.90 psi)

**Vacuum** : -6.0 to -3.5 kPa  
(-0.061 to -0.036 kg/cm<sup>2</sup> , -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-120](#) .

## EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

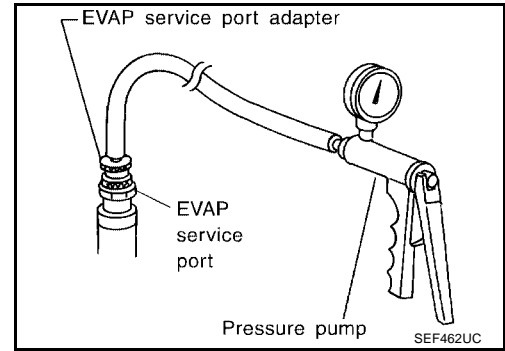
Refer to [EC-469](#) .

## FUEL TANK TEMPERATURE SENSOR

Refer to [EC-239](#) .

## 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.



UBS007FH

## How To Detect Fuel Vapor Leakage

### CAUTION:

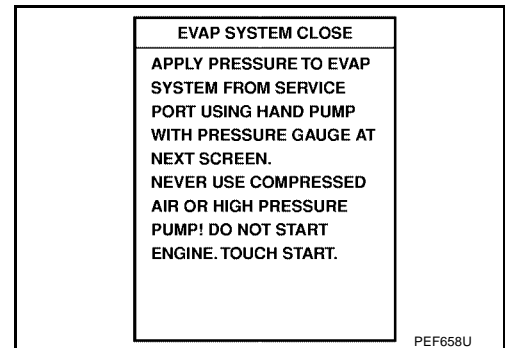
- Never use compressed air or a high pressure pump.
- Do not start engine.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in EVAP system.

### NOTE:

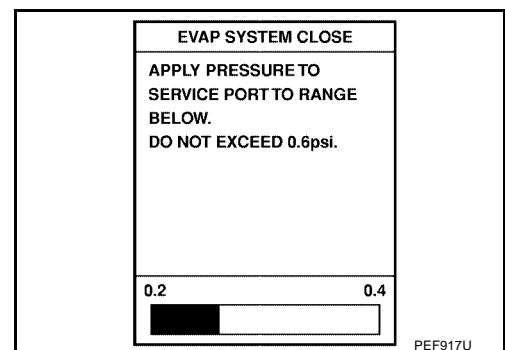
Improper installation of adapter to the service port may cause a leak.

### 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.



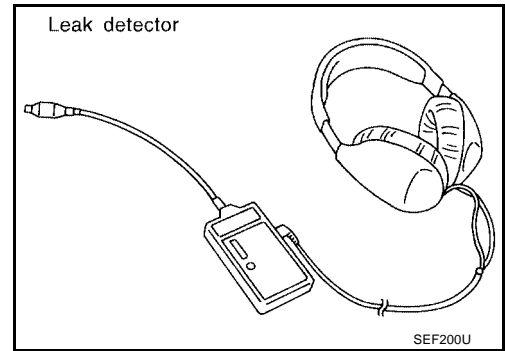
6. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7. Remove the EVAP service port adapter and hose with pressure pump.



# EVAPORATIVE EMISSION SYSTEM

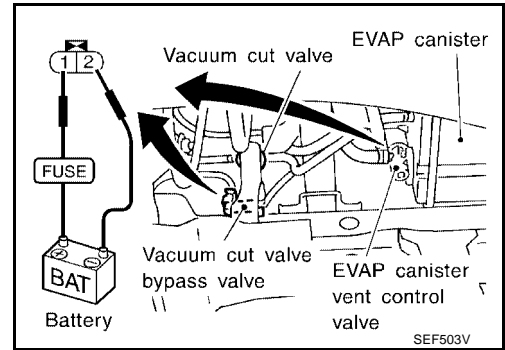
[KA24DE]

8. Locate the leak using a leak detector. Refer to [EC-568, "EVAPORATIVE EMISSION LINE DRAWING"](#).

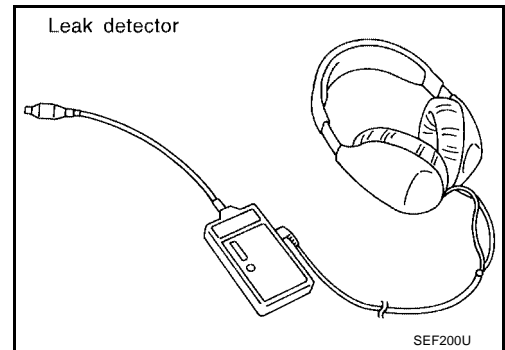


⊗ **WITHOUT CONSULT-II**

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<sup>2</sup>, 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-568, "EVAPORATIVE EMISSION LINE DRAWING"](#).

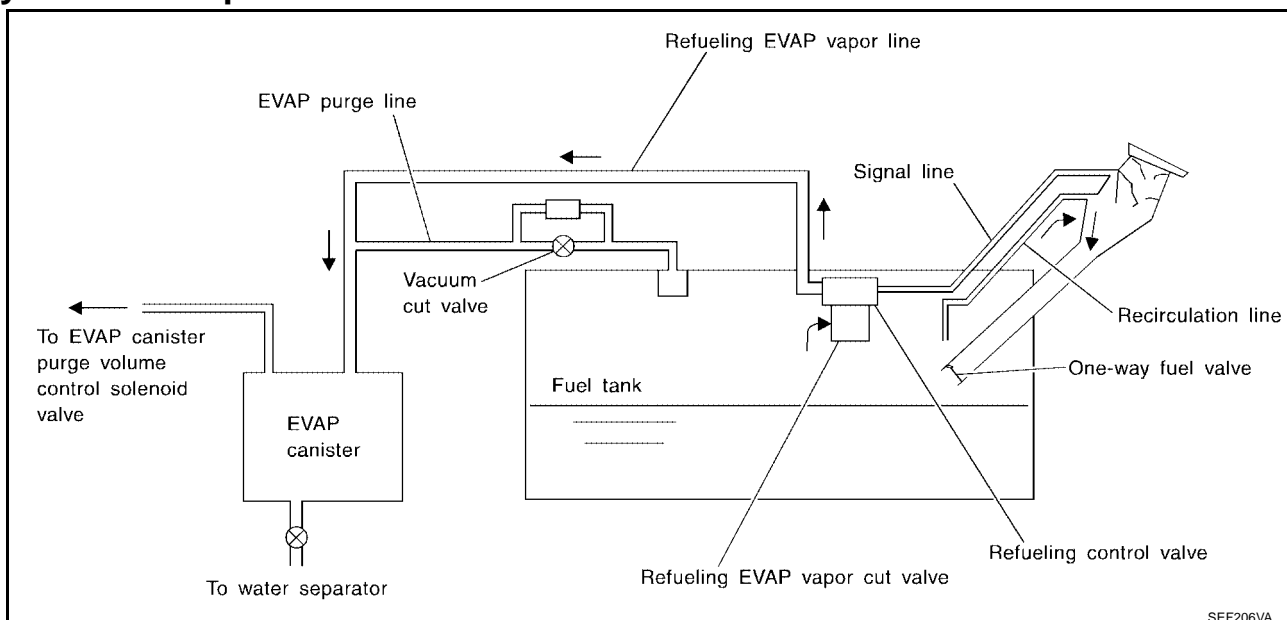


## ON BOARD REFUELING VAPOR RECOVERY (ORVR)

PFP:00032

## System Description

UBS005K3



SEF206VA

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<sub>2</sub> 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-45. "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

**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

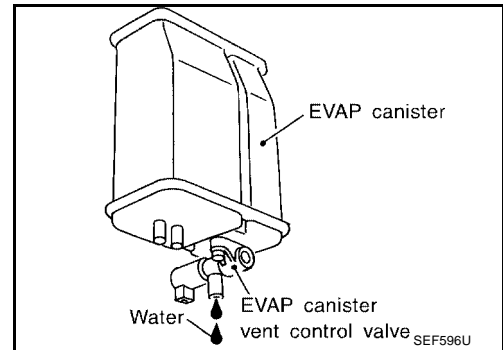
- OK >> GO TO 2.
- NG >> GO TO 3.

### 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

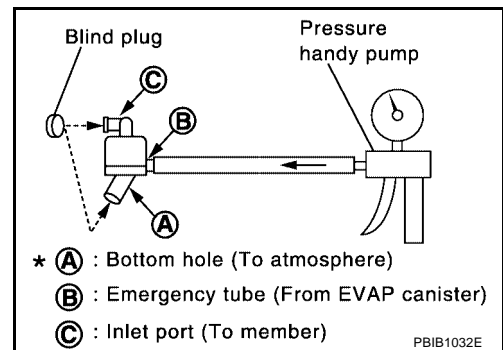
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

**NOTE:**

- Do not disassemble water separator.

OK or NG

- OK >> GO TO 5.
- NG >> Replace water separator.



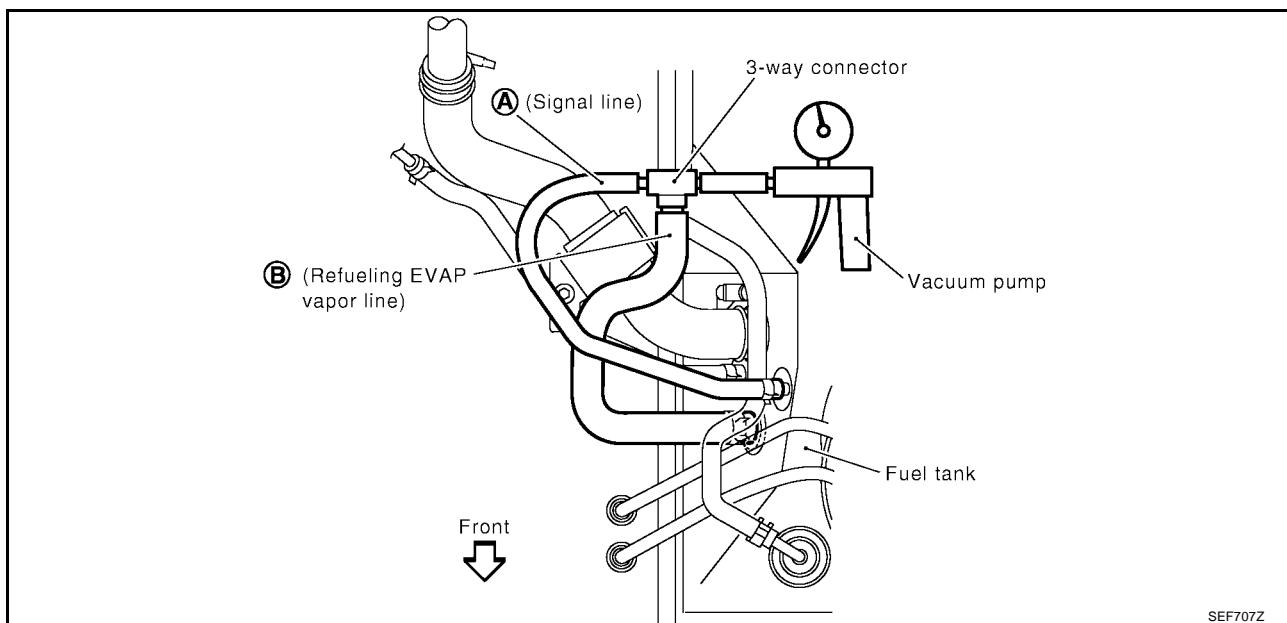
### 5. DETECT MALFUNCTIONING PART

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.



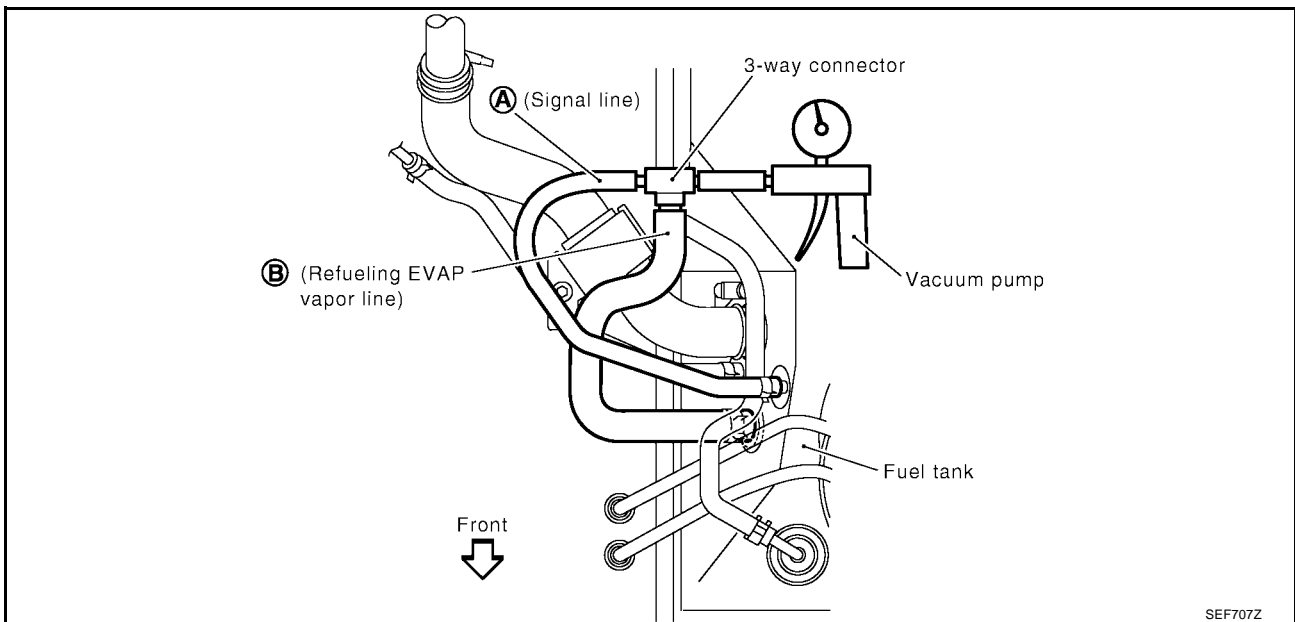
OK or NG

- 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.



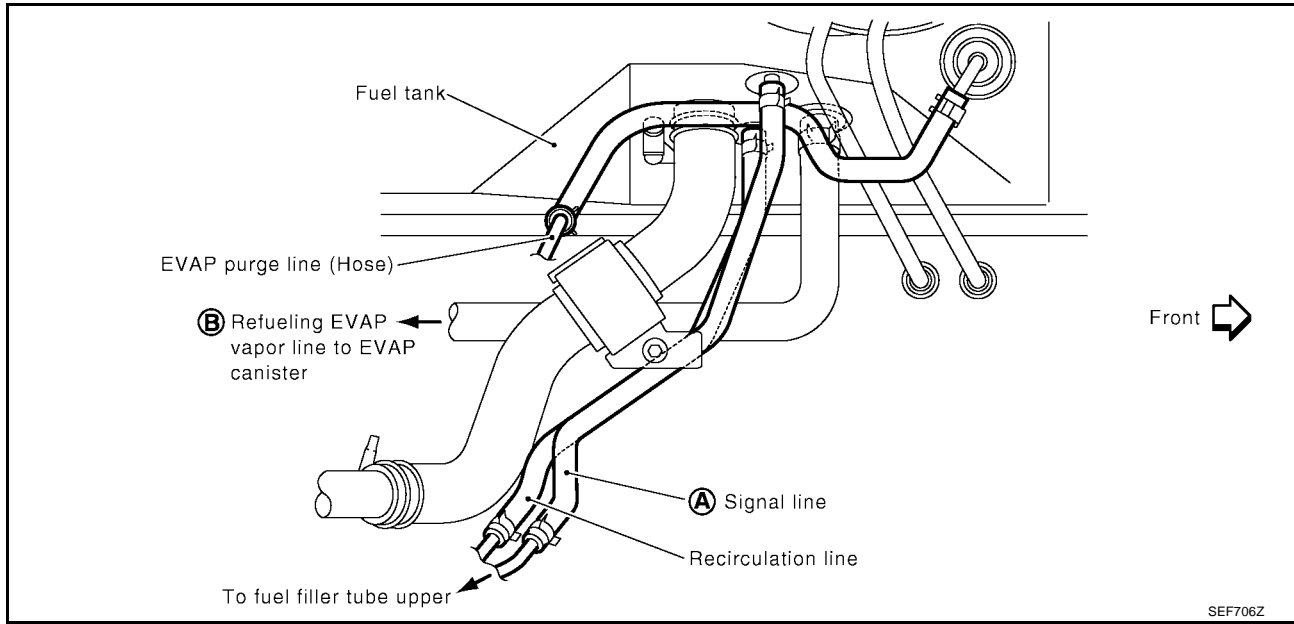
OK or NG

- 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.

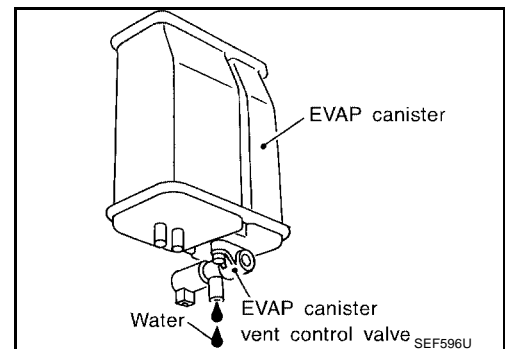
### 2. CHECK IF EVAP CANISTER SATURATED WITH WATER

- 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.

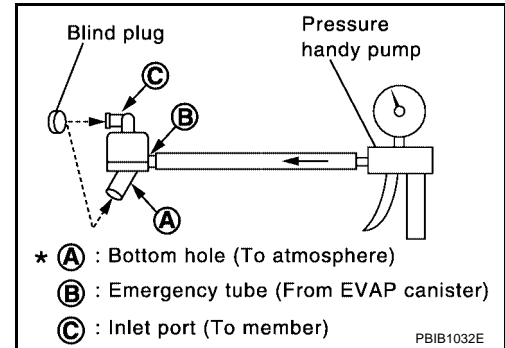
**NOTE:**

- 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.

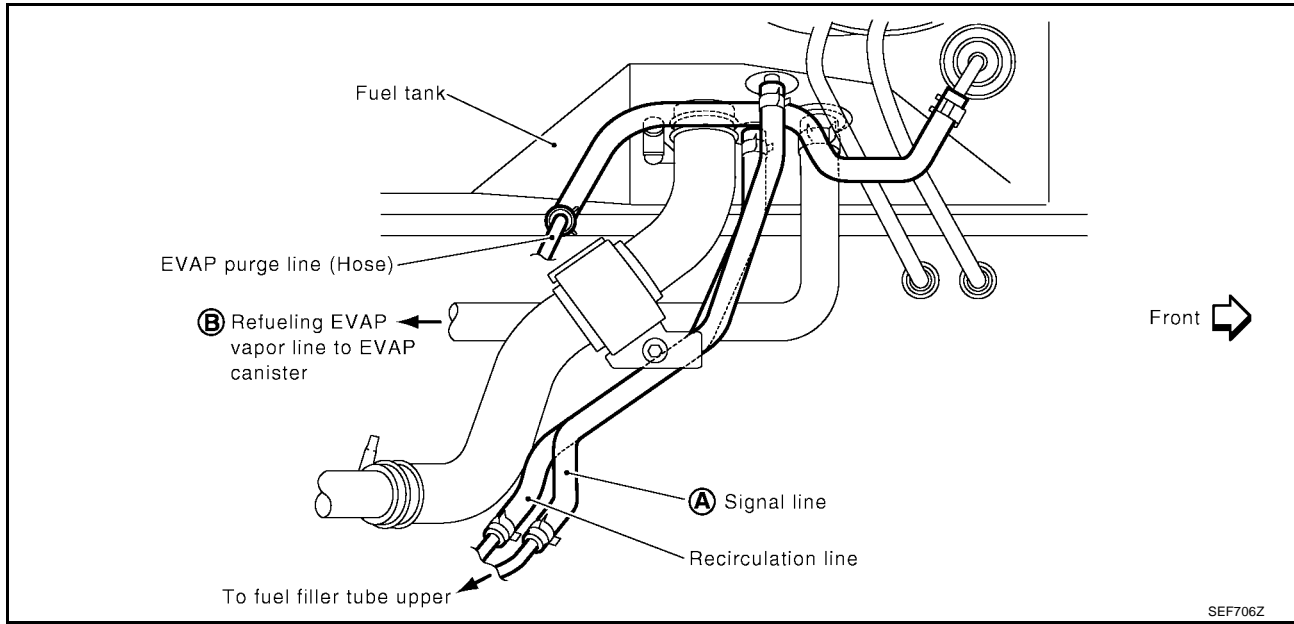
OK or NG

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.

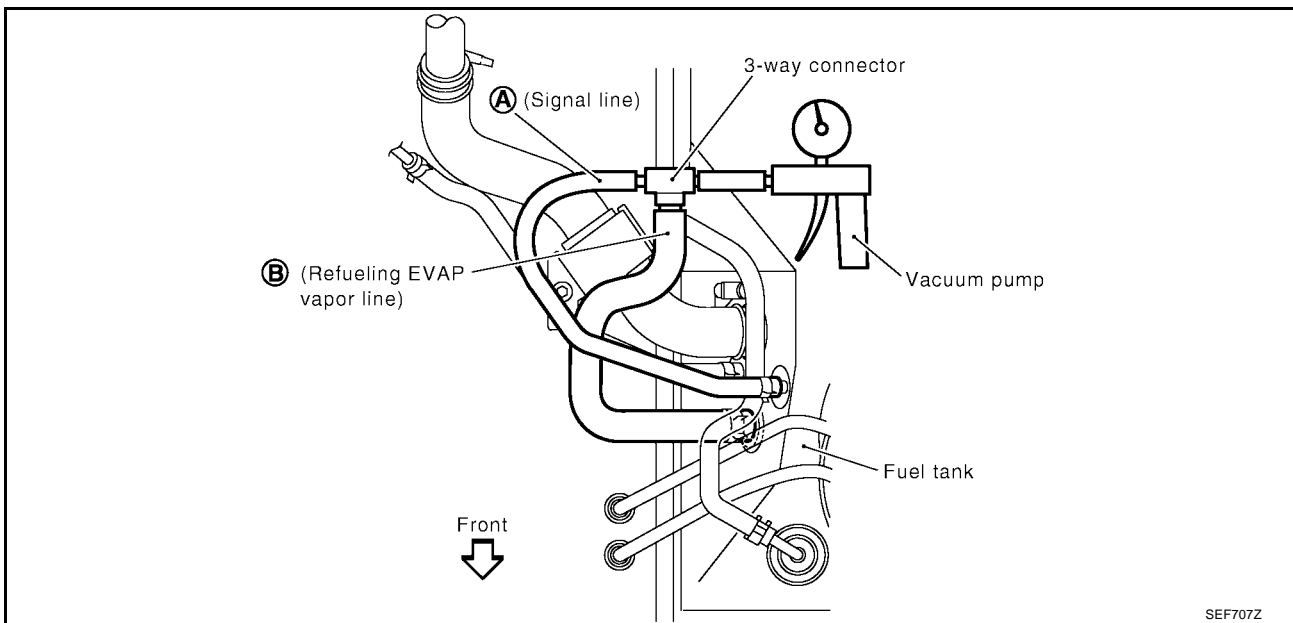
OK (Without CONSULT-II)>>GO TO 10.

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.



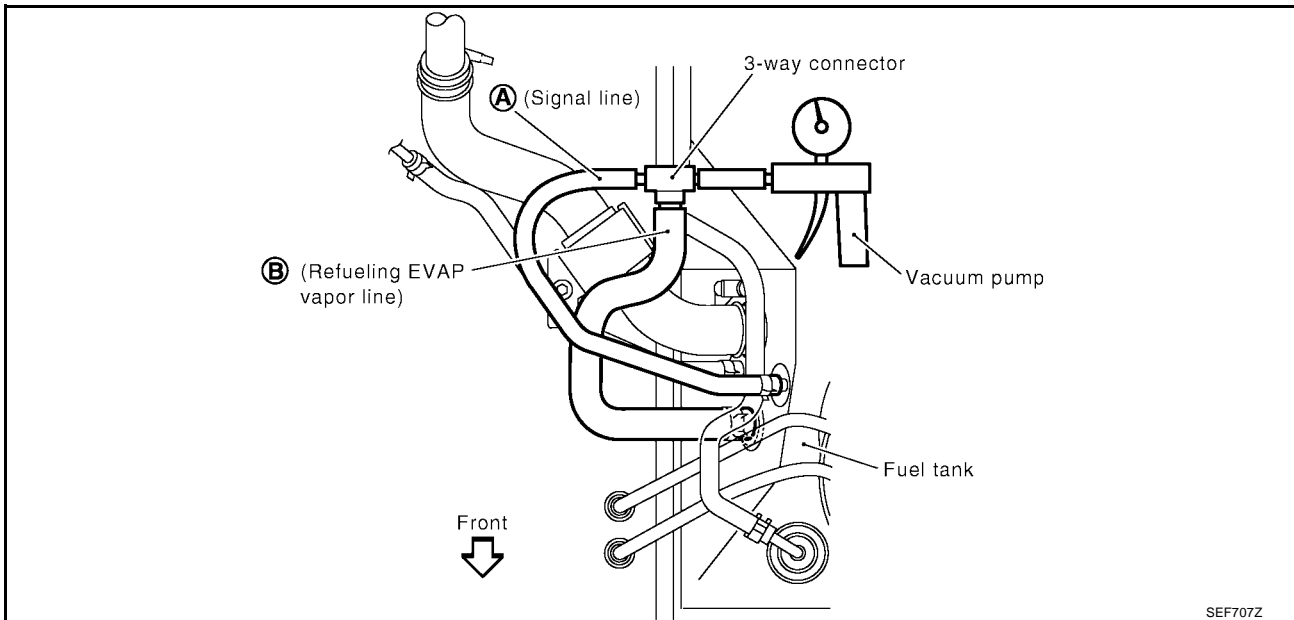
### OK or NG

- 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

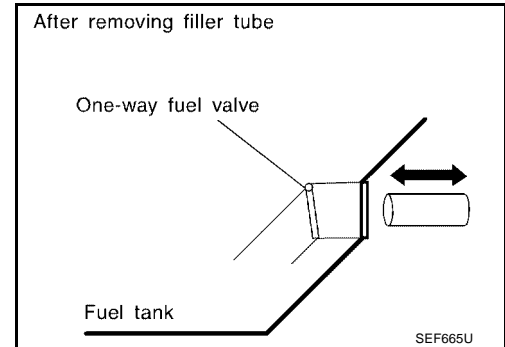
1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.  
When a stick is inserted, the valve should open, when removing stick it should close.

**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.

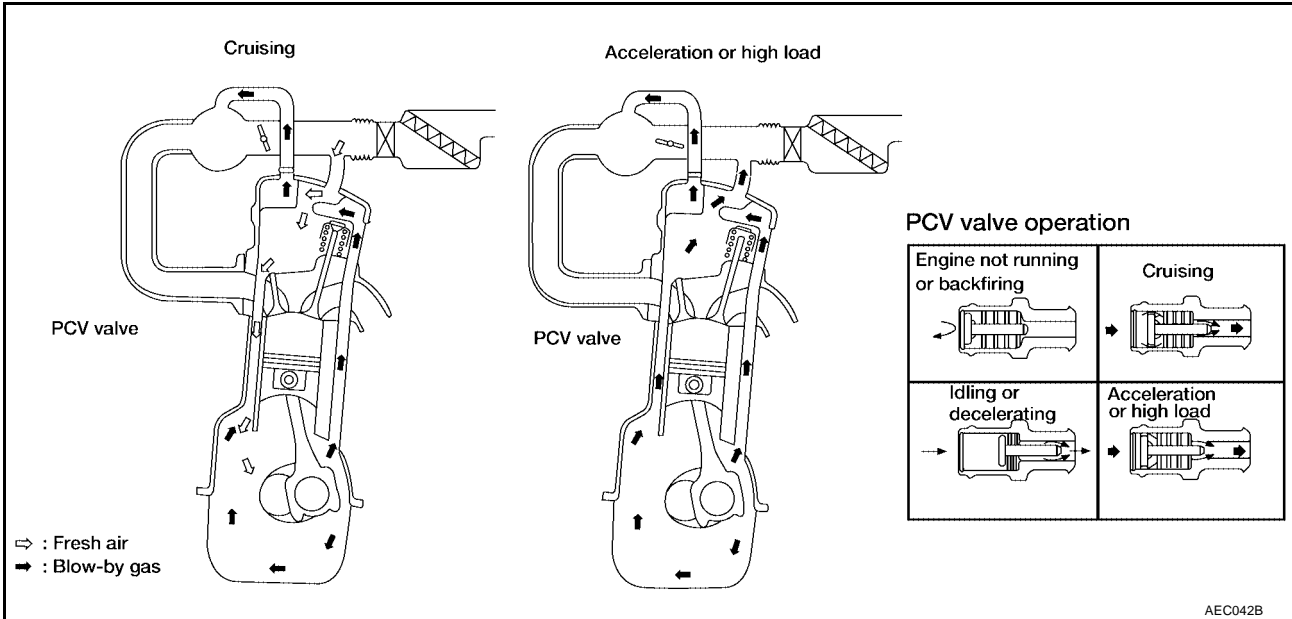


POSITIVE CRANKCASE VENTILATION

PFP:11810

UBS005K4

Description



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.

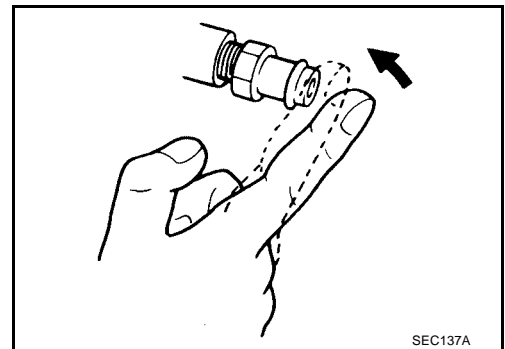
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

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**  
**PCV (POSITIVE CRANKCASE VENTILATION) VALVE**

UBS005K5

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.



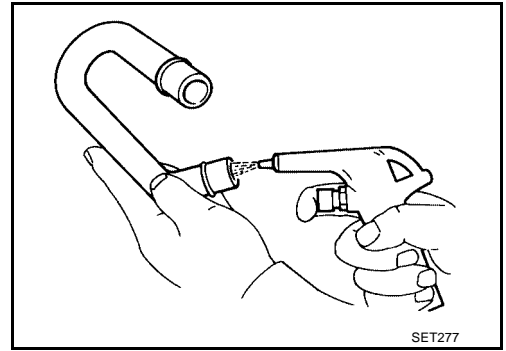
**VENTILATION HOSE**

1. Check hoses and hose connections for leaks.

## POSITIVE CRANKCASE VENTILATION

[KA24DE]

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





# SERVICE DATA AND SPECIFICATIONS (SDS)

[KA24DE]

## SERVICE DATA AND SPECIFICATIONS (SDS)

PF0:00030

### Fuel Pressure Regulator

UBS005K6

|   |                             |                             |
|---|-----------------------------|-----------------------------|
| Fuel pressure at idling<br>kPa (kg/cm <sup>2</sup> , psi) | Vacuum hose is connected    | Approximately 235 (2.4, 34) |
|   | Vacuum hose is disconnected | Approximately 294 (3.0, 43) |

### Idle Speed and Ignition Timing

UBS005K7

|                         |                                    |             |
|-------------------------|------------------------------------|-------------|
| Base idle speed*1 rpm   | No-load*3 (in "P" or "N" position) | 750±50      |
| Target idle speed*2 rpm | No-load*3 (in "P" or "N" position) | 800±50      |
| Air conditioner: ON rpm | In "P" or "N" position             | 875 or more |
| Ignition timing*1       | In "P" or "N" position             | 20°±2° BTDC |

\*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 (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

### Ignition Coil

UBS005K8

|  |                    |
|--|--------------------|
| 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

UBS005K9

|  |  |
|--|--|
| Supply voltage V                                   | Battery voltage (11 - 14)                      |
| Output voltage V                                   | 0.9 - 1.8*                                     |
| Mass air flow<br>(Using CONSULT-II or GST) g-m/sec | 0.9 - 5.8 at idle*<br>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

UBS005KA

|                     |               |
|---------------------|---------------|
| 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

UBS005KB

|                            |                |                    |
|----------------------------|----------------|--------------------|
| EGR temperature<br>°C (°F) | Voltage<br>(V) | Resistance<br>(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

UBS005KC

|                               |           |
|-------------------------------|-----------|
| Resistance [at 25°C (77°F)] Ω | 0.2 - 5.0 |
|-------------------------------|-----------|

### IACV-AAC Valve

UBS005KD

|                               |                    |
|-------------------------------|--------------------|
| Resistance [at 25°C (77°F)] Ω | Approximately 10.0 |
|-------------------------------|--------------------|

### Injector

UBS005KE

|                               |           |
|-------------------------------|-----------|
| Resistance [at 25°C (77°F)] Ω | 7.3 - 9.9 |
|-------------------------------|-----------|

# SERVICE DATA AND SPECIFICATIONS (SDS)

[KA24DE]

## Resistor

UBS005KF

|                                      |                   |
|--------------------------------------|-------------------|
| Resistance [at 25°C (77°F)] $\Omega$ | Approximately 2.2 |
|--------------------------------------|-------------------|

## Throttle Position Sensor

UBS005KG

| 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

UBS005KH

|                                      |           |
|--------------------------------------|-----------|
| Resistance [at 25°C (77°F)] $\Omega$ | 2.3 - 4.3 |
|--------------------------------------|-----------|

## Calculated Load Value

UBS005KI

|              | Calculated load value %<br>(Using CONSULT-II or GST) |
|--------------|--|
| At idle      | 9.5 - 34.0%  |
| At 2,500 rpm | 13.9 - 24.9%   |

## Intake Air Temperature Sensor

UBS005KJ

| Temperature $^{\circ}\text{C}$ ( $^{\circ}\text{F}$ ) | Resistance $\text{k}\Omega$ |
|---|-----------------------------|
| 20 (68)   | 2.1 - 2.9                   |
| 80 (176)  | 0.27 - 0.38                 |

## Heated Oxygen Sensor 2 Heater

UBS005KK

|                                      |           |
|--------------------------------------|-----------|
| Resistance [at 25°C (77°F)] $\Omega$ | 2.3 - 4.3 |
|--------------------------------------|-----------|

## Crankshaft Position Sensor (OBD)

UBS005KL

|                                      |           |
|--------------------------------------|-----------|
| Resistance [at 20°C (68°F)] $\Omega$ | 512 - 632 |
|--------------------------------------|-----------|

## Fuel Tank Temperature Sensor

UBS005KM

| Temperature $^{\circ}\text{C}$ ( $^{\circ}\text{F}$ ) | Resistance $\text{k}\Omega$ |
|---|-----------------------------|
| 20 (68)   | 2.3 - 2.7                   |
| 50 (122)  | 0.79 - 0.90                 |

# INDEX FOR DTC

[VG33E]

PFP:00024

UBS007HD

x: Applicable —: Not applicable

## INDEX FOR DTC Alphabetical Index

| Item<br>(CONSULT-II screen terms) | DTC*1 *2          | Trip | MIL<br>Lighting<br>up | Reference page          |
|-----------------------------------|-------------------|------|-----------------------|-------------------------|
|                                   | CONSULT-II<br>GST |      |                       |                         |
| Unable to access ECM              | —                 | —    | —                     | <a href="#">EC-648</a>  |
| A/T 1ST GR FNCTN                  | P0731             | 2    | x                     | <a href="#">AT-270</a>  |
| A/T 2ND GR FNCTN                  | P0732             | 2    | x                     | <a href="#">AT-276</a>  |
| A/T 3RD GR FNCTN                  | P0733             | 2    | x                     | <a href="#">AT-281</a>  |
| A/T 4TH GR FNCTN                  | P0734             | 2    | x                     | <a href="#">AT-286</a>  |
| A/T COMM LINE                     | P0600*3           | 2    | —                     | <a href="#">EC-1002</a> |
| A/T DIAG COMM LINE                | P1605             | 2    | x                     | <a href="#">EC-1127</a> |
| A/T TCC S/V FNCTN                 | P0744             | 2    | x                     | <a href="#">AT-298</a>  |
| ATF TEMP SEN/CIRC                 | P0710             | 2    | x                     | <a href="#">AT-255</a>  |
| CKP SEN/CIRCUIT                   | P0335             | 2    | x                     | <a href="#">EC-865</a>  |
| CKP SENSOR (COG)                  | P1336             | 2    | x                     | <a href="#">EC-1052</a> |
| CLOSED LOOP-B1                    | P1148             | 1    | x                     | <a href="#">EC-1046</a> |
| CLOSED LOOP-B2                    | P1168             | 1    | x                     | <a href="#">EC-1046</a> |
| CLOSED TP SW/CIRC                 | P0510             | 2    | x                     | <a href="#">EC-995</a>  |
| CMP SEN/CIRCUIT                   | P0340             | 2    | x                     | <a href="#">EC-871</a>  |
| CYL1 MISFIRE                      | P0301             | 2    | x                     | <a href="#">EC-853</a>  |
| CYL2 MISFIRE                      | P0302             | 2    | x                     | <a href="#">EC-853</a>  |
| CYL3 MISFIRE                      | P0303             | 2    | x                     | <a href="#">EC-853</a>  |
| CYL4 MISFIRE                      | P0304             | 2    | x                     | <a href="#">EC-853</a>  |
| CYL5 MISFIRE                      | P0305             | 2    | x                     | <a href="#">EC-853</a>  |
| CYL6 MISFIRE                      | P0306             | 2    | x                     | <a href="#">EC-853</a>  |
| ECM                               | P0605             | 2    | x                     | <a href="#">EC-1008</a> |
| ECT SEN/CIRCUIT                   | P0117             | 1    | x                     | <a href="#">EC-741</a>  |
| ECT SEN/CIRCUIT                   | P0118             | 1    | x                     | <a href="#">EC-741</a>  |
| ECT SENSOR                        | P0125             | 2    | x                     | <a href="#">EC-763</a>  |
| EGRC-BPT VALVE                    | P0402             | 2    | x                     | <a href="#">EC-887</a>  |
| EGR SOLENOID/V                    | P1400             | 2    | x                     | <a href="#">EC-1057</a> |
| EGR SYSTEM                        | P0400             | 2    | x                     | <a href="#">EC-878</a>  |
| EGR SYSTEM                        | P1402             | 2    | x                     | <a href="#">EC-1063</a> |
| EGR TEMP SEN/CIRC                 | P0405             | 2    | x                     | <a href="#">EC-893</a>  |
| EGR TEMP SEN/CIRC                 | P0406             | 2    | x                     | <a href="#">EC-893</a>  |
| ENG OVER TEMP                     | P0217             | 1    | x                     | <a href="#">EC-848</a>  |
| ENG OVER TEMP                     | P1217             | 1    | x                     | <a href="#">EC-1048</a> |
| ENG SPEED SIG                     | P0725             | 2    | x                     | <a href="#">AT-266</a>  |
| EVAP GROSS LEAK                   | P0455             | 2    | x                     | <a href="#">EC-952</a>  |
| EVAP PURG FLOW/MON                | P0441             | 2    | x                     | <a href="#">EC-904</a>  |
| EVAP SMALL LEAK                   | P0442             | 2    | x                     | <a href="#">EC-912</a>  |
| EVAP SMALL LEAK                   | P1442             | 2    | x                     | <a href="#">EC-1071</a> |
| EVAP SYS PRES SEN                 | P0452             | 2    | x                     | <a href="#">EC-937</a>  |

# INDEX FOR DTC

[VG33E]

| Item<br>(CONSULT-II screen terms) | DTC*1 *2          | Trip | MIL<br>Lighting<br>up | Reference page          |
|-----------------------------------|-------------------|------|-----------------------|-------------------------|
|                                   | CONSULT-II<br>GST |      |                       |                         |
| EVAP SYS PRES SEN                 | P0453             | 2    | ×                     | <a href="#">EC-943</a>  |
| EVAP VERY SML LEAK                | P0456             | 2    | ×                     | <a href="#">EC-962</a>  |
| EVAP VERY SML LEAK                | P1456             | 2    | ×                     | <a href="#">EC-1096</a> |
| FTT SEN/CIRCUIT                   | P0182             | 2    | ×                     | <a href="#">EC-844</a>  |
| FTT SEN/CIRCUIT                   | P0183             | 2    | ×                     | <a href="#">EC-844</a>  |
| FTT SENSOR                        | P0181             | 2    | ×                     | <a href="#">EC-839</a>  |
| FUEL LEV SEN SLOSH                | P0460             | 2    | ×                     | <a href="#">EC-973</a>  |
| FUEL LEVEL SEN/CIRC               | P1464             | 2    | ×                     | <a href="#">EC-1106</a> |
| FUEL LEVEL SENSOR                 | P0461             | 2    | ×                     | <a href="#">EC-977</a>  |
| FUEL LEVL SEN/CIRC                | P0462             | 2    | ×                     | <a href="#">EC-979</a>  |
| FUEL LEVL SEN/CIRC                | P0463             | 2    | ×                     | <a href="#">EC-979</a>  |
| FUEL SYS-LEAN-B1                  | P0171             | 2    | ×                     | <a href="#">EC-823</a>  |
| FUEL SYS-LEAN-B2                  | P0174             | 2    | ×                     | <a href="#">EC-823</a>  |
| FUEL SYS-RICH-B1                  | P0172             | 2    | ×                     | <a href="#">EC-831</a>  |
| FUEL SYS-RICH-B2                  | P0175             | 2    | ×                     | <a href="#">EC-831</a>  |
| HO2S1 (B1)                        | P0132             | 2    | ×                     | <a href="#">EC-771</a>  |
| HO2S1 (B1)                        | P0133             | 2    | ×                     | <a href="#">EC-780</a>  |
| HO2S1 (B1)                        | P0134             | 2    | ×                     | <a href="#">EC-793</a>  |
| HO2S1 (B1)                        | P1143             | 2    | ×                     | <a href="#">EC-1010</a> |
| HO2S1 (B1)                        | P1144             | 2    | ×                     | <a href="#">EC-1017</a> |
| HO2S1 (B2)                        | P0152             | 2    | ×                     | <a href="#">EC-771</a>  |
| HO2S1 (B2)                        | P0153             | 2    | ×                     | <a href="#">EC-780</a>  |
| HO2S1 (B2)                        | P0154             | 2    | ×                     | <a href="#">EC-793</a>  |
| HO2S1 (B2)                        | P1163             | 2    | ×                     | <a href="#">EC-1010</a> |
| HO2S1 (B2)                        | P1164             | 2    | ×                     | <a href="#">EC-1017</a> |
| HO2S1 HTR (B1)                    | P0031             | 2    | ×                     | <a href="#">EC-706</a>  |
| HO2S1 HTR (B1)                    | P0032             | 2    | ×                     | <a href="#">EC-706</a>  |
| HO2S1 HTR (B2)                    | P0051             | 2    | ×                     | <a href="#">EC-706</a>  |
| HO2S1 HTR (B2)                    | P0052             | 2    | ×                     | <a href="#">EC-706</a>  |
| HO2S2 HTR (B1)                    | P0037             | 2    | ×                     | <a href="#">EC-714</a>  |
| HO2S2 HTR (B1)                    | P0038             | 2    | ×                     | <a href="#">EC-714</a>  |
| HO2S2 HTR (B2)                    | P0057             | 2    | ×                     | <a href="#">EC-714</a>  |
| HO2S2 HTR (B2)                    | P0058             | 2    | ×                     | <a href="#">EC-714</a>  |
| HO2S2 (B1)                        | P0138             | 2    | ×                     | <a href="#">EC-804</a>  |
| HO2S2 (B1)                        | P0139             | 2    | ×                     | <a href="#">EC-813</a>  |
| HO2S2 (B1)                        | P1146             | 2    | ×                     | <a href="#">EC-1024</a> |
| HO2S2 (B1)                        | P1147             | 2    | ×                     | <a href="#">EC-1035</a> |
| HO2S2 (B2)                        | P0158             | 2    | ×                     | <a href="#">EC-804</a>  |
| HO2S2 (B2)                        | P0159             | 2    | ×                     | <a href="#">EC-813</a>  |
| HO2S2 (B2)                        | P1166             | 2    | ×                     | <a href="#">EC-1024</a> |
| HO2S2 (B2)                        | P1167             | 2    | ×                     | <a href="#">EC-1035</a> |
| IAT SEN/CIRCUIT                   | P0112             | 2    | ×                     | <a href="#">EC-736</a>  |

# INDEX FOR DTC

[VG33E]

| Item<br>(CONSULT-II screen terms)                            | DTC*1 *2          | Trip | MIL<br>Lighting<br>up | Reference page          |    |
|--|-------------------|------|-----------------------|-------------------------|----|
|  | CONSULT-II<br>GST |      |                       |                         |    |
| IAT SEN/CIRCUIT  | P0113             | 2    | ×                     | <a href="#">EC-736</a>  | A  |
| IAT SENSOR   | P0127             | 2    | ×                     | <a href="#">EC-766</a>  | EC |
| ISC SYSTEM/CIRC  | P0505             | 2    | ×                     | <a href="#">EC-988</a>  |    |
| KNOCK SEN/CIRC-B1  | P0327             | 2    | —                     | <a href="#">EC-861</a>  | C  |
| KNOCK SEN/CIRC-B1  | P0328             | 2    | —                     | <a href="#">EC-861</a>  |    |
| L/PRESS SOL/CIRC   | P0745             | 2    | ×                     | <a href="#">AT-306</a>  | D  |
| MAF SEN/CIRCUIT  | P0101             | 2    | ×                     | <a href="#">EC-723</a>  |    |
| MAF SEN/CIRCUIT  | P0102             | 1    | ×                     | <a href="#">EC-730</a>  | E  |
| MAF SEN/CIRCUIT  | P0103             | 2    | ×                     | <a href="#">EC-730</a>  |    |
| MULTI CYL MISFIRE  | P0300             | 2    | ×                     | <a href="#">EC-853</a>  | F  |
| <b>NO DTC IS DETECTED.<br/>FORTHTESTING MAY BE REQUIRED.</b> | <b>P0000</b>      | —    | —                     | —                       |    |
| P-N POS SW/CIRCUIT   | P1706             | 2    | ×                     | <a href="#">EC-1132</a> | G  |
| PNP SW/CIRC  | P0705             | 2    | ×                     | <a href="#">AT-249</a>  |    |
| PURG VOLUME CONT/V   | P0444             | 2    | ×                     | <a href="#">EC-924</a>  | H  |
| PURG VOLUME CONT/V   | P0445             | 2    | ×                     | <a href="#">EC-924</a>  |    |
| PURG VOLUME CONT/V   | P1444             | 2    | ×                     | <a href="#">EC-1073</a> | I  |
| SFT SOL A/CIRC   | P0750             | 2    | ×                     | <a href="#">AT-311</a>  |    |
| SFT SOL B/CIRC   | P0755             | 2    | ×                     | <a href="#">AT-316</a>  | J  |
| TCC SOLENOID/CIRC  | P0740             | 2    | ×                     | <a href="#">AT-293</a>  |    |
| THERMSTAT FNCTN  | P0128             | 2    | ×                     | <a href="#">EC-769</a>  | K  |
| TP SEN/CIRC A/T  | P1705*4           | 1    | ×                     | <a href="#">AT-321</a>  |    |
| TP SEN/CIRCUIT   | P0121             | 2    | ×                     | <a href="#">EC-746</a>  | L  |
| TP SEN/CIRCUIT   | P0122             | 1    | ×                     | <a href="#">EC-755</a>  |    |
| TP SEN/CIRCUIT   | P0123             | 1    | ×                     | <a href="#">EC-755</a>  | M  |
| TW CATALYST SYS-B1   | P0420             | 2    | ×                     | <a href="#">EC-899</a>  |    |
| TW CATALYST SYS-B2   | P0430             | 2    | ×                     | <a href="#">EC-899</a>  |    |
| VC CUT/V BYPASS/V  | P1491             | 2    | ×                     | <a href="#">EC-1115</a> |    |
| VC/V BYPASS/V  | P1490             | 2    | ×                     | <a href="#">EC-1109</a> |    |
| VEH SPEED SEN/CIRC AT  | P0720             | 2    | ×                     | <a href="#">AT-261</a>  |    |
| VEH SPEED SEN/CIRC   | P0500*4           | 2    | ×                     | <a href="#">EC-983</a>  |    |
| VENT CONTROL VALVE   | P0447             | 2    | ×                     | <a href="#">EC-931</a>  |    |
| VENT CONTROL VALVE   | P1446             | 2    | ×                     | <a href="#">EC-1082</a> |    |
| VENT CONTROL VALVE   | P1448             | 2    | ×                     | <a href="#">EC-1088</a> |    |

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

\*2: These numbers are prescribed by SAE J2012.

\*3: This DTC is displayed with CONSULT-II only.

\*4: The MIL illuminates when both the “Revolution sensor signal” and the “Vehicle speed sensor signal” meet the fail-safe condition at the same time.

**NOTE:**

Regarding D22 models, “B1” indicates bank 1, “B2” indicates bank 2.

# INDEX FOR DTC

[VG33E]

UBS007HE

## DTC No. Index

×: Applicable —: Not applicable

| DTC*1 *2          | Items<br>(CONSULT-II screen terms)                              | Trip | MIL<br>Lighting<br>up | Reference page         |
|-------------------|---|------|-----------------------|------------------------|
| CONSULT-II<br>GST |   |      |                       |                        |
| —                 | Unable to access ECM  | 2    | ×                     | <a href="#">EC-648</a> |
| <b>P0000</b>      | <b>NO DTC IS DETECTED.<br/>FURTHER TESTING MAY BE REQUIRED.</b> | —    | —                     | —                      |
| P0031             | HO2S1 HTR (B1)  | 2    | ×                     | <a href="#">EC-706</a> |
| P0032             | HO2S1 HTR (B1)  | 2    | ×                     | <a href="#">EC-706</a> |
| P0037             | HO2S2 HTR (B1)  | 2    | ×                     | <a href="#">EC-714</a> |
| P0038             | HO2S2 HTR (B1)  | 2    | ×                     | <a href="#">EC-714</a> |
| P0051             | HO2S1 HTR (B2)  | 2    | ×                     | <a href="#">EC-706</a> |
| P0052             | HO2S1 HTR (B2)  | 2    | ×                     | <a href="#">EC-706</a> |
| P0057             | HO2S2 HTR (B2)  | 2    | ×                     | <a href="#">EC-714</a> |
| P0058             | HO2S2 HTR (B2)  | 2    | ×                     | <a href="#">EC-714</a> |
| P0101             | MAF SEN/CIRCUIT   | 2    | ×                     | <a href="#">EC-723</a> |
| P0102             | MAF SEN/CIRCUIT   | 1    | ×                     | <a href="#">EC-730</a> |
| P0103             | MAF SEN/CIRCUIT   | 2    | ×                     | <a href="#">EC-730</a> |
| P0112             | IAT SEN/CIRCUIT   | 2    | ×                     | <a href="#">EC-736</a> |
| P0113             | IAT SEN/CIRCUIT   | 2    | ×                     | <a href="#">EC-736</a> |
| P0117             | ECT SEN/CIRCUIT   | 1    | ×                     | <a href="#">EC-741</a> |
| P0118             | ECT SEN/CIRCUIT   | 1    | ×                     | <a href="#">EC-741</a> |
| P0121             | TP SEN/CIRCUIT  | 2    | ×                     | <a href="#">EC-746</a> |
| P0122             | TP SEN/CIRCUIT  | 1    | ×                     | <a href="#">EC-755</a> |
| P0123             | TP SEN/CIRCUIT  | 1    | ×                     | <a href="#">EC-755</a> |
| P0125             | ECT SENSOR  | 2    | ×                     | <a href="#">EC-763</a> |
| P0127             | IAT SENSOR  | 2    | ×                     | <a href="#">EC-766</a> |
| P0128             | THERMSTAT FNCTN   | 2    | ×                     | <a href="#">EC-769</a> |
| P0132             | HO2S1 (B1)  | 2    | ×                     | <a href="#">EC-771</a> |
| P0133             | HO2S1 (B1)  | 2    | ×                     | <a href="#">EC-780</a> |
| P0134             | HO2S1 (B1)  | 2    | ×                     | <a href="#">EC-793</a> |
| P0138             | HO2S2 (B1)  | 2    | ×                     | <a href="#">EC-804</a> |
| P0139             | HO2S2 (B1)  | 2    | ×                     | <a href="#">EC-813</a> |
| P0152             | HO2S1 (B2)  | 2    | ×                     | <a href="#">EC-771</a> |
| P0153             | HO2S1 (B2)  | 2    | ×                     | <a href="#">EC-780</a> |
| P0154             | HO2S1 (B2)  | 2    | ×                     | <a href="#">EC-793</a> |
| P0158             | HO2S2 (B2)  | 2    | ×                     | <a href="#">EC-804</a> |
| P0159             | HO2S2 (B2)  | 2    | ×                     | <a href="#">EC-813</a> |
| P0171             | FUEL SYS-LEAN-B1  | 2    | ×                     | <a href="#">EC-823</a> |
| P0172             | FUEL SYS-RICH-B1  | 2    | ×                     | <a href="#">EC-831</a> |
| P0174             | FUEL SYS-LEAN-B2  | 2    | ×                     | <a href="#">EC-823</a> |
| P0175             | FUEL SYS-RICH-B2  | 2    | ×                     | <a href="#">EC-831</a> |
| P0181             | FTT SENSOR  | 2    | ×                     | <a href="#">EC-839</a> |
| P0182             | FTT SEN/CIRCUIT   | 2    | ×                     | <a href="#">EC-844</a> |
| P0183             | FTT SEN/CIRCUIT   | 2    | ×                     | <a href="#">EC-844</a> |

# INDEX FOR DTC

[VG33E]

| DTC*1 *2          | Items<br>(CONSULT-II screen terms) | Trip | MIL<br>Lighting<br>up | Reference page          | A  |
|-------------------|------------------------------------|------|-----------------------|-------------------------|----|
| CONSULT-II<br>GST |                                    |      |                       |                         |    |
| P0217             | ENG OVER TEMP                      | 1    | ×                     | <a href="#">EC-848</a>  | EC |
| P0300             | MULTI CYL MISFIRE                  | 2    | ×                     | <a href="#">EC-853</a>  |    |
| P0301             | CYL1 MISFIRE                       | 2    | ×                     | <a href="#">EC-853</a>  |    |
| P0302             | CYL2 MISFIRE                       | 2    | ×                     | <a href="#">EC-853</a>  | C  |
| P0303             | CYL3 MISFIRE                       | 2    | ×                     | <a href="#">EC-853</a>  |    |
| P0304             | CYL4 MISFIRE                       | 2    | ×                     | <a href="#">EC-853</a>  | D  |
| P0305             | CYL5 MISFIRE                       | 2    | ×                     | <a href="#">EC-853</a>  |    |
| P0306             | CYL6 MISFIRE                       | 2    | ×                     | <a href="#">EC-853</a>  |    |
| P0327             | KNOCK SEN/CIRC-B1                  | 2    | —                     | <a href="#">EC-861</a>  | E  |
| P0328             | KNOCK SEN/CIRC-B1                  | 2    | —                     | <a href="#">EC-861</a>  |    |
| P0335             | CKP SEN/CIRCUIT                    | 2    | ×                     | <a href="#">EC-865</a>  |    |
| P0340             | CMP SEN/CIRCUIT                    | 2    | ×                     | <a href="#">EC-871</a>  | F  |
| P0400             | EGR SYSTEM                         | 2    | ×                     | <a href="#">EC-878</a>  |    |
| P0402             | EGRC-BPT VALVE                     | 2    | ×                     | <a href="#">EC-887</a>  | G  |
| P0405             | EGR TEMP SEN/CIRC                  | 2    | ×                     | <a href="#">EC-893</a>  |    |
| P0406             | EGR TEMP SEN/CIRC                  | 2    | ×                     | <a href="#">EC-893</a>  |    |
| P0420             | TW CATALYST SYS-B1                 | 2    | ×                     | <a href="#">EC-899</a>  | H  |
| P0430             | TW CATALYST SYS-B2                 | 2    | ×                     | <a href="#">EC-899</a>  |    |
| P0441             | EVAP PURG FLOW/MON                 | 2    | ×                     | <a href="#">EC-904</a>  | I  |
| P0442             | EVAP SMALL LEAK                    | 2    | ×                     | <a href="#">EC-912</a>  |    |
| P0444             | PURG VOLUME CONT/V                 | 2    | ×                     | <a href="#">EC-924</a>  |    |
| P0445             | PURG VOLUME CONT/V                 | 2    | ×                     | <a href="#">EC-924</a>  | J  |
| P0447             | VENT CONTROL VALVE                 | 2    | ×                     | <a href="#">EC-931</a>  |    |
| P0452             | EVAP SYS PRES SEN                  | 2    | ×                     | <a href="#">EC-937</a>  | K  |
| P0453             | EVAP SYS PRES SEN                  | 2    | ×                     | <a href="#">EC-943</a>  |    |
| P0455             | EVAP GROSS LEAK                    | 2    | ×                     | <a href="#">EC-952</a>  |    |
| P0456             | EVAP VERY SML LEAK                 | 2    | ×                     | <a href="#">EC-962</a>  | L  |
| P0460             | FUEL LEV SEN SLOSH                 | 2    | ×                     | <a href="#">EC-973</a>  |    |
| P0461             | FUEL LEVEL SENSOR                  | 2    | ×                     | <a href="#">EC-977</a>  |    |
| P0462             | FUEL LEVL SEN/CIRC                 | 2    | ×                     | <a href="#">EC-979</a>  | M  |
| P0463             | FUEL LEVL SEN/CIRC                 | 2    | ×                     | <a href="#">EC-979</a>  |    |
| P0500*4           | VEH SPEED SEN/CIRC                 | 2    | ×                     | <a href="#">EC-983</a>  |    |
| P0505             | ISC SYSTEM/CIRC                    | 2    | ×                     | <a href="#">EC-988</a>  |    |
| P0510             | CLOSED TP SW/CIRC                  | 2    | ×                     | <a href="#">EC-995</a>  |    |
| P0600*3           | A/T COMM LINE                      | 2    | —                     | <a href="#">EC-1002</a> |    |
| P0605             | ECM                                | 2    | ×                     | <a href="#">EC-1008</a> |    |
| P0705             | PNP SW/CIRC                        | 2    | ×                     | <a href="#">AT-249</a>  |    |
| P0710             | ATF TEMP SEN/CIRC                  | 2    | ×                     | <a href="#">AT-255</a>  |    |
| P0720             | VEH SPD SEN/CIR AT                 | 2    | ×                     | <a href="#">AT-261</a>  |    |
| P0725             | ENGINE SPEED SIG                   | 2    | ×                     | <a href="#">AT-266</a>  |    |
| P0731             | A/T 1ST GR FNCTN                   | 2    | ×                     | <a href="#">AT-270</a>  |    |
| P0732             | A/T 2ND GR FNCTN                   | 2    | ×                     | <a href="#">AT-276</a>  |    |

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[VG33E]

| DTC*1 *2          | Items<br>(CONSULT-II screen terms) | Trip | MIL<br>Lighting<br>up | Reference page          |
|-------------------|------------------------------------|------|-----------------------|-------------------------|
| CONSULT-II<br>GST |                                    |      |                       |                         |
| P0733             | A/T 3RD GR FNCTN                   | 2    | ×                     | <a href="#">AT-281</a>  |
| P0734             | A/T 4TH GR FNCTN                   | 2    | ×                     | <a href="#">AT-286</a>  |
| P0740             | TCC SOLENOID/CIRC                  | 2    | ×                     | <a href="#">AT-293</a>  |
| P0744             | A/T TCC S/V FNCTN                  | 2    | ×                     | <a href="#">AT-298</a>  |
| P0745             | L/PRESS SOL/CIRC                   | 2    | ×                     | <a href="#">AT-306</a>  |
| P0750             | SFT SOL A/CIRC                     | 1    | ×                     | <a href="#">AT-311</a>  |
| P0755             | SFT SOL B/CIRC                     | 1    | ×                     | <a href="#">AT-316</a>  |
| P1143             | HO2S1 (B1)                         | 2    | ×                     | <a href="#">EC-1010</a> |
| P1144             | HO2S1 (B1)                         | 2    | ×                     | <a href="#">EC-1017</a> |
| P1146             | HO2S2 (B1)                         | 2    | ×                     | <a href="#">EC-1024</a> |
| P1147             | HO2S2 (B1)                         | 2    | ×                     | <a href="#">EC-1035</a> |
| P1148             | CLOSED LOOP-B1                     | 1    | ×                     | <a href="#">EC-1046</a> |
| P1163             | HO2S1 (B2)                         | 2    | ×                     | <a href="#">EC-1010</a> |
| P1164             | HO2S1 (B2)                         | 2    | ×                     | <a href="#">EC-1017</a> |
| P1166             | HO2S2 (B2)                         | 2    | ×                     | <a href="#">EC-1024</a> |
| P1167             | HO2S2 (B2)                         | 2    | ×                     | <a href="#">EC-1035</a> |
| P1168             | CLOSED LOOP-B2                     | 1    | ×                     | <a href="#">EC-1046</a> |
| P1217             | ENG OVER TEMP                      | 1    | ×                     | <a href="#">EC-1048</a> |
| P1336             | CKP SENSOR (COG)                   | 2    | ×                     | <a href="#">EC-1052</a> |
| P1400             | EGR SOLENOID/V                     | 2    | ×                     | <a href="#">EC-1057</a> |
| P1402             | EGR SYSTEM                         | 2    | ×                     | <a href="#">EC-1063</a> |
| P1442             | EVAP SMALL LEAK                    | 2    | ×                     | <a href="#">EC-1071</a> |
| P1444             | PURG VOLUME CONT/V                 | 2    | ×                     | <a href="#">EC-1073</a> |
| P1446             | VENT CONTROL VALVE                 | 2    | ×                     | <a href="#">EC-1082</a> |
| P1448             | VENT CONTROL VALVE                 | 2    | ×                     | <a href="#">EC-1088</a> |
| P1456             | EVAP VERY SML LEAK                 | 2    | ×                     | <a href="#">EC-1096</a> |
| P1464             | FUEL LEVL SEN/CIRC                 | 2    | ×                     | <a href="#">EC-1106</a> |
| P1490             | VC/V BYPASS/V                      | 2    | ×                     | <a href="#">EC-1109</a> |
| P1491             | VC CUT/V BYPASS/V                  | 2    | ×                     | <a href="#">EC-1115</a> |
| P1605             | A/T DIAG COMM LINE                 | 2    | ×                     | <a href="#">EC-1127</a> |
| P1705*4           | TP SEN/CIRC A/T                    | 1    | ×                     | <a href="#">AT-321</a>  |
| P1706             | P-N POS SW/CIRCUIT                 | 2    | ×                     | <a href="#">EC-1132</a> |
| P1760             | O/R CLTCH SOL/CIRC                 | 2    | ×                     | <a href="#">AT-329</a>  |

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

\*2: These numbers are prescribed by SAE J2012.

\*3: This DTC is displayed with CONSULT-II only.

\*4: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

**NOTE:**

Regarding D22 models, "B1" indicates bank 1, "B2" indicates bank 2.



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

UBS007HF

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

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**

UBS007HG

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

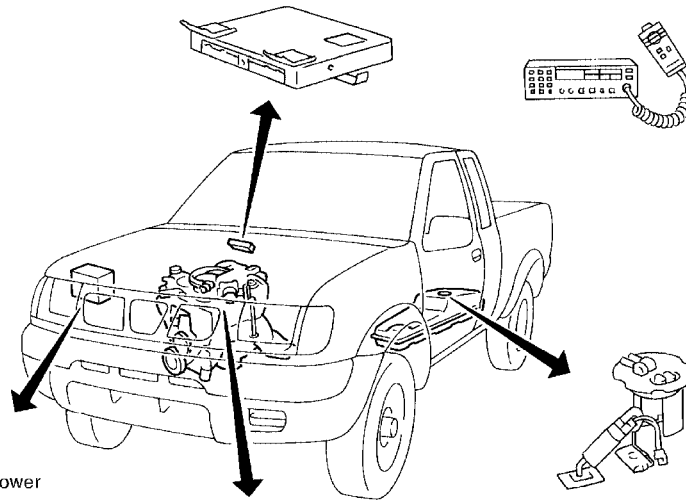
### ECM

- 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.)

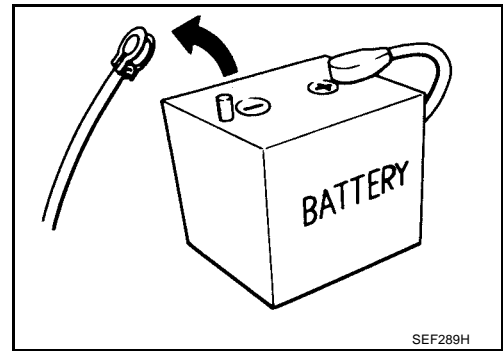
### ECM HARNESS HANDLING

- 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 receiving 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.

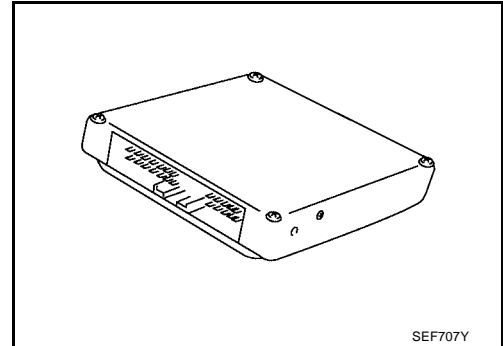
# PRECAUTIONS

[VG33E]


- 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.

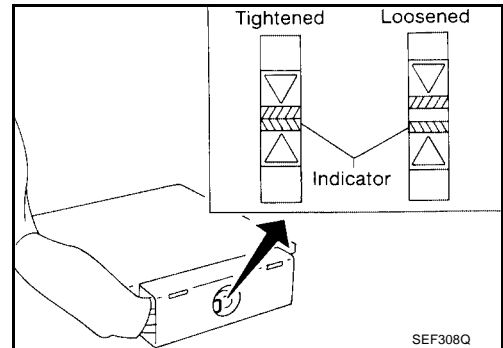


- Do not disassemble ECM.
- If a battery terminal is disconnected, the memory will return to the ECM value. The ECM will not start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace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

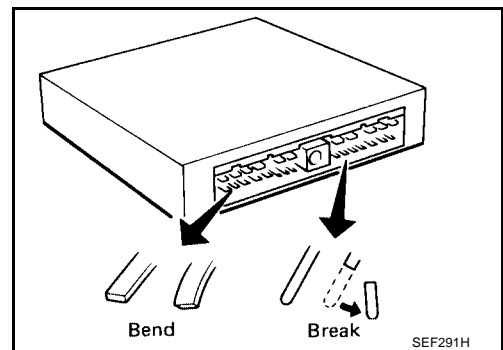


- When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.

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



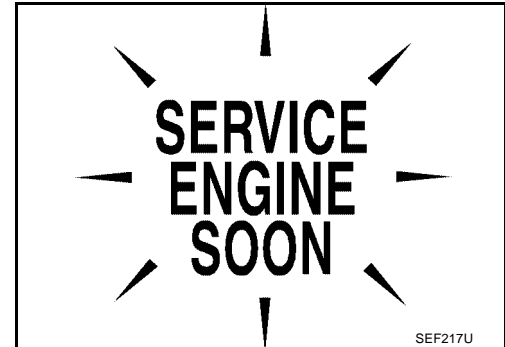
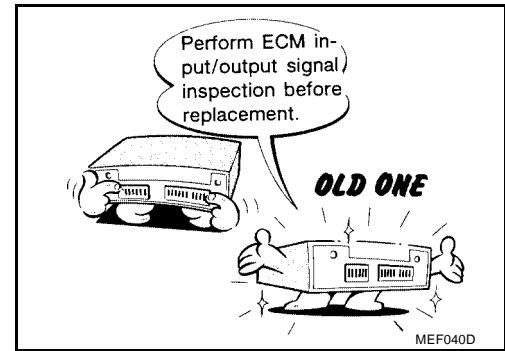
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break). Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors. A poor connection can cause an extremely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



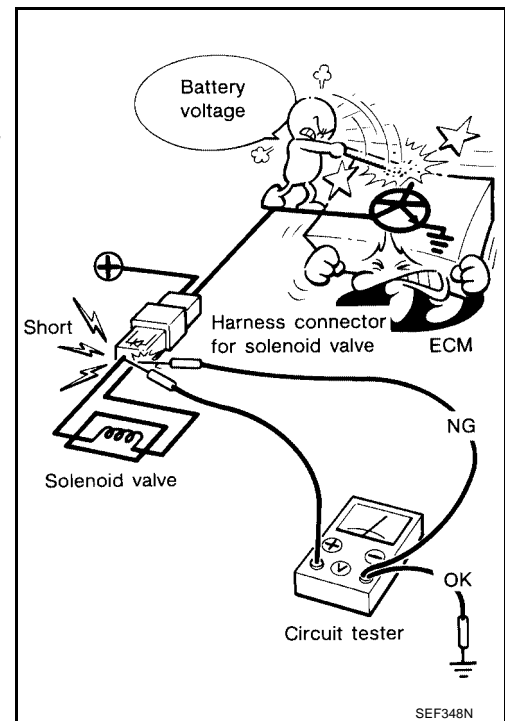
# PRECAUTIONS

[VG33E]

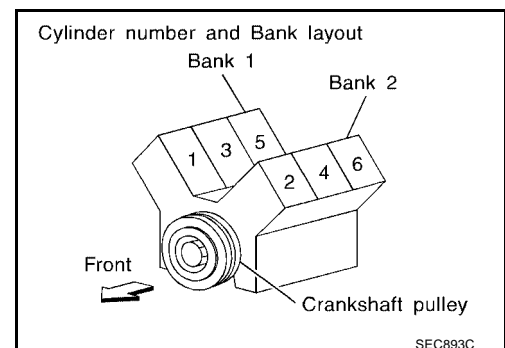
- Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to [EC-669](#).
- Handle mass air flow sensor carefully to avoid damage.
- Do not disassemble mass air flow sensor.
- Do not clean mass air flow sensor with any type of detergent.
- 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.



- Regarding model D22, “B1” indicates the bank 1, “B2” indicates the bank 2 as shown in the figure.



## Wiring Diagrams and Trouble Diagnosis

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"](#)

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# PREPARATION

[VG33E]

PFP:00002

UBS007HJ

## PREPARATION

### Special Service Tools

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

| Tool number<br>(Kent-Moore No.)<br>Tool name            | Description   |
|---|---|
| KV10117100<br>(J36471-A)<br>Heated oxygen sensor wrench | Loosening or tightening heated oxygen sensor 1 with 22 mm (0.87 in) hexagon nut |
| KV10114400<br>(J-38365)<br>Heated oxygen sensor wrench  | Loosening or tightening heated oxygen sensor 2<br><b>a: 22 mm (0.87 in)</b>     |
| J-44321<br>Fuel pressure gauge kit                      | Checking fuel pressure  |
| (J-45178)<br>TPS test connector                         | Used to test the throttle position sensor                                       |

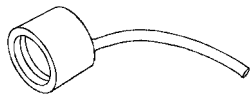
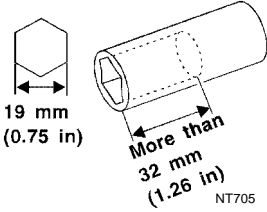
### Commercial Service Tools

UBS007HK

| Tool name (Kent-Moore No.)                       | Description  |
|--|--|
| Leak detector<br>i.e.: (J41416)                  | Locating the EVAP leak                               |
| EVAP service port adapter<br>i.e.: (J41413-OBDD) | Applying positive pressure through EVAP service port |

# PREPARATION

[VG33E]

| Tool name (Kent-Moore No.)  | Description   |
|---|---|
| Fuel filler cap adapter<br><br>NT653                                       | Checking fuel tank vacuum relief valve opening pressure   |
| Socket wrench<br><br>19 mm (0.75 in)<br>More than 32 mm (1.26 in)<br>NT705 | Removing and installing engine coolant temperature sensor   |
| Oxygen sensor thread cleaner<br>i.e.: (J-43897-18)<br>(J-43897-12)  | Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown in "Commercial Service Tools".<br>a: J-43897-18 (18 mm diameter with pitch 1.5 mm) for Zirconia Oxygen Sensor<br>b: J-43897-12 (12 mm diameter with pitch 1.25 mm) for Titania Oxygen Sensor |
| Anti-seize lubricant<br>i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)   | Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.  |

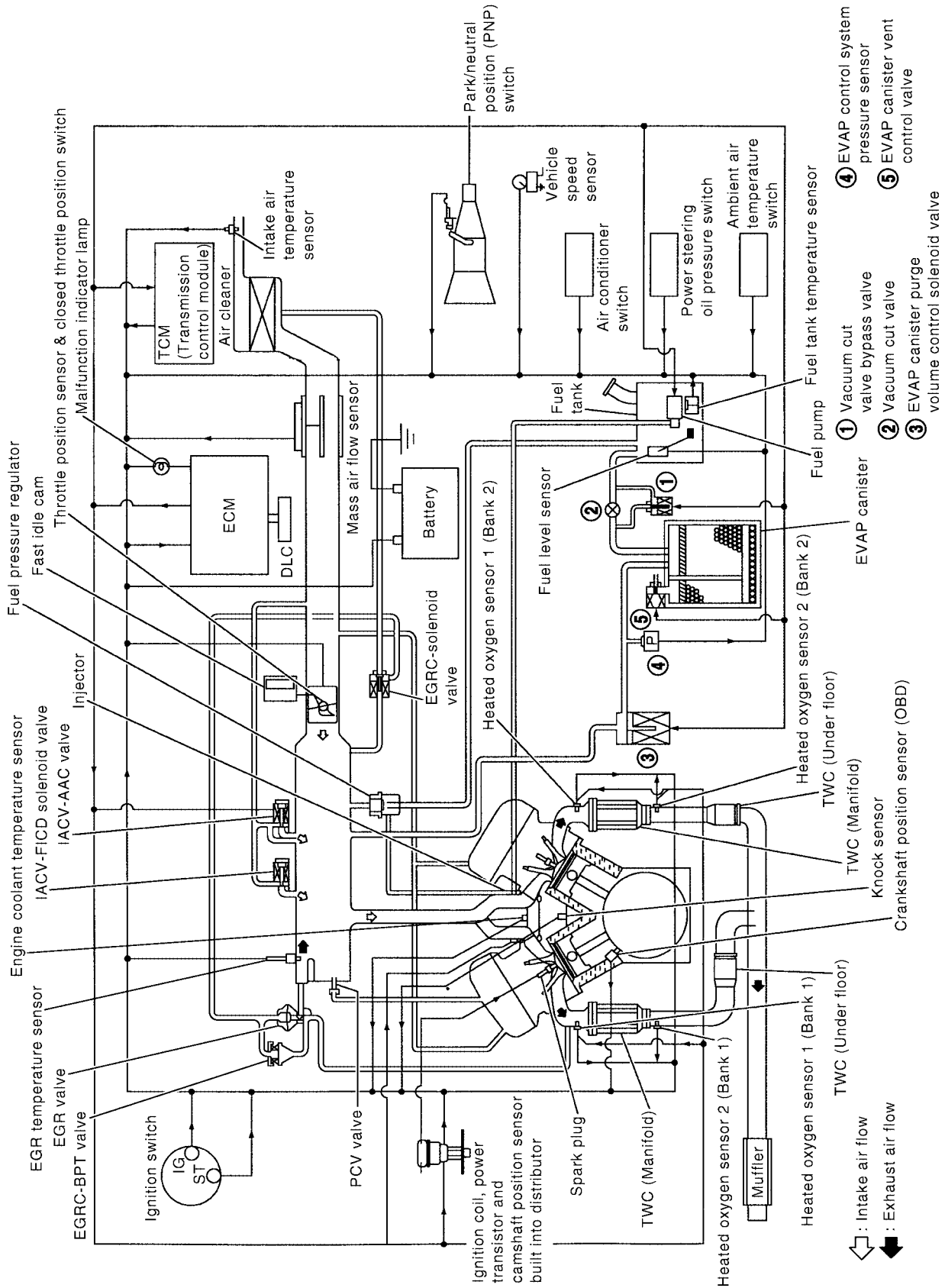
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## ENGINE CONTROL SYSTEM

PFP:23710

### System Diagram

UBS007HL





### Vacuum Hose Drawing

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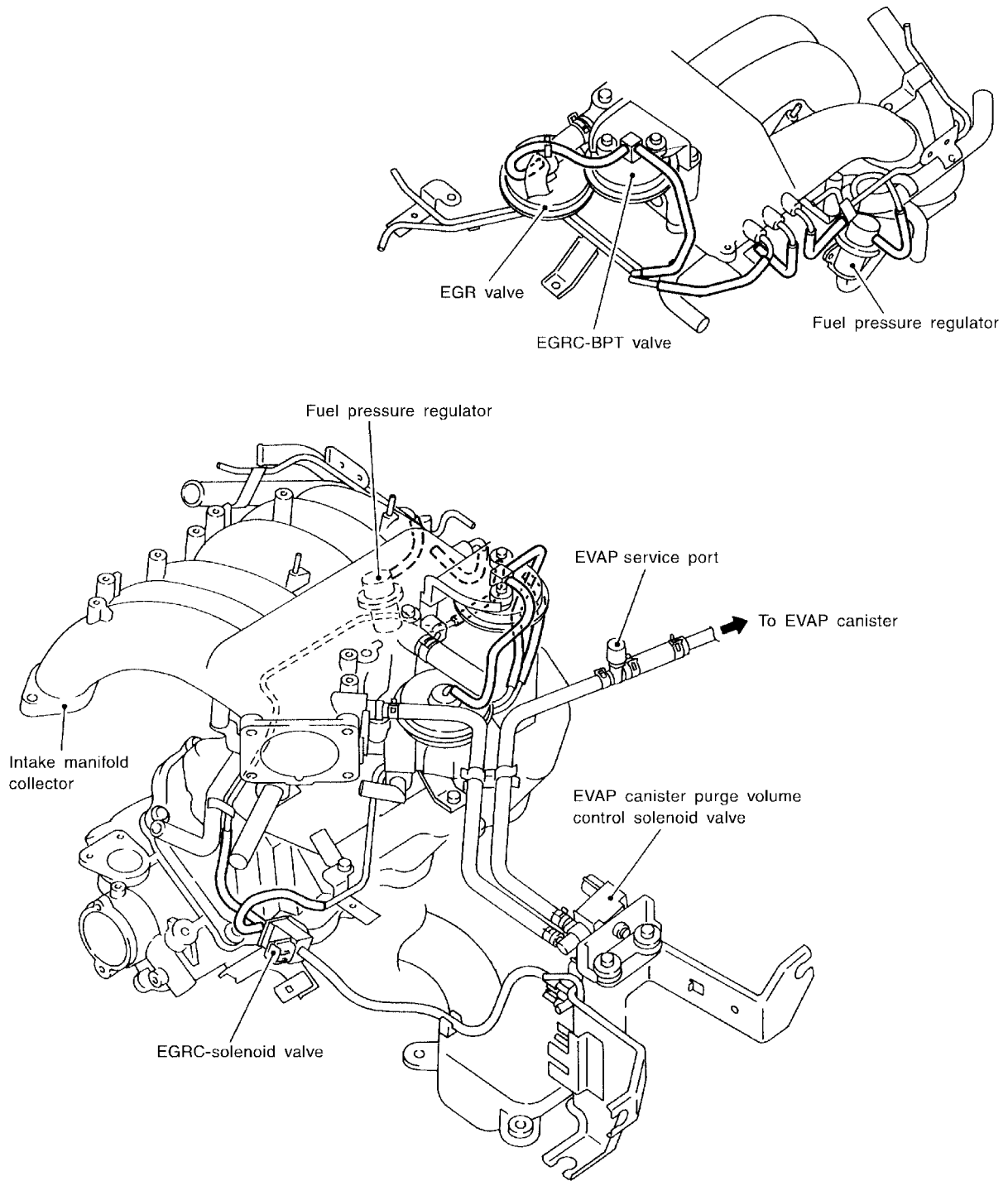
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**NOTE:**  
Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

BBA0183E

## System Chart

| Input (Sensor)  | ECM Function                           | Output (Actuator)                                 |   |
|---|--|---|---|
| <ul style="list-style-type: none"> <li>● Camshaft position sensor</li> <li>● Mass air flow sensor</li> <li>● Engine coolant temperature sensor</li> <li>● Heated oxygen sensor 1</li> <li>● Ignition switch</li> <li>● Throttle position sensor</li> <li>● Closed throttle position switch *4</li> <li>● Park/neutral position (PNP) switch</li> <li>● Air conditioner switch</li> <li>● Knock sensor</li> <li>● Intake air temperature sensor</li> <li>● EVAP control system pressure sensor *1</li> <li>● Battery voltage</li> <li>● Power steering oil pressure switch</li> <li>● Vehicle speed sensor</li> <li>● Fuel tank temperature sensor *1</li> <li>● Crankshaft position sensor (OBD) *1</li> <li>● Heated oxygen sensor 2 *3</li> <li>● TCM (Transmission control module) *2</li> <li>● Ambient air temperature switch</li> </ul> | Fuel injection & mixture ratio control | Injectors   |   |
|   | 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                | <ul style="list-style-type: none"> <li>● EVAP canister vent control valve</li> <li>● Vacuum cut valve bypass valve</li> </ul> |

\*1: These sensors are not used to control the engine system. They are 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.

## Multipoint Fuel Injection (MFI) System 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 | Injectors |
| 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<br>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                  |  |           |

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

### 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.

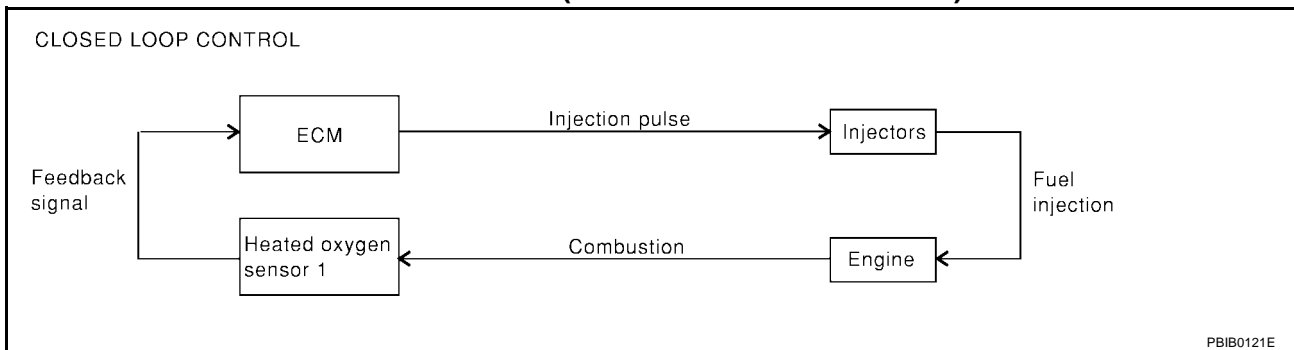
<Fuel increase>

- 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 if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1, refer to [EC-771](#). 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.

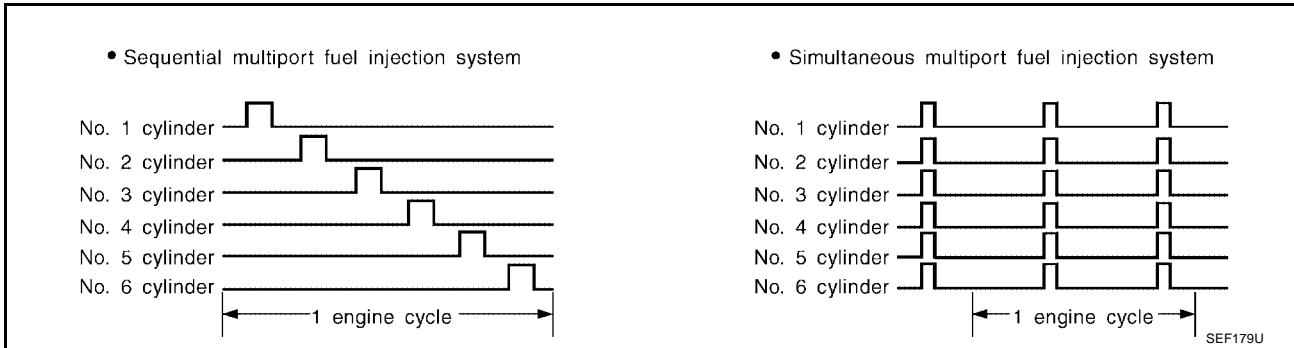
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"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 INPUT/OUTPUT SIGNAL CHART

UBS007HP

| 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<br>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                                   |                         |                  |

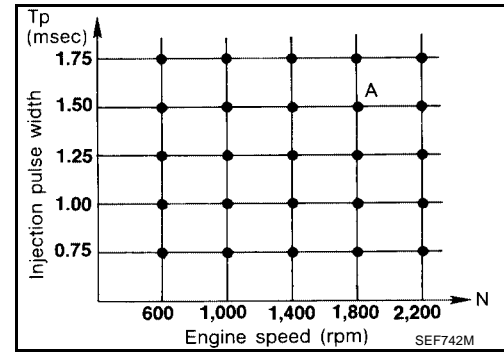
## SYSTEM DESCRIPTION

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 INPUT/OUTPUT SIGNAL CHART

UBS007HQ

| 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) INPUT/OUTPUT SIGNAL CHART

UBS007HR

| Sensor                             | Input Signal to ECM        | ECM function     | Actuator  |
|------------------------------------|----------------------------|------------------|-----------|
| Vehicle speed sensor               | Vehicle speed              | Fuel cut control | Injectors |
| Park/neutral position (PNP) switch | Neutral position           |                  |           |
| Throttle position sensor           | Throttle position          |                  |           |
| Engine coolant temperature sensor  | Engine coolant temperature |                  |           |
| Camshaft position sensor           | Engine speed               |                  |           |

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## SYSTEM DESCRIPTION

If the engine speed is above 2,500 rpm with no load (for example, in neutral and engine speed 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 operate until the engine speed reaches 2,000 rpm, then fuel cut is cancelled.

### NOTE:

This function is different from deceleration control listed under [EC-602. "Multiport Fuel Injection \(MFI\) System"](#)

## BASIC SERVICE PROCEDURE

### Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment 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.

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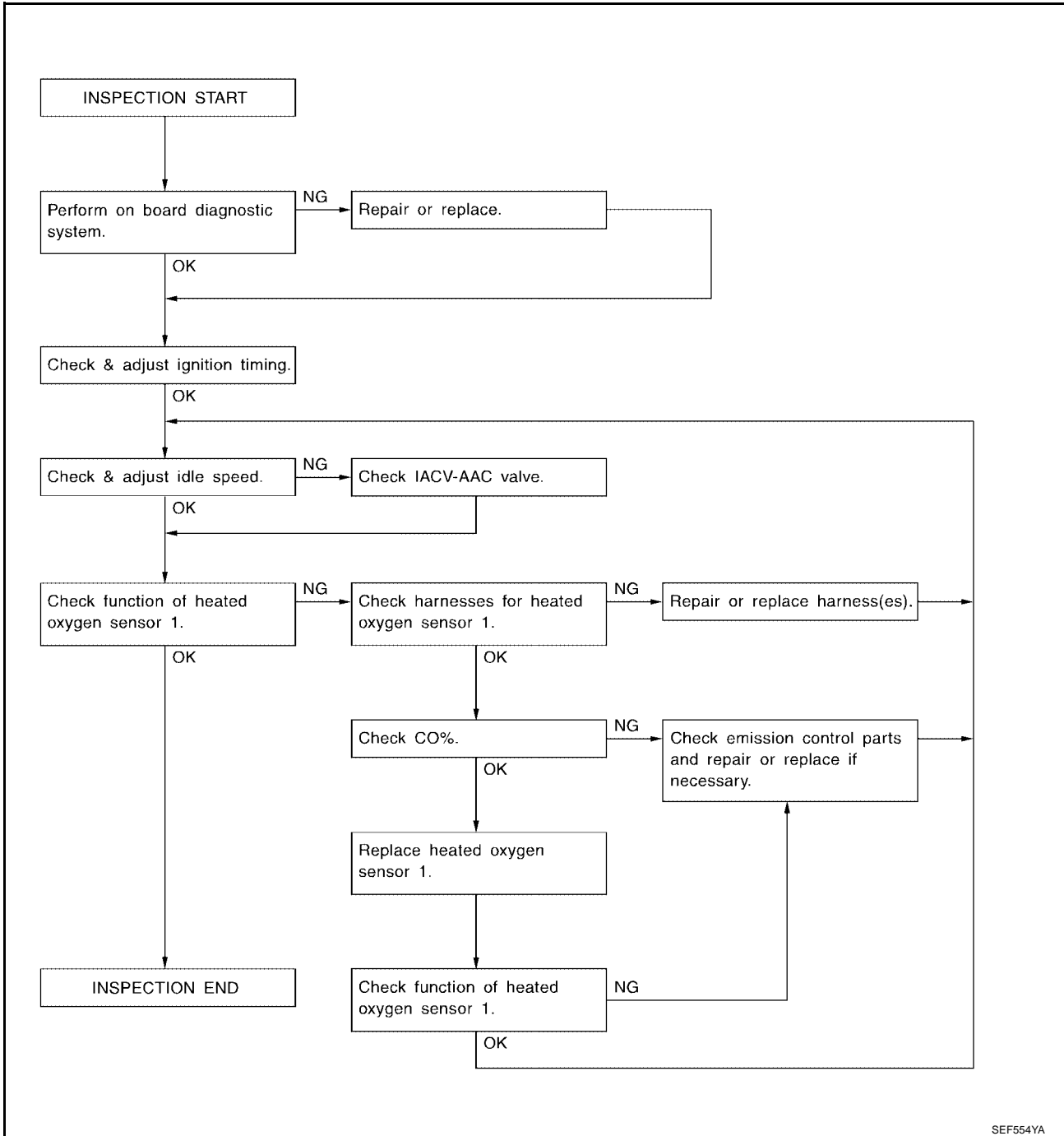
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OVERALL INSPECTION SEQUENCE



**NOTE:**

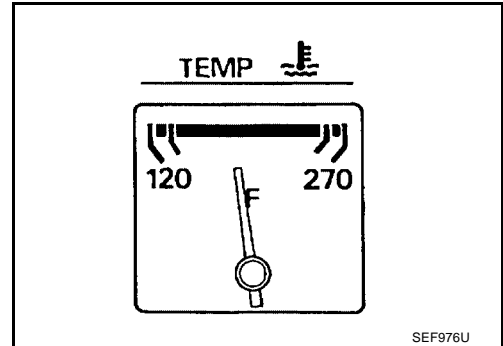
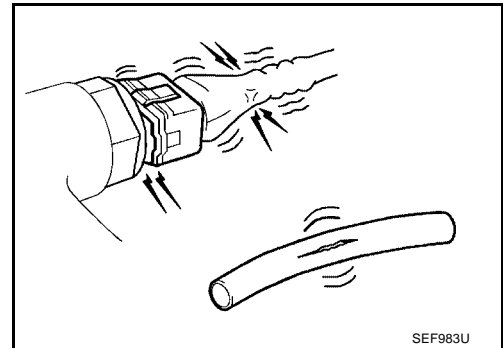
If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be expected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



## INSPECTION PROCEDURE

### 1. INSPECTION START

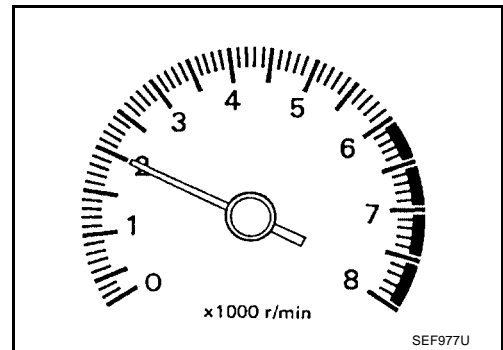
1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
  - Harness connectors for improper connections
  - Wiring harness for improper connections, pinches and cut
  - Vacuum hoses 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**

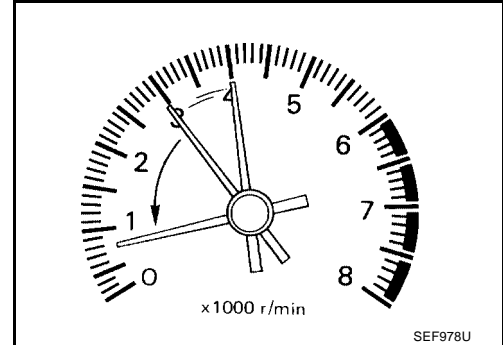
- OK >> GO TO 2.
- NG >> 1. Repair or replace components as necessary.  
2. GO TO 2.



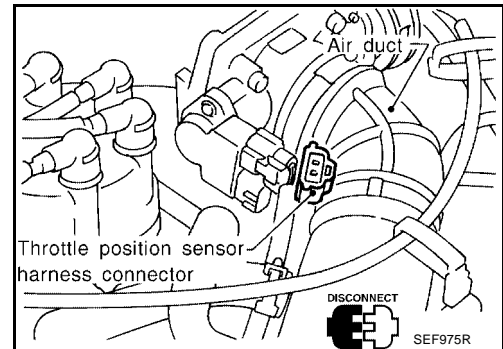
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## 2. CHECK IGNITION TIMING

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. Turn off 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.

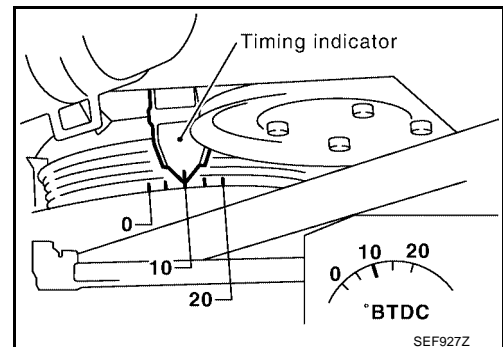


5. Check ignition timing with a timing light.

**M/T** :  $10^{\circ} \pm 2^{\circ}$  BTDC  
**A/T** :  $10^{\circ} \pm 2^{\circ}$  BTDC (in "P" or "N" position)

OK or NG

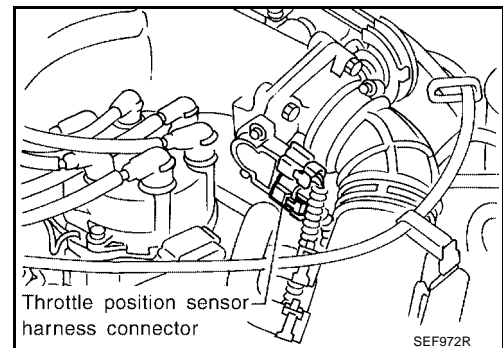
- OK >> GO TO 4.  
 NG >> GO TO 3.



## 3. ADJUST IGNITION TIMING

1. Adjust ignition timing by turning distributor after loosening securing bolts.
2. Turn off engine and connect throttle position sensor harness connector to throttle position sensor.

>> GO TO 2.



## 4. CHECK BASE IDLE SPEED

### With CONSULT-II

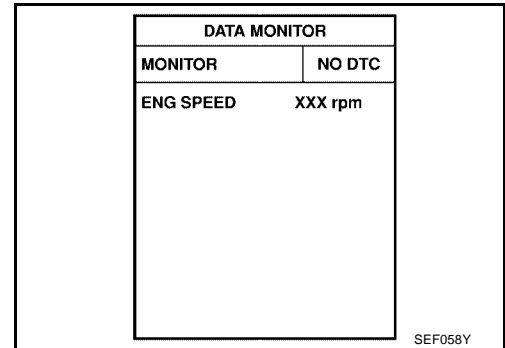
1. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

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

### Without CONSULT-II

1. Check idle speed.

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



### OK or NG

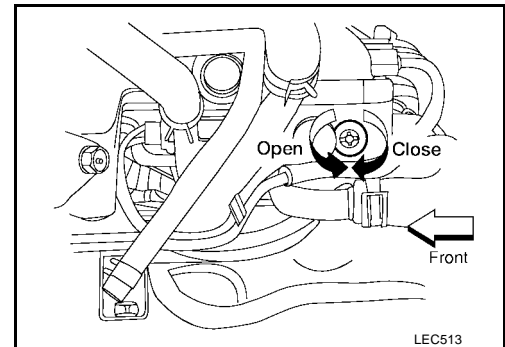
- OK >> GO TO 6.  
 NG >> GO TO 5.

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

>> GO TO 6.



**6. CHECK TARGET IDLE SPEED**

**With CONSULT-II**

1. Turn off 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**  
**A/T : 750±50 rpm (in "P" or "N" position)**

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

**Without CONSULT-II**

1. Turn off 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**  
**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-988](#) .
2. Check IACV-AAC valve harness and repair if necessary. Refer to [EC-988](#) .
3. Check ECM function by substituting another known-good ECM. (ECM may be the cause of an incident, but this is rarely the 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**

| DATA MONITOR    |         |
|-----------------|---------|
| MONITOR         | NO DTC  |
| ENG SPEED       | XXX rpm |
| HO2S1 MNTR (B1) | LEAN    |
| HO2S1 MNTR (B2) | RICH    |

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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 62 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 62 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-620](#) .
2. Check mass air flow sensor and its circuit. Refer to [EC-723](#) .
3. Check injector and its circuit. Refer to [EC-1145](#) .  
Clean or replace if necessary.
4. Check engine coolant temperature sensor and its circuit. Refer to [EC-741](#) .
5. Check ECM function by substituting another known good ECM.  
(ECM may be the cause of an incident, but this is rarely the case.)

>> GO TO 2.

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

## 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.

| DATA MONITOR    |         |
|-----------------|---------|
| MONITOR         | NO DTC  |
| ENG SPEED       | XXX rpm |
| HO2S1 MNTR (B1) | LEAN    |
| HO2S1 MNTR (B2) | RICH    |

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## 13. CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL

**⊗ Without CONSULT-II**

1. Set voltmeter probe between ECM terminal 63 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 63 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-620](#) .
2. Check mass air flow sensor and its circuit. Refer to [EC-723](#) .
3. Check injector and its circuit. Refer to [EC-1145](#) .  
Clean or replace if necessary.
4. Check engine coolant temperature sensor and its circuit. Refer to [EC-741](#) .
5. Check ECM function by substituting another known good ECM.  
(ECM may be the cause of an incident, but this is rarely the case.)

>> GO TO 2.

## 16. CHECK HEATED OXYGEN SENSOR 1 (BANK 1) HARNESS

1. Turn off 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. Turn off 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".

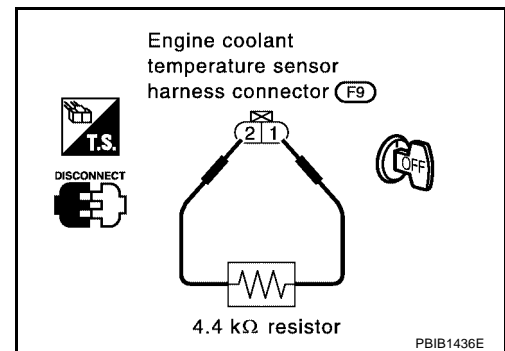
**Without CONSULT-II**

1. Disconnect engine coolant temperature sensor harness connector.

| ACTIVE TEST      |          |
|------------------|----------|
| ENG COOLANT TEMP | XXX °C   |
| MONITOR          |          |
| ENG SPEED        | XXX rpm  |
| INJ PULSE-B1     | XXX msec |
| IGN TIMING       | XXX BTDC |
|                  |          |
|                  |          |
|                  |          |

SEF172Y

2. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.

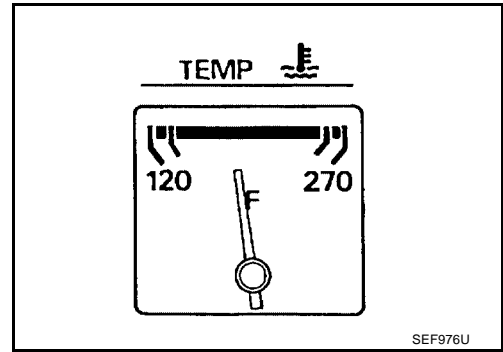


>> GO TO 19.



19. CHECK "CO" %

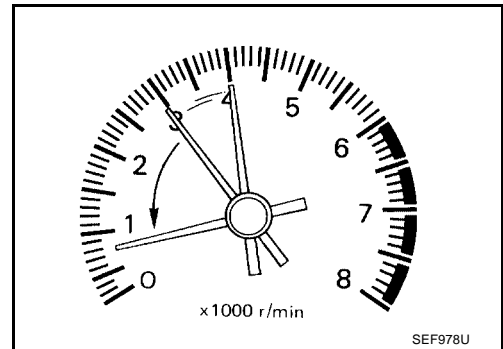
1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.



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-620](#) .
3. Check mass air flow sensor and its circuit. Refer to [EC-723](#) .
4. Check injector and its circuit. Refer to [EC-1145](#) .  
Clean or replace if necessary.
5. Check engine coolant temperature sensor and its circuit. Refer to [EC-741](#) .
6. Check ECM function by substituting another known good ECM.  
(ECM may be the cause of an incident, but this is rarely the case.)

>> GO TO 2.

**Fast Idle Cam (FIC) Inspection and Adjustment  
OPERATION PROCEDURE**

UBS007HU

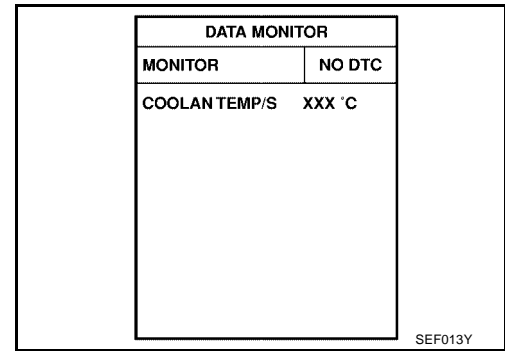
**With CONSULT-II**

1. Turn ignition switch ON.

# BASIC SERVICE PROCEDURE


[VG33E]

- See "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.

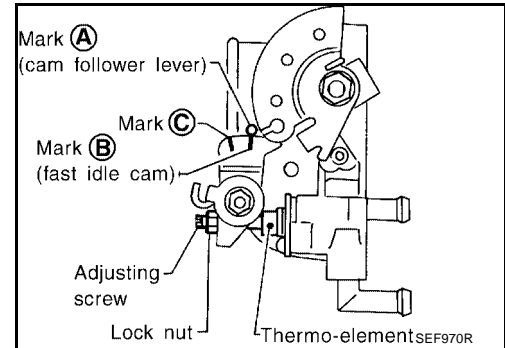


- When engine coolant temperature is 20 to 30°C (68 to 86°F), make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.
  - If NG, adjust by turning adjusting screw.

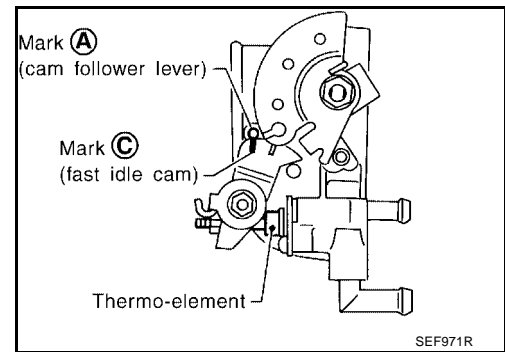
### Lock nut

 : 0.98 - 1.96 N·m (10 - 20 kg·cm, 8.7 - 17.4 in·lb)

- Start engine and warm it up.

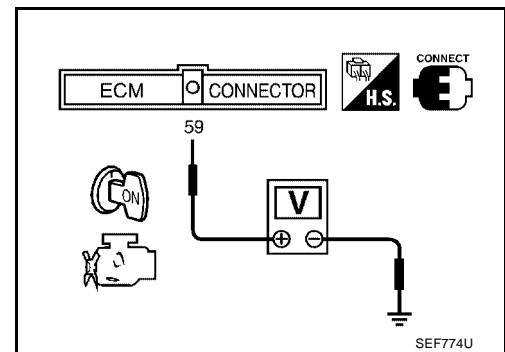


- When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.
  - The center of mark **A** is aligned with mark **C**.
  - The cam follower lever's roller is not touching the fast idle cam.
  - If NG, replace thermo-element and perform the above inspection and adjustment again.



### With GST

- Turn ignition switch ON.
- Check voltage between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.



# BASIC SERVICE PROCEDURE

[VG33E]

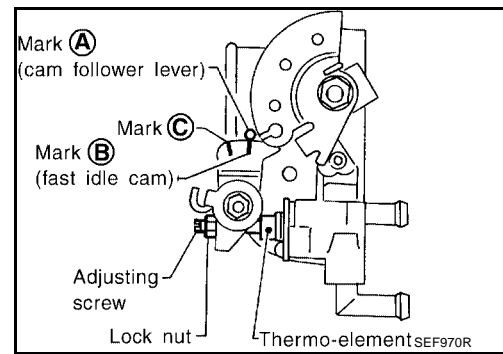
- When the voltage is between 3.12 to 3.52V, make sure that the center of mark **A** is aligned with mark **B** as shown in the figure.
  - If NG, adjust by turning adjusting screw.

## Lock nut

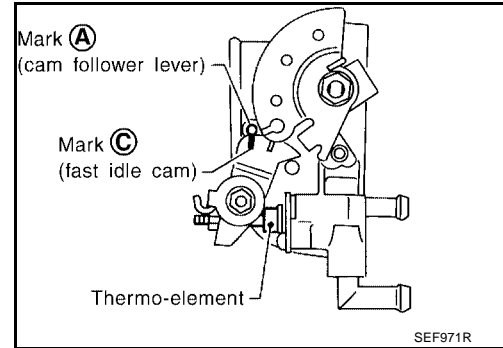


: 0.98 - 1.96 N·m (10 - 20 kg·cm, 8.7 - 17.4 in·lb)

- Start engine and warm it up.



- 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.



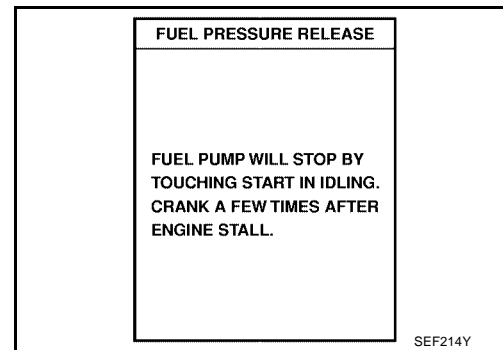
## Fuel Pressure Check FUEL PRESSURE RELEASE

UBS007HV

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

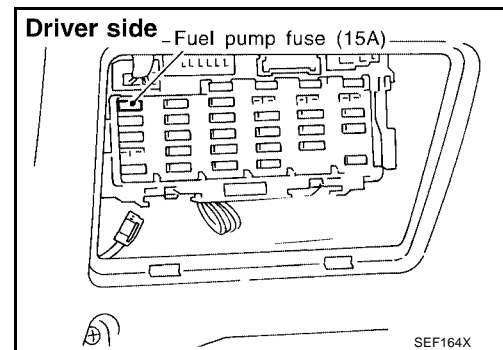
### With CONSULT-II

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



### Without CONSULT-II

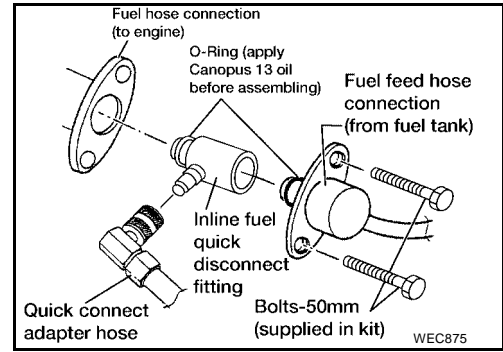
- Remove fuel pump fuse located in fuse box.
- Start engine.
- After engine stalls, crank it two or three times to release all fuel pressure.
- Turn ignition switch OFF.
- Reinstall fuel pump fuse after servicing fuel system.



## FUEL PRESSURE CHECK

- Use Fuel Pressure Gauge Kit J-44321 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. Refer to [EC-619](#).
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**

**Approximately 235 kPa**

**:With vacuum hose connected**

**(2.4 kg/cm<sup>2</sup> , 34 psi)**

**With vacuum hose disconnected**

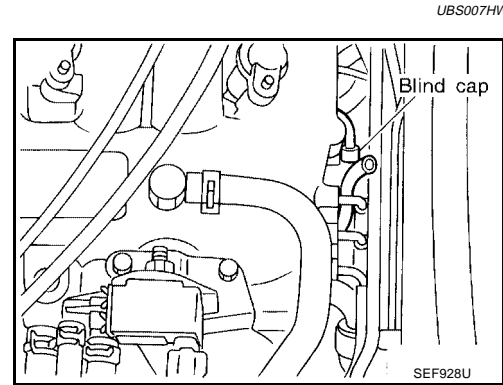
**Approximately 294 kPa**

**(3.0 kg/cm<sup>2</sup> , 43 psi)**

If results are unsatisfactory, perform Fuel Pressure Regulator Check.

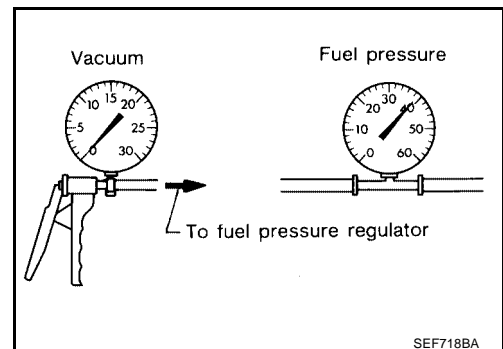
## Fuel Pressure Regulator Check

1. Stop engine and disconnect fuel pressure regulator vacuum hose from 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

### Introduction

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

| Emission-related diagnostic information         | 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-648](#).)

### Two Trip Detection Logic

UBS007HY

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 | ×        | —           | —        | —           | —                   | —                   | X                   | —                   |
| Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected | —        | —           | ×        | —           | —                   | ×                   | —                   | —                   |
| One trip detection diagnosis (refer to <a href="#">EC-587</a> .)                    | —        | ×           | —        | —           | ×                   | —                   | —                   | —                   |
| Except above  | —        | —           | —        | ×           | —                   | ×                   | ×                   | —                   |

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33E]

UBS007HZ

## Emission-related Diagnostic Information EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable —: Not applicable

| Items<br>(CONSULT-II screen terms)                          | DTC*1 *2          | SRT code | Test value/<br>Test limit<br>(GST only) | 1st trip DTC*1 | Reference page         |
|---|-------------------|----------|---|----------------|------------------------|
|   | CONSULT-II<br>GST |          |   |                |                        |
| <b>NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.</b> | <b>P0000</b>      | —        | —                                       | —              | —                      |
| HO2S1 HTR (B1)  | P0031             | ×        | ×                                       | X*4            | <a href="#">EC-706</a> |
| HO2S1 HTR (B1)  | P0032             | ×        | ×                                       | X*4            | <a href="#">EC-706</a> |
| HO2S2 HTR (B1)  | P0037             | ×        | ×                                       | X*4            | <a href="#">EC-714</a> |
| HO2S2 HTR (B1)  | P0038             | ×        | ×                                       | X*4            | <a href="#">EC-714</a> |
| HO2S1 HTR (B2)  | P0051             | ×        | ×                                       | X*4            | <a href="#">EC-706</a> |
| HO2S1 HTR (B2)  | P0052             | ×        | ×                                       | X*4            | <a href="#">EC-706</a> |
| HO2S2 HTR (B2)  | P0057             | ×        | ×                                       | X*4            | <a href="#">EC-714</a> |
| HO2S2 HTR (B2)  | P0058             | ×        | ×                                       | X*4            | <a href="#">EC-714</a> |
| MAF SEN/CIRCUIT   | P0101             | —        | —                                       | X              | <a href="#">EC-723</a> |
| MAF SEN/CIRCUIT   | P0102             | —        | —                                       | —              | <a href="#">EC-730</a> |
| MAF SEN/CIRCUIT   | P0103             | —        | —                                       | ×              | <a href="#">EC-730</a> |
| IAT SEN/CIRCUIT   | P0112             | —        | —                                       | ×              | <a href="#">EC-736</a> |
| IAT SEN/CIRCUIT   | P0113             | —        | —                                       | ×              | <a href="#">EC-736</a> |
| ECT SEN/CIRCUIT   | P0117             | —        | —                                       | —              | <a href="#">EC-741</a> |
| ECT SEN/CIRCUIT   | P0118             | —        | —                                       | —              | <a href="#">EC-741</a> |
| TP SEN/CIRCUIT  | P0121             | —        | —                                       | ×              | <a href="#">EC-746</a> |
| TP SEN/CIRCUIT  | P0122             | —        | —                                       | —              | <a href="#">EC-755</a> |
| TP SEN/CIRCUIT  | P0123             | —        | —                                       | —              | <a href="#">EC-755</a> |
| ECT SENSOR  | P0125             | —        | —                                       | ×              | <a href="#">EC-763</a> |
| IAT SENSOR  | P0127             | —        | —                                       | ×              | <a href="#">EC-766</a> |
| THERMSTAT FNCTN   | P0128             | —        | —                                       | ×              | <a href="#">EC-769</a> |
| HO2S1 (B1)  | P0132             | ×        | ×                                       | X*4            | <a href="#">EC-771</a> |
| HO2S1 (B1)  | P0133             | ×        | ×                                       | X*4            | <a href="#">EC-780</a> |
| HO2S1 (B1)  | P0134             | ×        | ×                                       | X*4            | <a href="#">EC-793</a> |
| HO2S2 (B1)  | P0138             | ×        | ×                                       | X*4            | <a href="#">EC-804</a> |
| HO2S2 (B1)  | P0139             | ×        | ×                                       | X*4            | <a href="#">EC-813</a> |
| HO2S1 (B2)  | P0152             | ×        | ×                                       | X*4            | <a href="#">EC-771</a> |
| HO2S1 (B2)  | P0153             | ×        | ×                                       | X*4            | <a href="#">EC-780</a> |
| HO2S1 (B2)  | P0154             | ×        | ×                                       | X*4            | <a href="#">EC-793</a> |
| HO2S2 (B2)  | P0158             | ×        | ×                                       | X*4            | <a href="#">EC-804</a> |
| HO2S2 (B2)  | P0139             | ×        | ×                                       | X*4            | <a href="#">EC-813</a> |
| FUEL SYS-LEAN-B1  | P0171             | —        | —                                       | ×              | <a href="#">EC-823</a> |
| FUEL SYS-RICH-B1  | P0172             | —        | —                                       | ×              | <a href="#">EC-831</a> |
| FUEL SYS-LEAN-B2  | P0174             | —        | —                                       | ×              | <a href="#">EC-823</a> |
| FUEL SYS-RICH-B2  | P0175             | —        | —                                       | ×              | <a href="#">EC-831</a> |

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33E]

| Items<br>(CONSULT-II screen terms) | DTC*1 *2           | SRT code       | Test value/<br>Test limit<br>(GST only) | 1st trip DTC*1 | Reference page          |
|------------------------------------|--------------------|----------------|---|----------------|-------------------------|
|                                    | CONSULT-II<br>GST  |                |   |                |                         |
| FTT SENSOR                         | P0181              | —              | —                                       | ×              | <a href="#">EC-839</a>  |
| FTT SEN/CIRCUIT                    | P0182              | —              | —                                       | ×              | <a href="#">EC-844</a>  |
| FTT SEN/CIRCUIT                    | P0183              | —              | —                                       | ×              | <a href="#">EC-844</a>  |
| ENG OVER TEMP                      | P0217              | —              | —                                       | —              | <a href="#">EC-848</a>  |
| MULTI CYL MISFIRE                  | P0300              | —              | —                                       | ×              | <a href="#">EC-853</a>  |
| CYL1 MISFIRE                       | P0301              | —              | —                                       | ×              | <a href="#">EC-853</a>  |
| CYL2 MISFIRE                       | P0302              | —              | —                                       | ×              | <a href="#">EC-853</a>  |
| CYL3 MISFIRE                       | P0303              | —              | —                                       | ×              | <a href="#">EC-853</a>  |
| CYL4 MISFIRE                       | P0304              | —              | —                                       | ×              | <a href="#">EC-853</a>  |
| CYL5 MISFIRE                       | P0305              | —              | —                                       | ×              | <a href="#">EC-853</a>  |
| CYL6 MISFIRE                       | P0306              | —              | —                                       | ×              | <a href="#">EC-853</a>  |
| KNOCK SEN/CIRC-B1                  | P0327              | —              | —                                       | ×              | <a href="#">EC-861</a>  |
| KNOCK SEN/CIRC-B1                  | P0328              | —              | —                                       | ×              | <a href="#">EC-861</a>  |
| CKP SEN/CIRCUIT                    | P0335              | —              | —                                       | ×              | <a href="#">EC-865</a>  |
| CMP SEN/CIRCUIT                    | P0340              | —              | —                                       | ×              | <a href="#">EC-871</a>  |
| EGR SYSTEM                         | P0400              | ×              | ×                                       | × <sup>4</sup> | <a href="#">EC-878</a>  |
| EGRC-BPT VALVE                     | P0402              | ×              | ×                                       | × <sup>4</sup> | <a href="#">EC-887</a>  |
| EGR TEMP SEN/CIRC                  | P0405              | —              | —                                       | ×              | <a href="#">EC-893</a>  |
| EGR TEMP SEN/CIRC                  | P0406              | —              | —                                       | ×              | <a href="#">EC-893</a>  |
| TW CATALYST SYS-B1                 | P0420              | ×              | ×                                       | × <sup>4</sup> | <a href="#">EC-899</a>  |
| TW CATALYST SYS-B2                 | P0430              | ×              | ×                                       | × <sup>4</sup> | <a href="#">EC-899</a>  |
| EVAP PURG FLOW/MON                 | P0441              | ×              | ×                                       | × <sup>4</sup> | <a href="#">EC-904</a>  |
| EVAP SMALL LEAK                    | P0442              | ×              | ×                                       | × <sup>4</sup> | <a href="#">EC-912</a>  |
| PURG VOLUME CONT/V                 | P0444              | —              | —                                       | ×              | <a href="#">EC-924</a>  |
| PURG VOLUME CONT/V                 | P0445              | —              | —                                       | ×              | <a href="#">EC-924</a>  |
| VENT CONTROL VALVE                 | P0447              | —              | —                                       | ×              | <a href="#">EC-931</a>  |
| EVAP SYS PRES SEN                  | P0452              | —              | —                                       | ×              | <a href="#">EC-937</a>  |
| EVAP SYS PRES SEN                  | P0453              | —              | —                                       | ×              | <a href="#">EC-943</a>  |
| EVAP GROSS LEAK                    | P0455              | ×              | ×                                       | × <sup>4</sup> | <a href="#">EC-952</a>  |
| EVAP VERY SML LEAK                 | P0456              | × <sup>3</sup> | ×                                       | × <sup>4</sup> | <a href="#">EC-962</a>  |
| FUEL LEV SEN SLOSH                 | P0460              | —              | —                                       | ×              | <a href="#">EC-973</a>  |
| FUEL LEVEL SENSOR                  | P0461              | —              | —                                       | ×              | <a href="#">EC-977</a>  |
| FUEL LEVL SEN/CIRC                 | P0462              | —              | —                                       | ×              | <a href="#">EC-979</a>  |
| FUEL LEVL SEN/CIRC                 | P0463              | —              | —                                       | ×              | <a href="#">EC-979</a>  |
| VEH SPEED SEN/CIRC                 | P0500 <sup>4</sup> | —              | —                                       | ×              | <a href="#">EC-983</a>  |
| ISC SYSTEM/CIRC                    | P0505              | —              | —                                       | ×              | <a href="#">EC-988</a>  |
| CLOSED TP SW/CIRC                  | P0510              | —              | —                                       | ×              | <a href="#">EC-995</a>  |
| A/T COMM LINE                      | P0600 <sup>3</sup> | —              | —                                       | ×              | <a href="#">EC-1002</a> |
| ECM                                | P0605              | —              | —                                       | ×              | <a href="#">EC-1008</a> |
| PNP SW/CIRC                        | P0705              | —              | —                                       | ×              | <a href="#">AT-249</a>  |
| ATF TEMP SEN/CIRC                  | P0710              | —              | —                                       | ×              | <a href="#">AT-255</a>  |

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# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33E]

| Items<br>(CONSULT-II screen terms) | DTC*1 *2          | SRT code | Test value/<br>Test limit<br>(GST only) | 1st trip DTC*1 | Reference page          |
|------------------------------------|-------------------|----------|---|----------------|-------------------------|
|                                    | CONSULT-II<br>GST |          |   |                |                         |
| VEH SPD SEN/CIR AT                 | P0720             | —        | —                                       | ×              | <a href="#">AT-261</a>  |
| ENGINE SPEED SIG                   | P0725             | —        | —                                       | ×              | <a href="#">AT-266</a>  |
| A/T 1ST GR FNCTN                   | P0731             | —        | —                                       | ×              | <a href="#">AT-270</a>  |
| A/T 2ND GR FNCTN                   | P0732             | —        | —                                       | ×              | <a href="#">AT-276</a>  |
| A/T 3RD GR FNCTN                   | P0733             | —        | —                                       | ×              | <a href="#">AT-281</a>  |
| A/T 4TH GR FNCTN                   | P0734             | —        | —                                       | ×              | <a href="#">AT-286</a>  |
| TCC SOLENOID/CIRC                  | P0740             | —        | —                                       | ×              | <a href="#">AT-293</a>  |
| A/T TCC S/V FNCTN                  | P0744             | —        | —                                       | ×              | <a href="#">AT-298</a>  |
| L/PRESS SOL/CIRC                   | P0745             | —        | —                                       | ×              | <a href="#">AT-306</a>  |
| SFT SOL A/CIRC                     | P0750             | —        | —                                       | —              | <a href="#">AT-311</a>  |
| SFT SOL B/CIRC                     | P0755             | —        | —                                       | —              | <a href="#">AT-316</a>  |
| HO2S1 (B1)                         | P1143             | ×        | ×                                       | ×*4            | <a href="#">EC-1010</a> |
| HO2S1 (B1)                         | P1144             | ×        | ×                                       | ×*4            | <a href="#">EC-1017</a> |
| HO2S2 (B1)                         | P1146             | ×        | ×                                       | ×*4            | <a href="#">EC-1024</a> |
| HO2S2 (B1)                         | P1147             | ×        | ×                                       | ×*4            | <a href="#">EC-1035</a> |
| CLOSED LOOP-B1                     | P1148             | —        | —                                       | —              | <a href="#">EC-1046</a> |
| HO2S1 (B2)                         | P1163             | ×        | ×                                       | ×*4            | <a href="#">EC-1010</a> |
| HO2S1 (B2)                         | P1164             | ×        | ×                                       | ×*4            | <a href="#">EC-1017</a> |
| HO2S2 (B2)                         | P1166             | ×        | ×                                       | ×*4            | <a href="#">EC-1024</a> |
| HO2S2 (B2)                         | P1167             | ×        | ×                                       | ×*4            | <a href="#">EC-1035</a> |
| CLOSED LOOP-B2                     | P1168             | —        | —                                       | —              | <a href="#">EC-1046</a> |
| ENG OVER TEMP                      | P1217             | —        | —                                       | —              | <a href="#">EC-1048</a> |
| CKP SENSOR (COG)                   | P1336             | —        | —                                       | ×              | <a href="#">EC-1052</a> |
| EGR SOLENOID/V                     | P1400             | —        | —                                       | ×              | <a href="#">EC-1057</a> |
| EGR SYSTEM                         | P1402             | ×        | ×                                       | ×*4            | <a href="#">EC-1063</a> |
| EVAP SMALL LEAK                    | P1442             | ×        | ×                                       | ×*4            | <a href="#">EC-1071</a> |
| PURG VOLUME CONT/V                 | P1444             | —        | —                                       | ×              | <a href="#">EC-1073</a> |
| VENT CONTROL VALVE                 | P1446             | —        | —                                       | ×              | <a href="#">EC-1082</a> |
| VENT CONTROL VALVE                 | P1448             | —        | —                                       | ×              | <a href="#">EC-1088</a> |
| EVAP VERY SML LEAK                 | P1456             | ×*3      | ×                                       | ×*4            | <a href="#">EC-1096</a> |
| FUEL LEVEL SEN/CIRC                | P1464             | —        | —                                       | ×              | <a href="#">EC-1106</a> |
| VC/V BYPASS/V                      | P1490             | —        | —                                       | ×              | <a href="#">EC-1109</a> |
| VC CUT/V BYPASS/V                  | P1491             | —        | —                                       | ×              | <a href="#">EC-1115</a> |
| A/T DIAG COMM LINE                 | P1605             | —        | —                                       | ×              | <a href="#">EC-1127</a> |
| TP SEN/CIRC A/T                    | P1705*4           | —        | —                                       | —              | <a href="#">AT-321</a>  |
| P-N POS SW/CIRCUIT                 | P1706             | —        | —                                       | ×              | <a href="#">EC-1132</a> |
| O/R CLTCH SOL/CIRC                 | P1760             | —        | —                                       | ×              | <a href="#">AT-329</a>  |

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

\*2: These numbers are prescribed by SAE J2012.

\*3: SRT code will not be set if the self-diagnostic result is NG.

\*4: These are not displayed with GST.



**NOTE:**

Regarding D22 models, "B1" indicates bank 1, "B2" indicates bank 2.

## DTC AND 1ST TRIP DTC

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

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

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in [EC-634, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#).

For malfunctions in which 1st trip DTCs are displayed, refer to [EC-622](#). 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-643](#). 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          |   | 1st trip DTC display | SELF DIAG RESULTS          |    |
|             | DTC RESULTS                |   |                      | DTC RESULTS                |    |
|             | CKP SEN/CIRCUIT<br>[P0335] | 0 |                      | CKP SEN/CIRCUIT<br>[P0335] | 1t |
|             |                            |   |                      |                            |    |

## FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed 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-681](#).

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<br>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-634, "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.

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33E]

## SRT Item

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

| SRT item<br>(CONSULT-II indication) | Performance<br>Priority * | Required self-diagnostic items to set the SRT to "CMPLT" | Corresponding DTC<br>No.      |
|-------------------------------------|---------------------------|--|-------------------------------|
| CATALYST                            | 3                         | Three way catalyst function                              | P0420, P0430                  |
| EVAP SYSTEM                         | 2                         | EVAP control system                                      | P0442, P1442                  |
|                                     | 3                         | EVAP control system                                      | P0456, P1456                  |
|                                     | 3                         | EVAP control system purge flow monitoring                | P0441                         |
| HO2S                                | 3                         | Heated oxygen sensor 1                                   | P0132, P0152                  |
|                                     |                           | Heated oxygen sensor 1                                   | P0133, P0153                  |
|                                     |                           | Heated oxygen sensor 1                                   | P0134, P0154                  |
|                                     |                           | Heated oxygen sensor 1                                   | P1143, P1163                  |
|                                     |                           | Heated oxygen sensor 1                                   | P1144, P1164                  |
|                                     |                           | Heated oxygen sensor 2                                   | P0138, P0158                  |
|                                     |                           | 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,<br>P0052 |
|                                     |                           | Heated oxygen sensor 2 heater                            | P0037, P0038, P0057,<br>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<br>OFF – ON –<br>OFF | Ignition<br>OFF – ON –<br>OFF | Ignition<br>OFF – ON –<br>OFF | Ignition<br>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"                    |

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

**[VG33E]**

|           |        |                |              |         |              |                     |
|-----------|--------|----------------|--------------|---------|--------------|---------------------|
| 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;

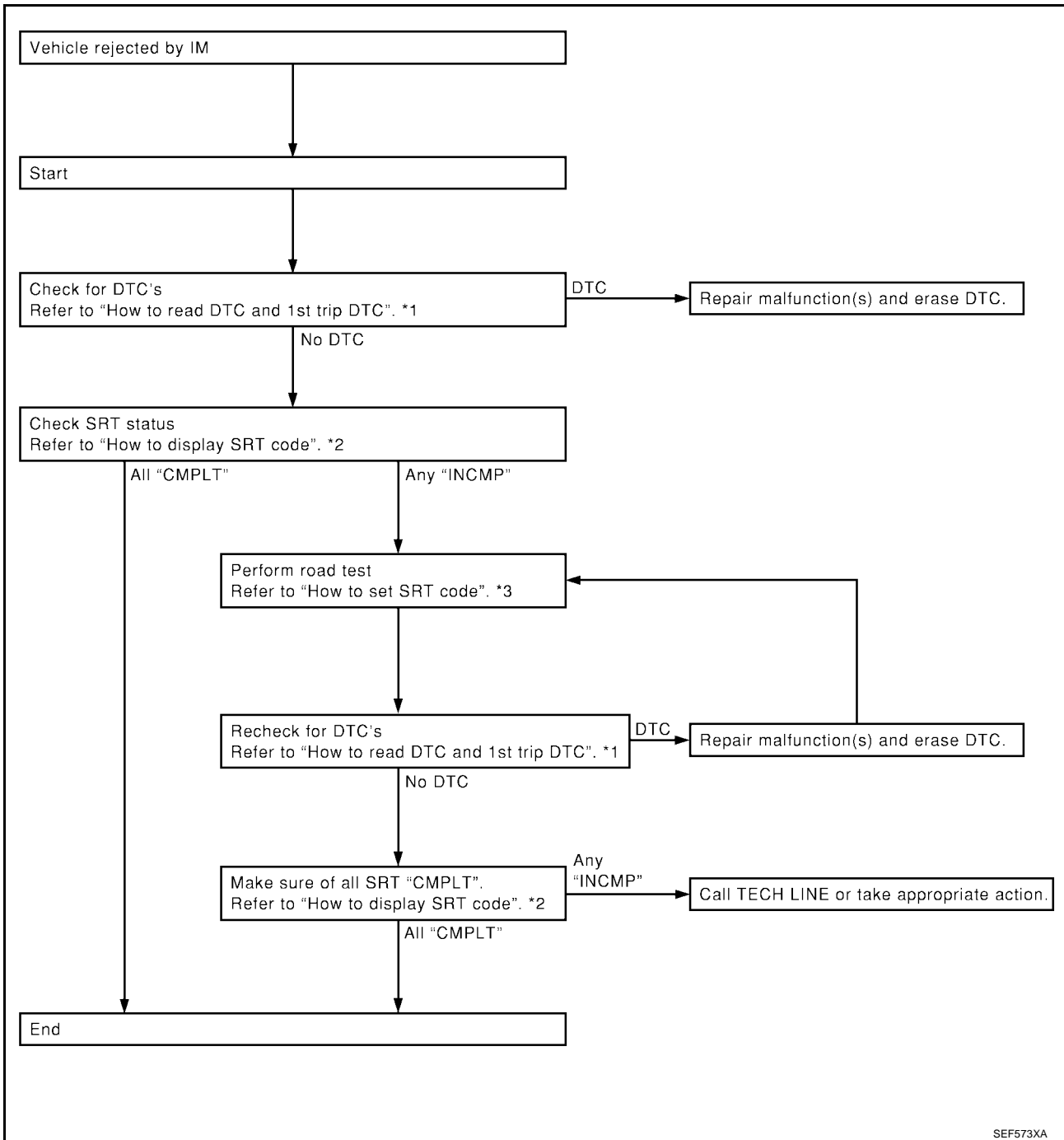
- The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis result.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to “CMPLT” of SRT, the self-diagnosis memory 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-625](#)

\*2 [EC-630](#)

\*3 [EC-630](#)

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## 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.

| SRT STATUS  |       |
|-------------|-------|
| CATALYST    | CMPLT |
| EVAP SYSTEM | INCMP |
| HO2S HTR    | CMPLT |
| HO2S        | CMPLT |

SEF935Z

### 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-627](#).

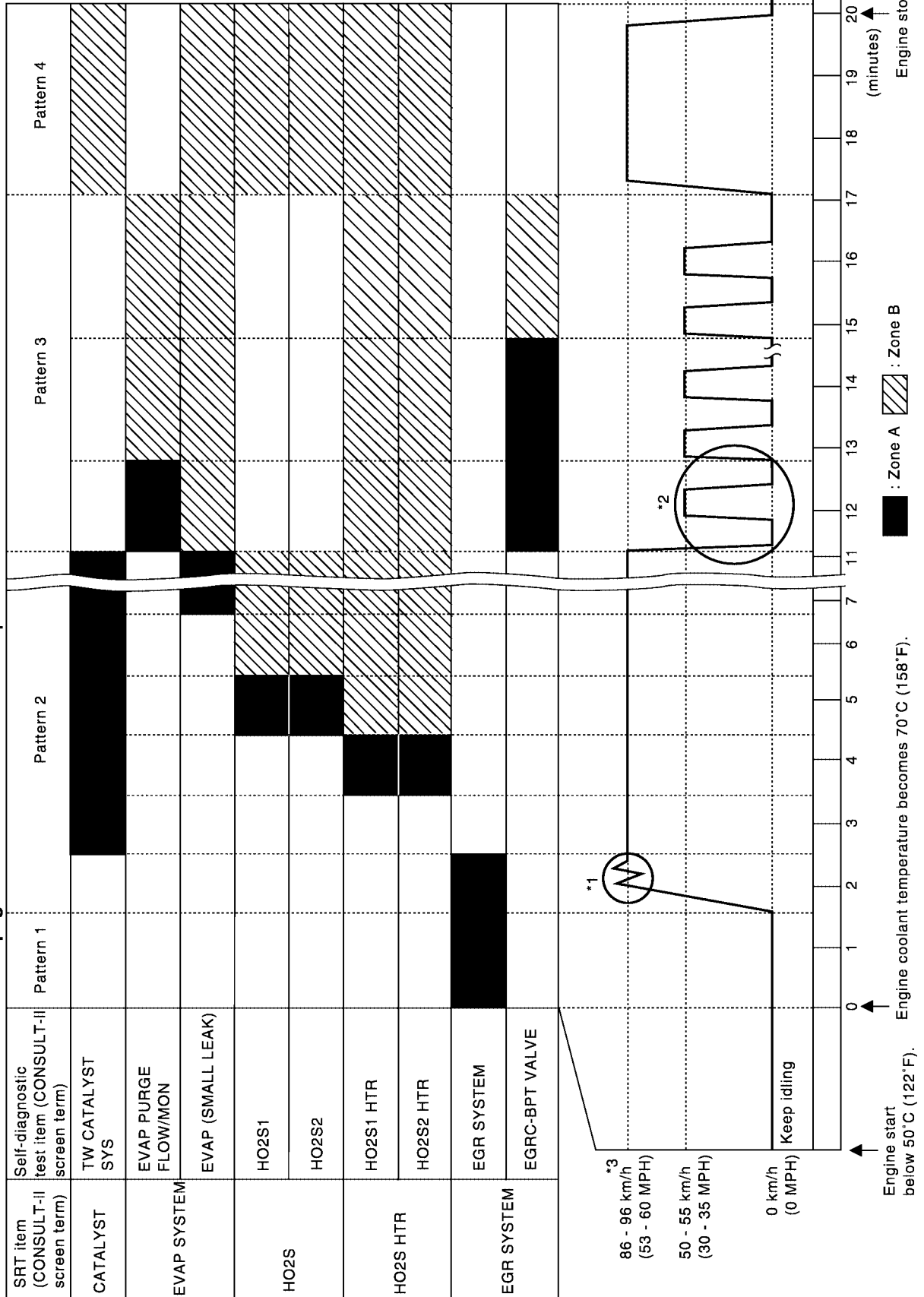
### Without CONSULT-II

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

Driving Pattern

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

**Driving pattern**



PBIB1400E

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33E]

- 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:

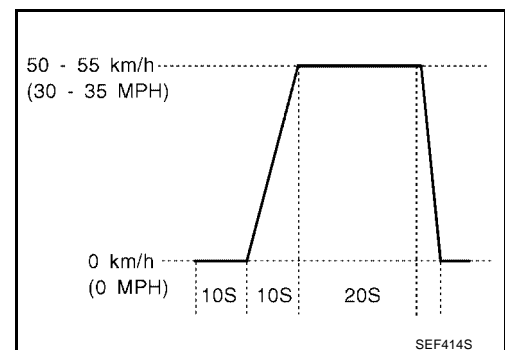
- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

\*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.



# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33E]

|             | For normal acceleration in low altitude areas<br>[less than 1,219 m (4,000 ft)]: | For quick acceleration in low altitude areas<br>and high altitude areas [over 1,219 m (4,000<br>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)<br>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.

Items for which these data (test value and test limit) are displayed are the same as SRT code items (30 test items).

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

X: Applicable —: Not applicable

| SRT item    | Self-diagnostic test item                 | Test value (GST display) |     | Test limit | Application |
|-------------|---|--------------------------|-----|------------|-------------|
|             |   | TID                      | CID |            |             |
| CATALYST    | Three way catalyst function (Bank 1)      | 01H                      | 01H | Max.       | X           |
|             | Three way catalyst function (Bank 2)      | 03H                      | 02H | Max.       | X           |
| EVAP SYSTEM | EVAP control system (Small leak)          | 05H                      | 03H | Max.       | X           |
|             | EVAP control system purge flow monitoring | 06H                      | 83H | Min.       | X           |

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33E]

| SRT item    | Self-diagnostic test item       | Test value (GST display) |      | Test limit | Application |
|-------------|---------------------------------|--------------------------|------|------------|-------------|
|             |                                 | TID                      | CID  |            |             |
| HO2S        | Heated oxygen sensor 1 (bank 1) | 09H                      | 04H  | Max.       | X           |
|             |                                 | 0AH                      | 84H  | Min.       | X           |
|             |                                 | 0BH                      | 04H  | Max.       | X           |
|             |                                 | 0CH                      | 04H  | Max.       | X           |
|             |                                 | 0DH                      | 04H  | Max.       | X           |
|             | Heated oxygen sensor 1 (bank 2) | 11H                      | 05H  | Max.       | X           |
|             |                                 | 12H                      | 85H  | Min.       | X           |
|             |                                 | 13H                      | 05H  | Max.       | X           |
|             |                                 | 14H                      | 05H  | Max.       | X           |
|             |                                 | 15H                      | 05H  | Max.       | X           |
|             | Heated oxygen sensor 2 (bank 1) | 19H                      | 86H  | Min.       | X           |
|             |                                 | 1AH                      | 86H  | Min.       | X           |
|             |                                 | 1BH                      | 06H  | Max.       | X           |
|             |                                 | 1CH                      | 06H  | Max.       | X           |
|             | Heated oxygen sensor 2 (bank 2) | 21H                      | 87H  | Min.       | X           |
|             |                                 | 22H                      | 87H  | Min.       | X           |
| 23H         |                                 | 07H                      | Max. | X          |             |
| 24H         |                                 | 07H                      | Max. | X          |             |
| HO2S HEATER | Heated oxygen sensor 1 (bank 1) | 29H                      | 08H  | Max.       | X           |
|             |                                 | 2AH                      | 88H  | Min.       | X           |
|             | Heated oxygen sensor 1 (bank 2) | 2BH                      | 09H  | Max.       | X           |
|             |                                 | 2CH                      | 89H  | Min.       | X           |
|             | Heated oxygen sensor 2 (bank 1) | 2DH                      | 0AH  | Max.       | X           |
|             |                                 | 2EH                      | 8AH  | Min.       | X           |
|             | Heated oxygen sensor 2 (bank 2) | 2FH                      | 0BH  | Max.       | X           |
|             |                                 | 30H                      | 8BH  | Min.       | X           |
| EGR SYSTEM  | EGR function                    | 31H                      | 8CH  | Min.       | X           |
|             |                                 | 32H                      | 8CH  | Min.       | X           |
|             |                                 | 33H                      | 8CH  | Min.       | X           |
|             |                                 | 34H                      | 8CH  | Min.       | X           |
|             |                                 | 35H                      | 0CH  | Max.       | X           |
|             | EGRC-BPT valve function         | 36H                      | 0CH  | Max.       | X           |
|             |                                 | 37H                      | 8CH  | Min.       | X           |

## HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

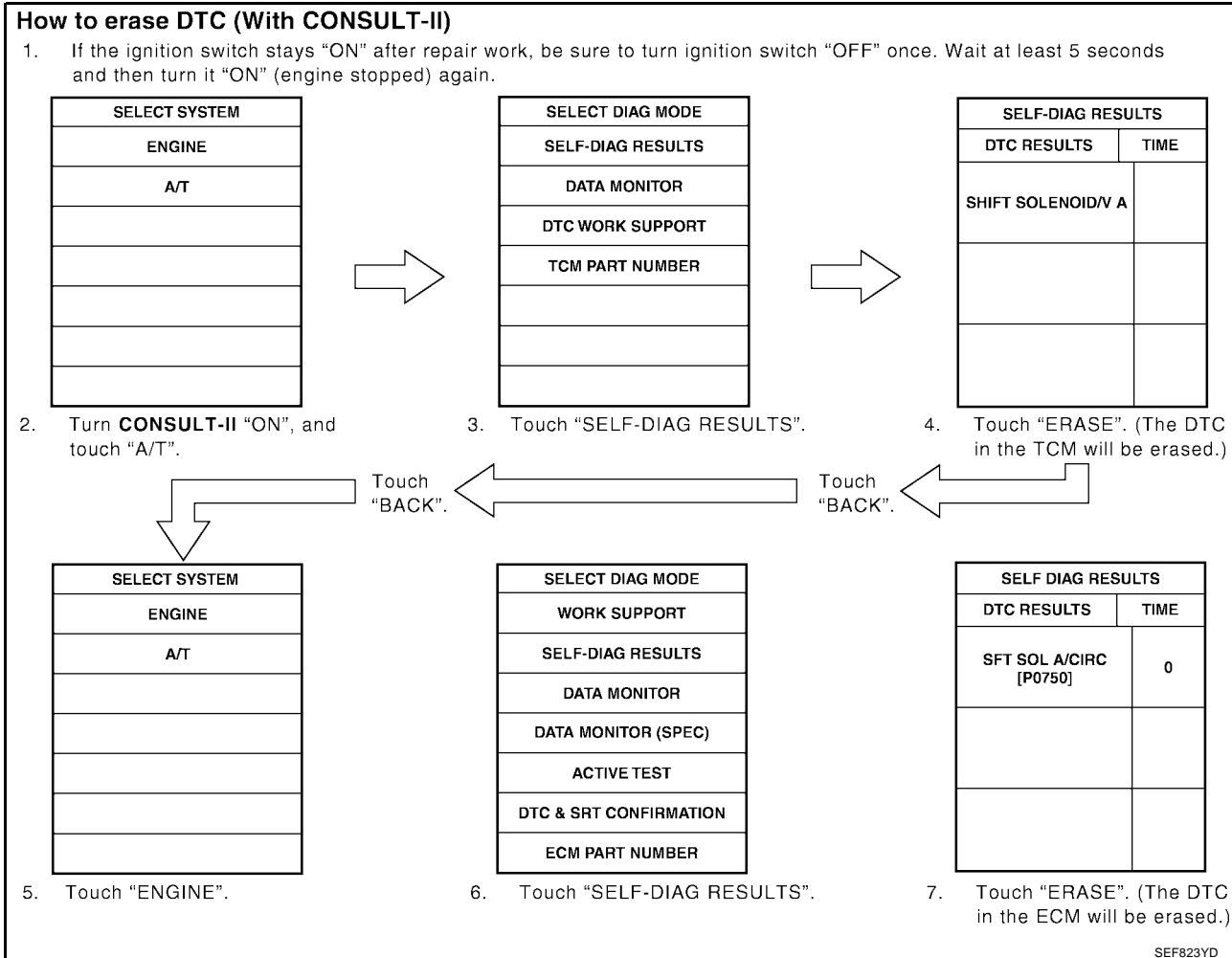
### How to Erase DTC ( With CONSULT-II)

#### NOTE:

If the DTC is not for A/T related items (see [EC-587](#) ), 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).



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

### How to Erase DTC ( With GST)

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

**NOTE:**

**If the DTC is not for A/T related items (see [EC-587](#) ), 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 "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
  3. Select Mode 4 with GST (Generic Scan Tool).
- **If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.**
  - **Erasing the emission-related diagnostic information using CONSULT-II or GST is easier and quicker than switching the mode selector on the ECM.**
  - **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

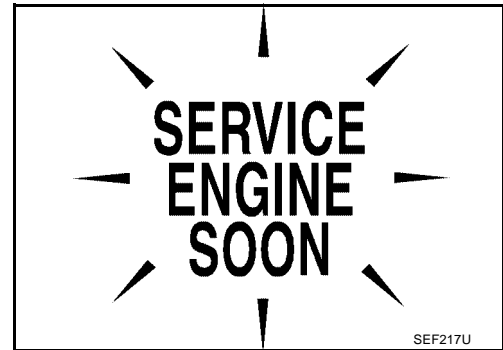
Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

## Malfunction Indicator Lamp (MIL) DESCRIPTION

UBS00710




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 [EC-1168](#) , or see [DI-25, "WARNING LAMPS"](#) .
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<br> | BULB CHECK          | This function checks the MIL bulb for damage (blown, open circuit, etc.).<br>If the MIL does not come on, check MIL circuit. (See <a href="#">EC-1168</a> .)  |
|                      | Engine stopped<br>                 |                     |   |
|                      | Engine running<br>                 | 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.<br>The following malfunctions will light up or blink the MIL in the 1st trip. <ul style="list-style-type: none"> <li>● "Misfire (Possible three way catalyst damage)"</li> <li>● "One trip detection diagnoses"</li> </ul> |

### 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 [EC-1168](#) , or see [DI-25, "WARNING LAMPS"](#) .

### 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

UBS00711

### 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.

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33E]

- 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-621, "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)  |

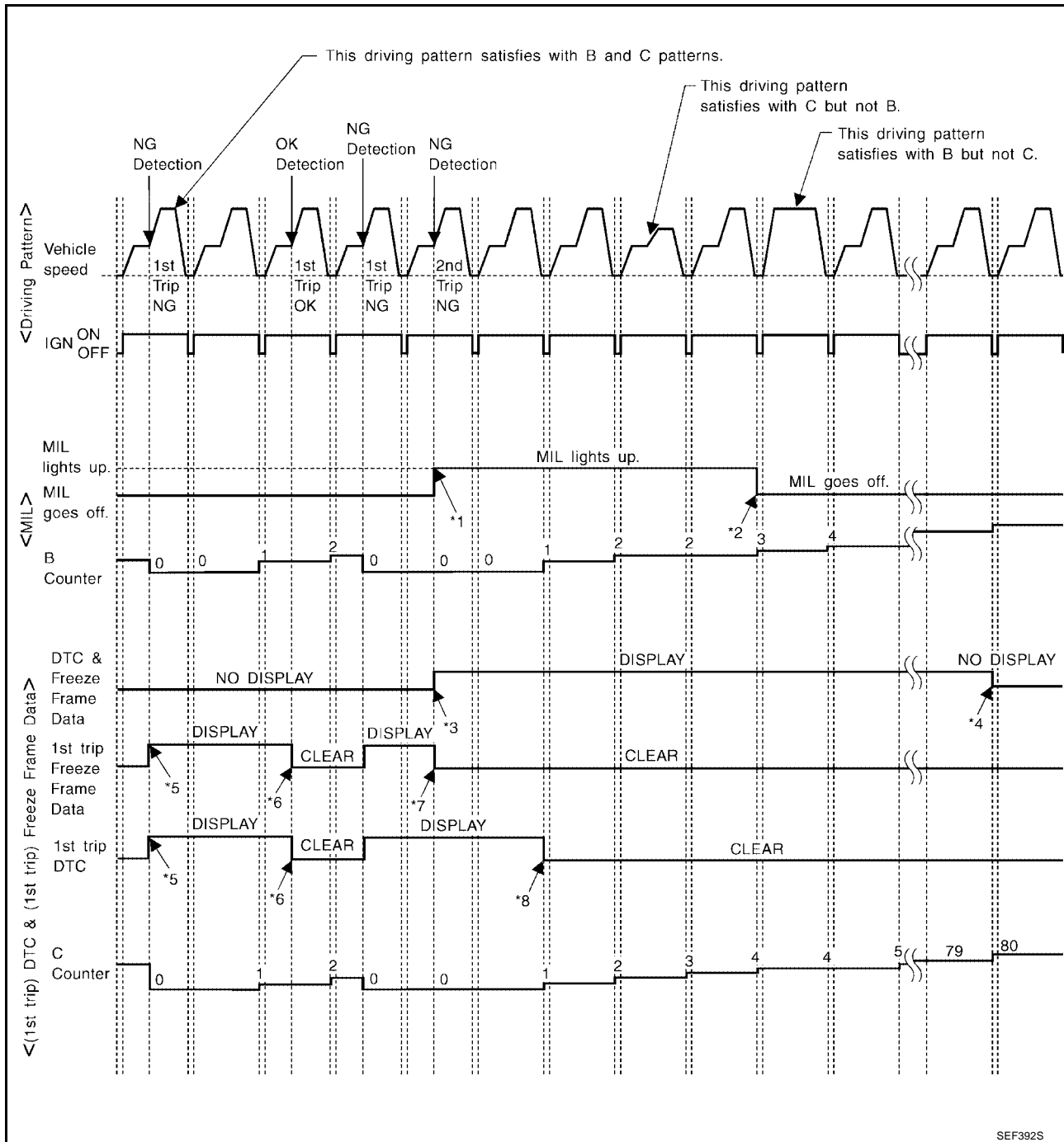
For details about patterns "B" and "C" under "Fuel Injection System" and "Misfire", see [EC-639](#) .

For details about patterns "A" and "B" under "Other", see [EC-641](#) .

\*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 "MIS-FIRE" <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)  $\pm 375$  rpm

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

Engine coolant temperature (T) condition:

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

Example:

If the stored freeze frame data is as follows:

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

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

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

- The C counter will be cleared when the malfunction is detected regardless of 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.

A

EC

C

D

E

F

G

H

I

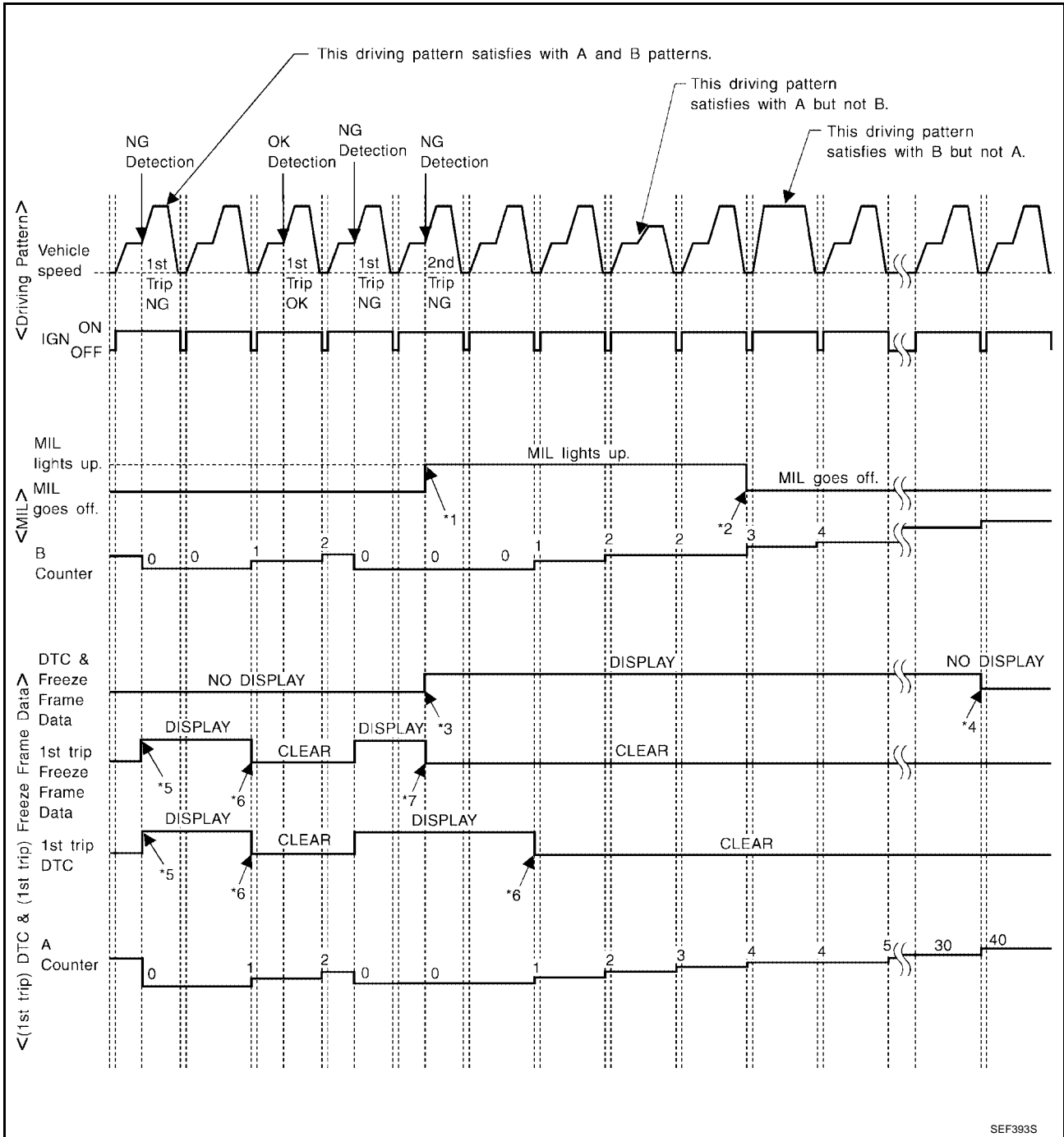
J

K

L

M

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



SEF393S

\*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.

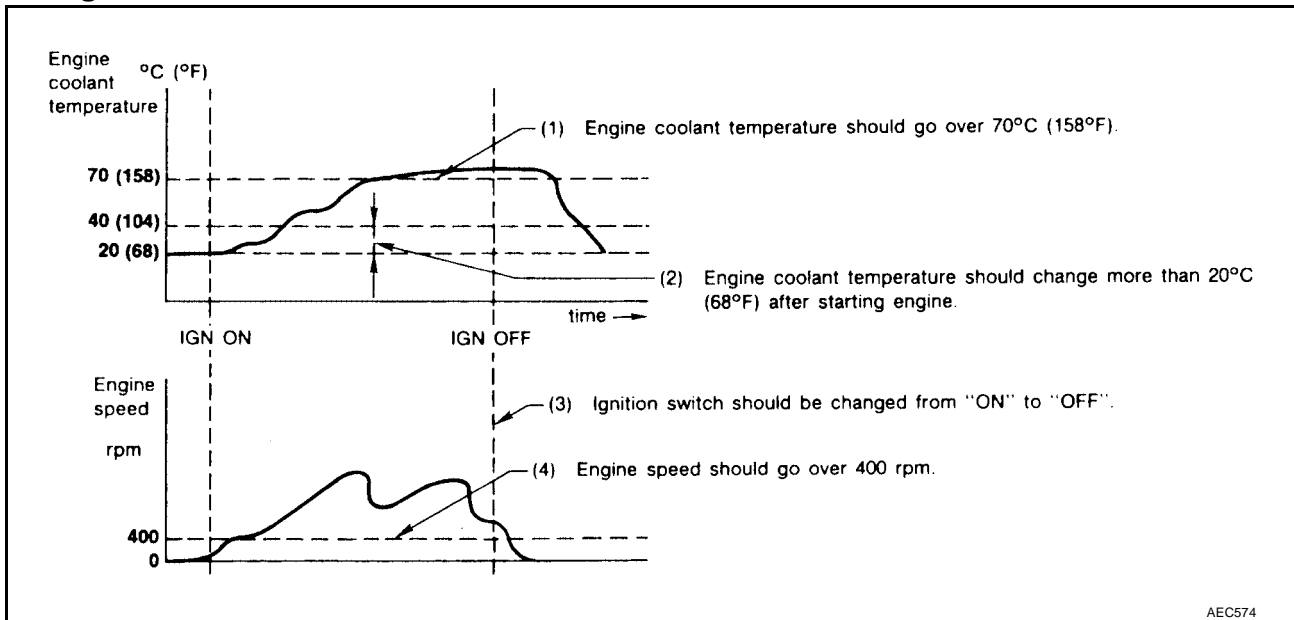
\*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

\*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:

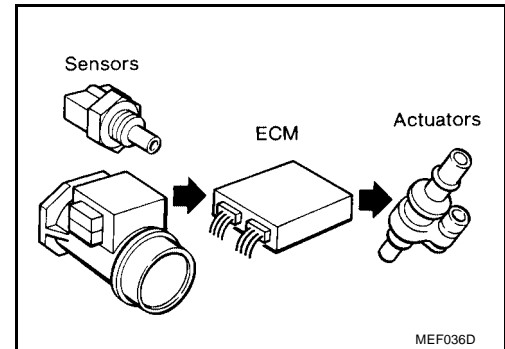
All components and systems should be monitored at least once by the OBD system.

- 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").

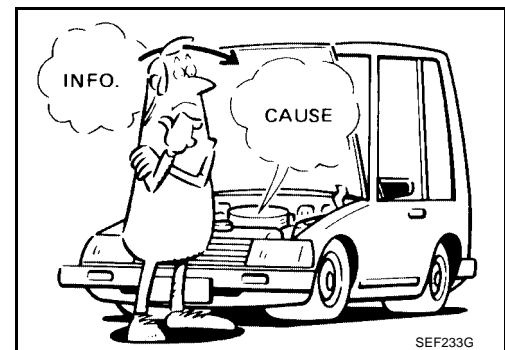
## TROUBLE DIAGNOSIS

### Trouble Diagnosis Introduction INTRODUCTION

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



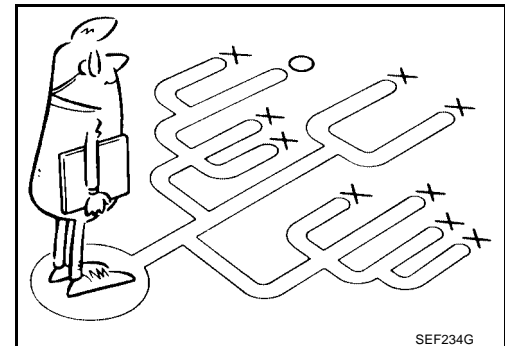
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



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 [EC-643, "WORK FLOW"](#).

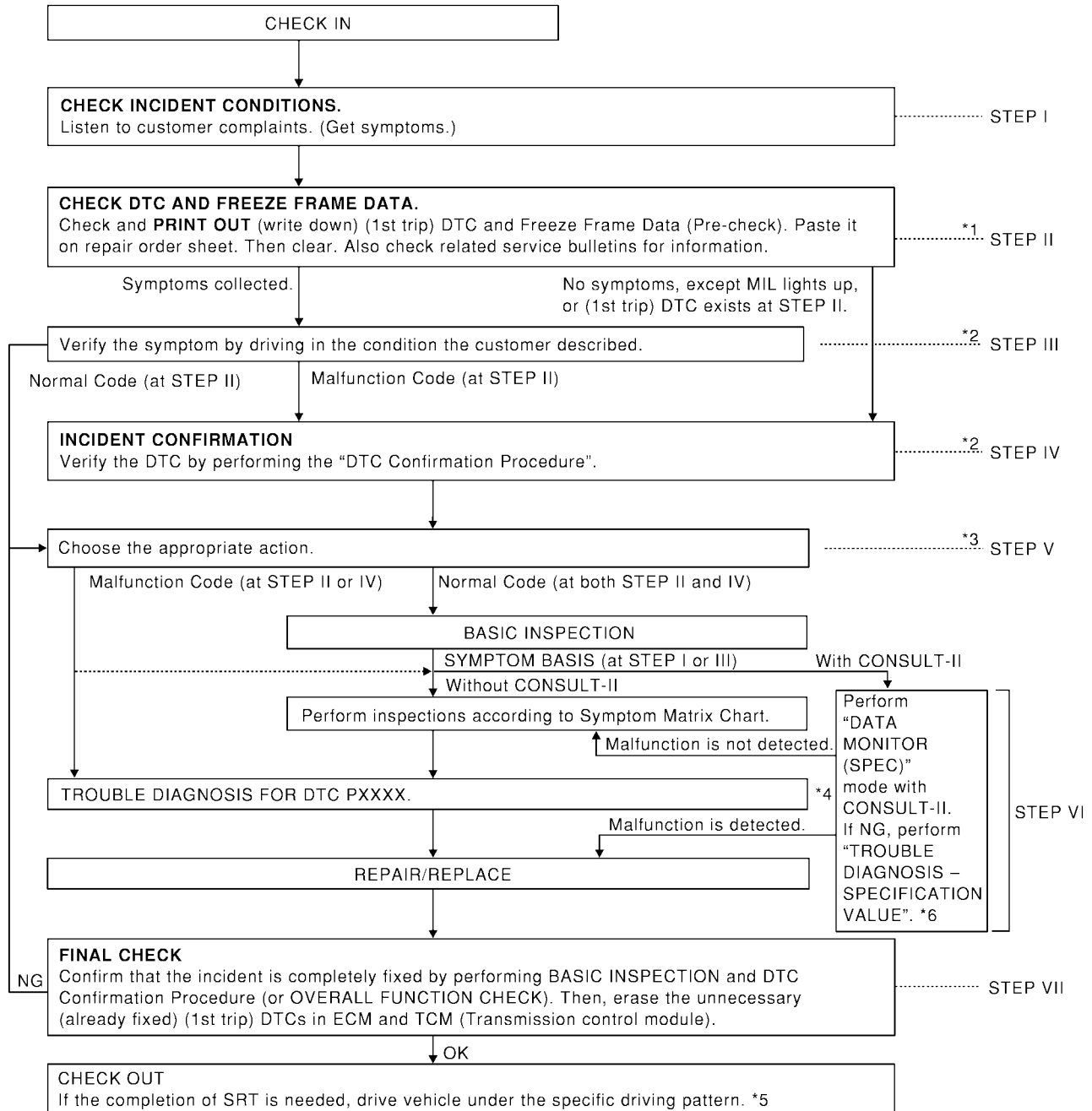
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A "Diagnostic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



\*1 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

\*4 If malfunctioning part cannot be detected, perform [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

\*2 If the incident cannot be verified, perform [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

\*5 [EC-631, "Driving Pattern"](#) .

\*3 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to [EC-700, "POWER SUPPLY CIRCUIT FOR ECM"](#) .

\*6 [EC-695, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE"](#) .

PBIB1043E

# TROUBLE DIAGNOSIS

[VG33E]

## Description For Work Flow

| STEP     | DESCRIPTION   |
|----------|---|
| STEP I   | Get detailed information about the conditions and the environment when the incident/symptom occurred using the <a href="#">EC-645, "DIAGNOSTIC WORKSHEET"</a> .   |
| STEP II  | Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to <a href="#">EC-634</a> .) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV.<br>If the incident cannot be verified, perform <a href="#">EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"</a> .<br>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 <a href="#">EC-661</a> .)<br>Also check related service bulletins for information.  |
| STEP III | Try to confirm the symptom and under what conditions the incident occurs.<br>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.<br>If the incident cannot be verified, perform <a href="#">EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"</a> .<br>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.<br>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.<br>If the incident cannot be verified, perform <a href="#">EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"</a> 6.<br>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.<br>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.<br>If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX.<br>If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to <a href="#">EC-648</a> .) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the <a href="#">EC-695, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE"</a> . (If malfunction is detected, proceed to "REPAIR/REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to <a href="#">EC-661</a> .)   |
| 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".<br>Gently shake the related connectors, components or wiring harness with CONSULT-II set in "DATA MONITOR (AUTO TRIG)" mode.<br>Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II.<br>Refer to <a href="#">EC-669</a> , <a href="#">EC-690</a> .<br>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 <a href="#">GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident"</a> .<br>Repair or replace the malfunction parts.<br>If malfunctioning part cannot be detected, perform <a href="#">EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"</a> . |
| 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.<br>Perform the "DTC Confirmation Procedure" and confirm the normal code [DTC No. P0000 or 0505] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one.<br>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 <a href="#">EC-634</a> and <a href="#">AT-187</a> .)   |

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 [for the models with EVAP (SMALL LEAK) diagnosis].

| KEY POINTS         |  |
|--------------------|--|
| <b>WHAT</b> .....  | Vehicle & engine model                                   |
| <b>WHEN</b> .....  | Date, Frequencies  |
| <b>WHERE</b> ..... | Road conditions  |
| <b>HOW</b> .....   | Operating conditions,<br>Weather conditions,<br>Symptoms |

SEF907L

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# TROUBLE DIAGNOSIS

[VG33E]

UBS00713

## DTC Inspection Priority Chart

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

| Priority | Detected items (DTC)  | EC                         |
|----------|---|----------------------------|
| 1        | <ul style="list-style-type: none"> <li>● P0101, P0102, P0103 Mass air flow sensor</li> <li>● P0112, P0113, P0127 Intake air temperature sensor</li> <li>● P0117, P0118, P0125 Engine coolant temperature sensor</li> <li>● P0121, P0122, P0123 Throttle position sensor</li> <li>● P0181, P0182, P0183 Fuel tank temperature sensor</li> <li>● P0327, P0328 Knock sensor</li> <li>● P0335 P1336 CKP sensor (OBD)</li> <li>● P0340 CMP sensor</li> <li>● P0460 P0461 P1464 Fuel level sensor</li> <li>● P0500 VSS</li> <li>● P0600 A/T control</li> <li>● P0605 ECM</li> <li>● P1400 EGRC-solenoid valve</li> <li>● P1605 A/T diagnosis communication line</li> <li>● P1706 PNP switch</li> </ul>  | A<br>C<br>D<br>E<br>F<br>G |
| 2        | <ul style="list-style-type: none"> <li>● P0132-P0134, P1143, P1144/P0152-P0154, P1163, P1164 HO2S1</li> <li>● P0031, P0032/P0051, P0052 HO2S1 heater</li> <li>● P0138, P0139, P1146, P1147/P0158, P0159, P1166, P1167 HO2S2</li> <li>● P0037, P0038/P0057, P0058 HO2S2 heater</li> <li>● P0217 Engine coolant overtemperature enrichment protection</li> <li>● P0405, P0406 EGR temperature sensor</li> <li>● P0441 EVAP control system purge flow monitoring</li> <li>● P0444, P0445, P1444 EVAP canister purge volume control solenoid valve</li> <li>● P0447, P1446, P1448 EVAP canister vent control valve</li> <li>● P0452, P0453 EVAP control system pressure sensor</li> <li>● P0456, P1456 EVAP control system</li> <li>● P0510 CTP switch</li> <li>● P0705-P0755, P1705, P1760 A/T related sensors, solenoid valves and switches</li> <li>● P1490 P1491 Vacuum cut valve bypass valve</li> </ul> | H<br>I<br>J<br>K<br>L      |
| 3        | <ul style="list-style-type: none"> <li>● P0171, P0172, P0174, P0175 Fuel injection system function</li> <li>● P0306 - P0300 Misfire</li> <li>● P0400, P1402 EGR function</li> <li>● P0402 EGRC-BPT valve function</li> <li>● P0420, P0430 Three way catalyst function</li> <li>● P0442/P1442 EVAP control system</li> <li>● P0455 EVAP control system</li> <li>● P0505 ISC valve</li> <li>● P0731-P0734 P0744 A/T function</li> <li>● P1148, P1168 Closed loop control</li> </ul>   | M                          |

# TROUBLE DIAGNOSIS

[VG33E]

UBS00714

## Fail-safe Chart

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

| DTC No.              | Detected items                            | Engine operating condition in fail-safe mode   |   |
|----------------------|---|--|---|
| P0102<br>P0103       | Mass air flow sensor circuit              | Engine speed will not rise more than 2,400 rpm due to the fuel cut.  |   |
| P0117<br>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".<br>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)<br>(Depends on the time)                            |
| P0122<br>P0123       | Throttle position sensor circuit          | Throttle position will be determined based on the injected fuel amount and the engine speed.<br>Therefore, acceleration will be poor.  |   |
|                      |   | Condition  | Driving condition   |
|                      |   | When engine is idling  | Normal  |
|                      |   | When accelerating  | Poor acceleration   |
| Unable to access ECM | ECM                                       | <b>ECM fail-safe activating condition</b><br>The computing function of the ECM was judged to be malfunctioning.<br>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.<br>However it is not possible to access ECM and DTC cannot be confirmed. |   |
|                      |   | <b>Engine control with fail-safe</b><br>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  |   |
|                      |   | <b>Engine speed</b>  | <b>Engine speed will not rise more than 3,000 rpm</b>                       |
|                      |   | 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

UBS00715

### Precaution:

**Perform Basic Inspection without electrical or mechanical loads applied;**

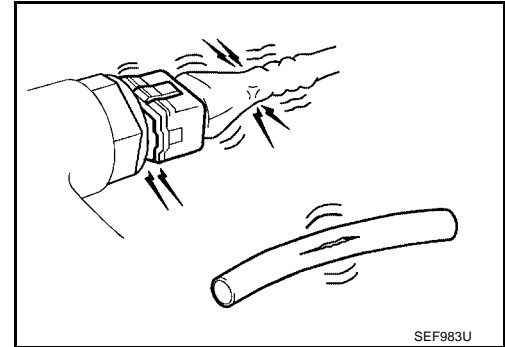
- Headlamp switch is OFF,
- Air conditioner switch is OFF,
- Rear window defogger switch is OFF,
- Steering wheel is in the straight-ahead position, etc.



## 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

Models with CONSULT-II>>GO TO 2.  
 Models with GST>>GO TO 2.  
 Models 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-679, "CONSULT-II INSPECTION PROCEDURE"](#) .

### With GST

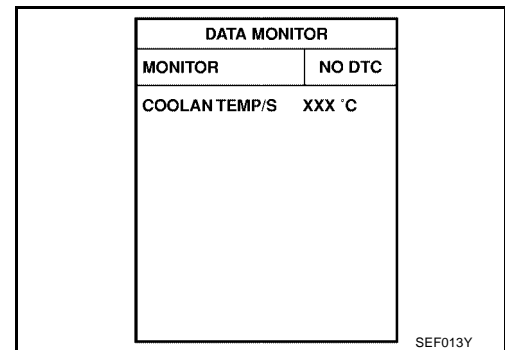
Connect "GST" to the data link connector for GST.  
 Refer to [EC-689, "GST INSPECTION PROCEDURE"](#) .

Models with CONSULT-II>>GO TO 3.  
 Models with GST>>GO TO 14.

### 3. CHECK FI CAM FUNCTION

#### With CONSULT-II

- Turn ignition switch ON.
- Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
- Start engine and warm it up.



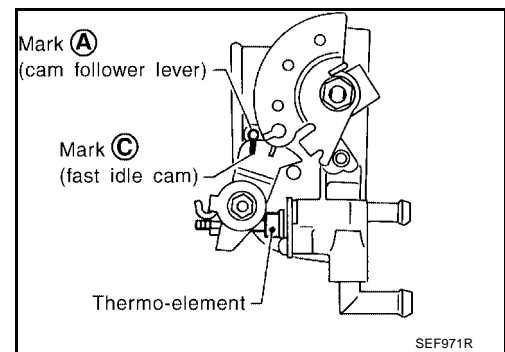
- When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

- 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.

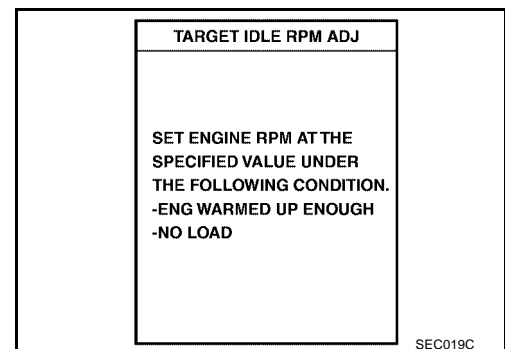
NG >> 1. Check FI cam. Refer to [EC-617, "Fast Idle Cam \(FIC\) Inspection and Adjustment"](#) .  
2. GO TO 4.



### 4. CHECK IGNITION TIMING

#### With CONSULT-II

- Warm up engine to normal operating temperature.
- Select "IGNITION TIMING ADJ" in "WORK SUPPORT" mode and touch "START".



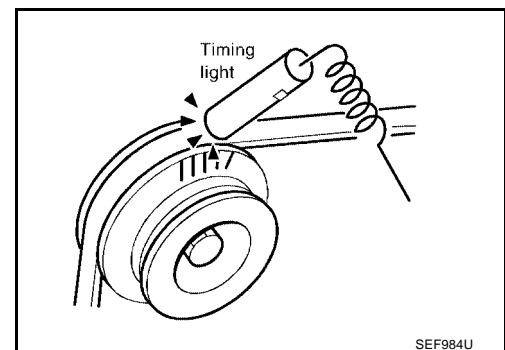
- Check ignition timing at idle using a timing light.

**Ignition timing** :  $10^{\circ} \pm 2^{\circ}$  BTDC

#### OK or NG

OK >> GO TO 5.

NG >> 1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", [EC-607](#) .  
2. GO TO 5.



## 5. CHECK BASE IDLE SPEED

### With CONSULT-II

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

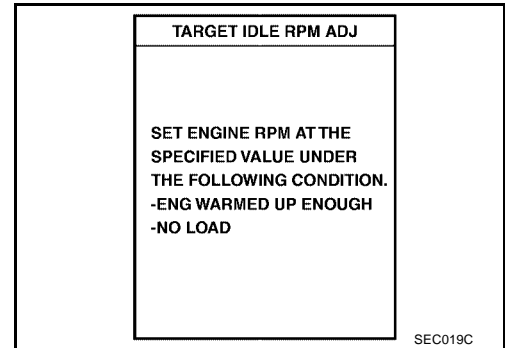
**700±50 rpm (in "P" or "N" position)**

#### OK or NG

OK >> GO TO 6.

NG >> 1. Adjust engine speed by turning idle speed adjusting screw. Refer to [EC-607, "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:

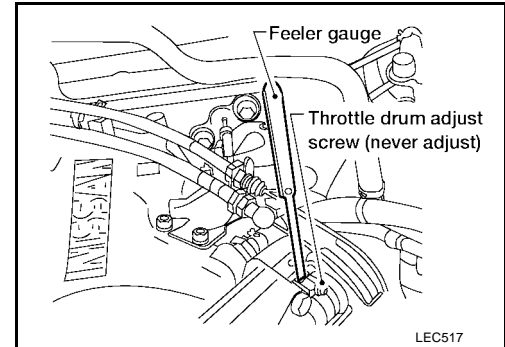
**Always check ignition timing and base idle speed before performing the following.**

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.



| DATA MONITOR  |        |
|---------------|--------|
| MONITOR       | NO DTC |
| 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

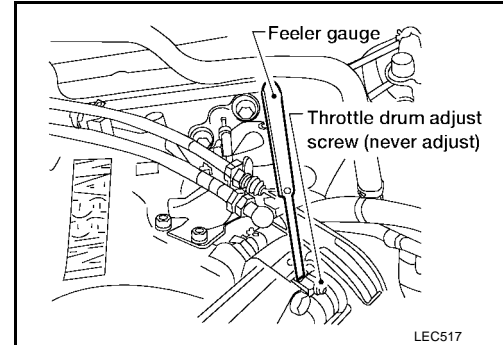
**NOTE:**

- 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.

| DATA MONITOR  |        |
|---------------|--------|
| MONITOR       | NO DTC |
| CLSD THL/P SW | OFF    |

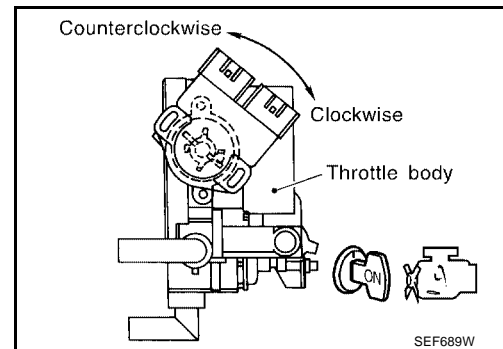
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**10. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III**

 **With CONSULT-II**

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

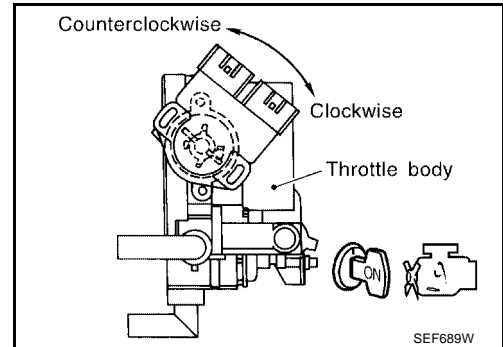
>> GO TO 11.



**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.

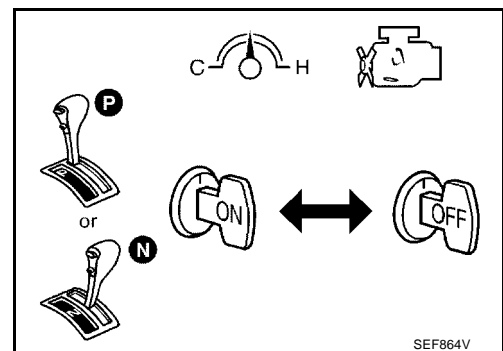
**12. RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY**

**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.

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

**750±50 rpm (in "P" or "N" position)**

**OK or NG**

OK >> **INSPECTION END.**

NG >> 1. Adjust idle speed. Refer to [EC-607, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment"](#).  
2. GO TO 27.

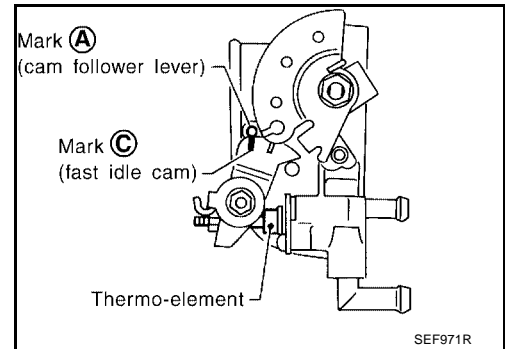
**14. CHECK FI CAM FUNCTION****With GST**

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.

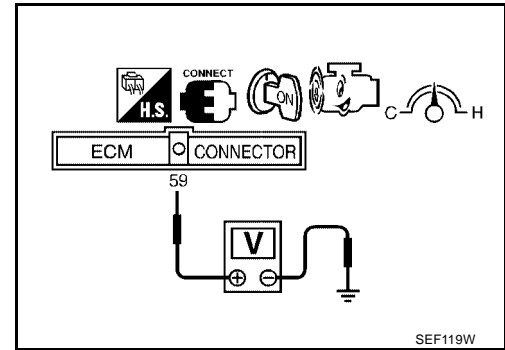
NG >> 1. Check FI cam. Refer to [EC-617, "Fast Idle Cam \(FIC\) Inspection and Adjustment"](#).  
2. GO TO 16.



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.

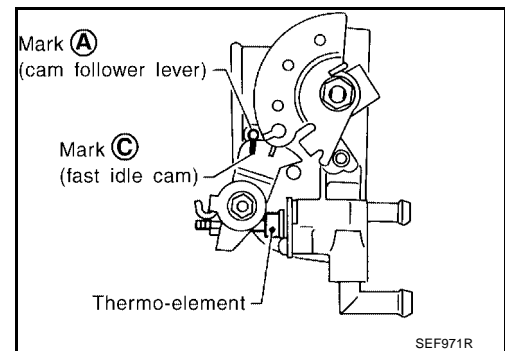


3. When the voltage is between 1.10 to 1.36V, check the following.
  - The center of mark **A** is aligned with mark **C**.
  - The cam follower lever's roller is not touching the fast idle cam.

OK or NG

OK >> GO TO 16.

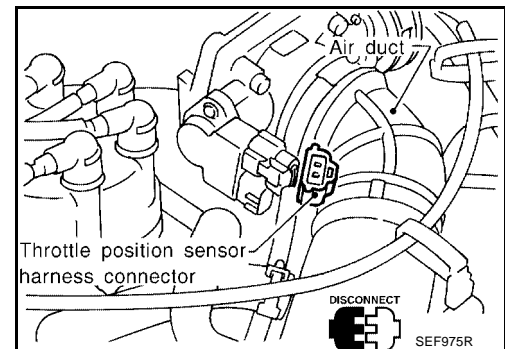
NG >> 1. Check FI cam. Refer to [EC-617, "Fast Idle Cam \(FIC\) Inspection and Adjustment"](#).  
 2. GO TO 16.



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.



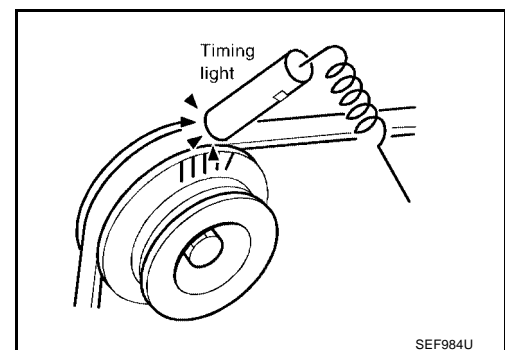
4. Check ignition timing at idle using a timing light.

**Ignition timing : 10°±2° BTDC**

OK or NG

OK >> GO TO 17.

NG >> 1. Adjust ignition timing by turning distributor. Refer to "Idle Speed/Ignition Timing/ Idle Mixture Ratio Adjustment", [EC-607](#).  
 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?

**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-607, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment"](#).

2. GO TO 18.

**18. CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION****⊗ Without CONSULT-II****NOTE:**

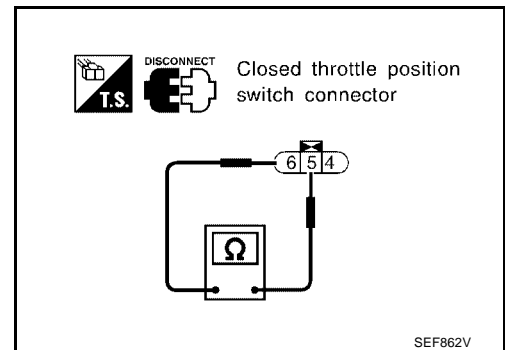
**Always check ignition timing and base idle speed before performing the following.**

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.

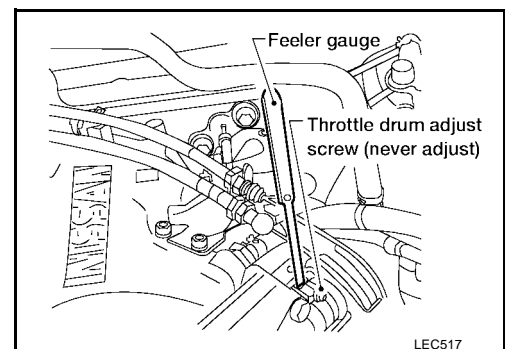


- Insert the 0.3 mm (0.012 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure.  
**"Continuity should exist" while inserting 0.3 mm (0.012 in) feeler gauge.**  
**"Continuity should not exist" while inserting 0.4 mm (0.016 in) feeler gauge.**

OK or NG

OK >> GO TO 24.

NG >> GO TO 20.



**20. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION**

⊗ Without CONSULT-II

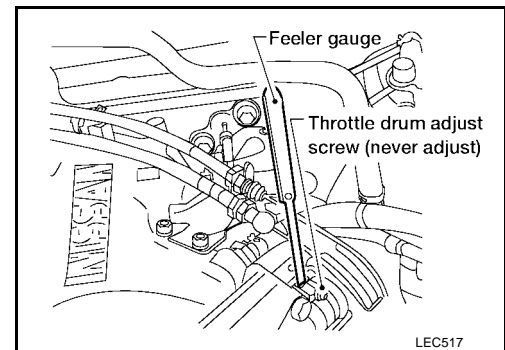
**NOTE:**

- 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 12 or 13.
  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.

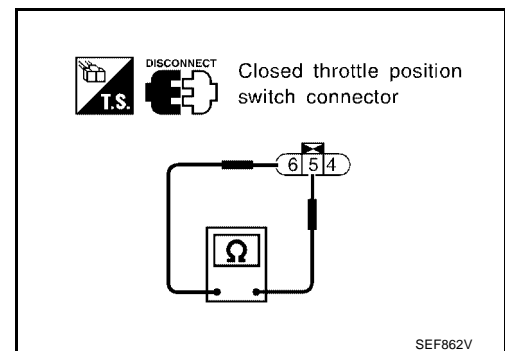


4. Check continuity between closed throttle position switch terminals 5 and 6.

**Continuity should not exist while closing the throttle position sensor.**

OK or NG

- OK >> GO TO 23.
- NG >> GO TO 22.

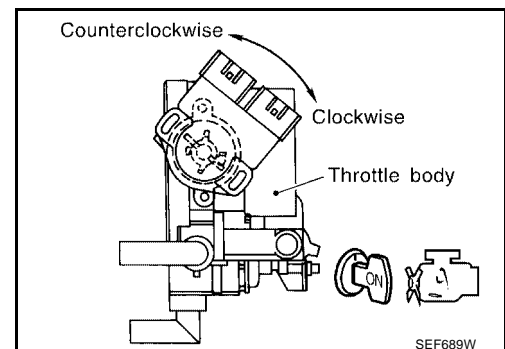


**22. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III**

⊗ Without CONSULT-II

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

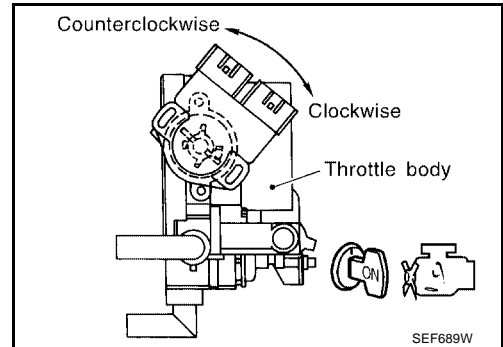
>> GO TO 23.



**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**

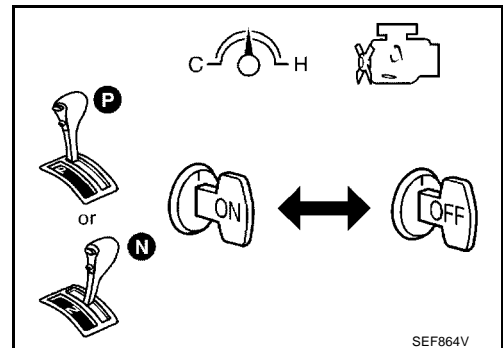
⊗ Without CONSULT-II

**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, 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.

**750±50 rpm (in "P" or "N" position)**

OK or NG

OK >> GO TO 27.

NG >> 1. Adjust idle speed. Refer to "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment", [EC-607](#).  
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-634, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#) and [AT-187, "HOW TO ERASE DTC"](#).

>> INSPECTION END.

# TROUBLE DIAGNOSIS

[VG33E]

UBS00716

## Symptom Matrix Chart 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                |                                       | A<br>A                           | A<br>B       | A<br>C                       | A<br>D                 | A<br>E                          | AF                 | A<br>G             | AH               | AJ                     | A<br>K                           | AL                         | A<br>M                    | H<br>A                      |   |
| Fuel                                 | Fuel pump circuit                     | 1                                | 1            | 2                            | 3                      | 2                               |                    | 3<br>2             | 2                |                        |                                  | 3                          |                           | 1                           | <a href="#">EC-1154</a>                 |
|                                      | Injector circuit                      |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                             | <a href="#">EC-1145</a>                 |
|                                      | Fuel pressure regulator system        |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                             | <a href="#">EC-620</a>                  |
|                                      | Evaporative emission system           | 4                                | 4            | 4                            | 4                      | 4                               | 4                  | 4                  | 3                | 3                      |                                  | 4                          |                           |                             | <a href="#">EC-1169</a>                 |
| Air                                  | Positive crankcase ventilation system |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            | 1                         |                             | <a href="#">EC-1187</a>                 |
|                                      | Incorrect idle speed adjustment       | 3                                | 3            |                              |                        |                                 | 1                  | 1                  | 1                | 1                      |                                  | 1                          |                           |                             | <a href="#">EC-607</a>                  |
|                                      | IACV-AAC valve circuit                | 2                                | 1            | 3                            | 3                      | 3                               | 2                  | 2                  |                  |                        |                                  | 3                          |                           | 1                           | <a href="#">EC-988</a>                  |
|                                      | IACV-FICD solenoid valve circuit      |                                  | 2            |                              |                        |                                 | 3                  | 3                  | 2                | 2                      |                                  |                            |                           |                             | <a href="#">EC-1163</a>                 |
| Ignition                             | Incorrect ignition timing adjustment  | 3                                | 3            | 1                            | 1                      | 1                               |                    | 1                  | 1                |                        |                                  | 1                          |                           |                             | <a href="#">EC-607</a>                  |
|                                      | Ignition circuit                      | 1                                | 1            | 2                            | 2                      | 2                               |                    | 2                  | 2                |                        |                                  | 2                          |                           |                             | <a href="#">EC-1139</a>                 |
| EGR                                  | EGRC-solenoid valve circuit           |                                  | 2            | 2                            | 3                      | 3                               |                    |                    |                  |                        |                                  | 3                          |                           |                             | <a href="#">EC-1057</a>                 |
|                                      | EGR system                            | 2                                | 1            | 2                            | 3                      | 3                               | 3                  | 2                  | 2                | 3                      |                                  | 3                          |                           |                             | <a href="#">EC-878, EC-887, EC-1063</a> |
| Main power supply and ground circuit |                                       | 1                                | 2            | 3                            | 3                      | 3                               |                    | 3                  | 2                |                        | 1                                | 3                          |                           | 1                           | <a href="#">EC-700</a>                  |
| Air conditioner circuit              |                                       | 2                                |              |                              |                        |                                 | 3                  |                    |                  | 2                      |                                  |                            |                           |                             | <a href="#">MTC-24</a>                  |

1 - 6: The numbers refer to the order of inspection.  
(continued on next page)

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# TROUBLE DIAGNOSIS

[VG33E]

|   | SYMPTOM                          |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                             | Reference page   |
|---|----------------------------------|--------------|------------------------------|------------------------|---------------------------------|--------------------|--------------------|------------------|------------------------|---------------------------------|----------------------------|---------------------------|-----------------------------|--|
|   | HARD/NO START/RESTART (EXCP. HA) | ENGINE STALL | HESITATION/SURGING/FLAT SPOT | SPARK KNOCK/DETONATION | LACK OF POWER/POOR ACCELERATION | HIGH IDLE/LOW IDLE | ROUGH IDLE/HUNTING | IDLING VIBRATION | SLOW/NO RETURN TO IDLE | OVERHEATSWATER TEMPERATURE HIGH | EXCESSIVE FUEL CONSUMPTION | EXCESSIVE OIL CONSUMPTION | BATTERY DEAD (UNDER CHARGE) |  |
| Warranty symptom code                         | A<br>A                           | A<br>B       | A<br>C                       | A<br>D                 | A<br>E                          | AF                 | A<br>G             | AH               | AJ                     | A<br>K                          | AL                         | A<br>M                    | H<br>A                      |  |
| Camshaft position sensor circuit              | 1                                |              |                              | 2                      |                                 |                    |                    | 2                |                        |                                 |                            |                           |                             | <a href="#">EC-871</a>                                   |
| Mass air flow sensor circuit                  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                             |  |
| Heated oxygen sensor 1 circuit                |                                  | 1            | 2                            | 3                      | 2                               |                    | 2                  |                  |                        |                                 | 2                          |                           |                             | <a href="#">EC-771, EC-780, EC-793, EC-1010, EC-1017</a> |
| Engine coolant temperature sensor circuit     | 1                                | 2            | 3                            |                        | 3                               | 3                  |                    |                  | 2                      |                                 |                            | 3                         |                             | <a href="#">EC-741, EC-763</a>                           |
| Throttle position sensor circuit              |                                  | 1            | 2                            |                        | 2                               | 2                  |                    |                  |                        |                                 |                            | 2                         |                             | <a href="#">EC-746, EC-755</a>                           |
| Incorrect throttle position sensor adjustment |                                  | 3            | 1                            |                        | 1                               | 1                  | 1                  | 1                | 1                      |                                 |                            | 1                         |                             | <a href="#">EC-648</a>                                   |
| Vehicle speed sensor circuit                  |                                  | 2            |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                             | <a href="#">EC-983</a>                                   |
| Knock sensor circuit                          |                                  |              | 3                            | 3                      | 3                               |                    |                    |                  |                        |                                 |                            | 3                         |                             | <a href="#">EC-861</a>                                   |
| ECM   | 2                                | 2            |                              |                        |                                 | 3                  | 3                  | 2                | 2                      | 1                               |                            |                           |                             | <a href="#">EC-1008, EC-648</a>                          |
| Start signal circuit                          | 1                                |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                             | <a href="#">EC-1150</a>                                  |
| Park/neutral position (PNP) switch circuit    |                                  |              | 3                            |                        | 3                               |                    | 3                  | 2                |                        |                                 |                            | 3                         |                             | <a href="#">EC-1132</a>                                  |
| Power steering oil pressure switch circuit    |                                  | 2            |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                             | <a href="#">EC-1159</a>                                  |

1 - 6: The numbers refer to the order of inspection.  
(continued on next page)

# TROUBLE DIAGNOSIS

[VG33E]

## 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 |  | A<br>A                           | A<br>B       | A<br>C                       | A<br>D                 | A<br>E                          | AF                 | A<br>G             | AH               | AJ                     | A<br>K                           | AL                         | A<br>M                    | H<br>A                      |                   |
| Fuel                  | Fuel tank  | 5                                |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                             | FL-2              |
|                       | Fuel piping  |                                  |              | 5                            | 5                      | 5                               |                    | 5                  | 4                |                        |                                  | 5                          |                           |                             |                   |
|                       | Vapor lock   |                                  | 5            |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                             |                   |
|                       | Valve deposit  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                             |                   |
|                       | Poor fuel (Heavy weight gasoline, Low octane)                    | 5                                |              | 5                            | 5                      | 5                               |                    | 5                  | 4                |                        |                                  | 5                          |                           |                             |                   |
| Air                   | Air duct   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                             | —                 |
|                       | Air cleaner  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                             |                   |
|                       | Air leakage from air duct (Mass air flow sensor — throttle body) |                                  | 5            | 5                            | 5                      | 5                               |                    | 5                  | 4                |                        |                                  | 5                          |                           |                             |                   |
|                       | Throttle body, Throttle wire                                     | 5                                |              |                              |                        |                                 | 5                  |                    |                  | 4                      |                                  |                            |                           |                             | EM-80             |
|                       | Air leakage from intake manifold/Collector/Gasket                |                                  |              |                              | 5                      |                                 |                    |                    |                  |                        |                                  |                            |                           |                             | —                 |
| Cranking              | Battery  |                                  | 1            | 1                            |                        | 1                               |                    | 1                  | 1                |                        |                                  | 1                          |                           | 1                           | SC-4              |
|                       | Generator circuit  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                             | SC-26             |
|                       | Starter circuit  | 1                                |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                             | SC-9              |
|                       | Park/neutral position (PNP) switch                               |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                             | AT-249, MT-9      |
|                       | Drive plate/Flywheel   | 6                                |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                             | EM-80             |

1 - 6: The numbers refer to the order of inspection.  
(continued on next page)

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# TROUBLE DIAGNOSIS

[VG33E]

|                       |  | 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 | OVERHEAT/WATER TEMPERATURE HIGH | EXCESSIVE FUEL CONSUMPTION | EXCESSIVE OIL CONSUMPTION |                   | BATTERY DEAD (UNDER CHARGE)   |  |
| Warranty symptom code |  | A<br>A                           | A<br>B       | A<br>C                       | A<br>D                 | A<br>E                          | AF                 | A<br>G             | AH               | AJ                     | A<br>K                          | AL                         | A<br>M                    | H<br>A            |   |  |
| Engine                | Cylinder head  | 5                                | 5            | 5                            | 5                      | 5                               |                    | 5                  | 5                |                        |                                 | 5                          |                           |                   | <a href="#">EM-102</a>  |  |
|                       | Cylinder head gasket                                 |                                  |              |                              |                        |                                 |                    |                    |                  |                        | 2                               | 5                          | 2                         |                   |   |  |
|                       | Cylinder block                                       |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                   |   | <a href="#">EM-131</a> , <a href="#">EM-91</a> |
|                       | Piston   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            | 3                         |                   |   |  |
|                       | Piston ring  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                   |   |  |
|                       | Connecting rod                                       | 6                                | 6            | 6                            | 6                      | 6                               |                    | 6                  | 6                |                        |                                 | 6                          |                           |                   |   |  |
|                       | Bearing  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                   |   |  |
|                       | Crankshaft   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                   |   |  |
| Valve mechanism       | Timing chain   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                   | <a href="#">EX-3</a>  |  |
|                       | Camshaft   | 6                                | 6            | 6                            | 6                      | 6                               |                    | 6                  | 6                |                        |                                 | 6                          |                           |                   |   |  |
|                       | Intake valve   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            | 2                         |                   |   |  |
|                       | Exhaust valve  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                   |   |  |
|                       | Hydraulic lash adjuster                              |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                   |   |  |
| Exhaust               | Exhaust manifold/Tube/Muffler/Gasket                 | 6                                | 6            | 6                            | 6                      | 6                               |                    | 6                  | 6                |                        |                                 | 6                          |                           |                   | <a href="#">EM-88</a> , <a href="#">LU-14</a> , <a href="#">LU-16</a>   |  |
|                       | Three way catalyst                                   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                   |   |  |
| Lubrication           | Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery | 6                                | 6            | 6                            | 6                      | 6                               |                    | 6                  | 6                |                        |                                 | 6                          | 2                         |                   | <a href="#">MA-30</a>   |  |
|                       | Oil level (Low/Filthy) oil                           |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                   |   |  |
| Cooling               | Radiator/Hose/Radiator filler cap                    |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                   | <a href="#">CO-22</a> , <a href="#">CO-25</a> , <a href="#">CO-28</a> , <a href="#">CO-32</a> , <a href="#">CO-30</a> |  |
|                       | Thermostat   |                                  |              |                              |                        |                                 | 5                  |                    |                  |                        | 5                               |                            |                           |                   |   |  |
|                       | Water pump   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                   |   |  |
|                       | Water gallery  | 6                                | 6            | 6                            | 6                      | 6                               |                    | 6                  | 6                |                        | 2                               | 6                          |                           |                   |   |  |
|                       | Cooling fan  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            | 5                         |                   |   |  |
|                       | Coolant level (low)/Contaminated coolant             |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                   |   | <a href="#">MA-26</a>                          |

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



## Engine Control Component Parts Location

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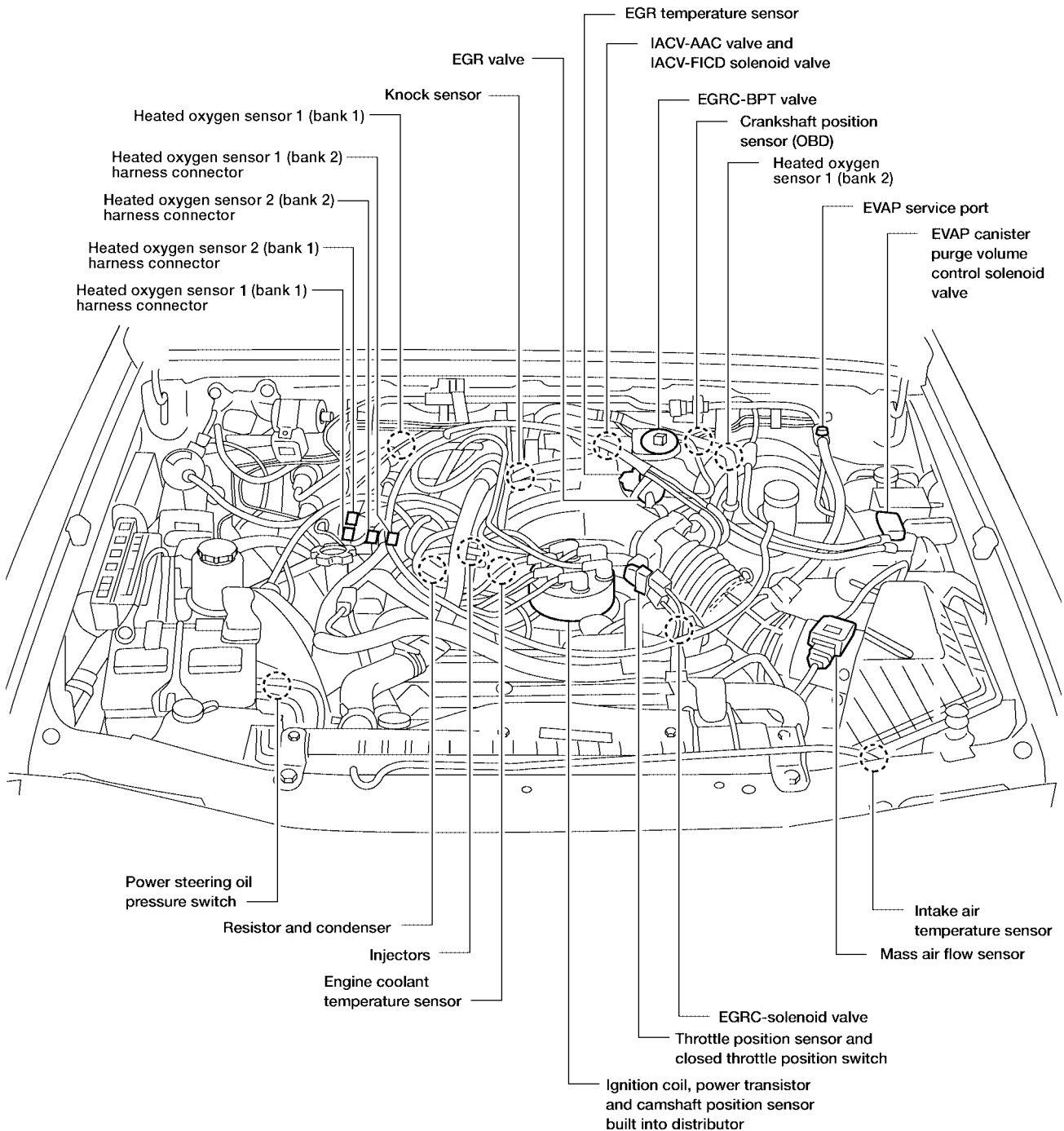
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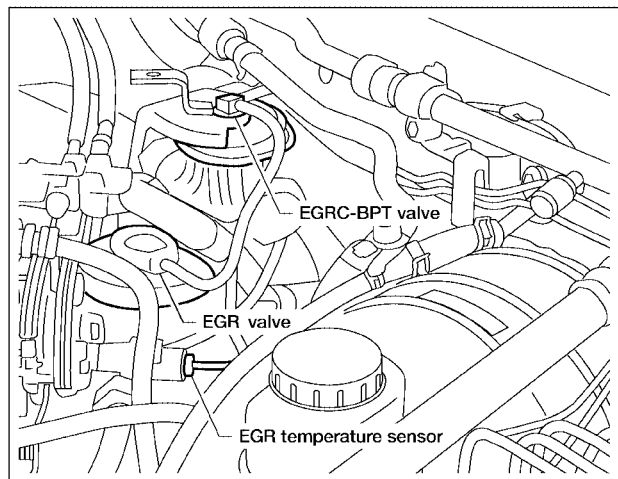
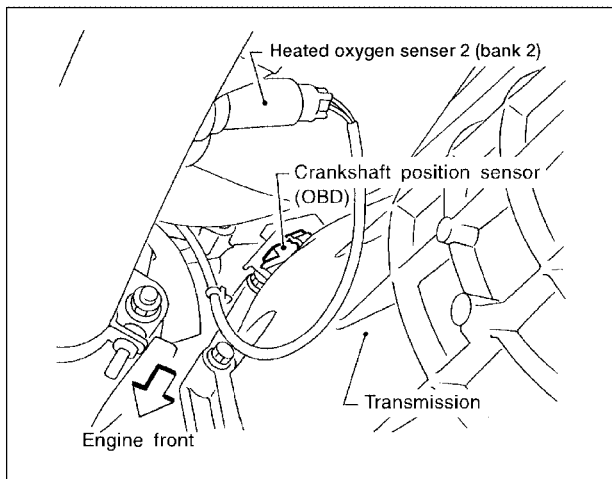
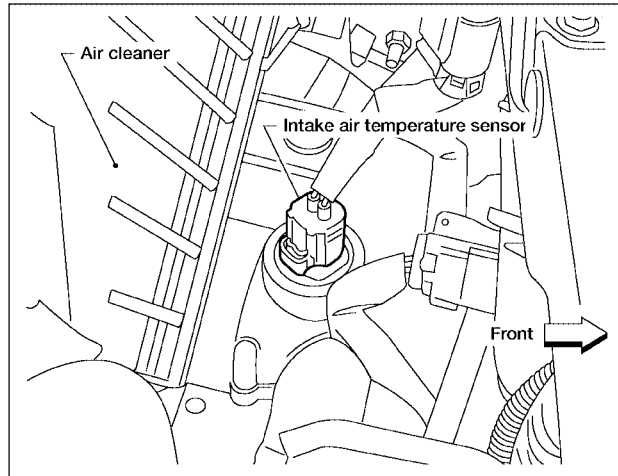
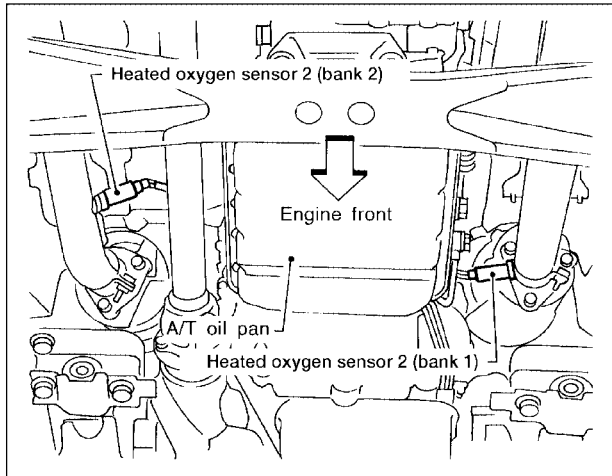
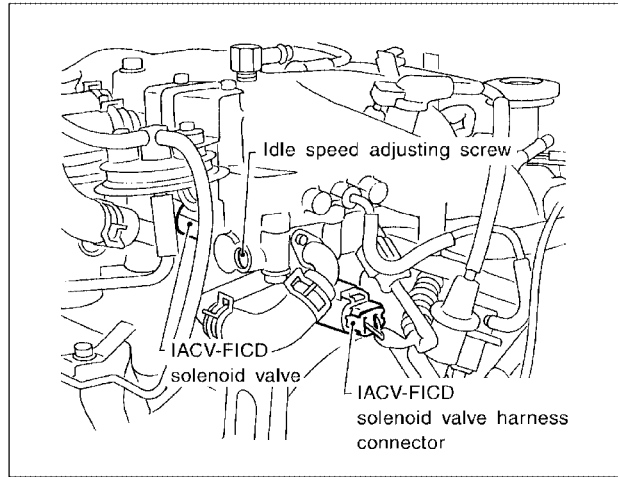
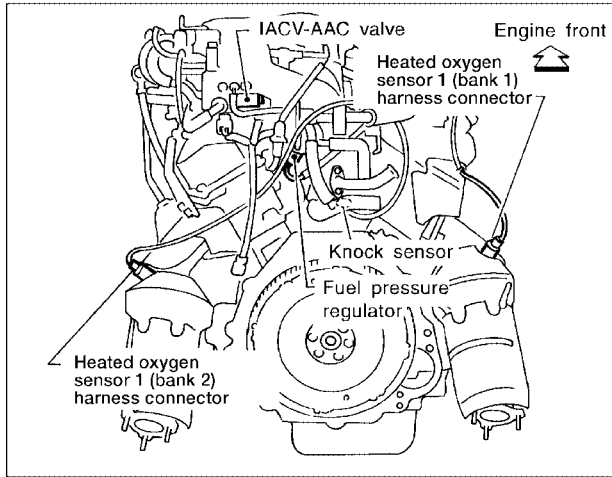
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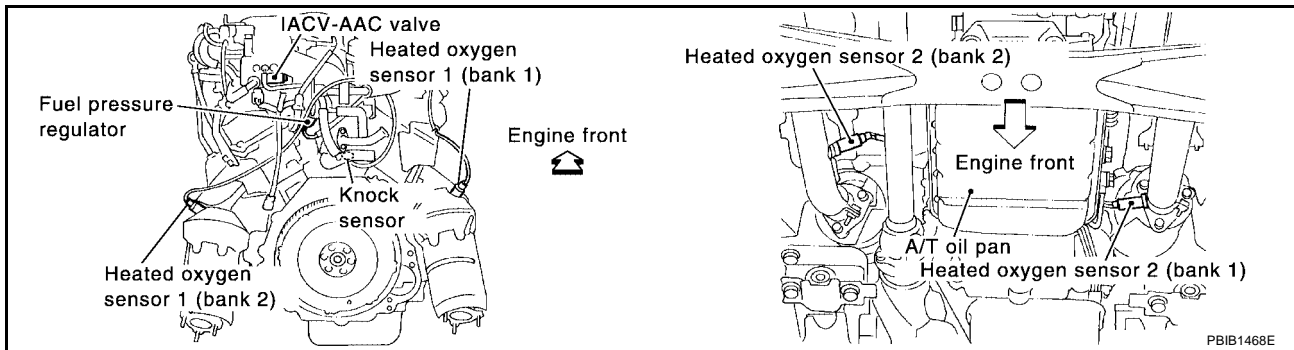
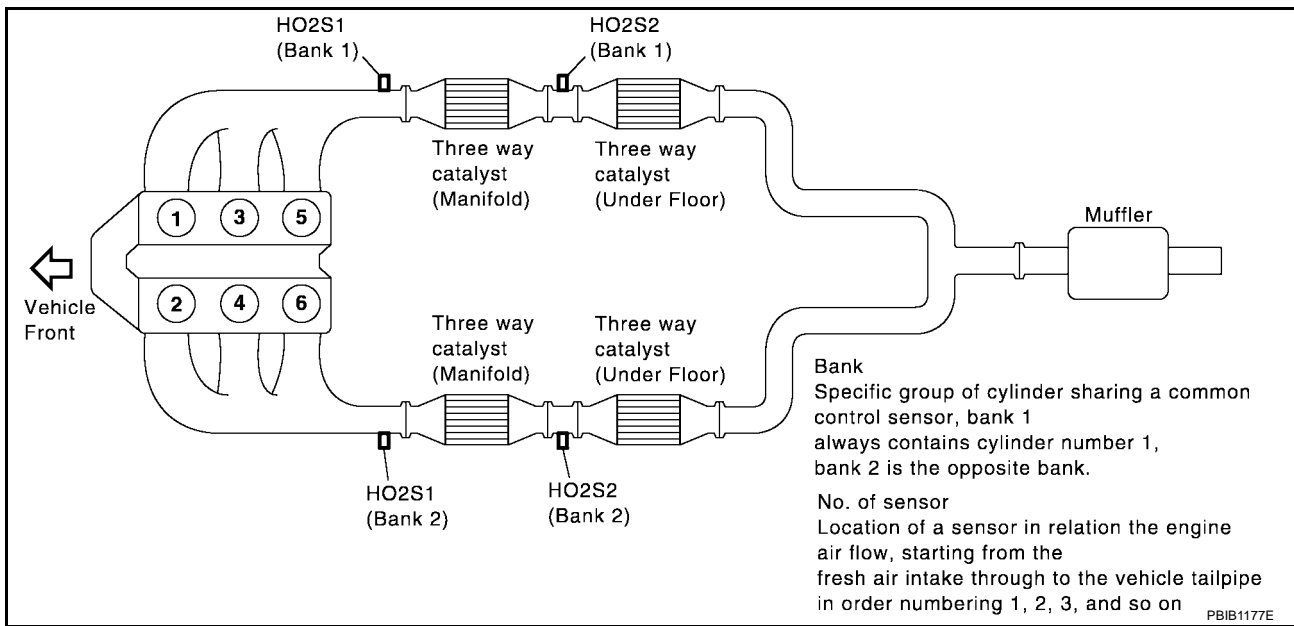
M





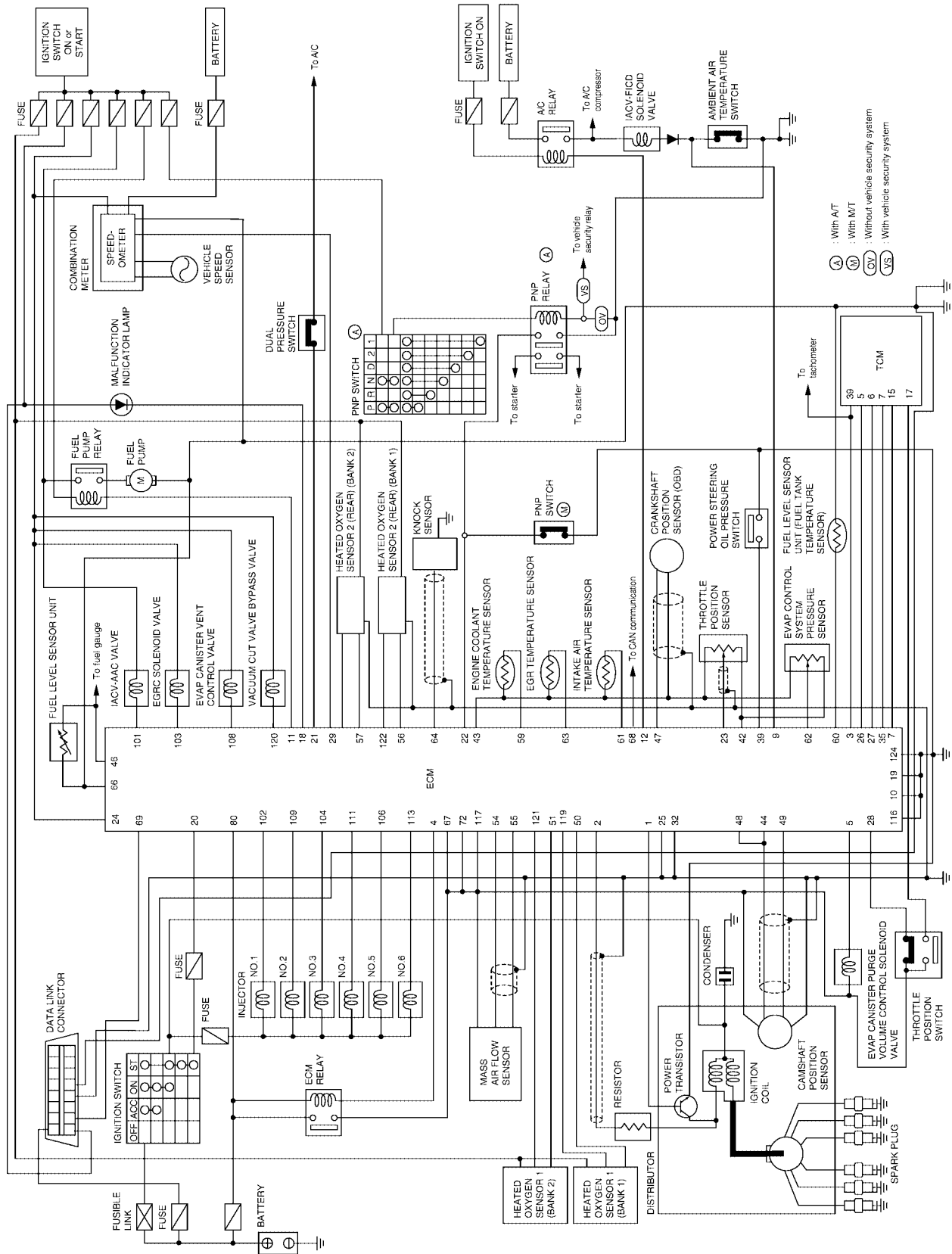
# TROUBLE DIAGNOSIS

[VG33E]



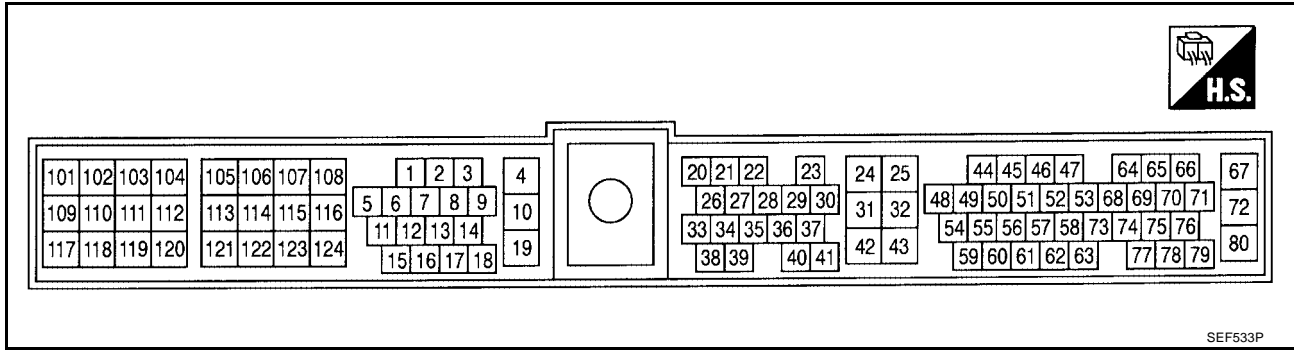
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## Circuit Diagram



## ECM Harness Connector Terminal Layout

UBS00719

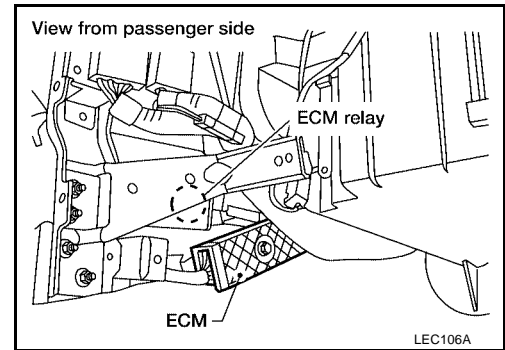


## ECM Terminals and Reference Value

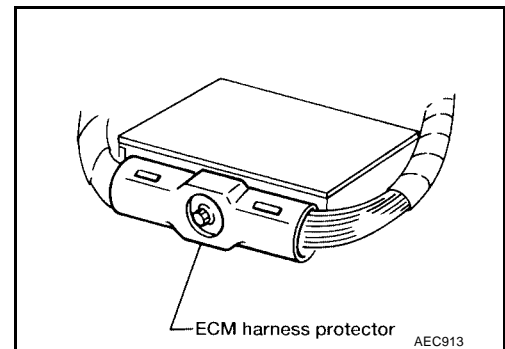
### PREPARATION

UBS0071A

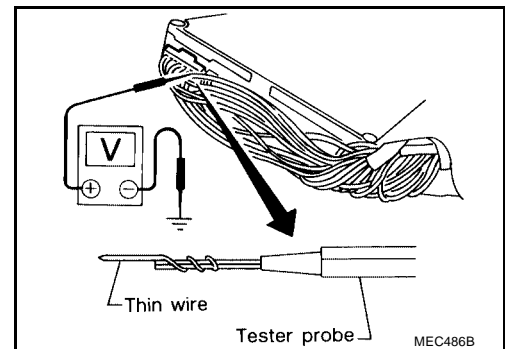
1. ECM is located behind the instrument lower cover. For this inspection:
  - Remove instrument lower cover.



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



## ECM INSPECTION TABLE

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

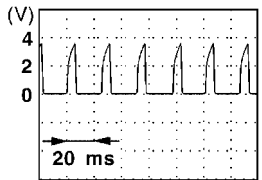
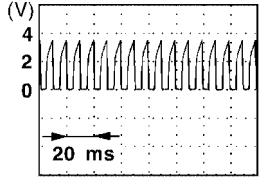
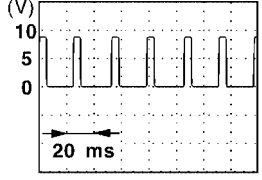
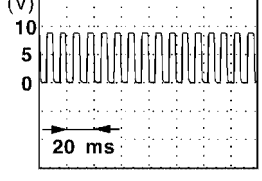
**CAUTION:**

**Do not use 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.**

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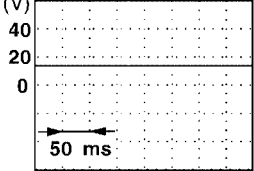
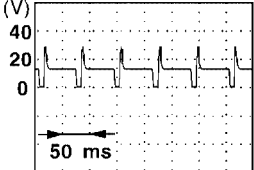
# TROUBLE DIAGNOSIS

[VG33E]

| TER-MINAL NO. | WIRE COLOR | ITEM                      | CONDITION  | DATA (DC Voltage)  |
|---------------|------------|---------------------------|--|--|
| 1             | PU/W       | Ignition signal           | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>   | <p>Approximately 0.7V★</p>  <p style="text-align: right; font-size: small;">SEF988U</p> |
|               |            |                           | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>  | <p>1.1 - 1.5V★</p>  <p style="text-align: right; font-size: small;">SEF989U</p>         |
| 3             | P/L        | Tachometer                | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>  | <p>1 - 2V★</p>  <p style="text-align: right; font-size: small;">SEF992U</p>             |
|               |            |                           | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>  | <p>3 - 5V★</p>  <p style="text-align: right; font-size: small;">SEF993U</p>           |
| 4             | OR/B       | ECM relay (Self shut-off) | <p><b>[Engine is running]</b><br/><b>[Ignition switch OFF]</b></p> <ul style="list-style-type: none"> <li>● For a few seconds after turning ignition switch OFF</li> </ul> | 0 - 1.5V   |
|               |            |                           | <p><b>[Ignition switch OFF]</b></p> <ul style="list-style-type: none"> <li>● A few seconds passed after turning ignition switch OFF</li> </ul>                             | BATTERY VOLTAGE<br>(11 - 14V)  |

# TROUBLE DIAGNOSIS

[VG33E]

| TER-MINAL NO. | WIRE COLOR | ITEM  | CONDITION  | DATA (DC Voltage)   |
|---------------|------------|---|--|---|
| 5             | R/Y        | EVAP canister purge volume control solenoid valve | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> </ul>   | BATTERY VOLTAGE<br>(11 - 14V)★<br>(V) <br><small>SEF994U</small> |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm (More than 100 seconds after starting engine)</li> </ul>  | BATTERY VOLTAGE<br>(11 - 14V)★<br>(V) <br><small>SEF995U</small> |
| 6             | G/W        | SCB valve control solenoid valve                  | <b>[Ignition switch ON]</b><br><ul style="list-style-type: none"> <li>● Engine stopped</li> </ul>  | BATTERY VOLTAGE (11 - 14V)  |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> </ul>   | Approximately 0V  |
| 7             | Y/G        | A/T check signal                                  | <b>[Ignition switch ON]</b><br><b>[Engine is running]</b>  | 0 - 3.0V  |
| 9             | B/Y        | Ambient air temperature switch                    | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> <li>● Ambient air temperature is above 25°C (77°F)</li> <li>● Air conditioner is operating</li> </ul>     | 0V  |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> <li>● Ambient air temperature is below 19°C (66°F)</li> <li>● Air conditioner is operating</li> </ul>     | BATTERY VOLTAGE (11 - 14V)  |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> <li>● Ambient air temperature is below 19°C (66°F)</li> <li>● Air conditioner is not operating</li> </ul> | Approximately 5V  |
| 10            | B/R        | ECM ground  | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> </ul>   | Engine ground   |
| 11            | W/R        | Fuel pump relay                                   | <b>[Ignition switch ON]</b><br><ul style="list-style-type: none"> <li>● For 5 seconds after turning ignition switch ON</li> </ul>  | 0 - 1V  |
|               |            |   | <b>[Engine is running]</b><br><b>[Ignition switch ON]</b><br><ul style="list-style-type: none"> <li>● More than 5 seconds after turning ignition switch ON</li> </ul>                            | BATTERY VOLTAGE (11 - 14V)  |
| 12            | P          | Air conditioner relay                             | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Both A/C switch and blower switch are ON*</li> </ul>  | 0 - 1V  |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● A/C switch is OFF</li> </ul>  | BATTERY VOLTAGE (11 - 14V)  |

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# TROUBLE DIAGNOSIS

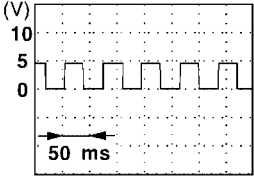
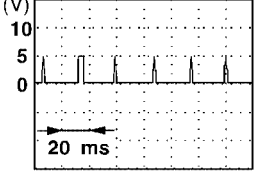
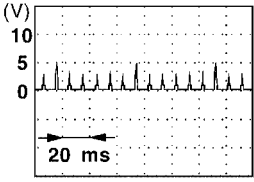
[VG33E]

| TER-MINAL NO. | WIRE COLOR | ITEM                                       | CONDITION   | DATA (DC Voltage)          |
|---------------|------------|--|---|----------------------------|
| 18            | R/W        | Malfunction indicator lamp                 | [Ignition switch ON]  | 0 - 1V                     |
|               |            |  | [Engine is running]<br>● Idle speed   | BATTERY VOLTAGE (11 - 14V) |
| 19            | B/R        | ECM ground                                 | [Engine is running]<br>● 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]<br>● Both A/C switch and blower switch are ON (Compressor operates)*  | Approximately 0V           |
|               |            |  | [Engine is running]<br>● A/C switch is OFF  | BATTERY VOLTAGE (11 - 14V) |
| 22            | L/B        | Park/neutral position (PNP) switch         | [Ignition switch ON]<br>● Gear position is "N" or "P"   | Approximately 0V           |
|               |            |  | [Ignition switch ON]<br>● Except the above gear position  | Approximately 5V           |
| 23            | L          | Throttle position sensor                   | [Engine is running]<br>● Warm-up condition<br>● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.<br>● Accelerator pedal fully released | 0.15 - 0.85V               |
|               |            |  | [Ignition switch ON]<br>● Engine stopped<br>● Accelerator pedal 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]<br>● Idle speed   | Engine ground              |
| 26            | PU/W       | A/T signal No. 1                           | [Engine is running]<br>● Idle speed   | Approximately 0 - 1.0V     |
| 27            | P/B        | A/T signal No. 2                           | [Engine is running]<br>● Idle speed   | Approximately 0 - 1.0V     |
| 28            | BR/W       | Throttle position switch (Closed position) | [Engine is running]<br>● Warm-up condition<br>● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.<br>● Accelerator pedal fully released | BATTERY VOLTAGE (11 - 14V) |
|               |            |  | [Ignition switch ON]<br>● Engine stopped<br>● Accelerator pedal depressed   | Approximately 0V           |



# TROUBLE DIAGNOSIS

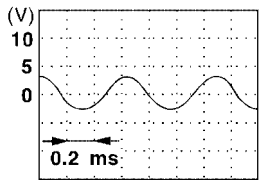
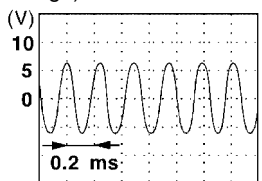
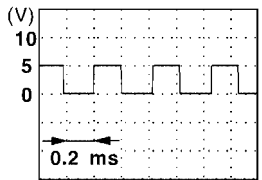
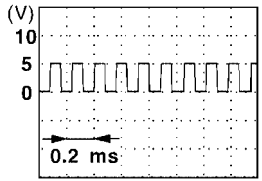
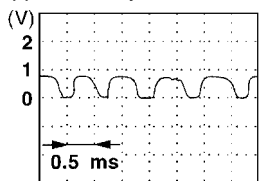
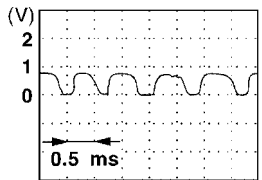
[VG33E]

| TER-MINAL NO. | WIRE COLOR | ITEM  | CONDITION  | DATA (DC Voltage)  |
|---------------|------------|---|--|--|
| 29            | G/B        | Vehicle speed sensor                        | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Lift up the vehicle.</li> <li>● In 2nd gear position</li> <li>● Vehicle speed is 40 km/h (25 MPH)</li> </ul> | 2 - 3V★<br>       |
| 32            | B/Y        | ECM ground                                  | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>  | Engine ground  |
| 35            | G/R        | A/T signal No. 3                            | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>  | Approximately 0 - 1.0V   |
| 39            | GY/R       | Power steering oil pressure switch          | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Steering wheel is being turned</li> </ul>  | Approximately 0V   |
|               |            |   | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Steering wheel is not being turned</li> </ul>  | Approximately 5V   |
| 42            | B/W        | Sensors' power supply                       | <b>[Ignition switch ON]</b>  | Approximately 5V   |
| 43            | BR         | Sensors' ground                             | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>   | Approximately 0V   |
| 44            | PU         | Camshaft position sensor (Reference signal) | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>  | 0.3 - 0.5V★<br> |
|               |            |   | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>   | 0.3 - 0.5V★<br> |
| 46            | G          | Fuel level sensor                           | <b>[Ignition switch ON]</b>  | Approximately 0 - 4.8V<br>Output voltage varies with fuel level.                                     |

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# TROUBLE DIAGNOSIS

[VG33E]

| TER-MINAL NO. | WIRE COLOR | ITEM                                       | CONDITION  | DATA (DC Voltage)  |
|---------------|------------|--|--|--|
| 47            | L          | Crankshaft position sensor (OBD)           | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>                | <p>1 - 2V★<br/>(AC range)</p>  <p style="text-align: right; font-size: small;">SEF690W</p>    |
|               |            |  | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>                              | <p>3 - 4V★<br/>(AC range)</p>  <p style="text-align: right; font-size: small;">SEF691W</p>    |
| 49            | LG         | Camshaft position sensor (Position signal) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>                | <p>Approximately 2.5V★</p>  <p style="text-align: right; font-size: small;">SEF999U</p>      |
|               |            |  | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>                              | <p>Approximately 2.5V★</p>  <p style="text-align: right; font-size: small;">SEF001V</p>     |
| 50            | B          | Heated oxygen sensor 1 (bank 1)            | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>0 - Approximately 1.0V★</p>  <p style="text-align: right; font-size: small;">SEF002V</p> |
| 51            | G          | Heated oxygen sensor 1 (bank 2)            | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>0 - Approximately 1.0V★</p>  <p style="text-align: right; font-size: small;">SEF002V</p> |

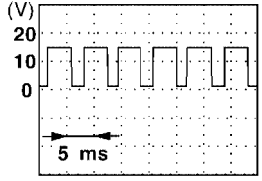
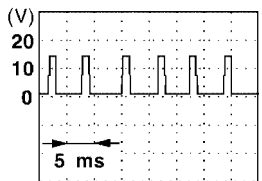
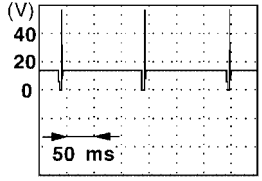
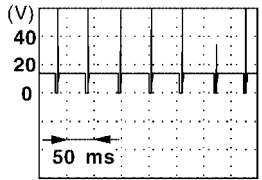
# TROUBLE DIAGNOSIS

[VG33E]

| TER-MINAL NO. | WIRE COLOR | ITEM                                | CONDITION  | DATA (DC Voltage)   | A  |
|---------------|------------|-------------------------------------|--|---|----|
| 54            | R          | Mass air flow sensor                | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>   | 1.0 - 1.7V  | EC |
|               |            |                                     | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,500 rpm</li> </ul>  | 1.7 - 2.3V  | C  |
| 55            | G          | Mass air flow sensor ground         | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>   | Approximately 0V  | D  |
| 56            | OR         | Heated oxygen sensor 2 (bank 1)     | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine after warming up.</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V  | E  |
| 57            | Y          | Heated oxygen sensor 2 (bank 2)     | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine after warming up.</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V  | F  |
| 59            | LG/R       | Engine coolant temperature sensor   | <b>[Engine is running]</b>   | Approximately 0 - 4.8V<br>Output voltage varies with engine coolant temperature | G  |
| 60            | Y/B        | Fuel tank temperature sensor        | <b>[Engine is running]</b>   | Approximately 0 - 4.8V<br>Output voltage varies with fuel temperature           | H  |
| 61            | PU/R       | Intake air temperature sensor       | <b>[Engine is running]</b>   | Approximately 0 - 4.8V<br>Output voltage varies with intake air temperature.    | I  |
| 62            | Y          | EVAP control system pressure sensor | <b>[Ignition switch ON]</b>  | 1.8 - 4.8V  | J  |
| 63            | G/OR       | EGR temperature sensor              | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>   | Less than 4.5V  | K  |
|               |            |                                     | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● EGR system is operating</li> </ul>  | 0 - 1.5V  | L  |
| 64            | W          | Knock sensor                        | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>  | Approximately 2.5V  | M  |
| 66            | B          | Fuel level sensor ground            | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>  | Approximately 0V  |    |
| 67            | B/P        | Power supply for ECM                | <b>[Ignition switch ON]</b>  | BATTERY VOLTAGE (11 - 14V)  |    |
| 68            | W/G        | A/T signal                          | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>  | Approximately 0 - 5.0V  |    |
| 69            | LG/R       | Data link connector                 | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed (CONSULT-II or GST is disconnected)</li> </ul>  | 6 - 10V   |    |

# TROUBLE DIAGNOSIS

[VG33E]

| TER-MINAL NO.                          | WIRE COLOR                            | ITEM   | CONDITION   | DATA (DC Voltage)   |
|--|---------------------------------------|--|---|---|
| 72                                     | B/P                                   | Power supply for ECM   | [Ignition switch ON]  | BATTERY VOLTAGE<br>(11 - 14V)   |
| 80                                     | SB                                    | Power supply (Back-up)   | [Ignition switch OFF]   | BATTERY VOLTAGE<br>(11 - 14V)   |
| 101                                    | OR/L                                  | IACV-AAC valve   | [Engine is running]<br>● Warm-up condition<br>● Idle speed                                    | 8 - 11V★<br><br><small>SEF005V</small>                         |
|  |                                       |  | [Engine is running]<br>● Warm-up condition<br>● Engine speed is 3,000 rpm                     | 7 - 10V★<br><br><small>SEF692W</small>                         |
| 102<br>104<br>106<br>109<br>111<br>113 | W/B<br>W/R<br>W/G<br>W/L<br>W/PU<br>W | Injector No. 1<br>Injector No. 3<br>Injector No. 5<br>Injector No. 2<br>Injector No. 4<br>Injector No. 6 | [Engine is running]<br>● Warm-up condition<br>● Idle speed                                    | BATTERY VOLTAGE<br>(11 - 14V)★<br><br><small>SEF007V</small>  |
|  |                                       |  | [Engine is running]<br>● Warm-up condition<br>● Engine speed is 2,000 rpm                     | BATTERY VOLTAGE<br>(11 - 14V)★<br><br><small>SEF008V</small> |
| 103                                    | G/W                                   | EGRC-solenoid valve  | [Engine is running]<br>● Warm-up condition<br>● Idle speed                                    | BATTERY VOLTAGE<br>(11 - 14V)   |
|  |                                       |  | [Engine is running]<br>● Warm-up condition<br>● Revving engine from idle to 3,000 rpm quickly | 0 - 1V  |
| 108                                    | R/G                                   | EVAP canister vent control valve   | [Ignition switch ON]  | BATTERY VOLTAGE<br>(11 - 14V)   |
| 116                                    | B/R                                   | ECM ground   | [Engine is running]<br>● Idle speed   | Engine ground   |
| 117                                    | B/P                                   | Current return   | [Engine is running]<br>● Idle speed   | BATTERY VOLTAGE<br>(11 - 14V)   |

# TROUBLE DIAGNOSIS

[VG33E]

| TER-MINAL NO. | WIRE COLOR | ITEM                                   | CONDITION  | DATA (DC Voltage)          |    |
|---------------|------------|--|--|----------------------------|----|
| 119           | BR/Y       | Heated oxygen sensor 1 heater (bank 1) | <b>[Engine is running]</b><br>● Engine speed is below 2,800 rpm  | Approximately 0.4V         | EC |
|               |            |  | <b>[Engine is running]</b><br>● Engine speed is above 2,800 rpm  | BATTERY VOLTAGE (11 - 14V) |    |
| 120           | P/B        | Vacuum cut valve bypass valve          | <b>[Ignition switch ON]</b>  | BATTERY VOLTAGE (11 - 14V) | C  |
| 121           | BR         | Heated oxygen sensor 1 heater (bank 2) | <b>[Engine is running]</b><br>● Engine speed is below 2,800 rpm  | Approximately 0.4V         | D  |
|               |            |  | <b>[Engine is running]</b><br>● Engine speed is above 2,800 rpm  | BATTERY VOLTAGE (11 - 14V) |    |
| 122           | R/B        | Heated oxygen sensor 2 heater (bank 1) | <b>[Engine is running]</b><br>● Engine speed is below 3,600 rpm after the following conditions are met.<br>– Engine: After warming up<br>– Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load. | 0 - 1.0V                   | F  |
|               |            |  | <b>[Ignition switch ON]</b><br>● Engine stopped<br><b>[Engine is running]</b><br>● Engine speed is above 3,600 rpm   | BATTERY VOLTAGE (11 - 14V) |    |
| 123           | R/Y        | Heated oxygen sensor 2 heater (bank 2) | <b>[Engine is running]</b><br>● Engine speed is below 3,600 rpm after the following conditions are met.<br>– Engine: After warming up<br>– Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load. | 0 - 1.0V                   | I  |
|               |            |  | <b>[Ignition switch ON]</b><br>● Engine stopped<br><b>[Engine is running]</b><br>● Engine speed is above 3,600 rpm   | BATTERY VOLTAGE (11 - 14V) |    |
| 124           | B/R        | ECM ground                             | <b>[Engine is running]</b><br>● Idle speed   | Engine ground              | M  |

\*: 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 FUNCTION

UBS0071B

| Diagnostic test mode    | Function   |
|-------------------------|--|
| Work support            | This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.    |
| Self-diagnostic results | Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*1 |
| Data monitor            | Input/Output data in the ECM can be read.  |
| Data monitor (SPEC)     | Input/Output 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 confirmation        | The status of system monitoring tests and the self-diagnosis status/result can be confirmed.   |

# TROUBLE DIAGNOSIS

[VG33E]

| Diagnostic test mode | Function  |
|----------------------|---|
| 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.  |

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

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

## ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

| Item                                    |   | DIAGNOSTIC TEST MODE |                          |                     |               |                      |             |                         |                   |
|---|---|----------------------|--------------------------|---------------------|---------------|----------------------|-------------|-------------------------|-------------------|
|   |   | WORK SUP-PORT        | SELF-DIAGNOS-TIC RESULTS |                     | DATA MONI-TOR | DATA MONI-TOR (SPEC) | ACTIVE TEST | DTC & SRT CON-FIRMATION |                   |
|   |   |                      | DTC*1                    | FREEZE FRAME DATA*2 |               |                      |             | SRT STA-TUS             | DTC WORK SUP-PORT |
| ENGINE CONTROL COMPONENT PARTS<br>INPUT | Camshaft position sensor  |                      | X                        | X                   | X             | X                    |             |                         |                   |
|   | Mass air flow sensor  |                      | X                        |                     | X             | X                    |             |                         |                   |
|   | Engine coolant temperature sensor                                 |                      | X                        | X                   | X             | X                    | X           |                         |                   |
|   | Heated oxygen sensor 1  |                      | X                        |                     | X             | X                    |             | X                       | X                 |
|   | Heated oxygen sensor 2  |                      | X                        |                     | X             | X                    |             | X                       | X                 |
|   | Vehicle speed sensor  |                      | X                        | X                   | X             | X                    |             |                         |                   |
|   | Throttle position sensor  | X                    | X                        |                     | X             | X                    |             |                         |                   |
|   | Fuel tank temperature sensor                                      |                      | X                        |                     | X             | X                    | X           |                         |                   |
|   | EVAP control system pressure sensor                               |                      | X                        |                     | X             | X                    |             |                         |                   |
|   | EGR temperature sensor  |                      | X                        |                     | X             | X                    |             |                         |                   |
|   | Intake air temperature sensor                                     |                      | X                        |                     | X             | X                    |             |                         |                   |
|   | Crankshaft position sensor (OBD)                                  |                      | X                        |                     |               |                      |             |                         |                   |
|   | Knock sensor  |                      | X                        |                     |               |                      |             |                         |                   |
|   | Ignition switch (start signal)                                    |                      |                          |                     | X             | X                    |             |                         |                   |
|   | Closed throttle position switch                                   |                      | X                        |                     | X             | X                    |             |                         |                   |
|   | Closed throttle position switch (throttle position sensor signal) |                      |                          |                     | X             | X                    |             |                         |                   |
|   | Air conditioner switch  |                      |                          |                     | X             | X                    |             |                         |                   |
|   | Park/neutral position (PNP) switch                                |                      | X                        |                     | X             | X                    |             |                         |                   |
|   | Power steering oil pressure switch                                |                      |                          |                     | X             | X                    |             |                         |                   |
|   | Battery voltage   |                      |                          |                     | X             | X                    |             |                         |                   |
| Ambient air temperature switch          |   |                      |                          | X                   | X             |                      |             |                         |                   |

# TROUBLE DIAGNOSIS

[VG33E]

| Item                           |   | DIAGNOSTIC TEST MODE |                          |                     |               |                      |             |                         |                   |
|--------------------------------|---|----------------------|--------------------------|---------------------|---------------|----------------------|-------------|-------------------------|-------------------|
|                                |   | WORK SUP-PORT        | SELF-DIAGNOS-TIC RESULTS |                     | DATA MONI-TOR | DATA MONI-TOR (SPEC) | ACTIVE TEST | DTC & SRT CON-FIRMATION |                   |
|                                |   |                      | DTC*1                    | FREEZE FRAME DATA*2 |               |                      |             | SRT STA-TUS             | DTC WORK SUP-PORT |
| ENGINE CONTROL COMPONENT PARTS | OUTPUT  | Injectors            |                          |                     | X             | X                    | X           |                         |                   |
|                                | Power transistor (Ignition timing)                | X                    |                          |                     | X             | X                    | X           |                         |                   |
|                                | IACV-AAC valve                                    | X                    | X                        |                     | X             | X                    | X           |                         |                   |
|                                | EVAP canister purge volume control solenoid valve |                      | X                        |                     | X             | X                    | X           |                         | X                 |
|                                | Air conditioner relay                             |                      |                          |                     | X             | X                    |             |                         |                   |
|                                | Fuel pump relay                                   | X                    |                          |                     | X             | X                    | X           |                         |                   |
|                                | EGRC-solenoid valve                               |                      | X                        |                     | X             | X                    | X           |                         |                   |
|                                | Heated oxygen sensor 1 heater                     |                      | X                        |                     | X             | X                    |             | X                       |                   |
|                                | Heated oxygen sensor 2 heater                     |                      | X                        |                     | X             | X                    |             | X                       |                   |
|                                | EVAP canister vent control valve                  | ×                    | X                        |                     | X             | X                    | X           |                         |                   |
|                                | Vacuum cut valve bypass valve                     | ×                    | X                        |                     | X             | X                    | X           |                         | X                 |
|                                | Calculated load value                             |                      |                          | X                   | X             | X                    |             |                         |                   |

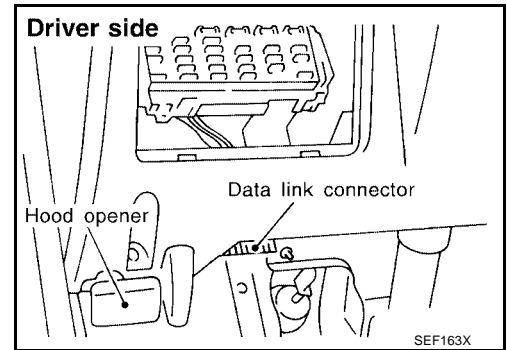
X: Applicable

\*1: This item includes 1st trip DTCs.

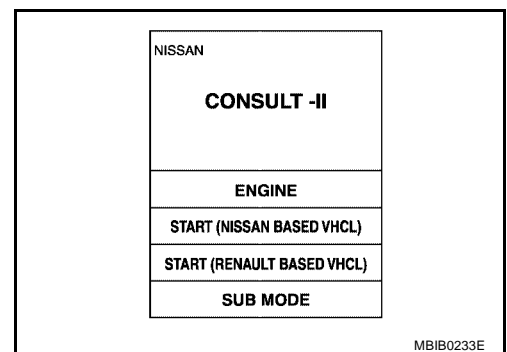
\*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to [EC-681, "Freeze Frame Data and 1st Trip Freeze Frame Data"](#).

## CONSULT-II 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.



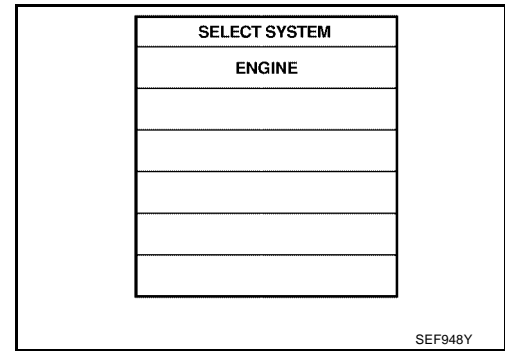
3. Turn ignition switch ON.
4. Touch "START (NISSAN BASED VHCL)".



# TROUBLE DIAGNOSIS

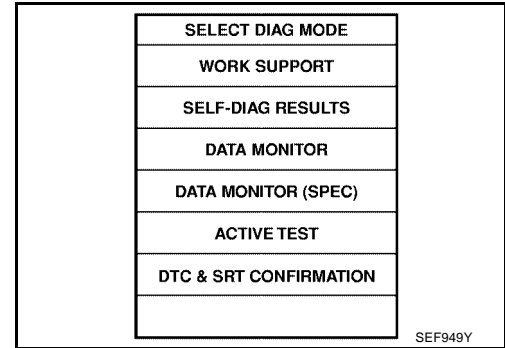
[VG33E]

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 | <ul style="list-style-type: none"> <li>FOLLOW THE BASIC INSPECTION INSTRUCTION IN THE SERVICE MANUAL.</li> </ul>   | When adjusting the idle throttle position   |
| IGNITION TIMING ADJ        | <ul style="list-style-type: none"> <li>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.</li> </ul> | When adjusting target ignition timing<br>After adjustment, confirm target ignition timing with a timing light by turning the distributor. |
| FUEL PRESSURE RELEASE      | <ul style="list-style-type: none"> <li>FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.</li> </ul>  | When releasing fuel pressure from fuel line   |
| SELF-LEARNING CONT         | <ul style="list-style-type: none"> <li>THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.</li> </ul>  | When clean the coefficient of self-learning control valve   |



# TROUBLE DIAGNOSIS

[VG33E]

| WORK ITEM            | CONDITION  | USAGE   |
|----------------------|--|---|
| EVAP SYSTEM CLOSE    | <p>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.</p> <ul style="list-style-type: none"> <li>● IGN SW ON</li> <li>● ENGINE NOT RUNNING</li> <li>● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F).</li> <li>● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM</li> <li>● FUEL TANK TEMP. IS MORE THAN 0°C (32°F).</li> <li>● WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE"</li> <li>● WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION.</li> </ul> <p><b>NOTE:</b><br/> <b>WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN IN USING CHARGED BATTERY.</b></p> | When detecting EVAP vapor leak point of EVAP system   |
| TARGET IDLE RPM ADJ* | <p>SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS.</p> <ul style="list-style-type: none"> <li>● ENGINE WARMED UP</li> <li>● NO-LOAD</li> </ul>   | When adjusting initial ignition timing and 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 "INDEX for DTC" (See [EC-587](#) .)

### Freeze Frame Data and 1st Trip Freeze Frame Data

| Freeze frame data item *1  | Description   |
|----------------------------|---|
| DIAG TROUBLE CODE [PXXXX]  | <ul style="list-style-type: none"> <li>● The engine control component part/control system has a trouble code, it is displayed as "PXXXX". (Refer to <a href="#">EC-587</a>. "INDEX FOR DTC" .)</li> </ul>   |
| FUEL SYS-B1 *2             | <ul style="list-style-type: none"> <li>● "Fuel injection system status" at the moment a malfunction is detected is displayed.</li> </ul>  |
| FUEL SYS-B2 *2             | <ul style="list-style-type: none"> <li>● One mode in the following is displayed.<br/> "MODE 2": Open loop due to detected system malfunction<br/> "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment)<br/> "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control<br/> "MODE 5": Open loop - has not yet satisfied condition to go to closed loop</li> </ul> |
| CAL/LD VALUE [%]           | <ul style="list-style-type: none"> <li>● The calculated load value at the moment a malfunction is detected is displayed.</li> </ul>   |
| COOLANT TEMP [°C] or [°F]  | <ul style="list-style-type: none"> <li>● The engine coolant temperature at the moment a malfunction is detected is displayed.</li> </ul>  |
| S-FUEL TRIM-B1 [%]         | <ul style="list-style-type: none"> <li>● "Short-term fuel trim" at the moment a malfunction is detected is displayed.</li> </ul>  |
| S-FUEL TRIM-B2 [%]         | <ul style="list-style-type: none"> <li>● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.</li> </ul>  |
| L-FUEL TRIM-B1 [%]         | <ul style="list-style-type: none"> <li>● "Long-term fuel trim" at the moment a malfunction is detected is displayed.</li> </ul>   |
| L-FUEL TRIM-B2 [%]         | <ul style="list-style-type: none"> <li>● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.</li> </ul>  |
| ENGINE SPEED [rpm]         | <ul style="list-style-type: none"> <li>● The engine speed at the moment a malfunction is detected is displayed.</li> </ul>  |
| VHCL SPEED [km/h] or [mph] | <ul style="list-style-type: none"> <li>● The vehicle speed at the moment a malfunction is detected is displayed.</li> </ul>   |
| ABSOL TH.P/S [%]           | <ul style="list-style-type: none"> <li>● The throttle valve opening angle at the moment a malfunction is detected is displayed.</li> </ul>  |

# TROUBLE DIAGNOSIS

[VG33E]

| Freeze frame data item *1  | Description  |
|----------------------------|--|
| B/FUEL SCHDL [msec]        | <ul style="list-style-type: none"> <li>The base fuel schedule at the moment a malfunction is detected is displayed.</li> </ul>     |
| INT/A TEMP SE [°C] or [°F] | <ul style="list-style-type: none"> <li>The intake air temperature at the moment a malfunction is detected is displayed.</li> </ul> |

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

\*2: Regarding D22 model, “-B1” indicates right bank and “-B2” indicates left bank.

## DATA MONITOR MODE

### Monitored Item

x: Applicable

| Monitored item [Unit]         | ECM INPUT SIGNALS | MAIN SIGNALS | Description  | Remarks   |
|-------------------------------|-------------------|--------------|--|---|
| ENG SPEED [rpm]               | x                 | x            | <ul style="list-style-type: none"> <li>Indicates the engine speed computed from the REF signal (120° signal) of the camshaft position sensor.</li> </ul>   |   |
| MAS A/F SE-B1 [V]             | x                 | x            | <ul style="list-style-type: none"> <li>The signal voltage of the mass air flow sensor is displayed.</li> </ul>   | <ul style="list-style-type: none"> <li>When the engine is stopped, a certain value is indicated.</li> </ul>   |
| B/FUEL SCHDL [msec]           |                   | x            | <ul style="list-style-type: none"> <li>“Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.</li> </ul>   |   |
| A/F ALPHA-B1 [%]              |                   | x            | <ul style="list-style-type: none"> <li>The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.</li> </ul>  | <ul style="list-style-type: none"> <li>When the engine is stopped, a certain value is indicated.</li> <li>This data also includes the data for the air-fuel ratio learning control.</li> </ul>  |
| A/F ALPHA-B2 [%]              |                   | x            |  |   |
| COOLAN TEMP/S [°C] or [°F]    | x                 | x            | <ul style="list-style-type: none"> <li>The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.</li> </ul>   | <ul style="list-style-type: none"> <li>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.</li> </ul>  |
| HO2S1 (B1) [V]                | x                 | x            | <ul style="list-style-type: none"> <li>The signal voltage of the heated oxygen sensor 1 is displayed.</li> </ul>   |   |
| HO2S1 (B2) [V]                | x                 | x            |  |   |
| HO2S2 (B1) [V]                | x                 | x            | <ul style="list-style-type: none"> <li>The signal voltage of the heated oxygen sensor 2 is displayed.</li> </ul>   |   |
| HO2S2 (B2) [V]                | x                 | x            |  |   |
| HO2S1 MNTR (B1) [RICH/LEAN]   | x                 |              | <ul style="list-style-type: none"> <li>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.</li> </ul> | <ul style="list-style-type: none"> <li>After turning ON the ignition switch, “RICH” is displayed until air-fuel mixture ratio feedback control begins.</li> <li>When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.</li> </ul> |
| HO2S1 MNTR (B2) [RICH/LEAN]   | x                 |              |  |   |
| HO2S2 MNTR (B1) [RICH/LEAN]   | x                 |              | <ul style="list-style-type: none"> <li>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.</li> </ul>  | <ul style="list-style-type: none"> <li>When the engine is stopped, a certain value is indicated.</li> </ul>   |
| HO2S2 MNTR (B2) [RICH/LEAN]   | x                 |              |  |   |
| VHCL SPEED SE [km/h] or [mph] | x                 | x            | <ul style="list-style-type: none"> <li>The vehicle speed computed from the vehicle speed sensor signal is displayed.</li> </ul>  |   |
| BATTERY VOLT [V]              | x                 | x            | <ul style="list-style-type: none"> <li>The power supply voltage of ECM is displayed.</li> </ul>  |   |

# TROUBLE DIAGNOSIS

[VG33E]

| Monitored item [Unit]      | ECM INPUT SIGNALS | MAIN SIGNALS | Description   | Remarks   |         |
|----------------------------|-------------------|--------------|---|---|---------|
| THRTL POS SEN [V]          | ×                 | ×            | ● The throttle position sensor signal voltage is displayed.   |   | A<br>EC |
| FUEL T/TMP SE [°C] or [°F] | ×                 |              | ● The fuel temperature judged from the fuel tank temperature sensor signal voltage is displayed.  |   | C       |
| INT/A TEMP SE [°C] or [°F] | ×                 | ×            | ● The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.                                      |   | D       |
| EVAP SYS PRES [V]          |                   |              | ● The signal voltage of EVAP control system pressure sensor is displayed.   |   | E       |
| EGR TEMP SEN [V]           | ×                 | ×            | ● The signal voltage of the EGR temperature sensor is displayed.  |   | F       |
| FUEL LEVEL SE [V]          | ×                 |              | ● The signal voltage of the fuel level sensor is displayed.   |   | F       |
| START SIGNAL [ON/OFF]      | ×                 | ×            | ● Indicates [ON/OFF] condition from the starter signal.   | ● After starting the engine, [OFF] is displayed regardless of the starter signal. | G       |
| CLSD THL POS [ON/OFF]      | ×                 | ×            | ● Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal.  |   | H       |
| CLSD THL/P SW [ON/OFF]     | ×                 |              | ● Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.   |   | I       |
| AIR COND SIG [ON/OFF]      | ×                 | ×            | ● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.   |   | J       |
| P/N POSI SW [ON/OFF]       | ×                 | ×            | ● Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.  |   | K       |
| 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.                     |   | L       |
| AMB TEMP SW [ON/OFF]       | ×                 |              | ● Indicates [ON/OFF] condition from the ambient air temperature switch signal.  |   | M       |
| 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.  |   |         |

# TROUBLE DIAGNOSIS

[VG33E]

| Monitored item [Unit]           | ECM INPUT SIGNALS | MAIN SIGNALS | Description   | Remarks   |
|---------------------------------|-------------------|--------------|---|---|
| PURG VOL C/V [%]                |                   |              | <ul style="list-style-type: none"> <li>● Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals.</li> <li>● The opening becomes larger as the value increases.</li> </ul>           |   |
| AIR COND RLY [ON/OFF]           |                   | ×            | <ul style="list-style-type: none"> <li>● The air conditioner relay control condition (determined by ECM according to the input signal) is indicated.</li> </ul>   |   |
| EGRC SOL/V [ON/OFF] (FLOW/CUT)  |                   | ×            | <ul style="list-style-type: none"> <li>● Indicates the control condition of the EGRC-solenoid valve determined by ECM according to the input signals.</li> <li>● ON ... EGR valve is operational</li> <li>● OFF ... EGR valve operation is cut-off</li> </ul> |   |
| FUEL PUMP RLY [ON/OFF]          |                   | ×            | <ul style="list-style-type: none"> <li>● Indicates the fuel pump relay control condition determined by ECM according to the input signals.</li> </ul>   |   |
| VENT CONT/V [ON/OFF]            |                   |              | <ul style="list-style-type: none"> <li>● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated.</li> <li>● ON ... Closed</li> <li>● OFF ... Open</li> </ul>                            |   |
| VC/V BYPASS/V [ON/OFF]          |                   |              | <ul style="list-style-type: none"> <li>● The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated.</li> <li>● ON ... Open</li> <li>● OFF ... Closed</li> </ul>                               |   |
| HO2S1 HTR (B1) [ON/OFF]         |                   |              | <ul style="list-style-type: none"> <li>● Indicates [ON/OFF] condition of heated oxygen sensors 1 heater determined by ECM according to the input signals.</li> </ul>  |   |
| HO2S1 HTR (B1) [ON/OFF]         |                   |              |   |   |
| HO2S2 HTR (B1) [ON/OFF]         |                   |              | <ul style="list-style-type: none"> <li>● Indicates [ON/OFF] condition of heated oxygen sensor 2 heaters determined by ECM according to the input signals.</li> </ul>  |   |
| HO2S2 HTR (B2) [ON/OFF]         |                   |              |   |   |
| VOLTAGE [V]                     |                   |              | <ul style="list-style-type: none"> <li>● Voltage measured by the voltage probe.</li> </ul>  |   |
| FREQUENCY [msec] or [Hz] or [%] |                   |              | <ul style="list-style-type: none"> <li>● Pulse width, frequency or duty cycle measured by the pulse probe.</li> </ul>   | <ul style="list-style-type: none"> <li>● Only “#” is displayed if item is unable to be measured.</li> <li>● Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.</li> </ul> |

**NOTE:**

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding D22 model, “B1” indicates bank 1 and “B2” indicates bank 2.

## DATA MONITOR (SPEC) MODE

### Monitored Items

| Monitored item [Unit] | ECM INPUT SIGNALS | MAIN SIGNALS | Description  | Remarks   |
|-----------------------|-------------------|--------------|--|---|
| MAS A/F SE-B1 [V]     | ×                 | ×            | <ul style="list-style-type: none"> <li>The signal voltage of the mass air flow sensor specification is displayed.</li> </ul>   | <ul style="list-style-type: none"> <li>When the engine is running, specification range is indicated.</li> </ul>             |
| B/FUEL SCHDL [msec]   |                   | ×            | <ul style="list-style-type: none"> <li>"Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.</li> </ul> | <ul style="list-style-type: none"> <li>When the engine is running, specification range is indicated.</li> </ul>             |
| A/F ALPHA-B1 [%]      |                   | ×            | <ul style="list-style-type: none"> <li>Indicates the mean value of the air-fuel ratio feedback correction factor per cycle.</li> </ul>   | <ul style="list-style-type: none"> <li>When the engine is running, specification range is indicated.</li> </ul>             |
| A/F ALPHA-B2 [%]      |                   | ×            |  | <ul style="list-style-type: none"> <li>This data also includes the data for the air-fuel ratio learning control.</li> </ul> |

**NOTE:**

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding D22 model, "B1" indicates bank 1 and "B2" indicates bank 2.

## ACTIVE TEST MODE

### Test Item

| TEST ITEM           | CONDITION   | JUDGEMENT  | CHECK ITEM (REMEDY)  |
|---------------------|---|--|--|
| FUEL INJECTION      | <ul style="list-style-type: none"> <li>Engine: Return to the original trouble condition</li> <li>Change the amount of fuel injection using CONSULT-II.</li> </ul>   | If trouble symptom disappears, see CHECK ITEM.         | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>Fuel injectors</li> <li>Heated oxygen sensor 1</li> </ul>  |
| IGNITION TIMING     | <ul style="list-style-type: none"> <li>Engine: Return to the original trouble condition</li> <li>Timing light: Set</li> <li>Retard the ignition timing using CONSULT-II.</li> </ul>                                   | If trouble symptom disappears, see CHECK ITEM.         | <ul style="list-style-type: none"> <li>Adjust initial ignition timing</li> </ul>   |
| IACV-AAC/V OPENING  | <ul style="list-style-type: none"> <li>Engine: After warming up, idle the engine.</li> <li>Change the IACV-AAC valve opening percent using CONSULT-II.</li> </ul>   | Engine speed changes according to the opening percent. | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>IACV-AAC valve</li> </ul>  |
| POWER BALANCE       | <ul style="list-style-type: none"> <li>Engine: After warming up, idle the engine.</li> <li>A/C switch "OFF"</li> <li>Shift lever "N"</li> <li>Cut off each injector signal one at a time using CONSULT-II.</li> </ul> | Engine runs rough or dies.                             | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>Compression</li> <li>Injectors</li> <li>Power transistor</li> <li>Spark plugs</li> <li>Ignition coils</li> </ul> |
| ENG COOLANT TEMP    | <ul style="list-style-type: none"> <li>Engine: Return to the original trouble condition</li> <li>Change the engine coolant temperature using CONSULT-II.</li> </ul>   | If trouble symptom disappears, see CHECK ITEM.         | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>Engine coolant temperature sensor</li> <li>Fuel injectors</li> </ul>   |
| FUEL PUMP RELAY     | <ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> <li>Turn the fuel pump relay "ON" and "OFF" using CONSULT-II and listen to operating sound.</li> </ul>                               | Fuel pump relay makes the operating sound.             | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>Fuel pump relay</li> </ul>   |
| EGRC SOLENOID VALVE | <ul style="list-style-type: none"> <li>Ignition switch: ON</li> <li>Turn EGRC-solenoid valve "ON" and "OFF" using CONSULT-II and listen to operating sound.</li> </ul>  | EGRC-solenoid valve makes an operating sound.          | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>EGRC-solenoid valve</li> </ul>   |

# TROUBLE DIAGNOSIS

[VG33E]

| TEST ITEM       | CONDITION  | JUDGEMENT  | CHECK ITEM (REMEDY)   |
|-----------------|--|--|---|
| PURG VOL CONT/V | <ul style="list-style-type: none"> <li>● Engine: After warming up, run engine at 1,500 rpm.</li> <li>● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.</li> </ul> | Engine speed changes according to the opening percent. | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Solenoid valve</li> </ul> |
| FUEL/T TEMP SEN | <ul style="list-style-type: none"> <li>● Change the fuel tank temperature using CONSULT-II.</li> </ul>   |  |   |
| VENT CONTROL/V  | <ul style="list-style-type: none"> <li>● Ignition switch: ON (Engine stopped)</li> <li>● Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound.</li> </ul>                        | Solenoid valve makes an operating sound.               | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Solenoid valve</li> </ul> |
| VC/V BYPASS/V   | <ul style="list-style-type: none"> <li>● Ignition switch: ON (Engine stopped)</li> <li>● Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound.</li> </ul>                        | Solenoid valve makes an operating sound.               | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Solenoid valve</li> </ul> |

## DTC & SRT CONFIRMATION MODE

### SRT STATUS Mode

For details, refer to [EC-626, "SYSTEM READINESS TEST \(SRT\) CODE"](#) .

### SRT Work Support Mode

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

### DTC Work Support Mode

| Test mode   | Test item                 | Condition   | Reference page                 |
|-------------|---------------------------|---|--------------------------------|
| EVAP SYSTEM | EVAP SML LEAK P0442/P1442 | Refer to corresponding trouble diagnosis for DTC. | <a href="#">EC-912/EC-1071</a> |
|             | EVAP V/S LEAK P0456/P1456 |   | <a href="#">EC-962/EC-1096</a> |
|             | PURG VOL CN/V P1444       |   | <a href="#">EC-1073</a>        |
|             | PURGE FLOW P0441          |   | <a href="#">EC-904</a>         |
|             | VC CUT/V BP/V P1491       |   | <a href="#">EC-1115</a>        |
| HO2S1       | HO2S1 (B1) P0134          |   | <a href="#">EC-793</a>         |
|             | HO2S1 (B1) P1143          |   | <a href="#">EC-1010</a>        |
|             | HO2S1 (B1) P1144          |   | <a href="#">EC-1017</a>        |
|             | HO2S1 (B1) P0133          |   | <a href="#">EC-780</a>         |
|             | HO2S1 (B2) P0154          |   | <a href="#">EC-793</a>         |
|             | HO2S1 (B2) P1163          |   | <a href="#">EC-1010</a>        |
|             | HO2S1 (B2) P1164          |   | <a href="#">EC-1017</a>        |
|             | HO2S1 (B2) P0153          |   | <a href="#">EC-780</a>         |
| HO2S2       | HO2S2 (B1) P1146          | <a href="#">EC-1024</a>                           |                                |
|             | HO2S2 (B1) P1147          | <a href="#">EC-1035</a>                           |                                |
|             | HO2S2 (B1) P0139          | <a href="#">EC-813</a>                            |                                |
|             | HO2S2 (B2) P1166          | <a href="#">EC-1024</a>                           |                                |
|             | HO2S2 (B2) P1167          | <a href="#">EC-1035</a>                           |                                |
|             | HO2S2 (B2) P0159          | <a href="#">EC-813</a>                            |                                |
| EGR SYSTEM  | EGR SYSTEM P0400          | <a href="#">EC-878</a>                            |                                |
|             | EGR-BPT/VLV P0402         | <a href="#">EC-887</a>                            |                                |
|             | EGR SYSTEM P1402          | <a href="#">EC-887</a>                            |                                |

**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.

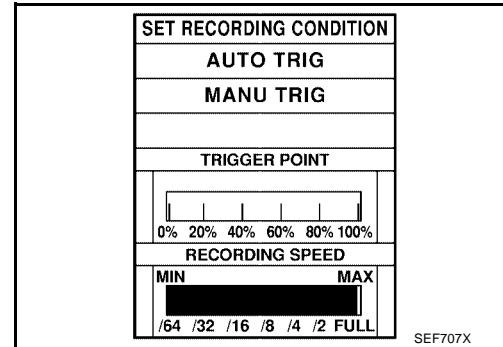
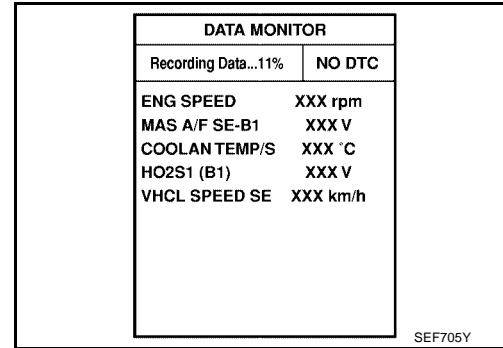
In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.

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.

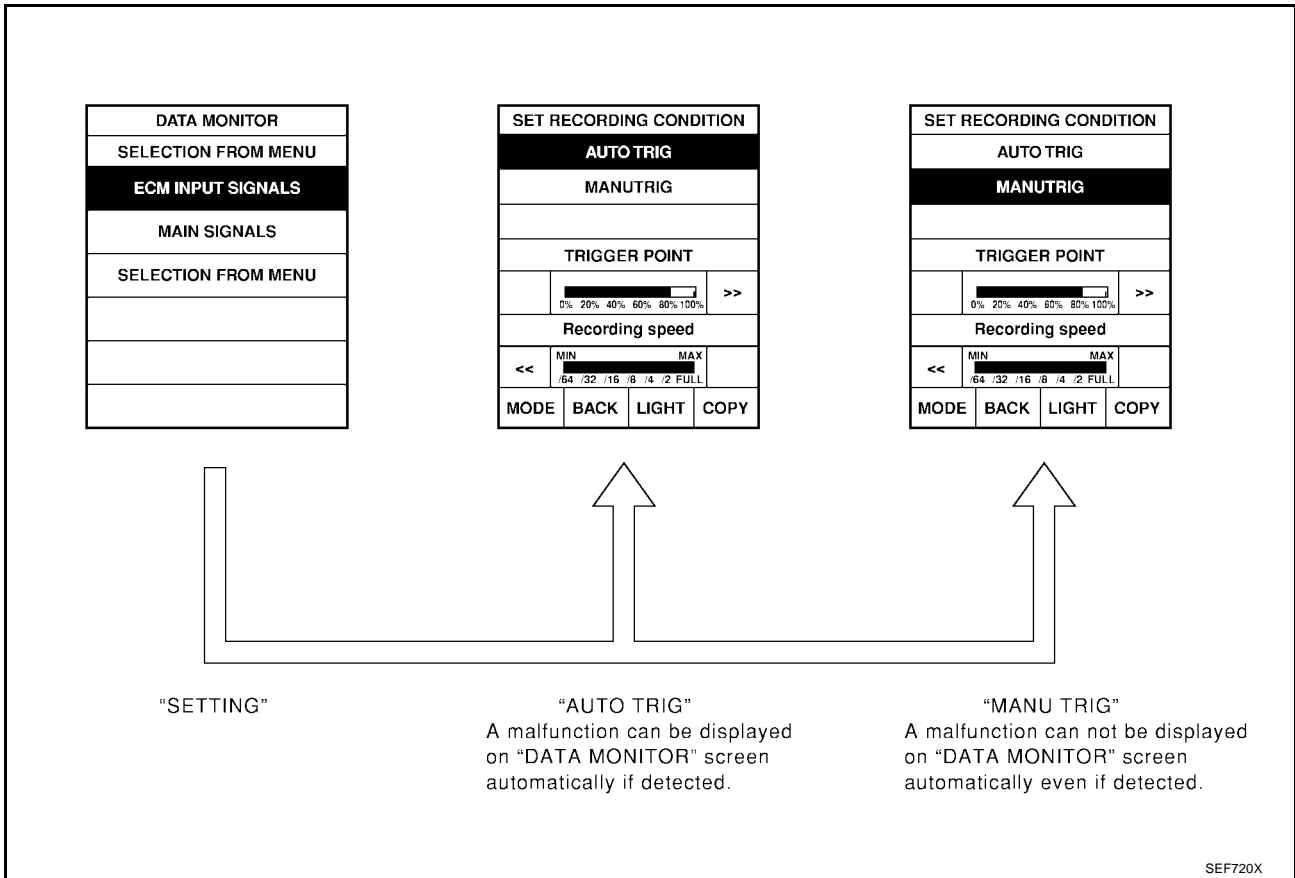
When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the "DTC Confirmation Procedure", the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to [G1-25. "How to Perform Efficient Diagnosis for an Electrical Incident"](#) .)

2. "MANU TRIG"

# TROUBLE DIAGNOSIS

[VG33E]

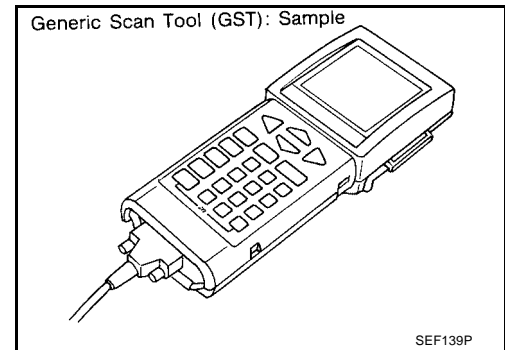
- If the malfunction is displayed as soon as "DATA MONITOR" is selected, reset CONSULT-II to "MANU TRIG". By selecting "MANU TRIG" you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.



## Generic Scan Tool (GST) Function DESCRIPTION

UBS0071C

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 7 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 "Freeze Frame Data" (EC-681).]   |
| MODE 3               | DTCs            | This mode gains access to emission-related power train trouble codes which were stored by ECM.  |



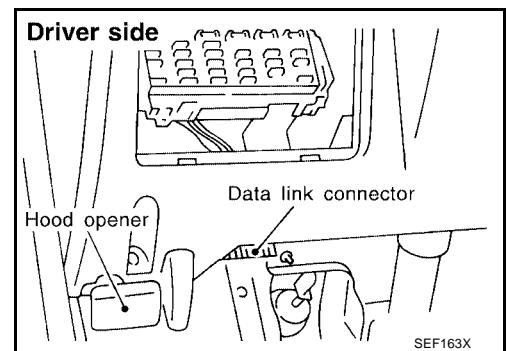
# TROUBLE DIAGNOSIS

[VG33E]

| Diagnostic test mode |                  | Function  |
|----------------------|------------------|---|
| MODE 4               | CLEAR DIAG INFO  | <p>This mode can clear all emission-related diagnostic information. This includes:</p> <ul style="list-style-type: none"> <li>● Clear number of diagnostic trouble codes (MODE 1)</li> <li>● Clear diagnostic trouble codes (MODE 3)</li> <li>● Clear trouble code for freeze frame data (MODE 1)</li> <li>● Clear freeze frame data (MODE 2)</li> <li>● Reset status of system monitoring test (MODE 1)</li> <li>● Clear on board monitoring test results (MODE 6 and 7)</li> </ul>  |
| 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               | —                | <p>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.</p> <ul style="list-style-type: none"> <li>● EVAP canister vent control valve open</li> <li>● Vacuum cut valve bypass valve closed</li> </ul> <p>In the following conditions, this mode cannot function.</p> <ul style="list-style-type: none"> <li>● Low ambient temperature</li> <li>● Low battery voltage</li> <li>● Engine running</li> <li>● Ignition switch OFF</li> <li>● Low fuel temperature</li> <li>● Too much pressure is applied to EVAP system</li> </ul> |
| 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.   |

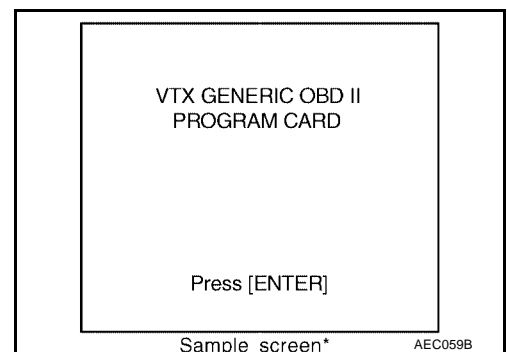
## GST INSPECTION PROCEDURE

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



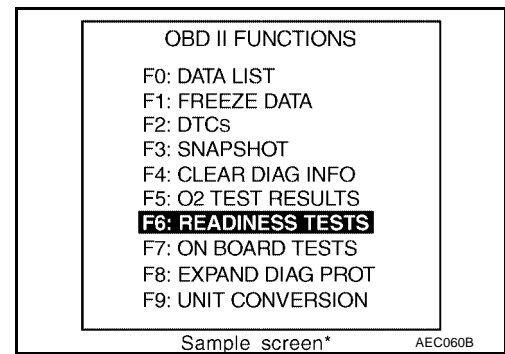
3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.

(\*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.

**For further information, see the GST Operation Manual of the tool maker.**



## CONSULT-II Reference Value in Data Monitor Mode

UBS0071D

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   | Idle  | 1.0 - 1.7V   |
|                                    | ● Air conditioner switch: OFF<br>● Shift lever: "N"<br>● No-load   | 2,500 rpm   | 1.7 - 2.3V   |
| COOLAN TEMP/S                      | ● Engine: After warming up   |   | More than 70°C (158°F)                                       |
| HO2S1 (B1)<br>HO2S1 (B2)           | ● Engine: After warming up   | Maintaining engine speed at 2,000 rpm.            | 0 - 0.3V ←→ Approx. 0.6 - 1.0V                               |
| HO2S1 MNTR (B1)<br>HO2S1 MNTR (B2) |  |   | LEAN ←→ RICH<br>Changes more than 5 times during 10 seconds. |
| HO2S2 (B1)<br>HO2S2 (B2)           | ● Warm-up condition<br>● After keeping engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load. | Revving engine from idle up to 3,000 rpm quickly  | 0 - 0.3V ←→ Approx. 0.6 - 1.0V                               |
| HO2S2 MNTR (B1)<br>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 (a)                  | 0.15 - 0.85V   |
|                                    | ● Engine: After warming up<br>● Ignition switch: ON (Engine stopped)   | Throttle valve: Partially open                    | Between (a) and (b)  |
|                                    |  | Throttle valve: fully opened (b)                  | 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<br>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"                           | ON   |
|                                    |  | Except above                                      | OFF  |

# TROUBLE DIAGNOSIS

[VG33E]

| MONITOR ITEM                     | CONDITION  | SPECIFICATION  |
|----------------------------------|--|--|
| PW/ST SIGNAL                     | ● Engine: After warming up, idle the engine  | Steering wheel in neutral position (forward direction)<br>OFF      |
|                                  |  | The steering wheel is turned<br>ON                                 |
| AMB TEMP SW                      | ● Ignition switch: ON  | Below 19°C (66°F)<br>OFF   |
|                                  | ● Compare ambient air temperature with the following:  | Above 25°C (77°F)<br>ON  |
| IGNITION SW                      | ● Ignition switch: ON → OFF → ON   | ON → OFF → ON  |
| INJ PULSE-B1<br>INJ PULSE-B2     | ● Engine: After warming up   | Idle<br>2.4 - 3.7 msec   |
|                                  | ● Air conditioner switch: OFF<br>● Shift lever: "N"<br>● No-load   | 2,000 rpm<br>1.9 - 3.3 msec  |
| B/FUEL SCHDL                     | ● Engine: After warming up   | Idle<br>1.0 - 1.6 msec   |
|                                  | ● Air conditioner switch: OFF<br>● Shift lever: "N"<br>● No-load   | 2,000 rpm<br>0.7 - 1.4 msec  |
| IGN TIMING                       | ● Engine: After warming up   | Idle<br>10°±2° BTDC  |
|                                  | ● Air conditioner switch: OFF<br>● Shift lever: "N"<br>● No-load   | 2,000 rpm<br>More than 25° BTDC                                    |
| IACV-AAC/V                       | ● Engine: After warming up   | Idle<br>10 - 20%   |
|                                  | ● Air conditioner switch: OFF<br>● Shift lever: "N"<br>● No-load   | 2,000 rpm<br>—   |
| PURG VOL C/V                     | ● Engine: After warming up   | Idle<br>0%   |
|                                  | ● Air conditioner switch: OFF<br>● Shift lever: "N"<br>● No-load   | 2,000 rpm<br>—   |
| A/F ALPHA-B1<br>A/F ALPHA-B2     | ● Engine: After warming up   | Maintaining engine speed at 2,000 rpm<br>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)<br>● Engine running and cranking  | ON   |
|                                  | Except as shown above  | OFF  |
| EGRC SOL/V                       | ● Engine: After warming up   | Idle<br>OFF  |
|                                  | ● Air conditioner switch: OFF<br>● Shift lever: "N"<br>● No-load   | Engine speed: Revving engine from idle to 3,000 rpm quickly.<br>ON |
| VENT CONT/V                      | ● Ignition switch: ON  | OFF  |
| HO2S1 HTR (B1)<br>HO2S1 HTR (B2) | ● Engine speed: Below 2,800 rpm  | ON   |
|                                  | ● Engine speed: Above 2,800 rpm  | OFF  |
| HO2S2 HTR (B1)<br>HO2S2 HTR (B2) | ● Engine speed: Below 3,600 rpm after the following conditions are met.<br>● Engine: After warming up<br>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load. | ON   |
|                                  | ● Engine speed: Above 3,600 rpm  | OFF  |
| VC/V BYPASS/V                    | Ignition switch: ON  | OFF  |

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

# TROUBLE DIAGNOSIS

[VG33E]

| MONITOR ITEM | CONDITION  | SPECIFICATION                |                   |
|--------------|--|------------------------------|-------------------|
| CAL/LD VALUE | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> </ul>  | Idle                         | 18.5 - 26.0%      |
|              | <ul style="list-style-type: none"> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul>  | 2,500 rpm                    | 18.0 - 21.0%      |
| ABSOL TH·P/S | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Ignition switch: ON</li> <li>● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.</li> </ul> | Throttle valve: fully closed | 0.0%              |
|              | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Ignition switch: ON (Engine stopped)</li> </ul>   | Throttle valve: fully opened | Approx. 80%       |
| MASS AIRFLOW | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> </ul>  | Idle                         | 3.3 - 4.8 g·m/s   |
|              | <ul style="list-style-type: none"> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul>  | 2,500 rpm                    | 12.0 - 14.9 g·m/s |

## Major Sensor Reference Graph in Data Monitor Mode

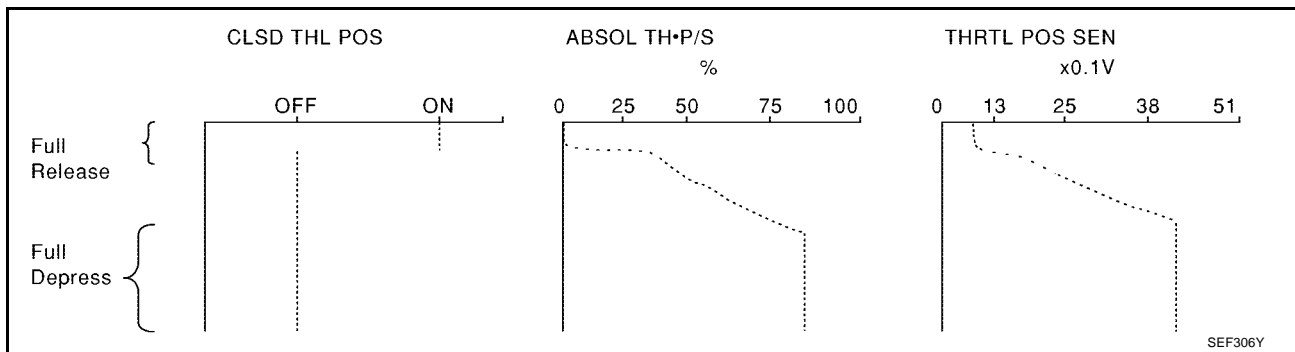
UBS0071E

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".



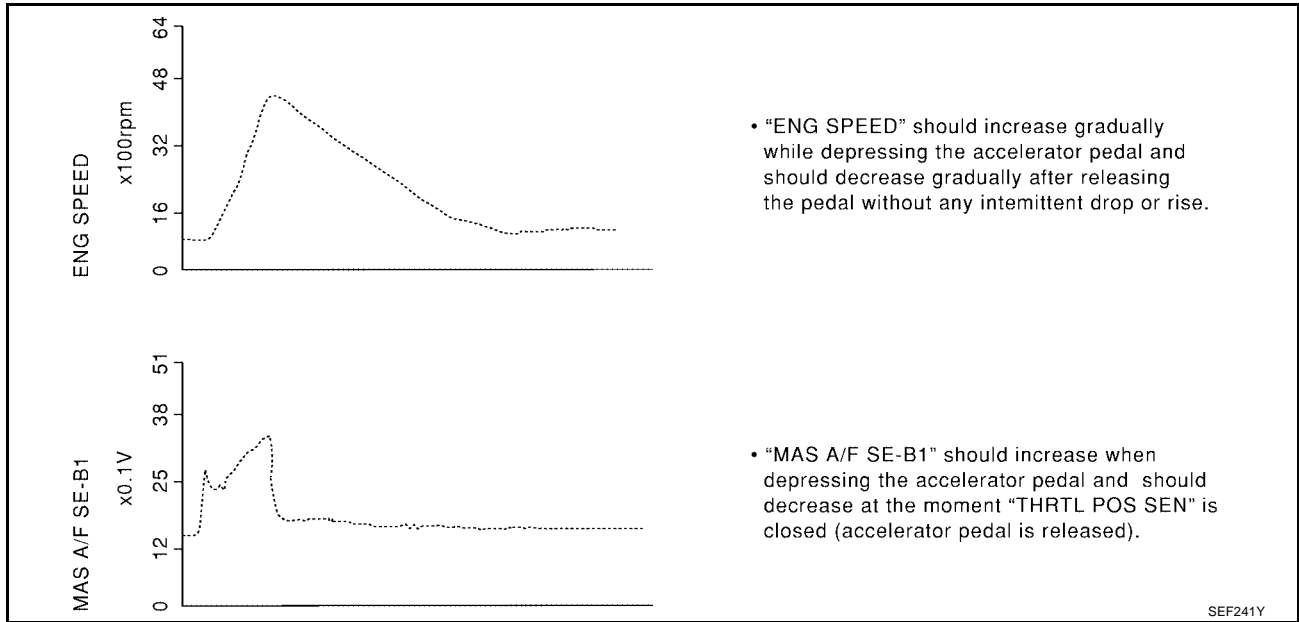
### ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

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.

# TROUBLE DIAGNOSIS

[VG33E]

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



A

EC

C

D

E

F

G

H

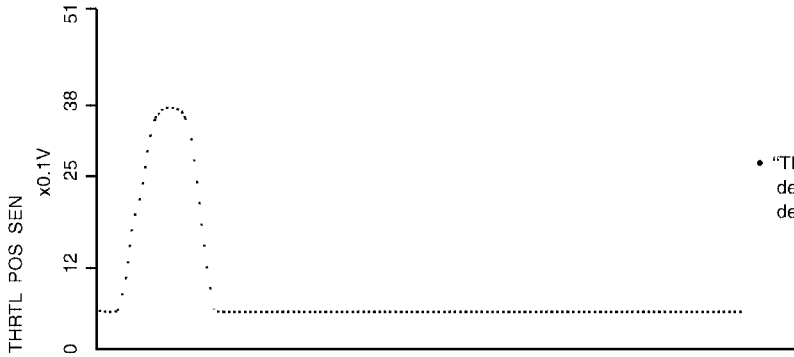
I

J

K

L

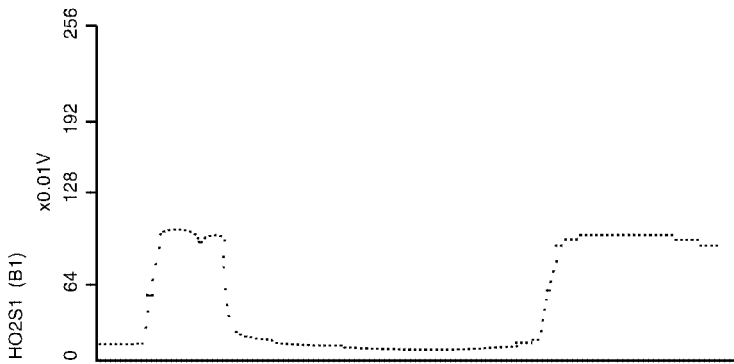
M



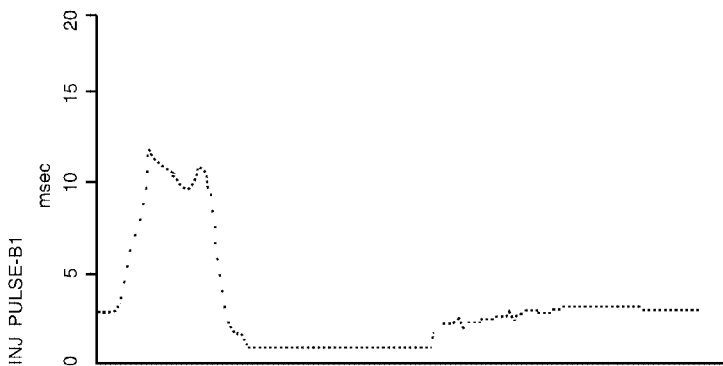
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "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.

## TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

### Description

UBS0071F

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

UBS0071G

- 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.

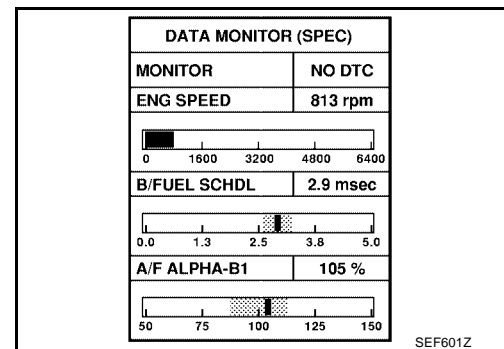
### Inspection Procedure

UBS0071H

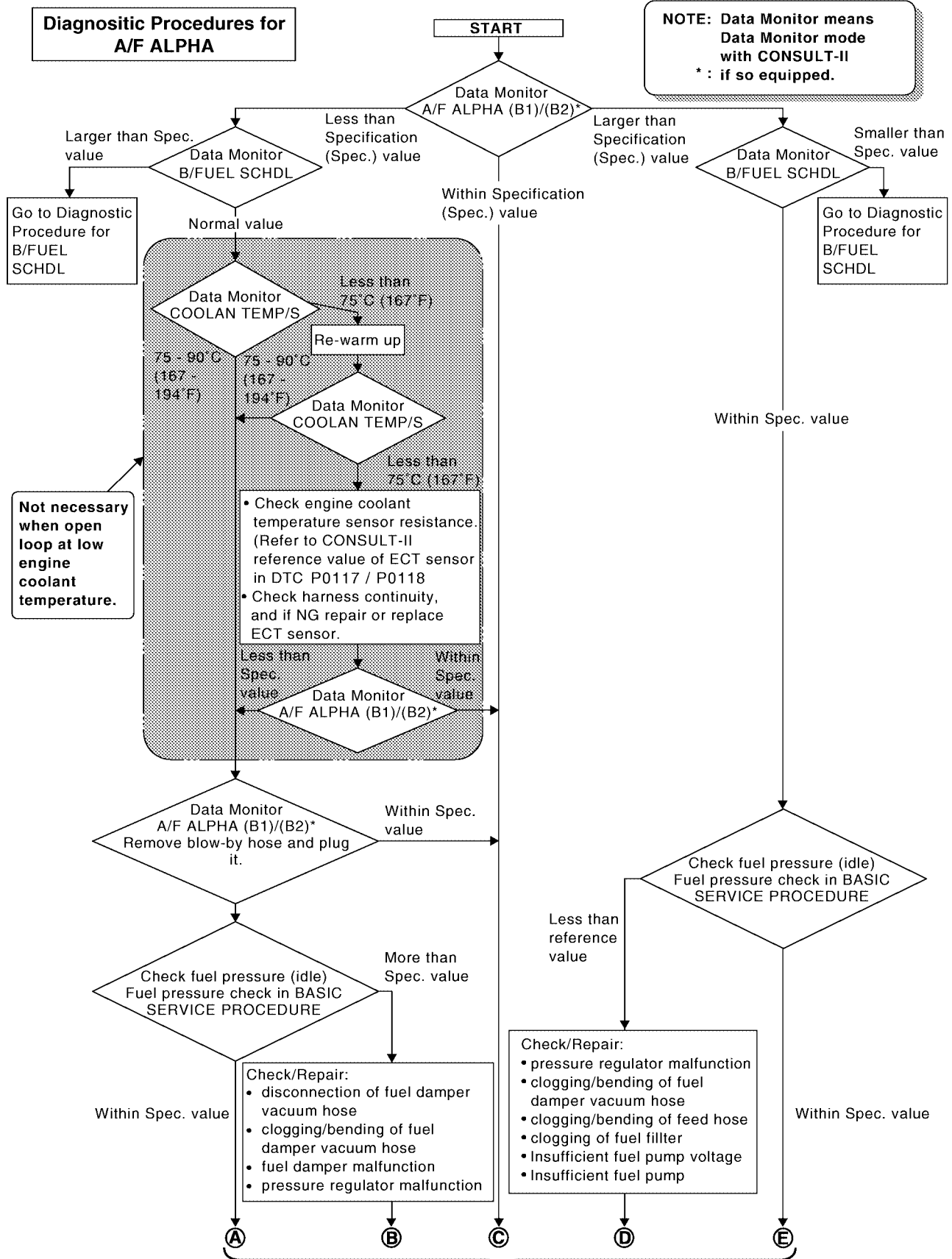
#### NOTE:

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

1. Perform [EC-648, "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-696, "Diagnostic Procedure"](#) .



Diagnostic Procedure

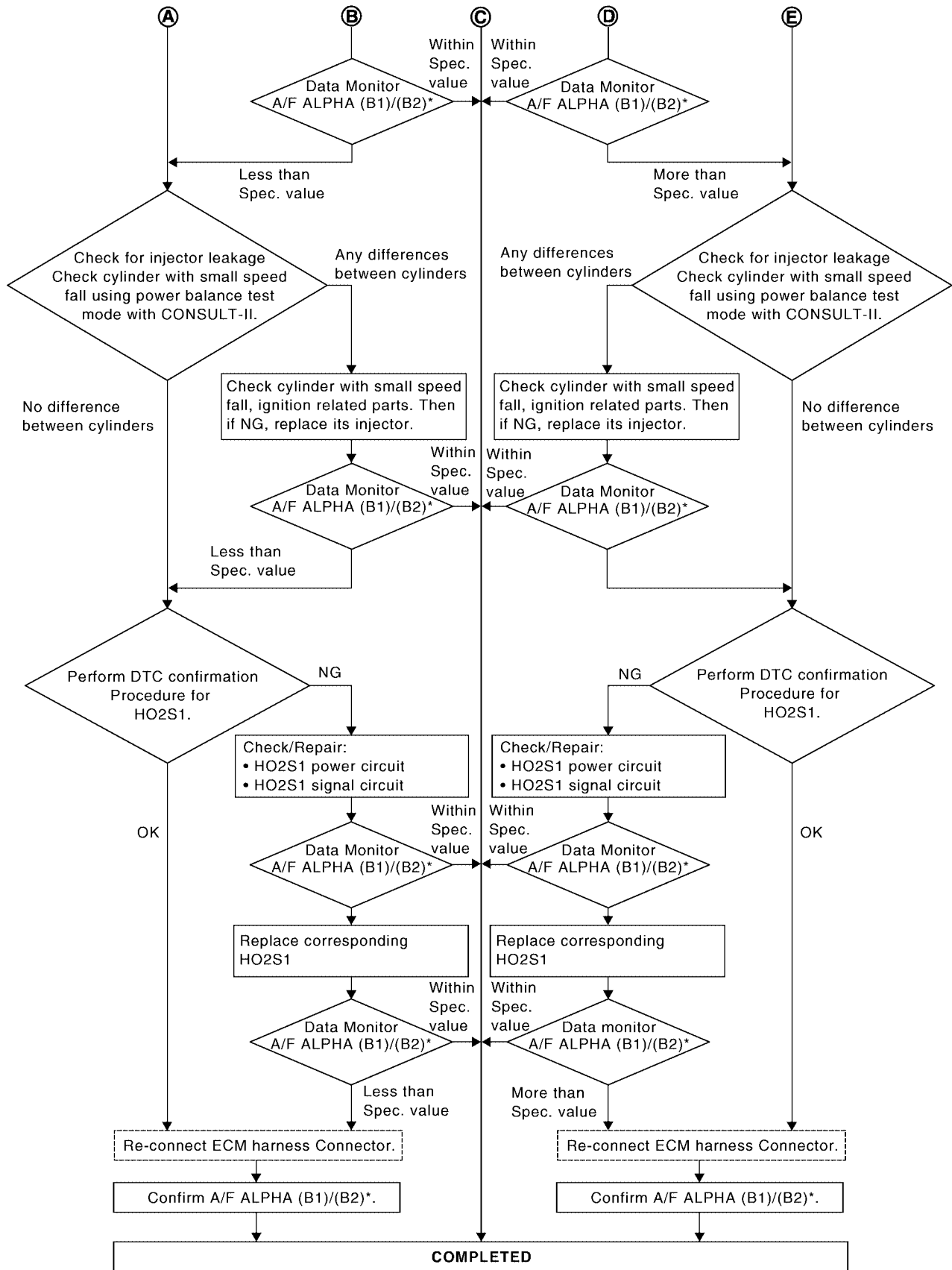


(Go to next page.)



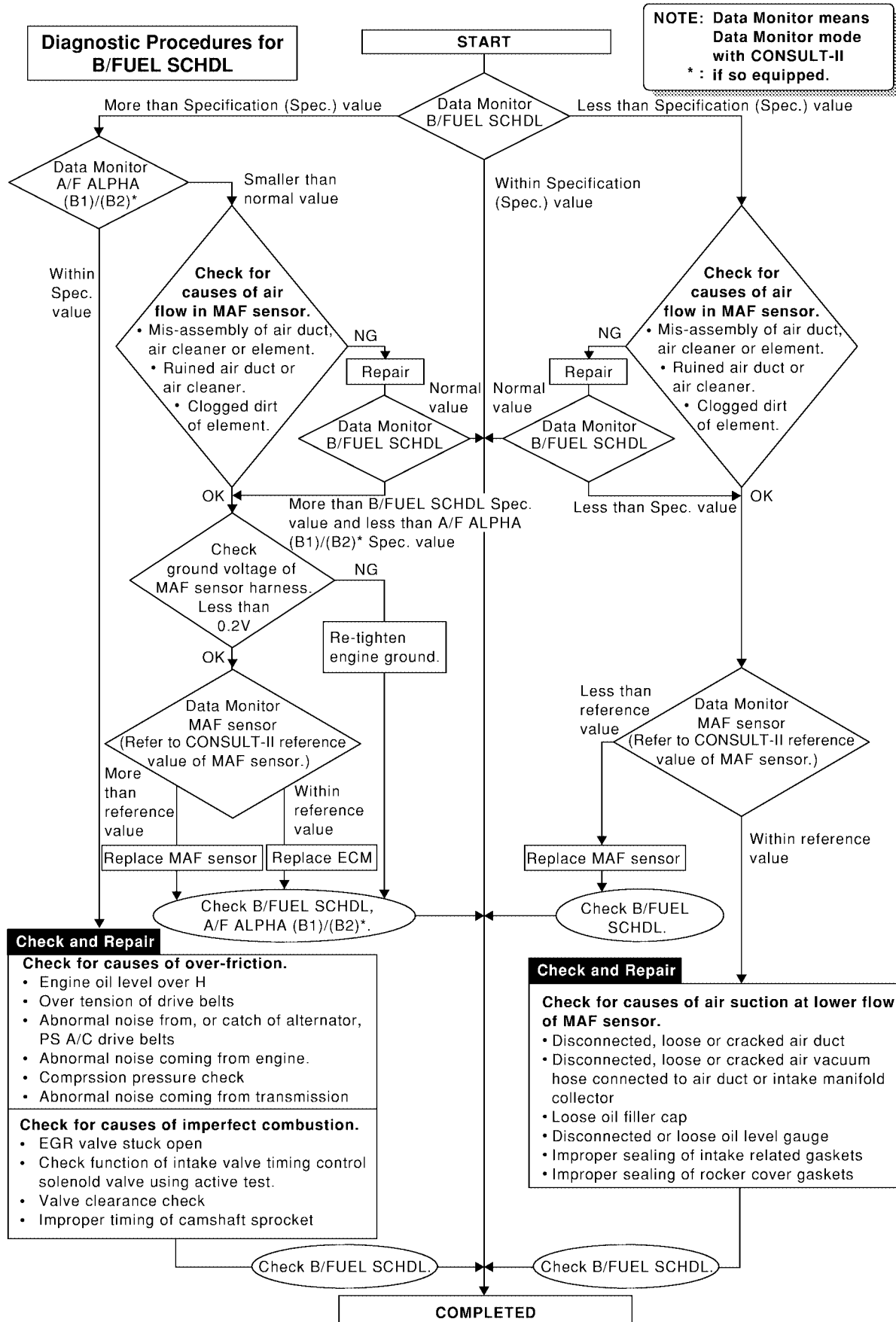
# TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[VG33E]



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SEF768Z



LEC090A

**TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT****Description**

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 malfunction 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 malfunction area.                     |

**Diagnostic Procedure****1. INSPECTION START**

Erase (1st trip) DTCs. Refer to [EC-634, "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"](#).

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"](#).

OK or NG

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

**4. CHECK CONNECTOR TERMINALS**

Refer to [GI-22, "How to Check Terminal"](#).

OK or NG

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

# POWER SUPPLY CIRCUIT FOR ECM

[VG33E]

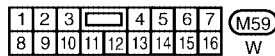
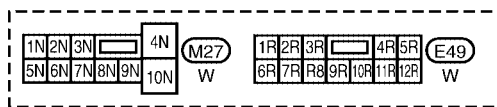
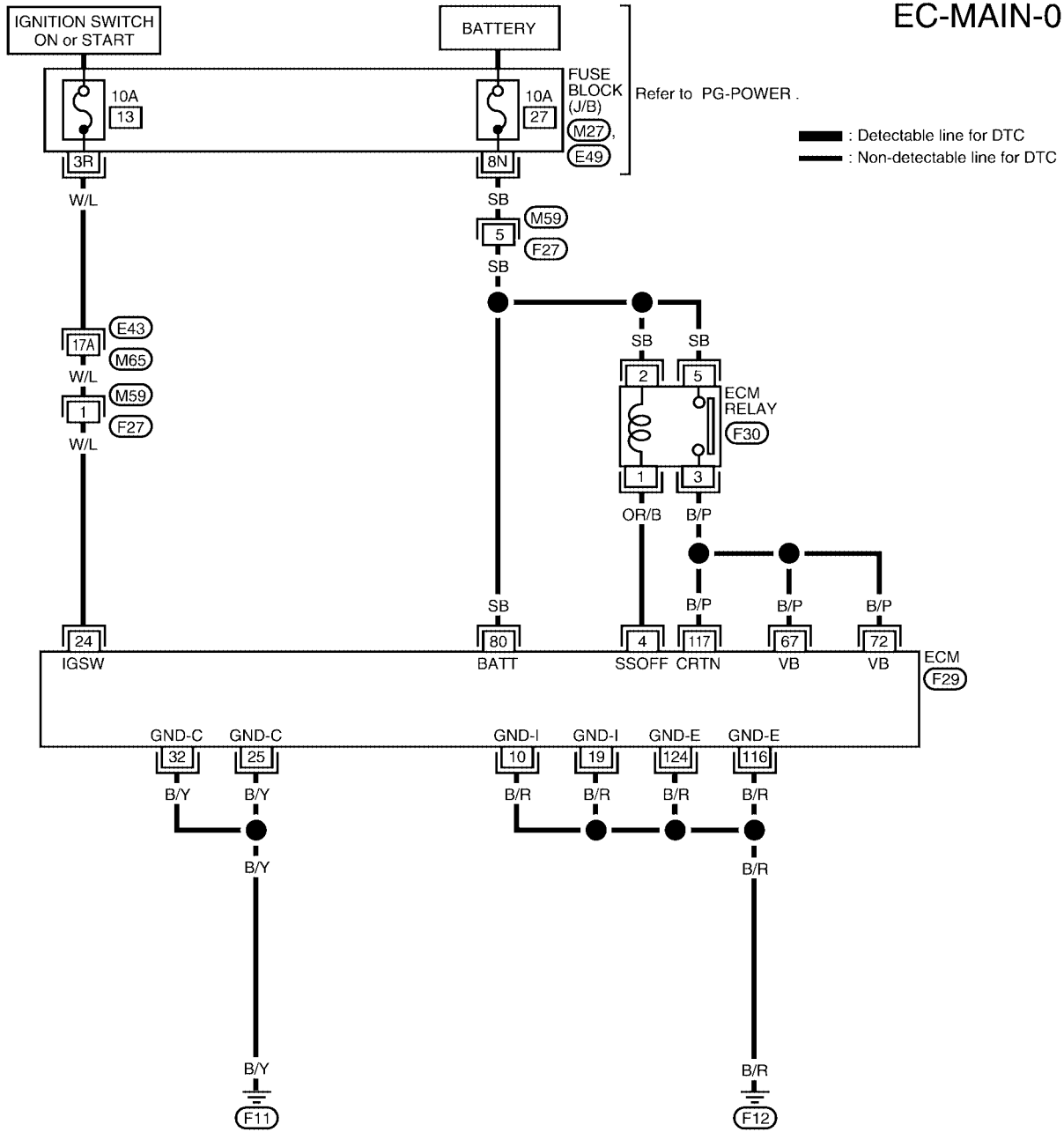
## POWER SUPPLY CIRCUIT FOR ECM

FPF:24110

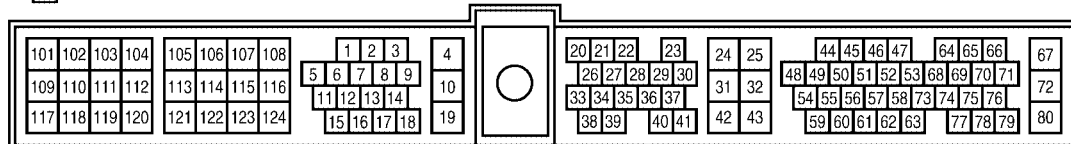
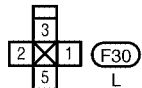
### Wiring Diagram

UBS007L

EC-MAIN-01



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



# POWER SUPPLY CIRCUIT FOR ECM

[VG33E]

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

**CAUTION:**

**Do not use 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 COLO R | ITEM                     | CONDITION   | DATA (DC Voltage)          |
|---------------|-------------|--------------------------|---|----------------------------|
| 4             | OR/B        | ECM relay (Self-shutoff) | [Engine is running]<br>[Ignition switch OFF]<br>● For a few seconds after turning ignition switch OFF | 0 - 1.5V                   |
|               |             |                          | [Ignition switch OFF]<br>● A few seconds passed after turning ignition switch OFF                     | BATTERY VOLTAGE (11 - 14V) |
| 10            | B/R         | ECM ground               | [Engine is running]<br>● Idle speed   | Engine ground              |
| 19            | B/R         | ECM ground               | [Engine is running]<br>● 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]<br>● Idle speed   | Engine ground              |
| 32            | B/Y         | ECM ground               | [Engine is running]<br>● 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]<br>● Idle speed   | Engine ground              |
| 117           | B/P         | Current return           | [Engine is running]<br>● Idle speed   | BATTERY VOLTAGE (11 - 14V) |
| 124           | B/R         | ECM ground               | [Engine is running]<br>● Idle speed   | Engine ground              |

## Diagnostic Procedure

UBS0071M

### 1. INSPECTION START

Start engine.

**Is engine running?**

Yes or No

Yes >> GO TO 6.

No >> GO TO 2.

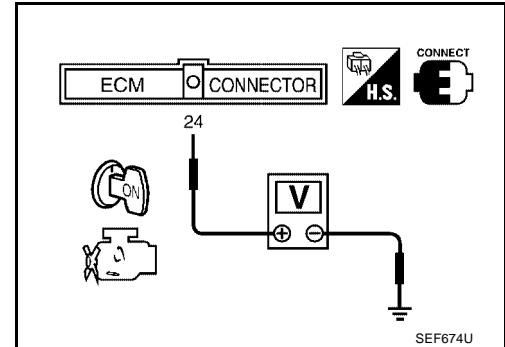
## 2. CHECK ECM POWER SUPPLY CIRCUIT-I

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 M5, F27
- Fuse block (J/B) connector E49
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair harness or connectors.

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

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

**Continuity should exist.**

4. Also check harness for short to power.

OK or NG

- OK >> GO TO 15.  
 NG >> GO TO 5.

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open between ECM and engine ground

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

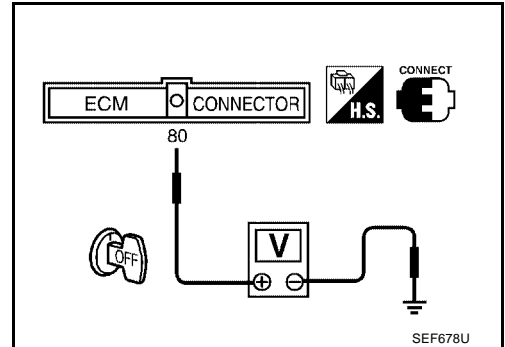
**6. CHECK ECM POWER SUPPLY CIRCUIT-II**

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 M81, F36
- Fuse block (J/B) connector M27
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair harness or connectors.

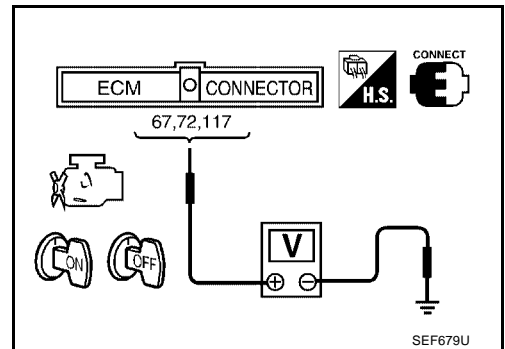
**8. CHECK ECM POWER SUPPLY CIRCUIT-III**

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.**

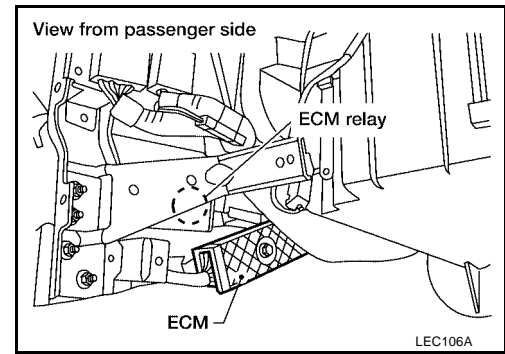
OK or NG

- 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 13.



## 9. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM relay.

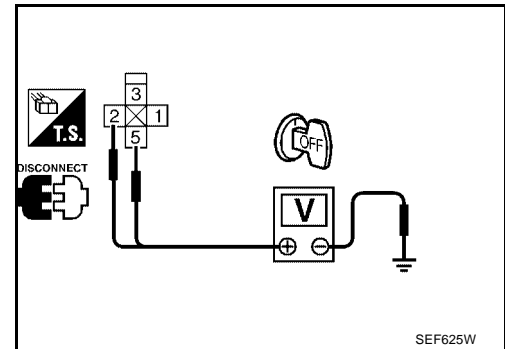


2. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.

**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 connectors M59, F27

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

## 11. 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 12.  
 NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 12. CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals 67, 72, 117 and ECM relay terminal 3. Refer to WIRING DIAGRAM.

**Continuity should exist.**

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

OK or NG

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



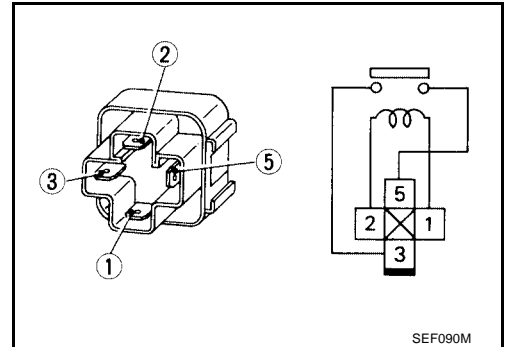
**13. CHECK ECM RELAY**

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 ECM GROUND CIRCUIT-II FOR OPEN AND SHORT**

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

**Continuity should exist.**

4. Also check harness for short to power.

OK or NG

- OK >> GO TO 15.
- NG >> GO TO 5.

**15. CHECK INTERMITTENT INCIDENT**

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

**>> INSPECTION END.**

# DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

[VG33E]

## DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

PFP:22690

### Description SYSTEM DESCRIPTION

UBS0071N

| Sensor                   | Input Signal to ECM | ECM function                          | Actuator                       |
|--------------------------|---------------------|---------------------------------------|--------------------------------|
| Camshaft position sensor | Engine speed        | Heated oxygen sensor 1 heater control | Heated oxygen sensor 1 heaters |

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

### OPERATION

| Engine speed rpm | Heated oxygen sensor 1 heaters |
|------------------|--------------------------------|
| Above 2,800      | OFF                            |
| Below 2,800      | ON                             |

### CONSULT-II Reference Value in Data Monitor Mode

UBS0071O

Specification data are reference values.

| MONITOR ITEM   | CONDITION                       | SPECIFICATION |
|----------------|---------------------------------|---------------|
| HO2S1 HTR (B1) | ● Engine speed: Below 2,800 rpm | ON            |
| HO2S1 HTR (B2) | ● Engine speed: Above 2,800 rpm | OFF           |

### On Board Diagnosis Logic

UBS0071P

| DTC No.           | Trouble diagnosis name                             | DTC detecting condition   | Possible cause   |
|-------------------|--|---|--|
| P0031<br>(Bank 1) | 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.<br>(An excessively low voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)  | <ul style="list-style-type: none"> <li>● Harness or connectors<br/>(The heated oxygen sensor 1 heater circuit is open or shorted.)</li> <li>● Heater oxygen sensor 1 heater</li> </ul> |
| P0051<br>(Bank 2) |  |   |  |
| P0032<br>(Bank 1) | 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.<br>(An excessively high voltage signal is sent to ECM through the heated oxygen sensor 1 heater.) | <ul style="list-style-type: none"> <li>● Harness or connectors<br/>(The heated oxygen sensor 1 heater circuit is shorted.)</li> <li>● Heater oxygen sensor 1 heater</li> </ul>         |
| P0052<br>(Bank 2) |  |   |  |

### DTC Confirmation Procedure

UBS0071Q

#### 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 run it for at least 6 seconds at idle speed.
3. If 1st trip DTC is detected, go to [EC-711, "Diagnostic Procedure"](#)

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

**WITH GST**

1. Start engine and run it for at least 6 seconds at idle speed.
  2. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
  3. Start engine and run it for at 6 seconds at idle speed.
  4. Select "MODE 3" with GST.
  5. If DTC is detected, go to [EC-711, "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.**

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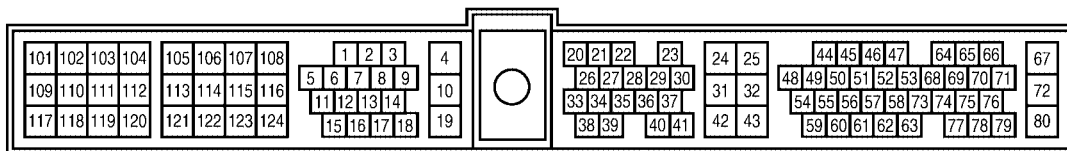
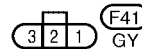
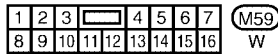
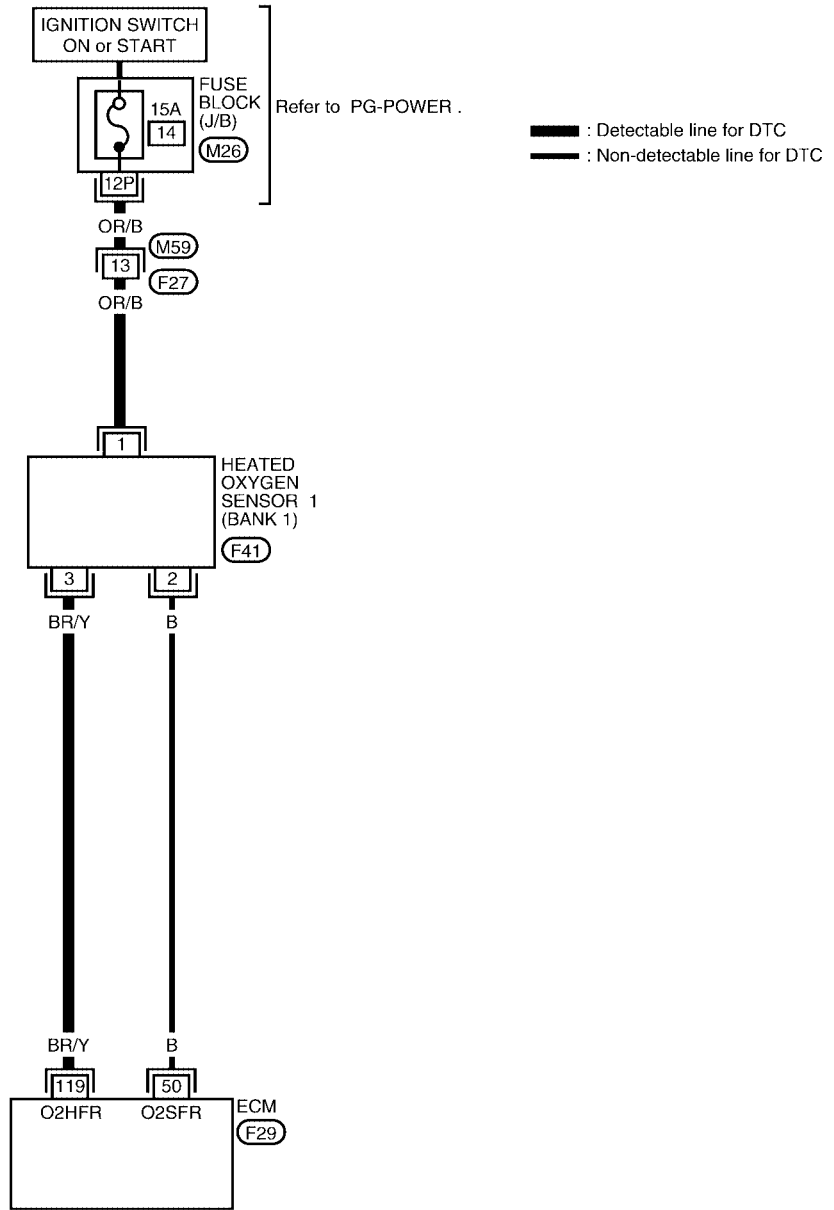
# DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

[VG33E]

UBS0071R

## Wiring Diagram BANK 1

EC-O2H1B1-01



# DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

[VG33E]

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

**CAUTION:**

Do not use 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 COLO R | ITEM                                   | CONDITION  | DATA (DC Voltage)          |
|---------------|-------------|--|--|----------------------------|
| 119           | BR/Y        | Heated oxygen sensor 1 heater (bank 1) | [Engine is running]<br>● Engine speed is below 2,800 rpm | Approximately 0.4V         |
|               |             |  | [Engine is running]<br>● Engine speed is above 2,800 rpm | BATTERY VOLTAGE (11 - 14V) |

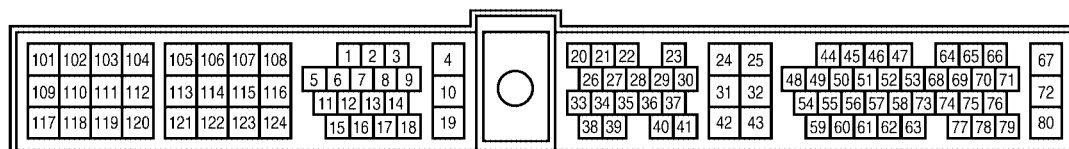
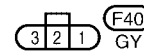
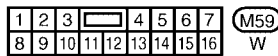
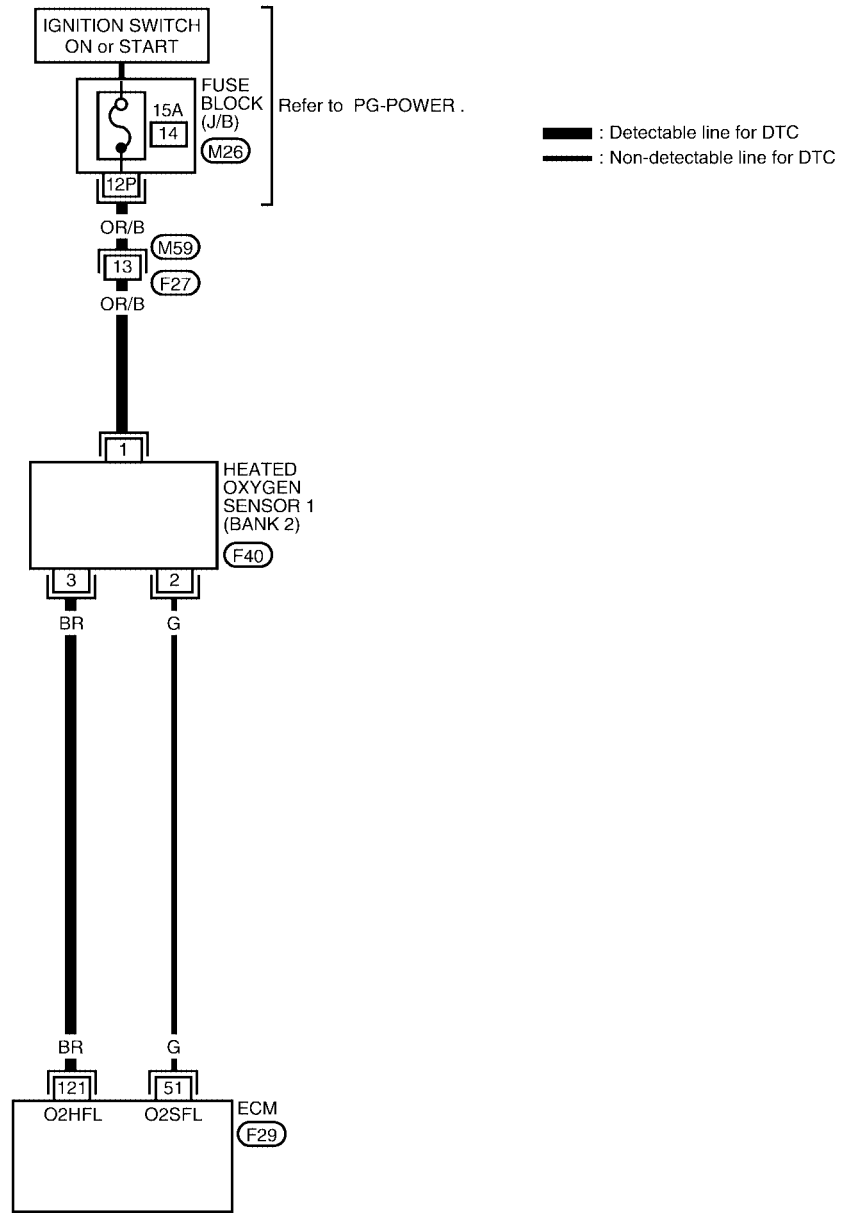
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# DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

[VG33E]

BANK 2

EC-O2H1B2-01



BBWA0467E

# DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

[VG33E]

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

**CAUTION:**

Do not use 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.

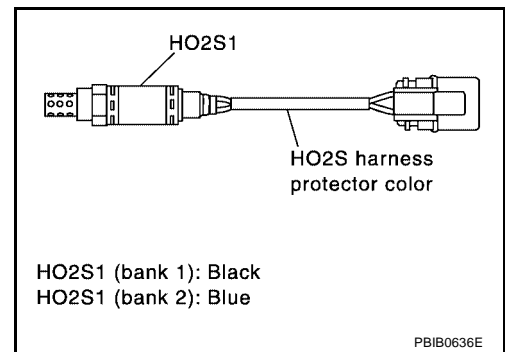
| TER-MINAL NO. | WIRE COLO R | ITEM                                   | CONDITION  | DATA (DC Voltage)          |
|---------------|-------------|--|--|----------------------------|
| 121           | BR          | Heated oxygen sensor 1 heater (bank 2) | [Engine is running]<br>● Engine speed is below 2,800 rpm | Approximately 0.4V         |
|               |             |  | [Engine is running]<br>● Engine speed is above 2,800 rpm | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

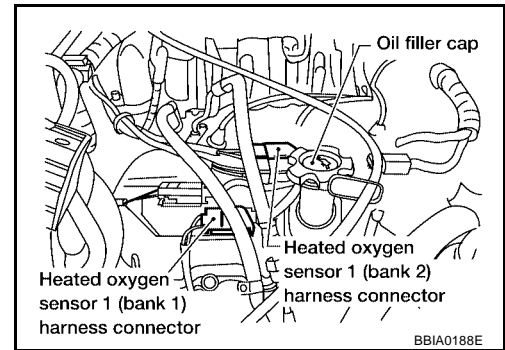
UBS007IS

### 1. CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check heated oxygen sensor 1 harness protector.



3. Disconnect corresponding heated oxygen sensor 1 harness connector.
4. Turn ignition switch ON.

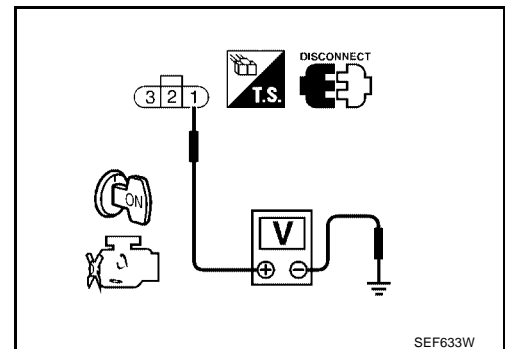


5. Check voltage between HO2S1 terminal 1 and ground with CONSULT-II or tester.

**Voltage** : Battery voltage

OK or NG

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



## 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Fuse block (J/B) connector M26
- 10A fuse
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair harness or connectors.

## 3. 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 4.

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

## 4. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to [EC-712, "Component Inspection"](#) .

OK or NG

OK >> GO TO 5.

NG >> Replace malfunctioning heated oxygen sensor 1.

## 5. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END

### Component Inspection HEATED OXYGEN SENSOR 1 HEATER

UBS007IT

1. Check resistance between HO2S1 terminals 3 and 1.

**Resistance : 2.3 - 4.3Ω at 25°C (77°F)**

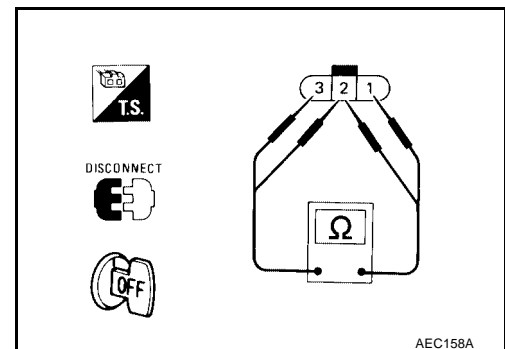
2. Check continuity between HO2S1 terminals 2 and 1, 3 and 2.

**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.





# DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

[VG33E]

- 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.

A

## Removal and Installation HEATED OXYGEN SENSOR 1

UBS007IU

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

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# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

[VG33E]

## DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

PF2:226A0

### Description SYSTEM DESCRIPTION

UBS0071V

| Sensor                   | Input Signal to ECM | ECM function                          | Actuator                       |
|--------------------------|---------------------|---------------------------------------|--------------------------------|
| Camshaft position sensor | Engine speed        | Heated oxygen sensor 2 heater control | Heated oxygen sensor 2 heaters |

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. <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> | ON                            |

### CONSULT-II Reference Value in Data Monitor Mode

UBS0071W

Specification data are reference values.

| MONITOR ITEM                     | CONDITION  | SPECIFICATION |
|----------------------------------|--|---------------|
| HO2S2 HTR (B1)<br>HO2S2 HTR (B2) | <ul style="list-style-type: none"> <li>● Engine speed: Below 3,600 rpm after the following conditions are met.</li> <li>● Engine: After warming up</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> | ON            |
|                                  | <ul style="list-style-type: none"> <li>● Engine speed: Above 3,600 rpm</li> </ul>  | OFF           |

### On Board Diagnosis Logic

UBS0071X

| DTC No.                          | Trouble diagnosis name                             | DTC detecting condition  | Possible cause   |
|----------------------------------|--|--|--|
| P0037 (Bank 1)<br>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.)  | <ul style="list-style-type: none"> <li>● Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.)</li> <li>● Heater oxygen sensor 2 heater</li> </ul> |
| P0038 (Bank 1)<br>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.) | <ul style="list-style-type: none"> <li>● Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.)</li> <li>● Heater oxygen sensor 2 heater</li> </ul>         |

### DTC Confirmation Procedure

UBS0071Y

#### 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 one minute under no load.
5. Let engine idle for one minute.
6. If 1st trip DTC is detected, go to [EC-720, "Diagnostic Procedure"](#)

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

 **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 one minute under no load.
  3. Let engine idle for one 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 one minute under no load.
  6. Let engine idle for one minute.
  7. Select "MODE 3" with GST.
  8. If DTC is detected, go to [EC-720, "Diagnostic Procedure"](#).
- **When using GST, "DTC Confirmation Procedure" should be performed twice as much as when using CONSULT-II because GST cannot display MODE 7 (1st trip DTC) concerning this diagnosis. Therefore, using CONSULT-II is recommended.**

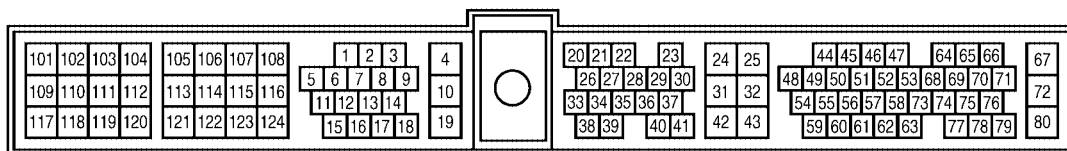
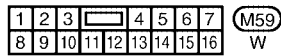
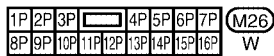
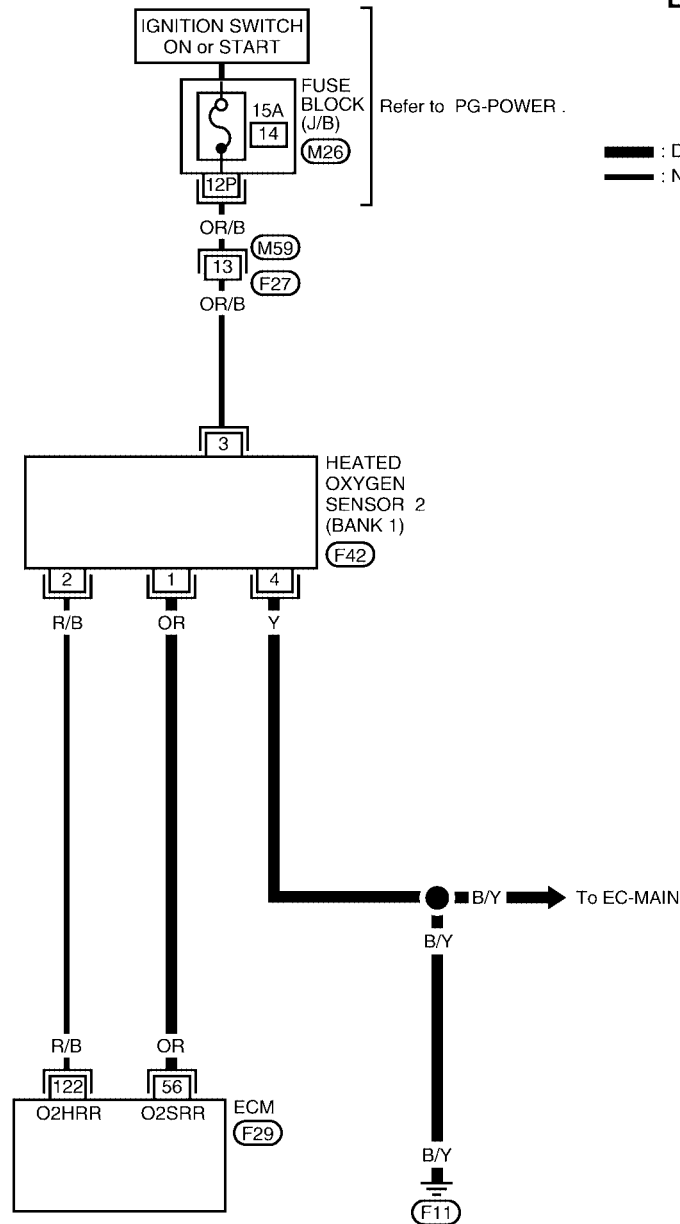
# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

[VG33E]

UBS0071Z

## Wiring Diagram BANK 1

EC-O2S2B1-01



BBWA0476E

# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

[VG33E]

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

**CAUTION:**

**Do not use 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 COLO R | ITEM                                   | CONDITION   | DATA (DC Voltage)          |
|---------------|-------------|--|---|----------------------------|
| 122           | R/B         | Heated oxygen sensor 2 heater (bank 1) | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is below 3,600 rpm after the following conditions are met.</li> <li>– Engine: After warning up</li> <li>– Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> | 0 - 1.0V                   |
|               |             |  | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"> <li>● Engine stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is above 3,600 rpm</li> </ul>   | BATTERY VOLTAGE (11 - 14V) |

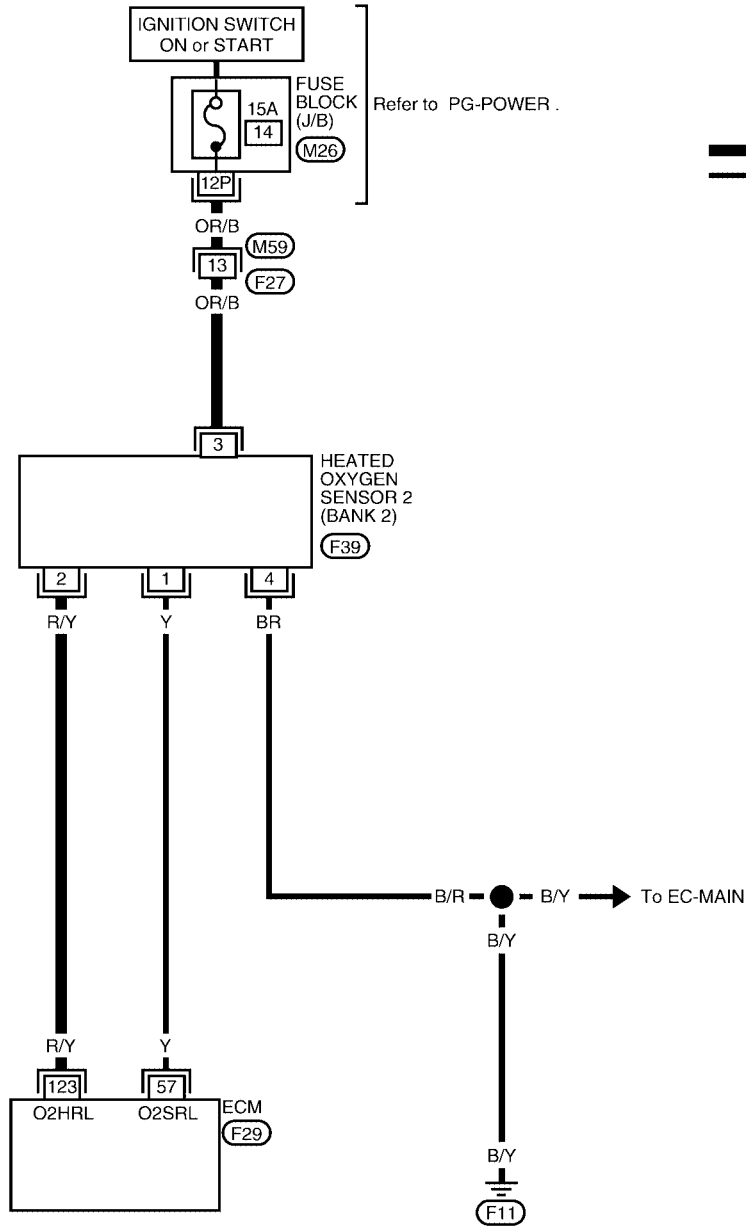
A  
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# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

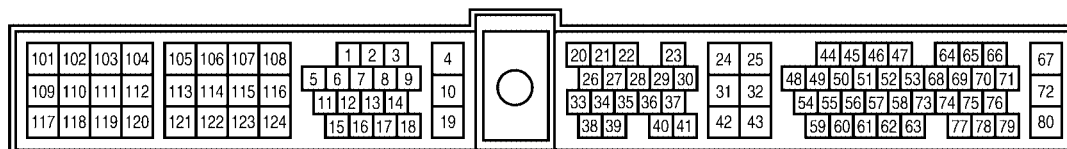
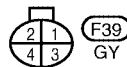
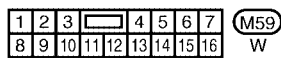
[VG33E]

BANK 2

EC-O2H2B2-01



— : Detectable line for DTC  
 — : Non-detectable line for DTC



WBWA0027E

# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

[VG33E]

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

**CAUTION:**

Do not use 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.

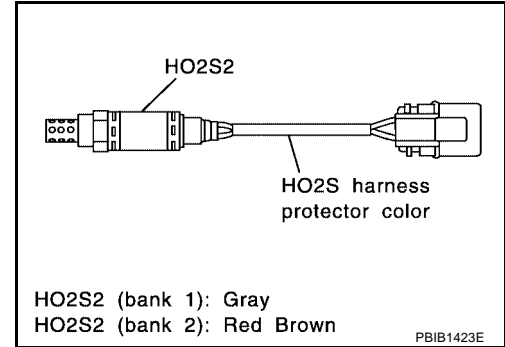
| TER-MINAL NO. | WIRE COLO R | ITEM                                   | CONDITION   | DATA (DC Voltage)          |
|---------------|-------------|--|---|----------------------------|
| 123           | R/Y         | Heated oxygen sensor 2 heater (bank 2) | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is below 3,600 rpm after the following conditions are met.</li> <li>– Engine: After warning up</li> <li>– Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> | 0 - 1.0V                   |
|               |             |  | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"> <li>● Engine stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is above 3,600 rpm</li> </ul>   | BATTERY VOLTAGE (11 - 14V) |

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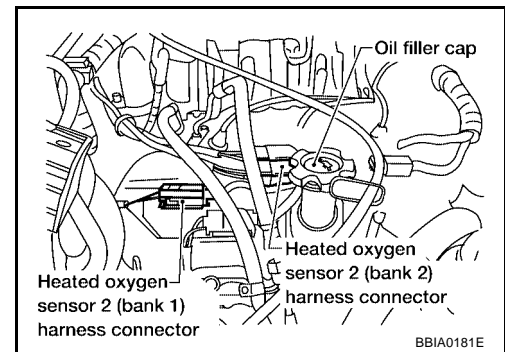
## Diagnostic Procedure

### 1. CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 harness protector color.



3. Disconnect corresponding heated oxygen sensor 2 harness connector.
4. Turn ignition switch ON.

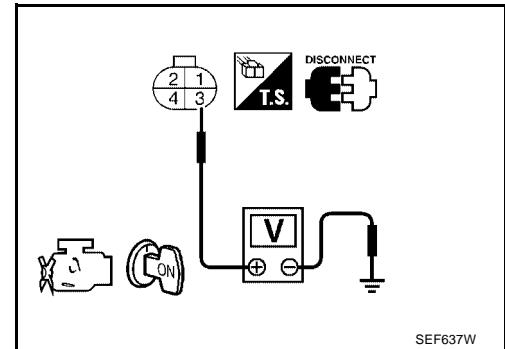


5. Check voltage between HO2S2 terminal 3 and ground.

**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 M26
- 10A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair harness or connectors.



### 3. 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,<br>P0038 | 122       | 2      | Bank 1 |
| P0057,<br>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 >> GO TO 4.

### 4. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open or short between heated oxygen sensor 2 and engine ground.

>> 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-721, "Component Inspection"](#) .

OK or NG

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

### 6. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Component Inspection HEATED OXYGEN SENSOR 2 HEATER

Check the following.

UBS007J1

# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

[VG33E]

1. Check resistance between HO2S2 terminals 2 and 3.

**Resistance : 2.3 - 4.3Ω at 25°C (77°F)**

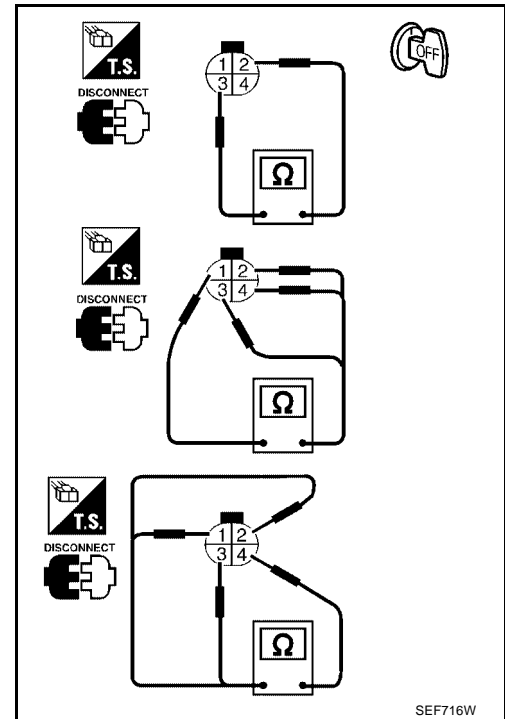
2. Check continuity.

| 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 HEATED OXYGEN SENSOR 2

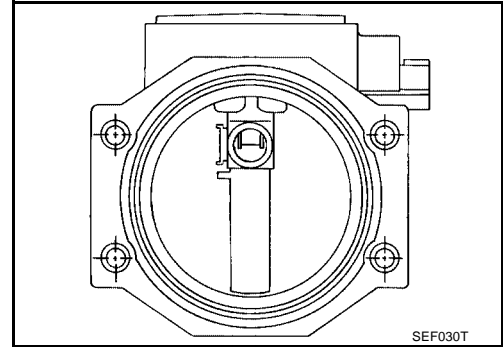
Refer to [EX-3, "EXHAUST SYSTEM"](#) .

UBS007J2

## DTC P0101 MAF SENSOR

### Component Description

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot wire that is supplied with electric current from the ECM. The temperature of the hot wire is controlled by the ECM 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 ECM must supply more 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.



### CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

| MONITOR ITEM  | CONDITION  |           | SPECIFICATION     |
|---------------|--|-----------|-------------------|
| MAS A/F SE-B1 | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 1.0 - 1.7V        |
|               |  | 2,500 rpm | 1.7 - 2.3V        |
| CAL/LD VALUE  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 18.5 - 26.0%      |
|               |  | 2,500 rpm | 18.0 - 21.0%      |
| MASS AIRFLOW  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 3.3 - 4.8 g-m/s   |
|               |  | 2,500 rpm | 12.0 - 14.9 g-m/s |

### On Board Diagnosis Logic

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Mass air flow sensor</li> </ul>                             |
|         |  | B)                      | A low voltage from the sensor is sent to ECM under heavy load driving condition.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Intake air leaks</li> <li>● Mass air flow sensor</li> </ul> |

### DTC Confirmation Procedure

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-727, "Diagnostic Procedure"](#)

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

SEF174Y

**With GST**

Follow the procedure "With CONSULT-II".

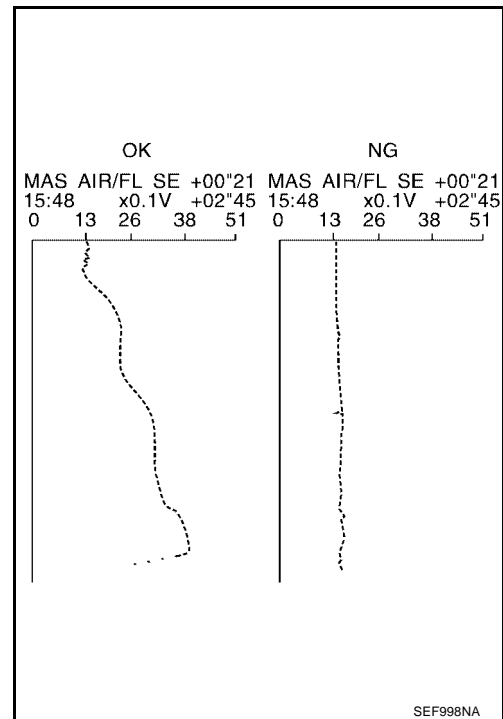
**PROCEDURE FOR MALFUNCTION B**

**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-727, "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-727, "Diagnostic Procedure"](#) .  
If OK, go to following step.



# DTC P0101 MAF SENSOR

[VG33E]

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. |

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| VHCL SPEED SE | XXX km/h |
| THRTL POS SEN | XXX V    |

SEF175Y

8. If 1st trip DTC is detected, go to [EC-727, "Diagnostic Procedure"](#)

## Overall Function Check PROCEDURE FOR MALFUNCTION B

UBS007J7

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-727, "Diagnostic Procedure"](#) .

|              |                   |
|--------------|-------------------|
| CALC LOAD    | 20%               |
| COOLANT TEMP | 95°C              |
| SHORT FT #1  | 2%                |
| LONG FT #1   | 0%                |
| SHORT FT #2  | 4%                |
| LONG FT #2   | 0%                |
| ENGINE SPD   | 2637RPM           |
| VEHICLE SPD  | 0MPH              |
| IGN ADVANCE  | 41.0°             |
| INTAKE AIR   | 41°C              |
| <b>MAF</b>   | <b>14.1gm/sec</b> |
| THROTTLE POS | 3%                |

SEF534P

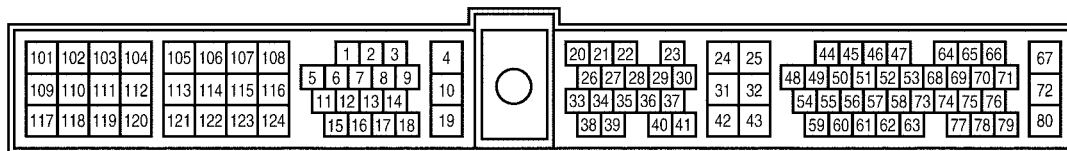
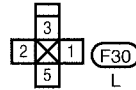
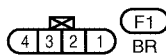
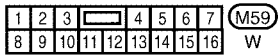
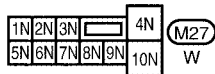
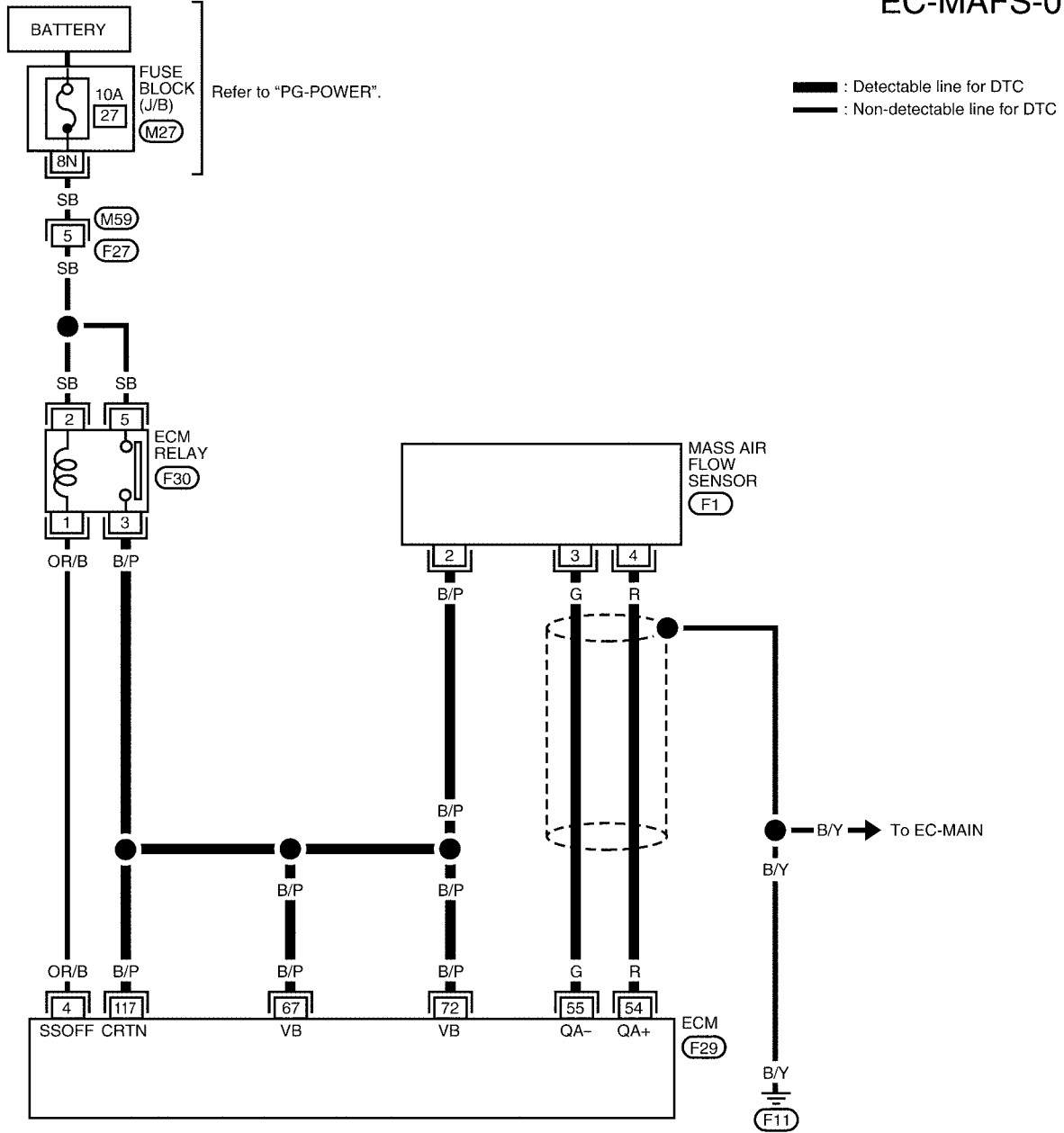
# DTC P0101 MAF SENSOR

[VG33E]

UBS007J8

## Wiring Diagram

EC-MAFS-01



BBWA0470E

# DTC P0101 MAF SENSOR

[VG33E]

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

**CAUTION:**

Do not use 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 COLO R | ITEM                        | CONDITION   | DATA (DC Voltage)          |
|---------------|-------------|-----------------------------|---|----------------------------|
| 54            | R           | Mass air flow sensor        | [Engine is running]<br>● Warm-up condition<br>● Idle speed                | 1.0 - 1.7V                 |
|               |             |                             | [Engine is running]<br>● Warm-up condition<br>● Engine speed is 2,500 rpm | 1.7 - 2.3V                 |
| 55            | G           | Mass air flow sensor ground | [Engine is running]<br>● Warm-up condition<br>● 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) |

## Diagnostic Procedure

UBS007J9

### 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

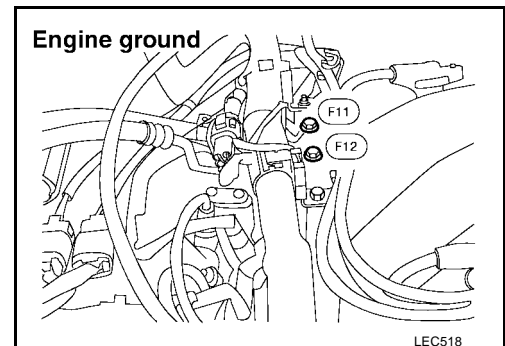
OK or NG

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

### 3. RETIGHTEN GROUND SCREWS

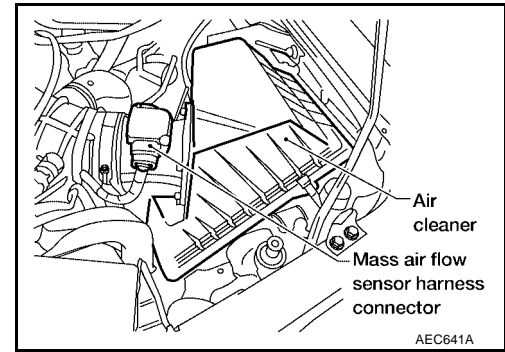
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 4.



## 4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

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

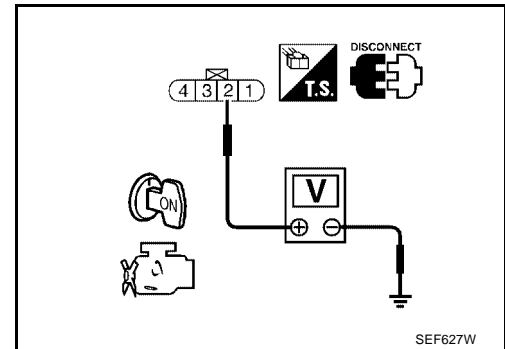


3. Check voltage between terminal 2 and ground with CONSULT-II or tester.

**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 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-729, "Component Inspection"](#) .

OK or NG

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

**9. CHECK INTERMITTENT INCIDENT**

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Component Inspection  
MASS AIR FLOW SENSOR**

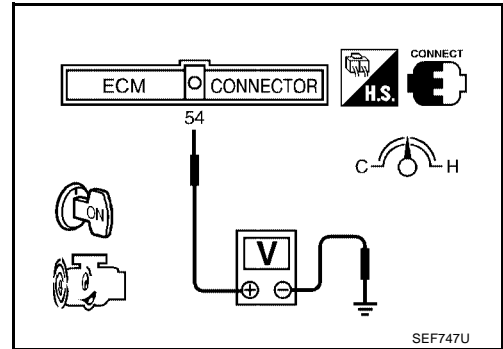
UBS007JA

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.



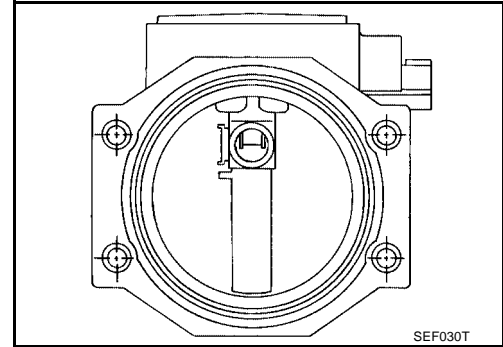
SEF747U

## DTC P0102, P0103 MAF SENSOR

### Component Description

UBS007JC

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot wire that is supplied with electric current from the ECM. The temperature of the hot wire is controlled by the ECM 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 ECM must supply more 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.



### CONSULT-II Reference Value in Data Monitor Mode

UBS007JD

Specification data are reference values.

| MONITOR ITEM  | CONDITION  |           | SPECIFICATION     |
|---------------|--|-----------|-------------------|
| MAS A/F SE-B1 | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 1.0 - 1.7V        |
|               |  | 2,500 rpm | 1.7 - 2.3V        |
| CAL/LD VALUE  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 18.5 - 26.0%      |
|               |  | 2,500 rpm | 18.0 - 21.0%      |
| MASS AIRFLOW  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 3.3 - 4.8 g·m/s   |
|               |  | 2,500 rpm | 12.0 - 14.9 g·m/s |

### On Board Diagnosis Logic

UBS007JE

| 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.<br>This self-diagnosis has the one trip detection logic. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Intake air leaks</li> <li>● Mass air flow sensor</li> </ul> |
| P0103   | Mass air flow sensor circuit high input | An excessively high voltage from the sensor is sent to ECM.   | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Mass air flow sensor</li> </ul>                             |

### 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

UBS007JF

#### 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-733, "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-733, "Diagnostic Procedure"](#) .

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

### With GST

Follow the procedure "With CONSULT-II".

## 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-733, "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-733, "Diagnostic Procedure"](#) .

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

### With GST

Follow the procedure "With CONSULT-II".

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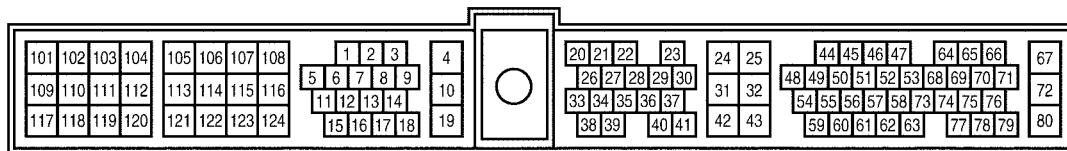
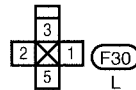
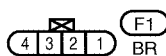
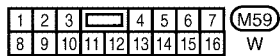
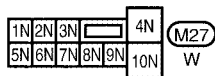
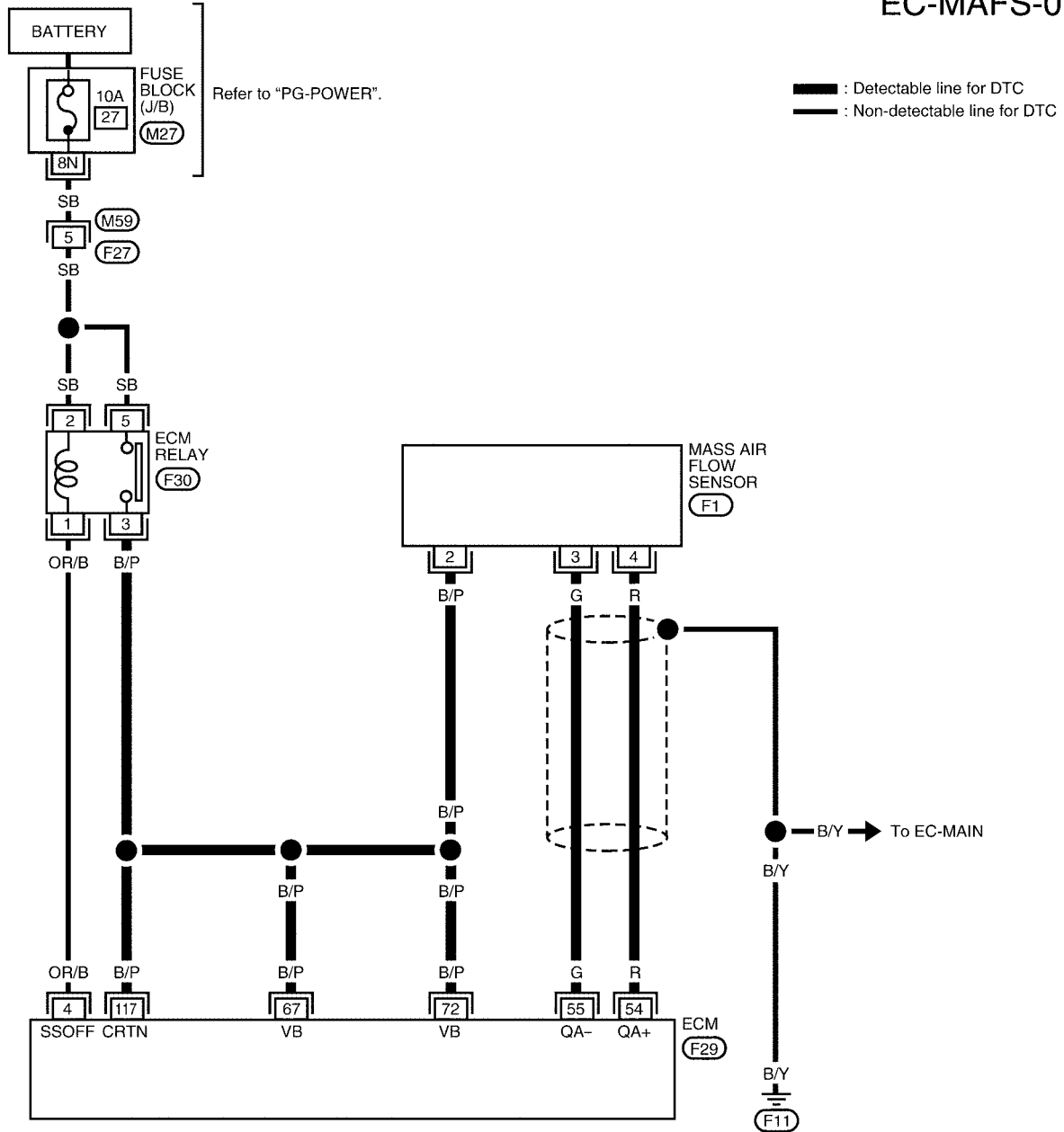
# DTC P0102, P0103 MAF SENSOR

[VG33E]

UBS007JG

## Wiring Diagram

EC-MAFS-01



BBWA0470E

# DTC P0102, P0103 MAF SENSOR

[VG33E]

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

**CAUTION:**

Do not use 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 COLO R | ITEM                        | CONDITION   | DATA (DC Voltage) |
|---------------|-------------|-----------------------------|---|-------------------|
| 54            | R           | Mass air flow sensor        | [Engine is running]<br>● Warm-up condition<br>● Idle speed                | 1.0 - 1.7V        |
|               |             |                             | [Engine is running]<br>● Warm-up condition<br>● Engine speed is 2,500 rpm | 1.7 - 2.3V        |
| 55            | G           | Mass air flow sensor ground | [Engine is running]<br>● Warm-up condition<br>● Idle speed                | Approximately 0V  |

## Diagnostic Procedure

UBS007JH

### 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

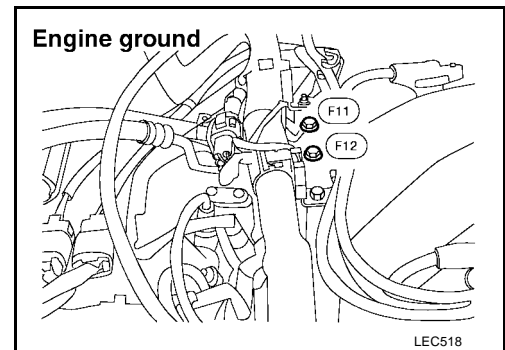
OK or NG

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

### 3. RETIGHTEN GROUND SCREWS

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

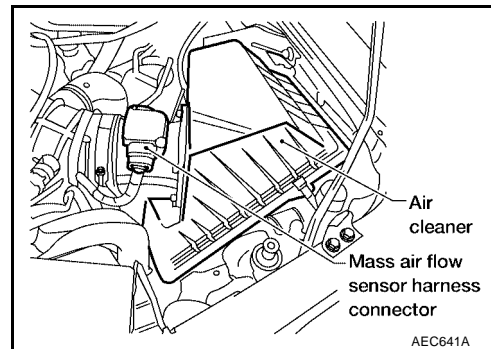
>> GO TO 4.



LEC518

#### 4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

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

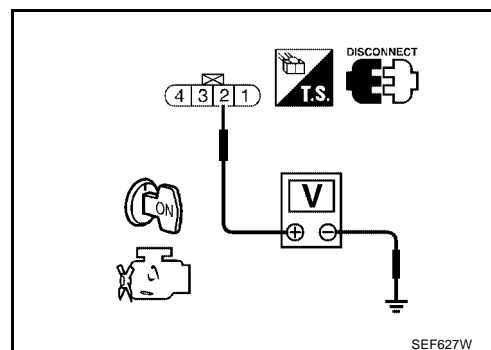


3. Check voltage between terminal 2 and ground with CONSULT-II or tester.

**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 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 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-735, "Component Inspection"](#) .

OK or NG

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

**9. CHECK INTERMITTENT INCIDENT**

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Component Inspection  
MASS AIR FLOW SENSOR**

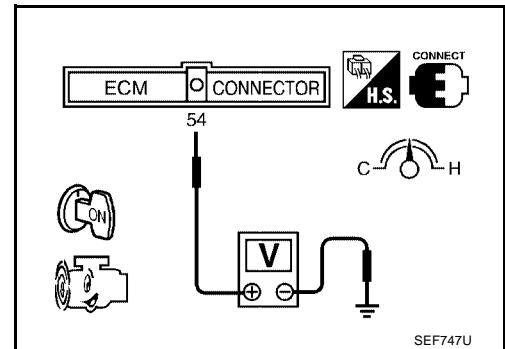
UBS00903

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.



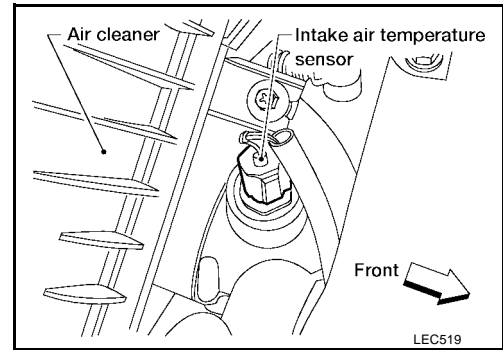
A  
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**DTC P0112, P0113 IAT SENSOR**

**Component Description**

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.



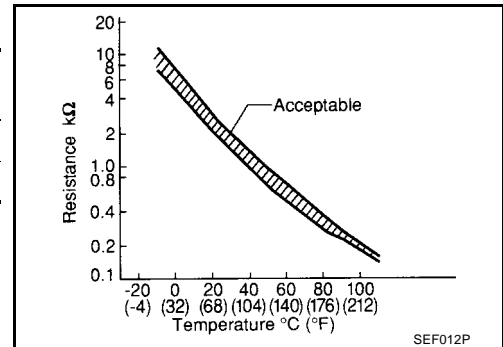
**<Reference data>**

| 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**

| 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.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Intake air temperature sensor</li> </ul> |
| P0113   | Intake air temperature sensor circuit high input | An excessively high voltage from the sensor is sent to ECM. |   |

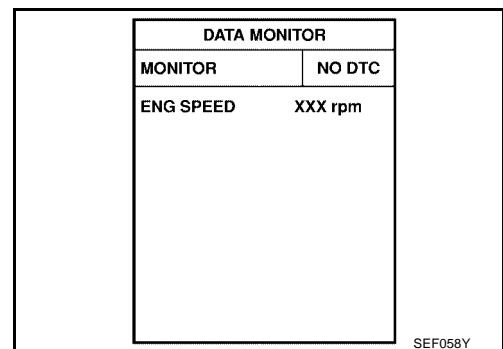
**DTC Confirmation Procedure**

**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.

**④ 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-739, "Diagnostic Procedure"](#)





# DTC P0112, P0113 IAT SENSOR

[VG33E]



## WITH GST

Follow the procedure "With CONSULT-II".

A

EC

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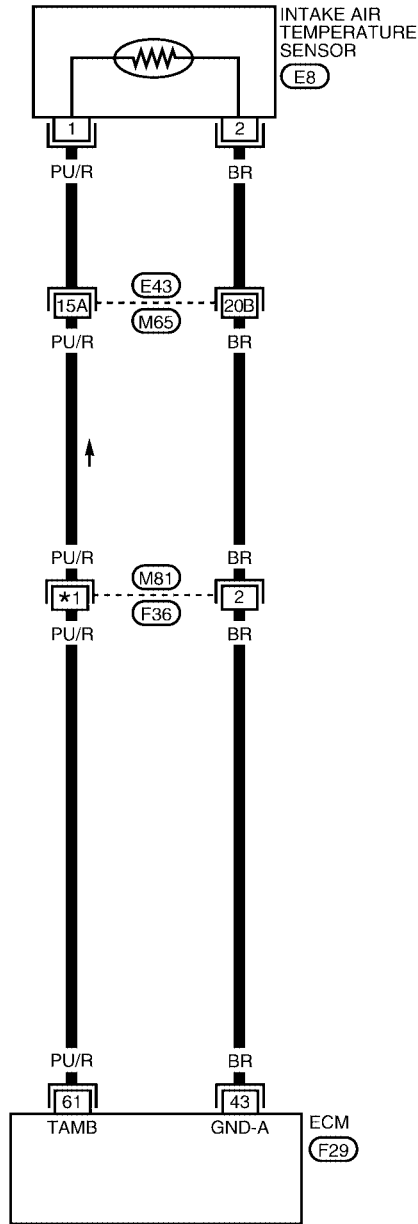
# DTC P0112, P0113 IAT SENSOR

[VG33E]

UBS007JM

## Wiring Diagram

EC-IATS-01

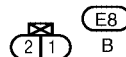
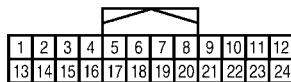
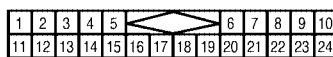


: Detectable line for DTC  
 : Non-detectable line for DTC

EP : EARLY PRODUCTION  
LP : LATE PRODUCTION

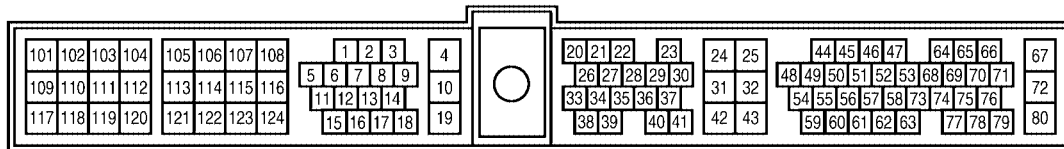
EP : 22  
LP : 24

\*1



Refer to the following.

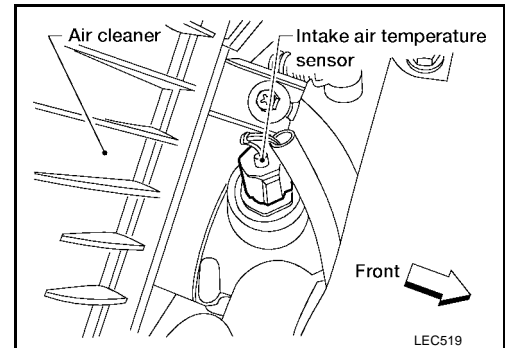
E43 - SUPER MULTIPLE JUNCTION (SMJ)



WBWA0028E

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

1. Turn ignition switch OFF.
2. Disconnect intake air temperature sensor harness connector.
3. Turn ignition switch ON.

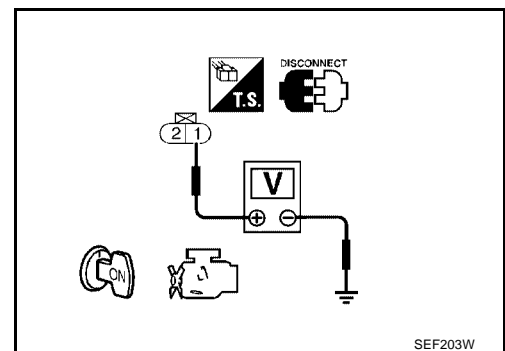


4. Check voltage between terminal 1 and ground.

**Voltage** : **Approximately 5V**

OK or NG

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

**2. 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.

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

1. Turn ignition switch OFF.
2. Check harness continuity between intake air temperature sensor terminal 2 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 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 ECM and intake air temperature sensor

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

## 5. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-740, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 6.
- NG >> Replace intake air temperature sensor.

## 6. CHECK INTERMITTENT INCIDENT

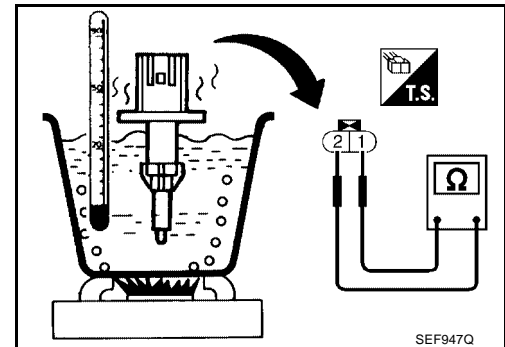
Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Component Inspection INTAKE AIR TEMPERATURE SENSOR

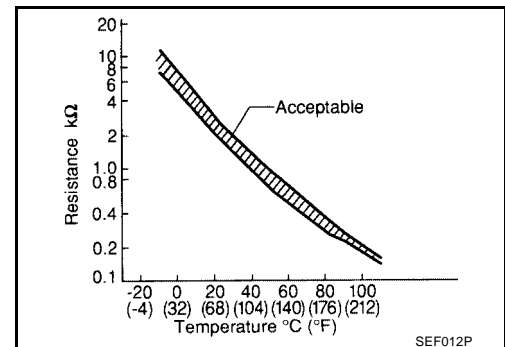
Check resistance as shown in the figure.

UBS007JO



#### <Reference data>

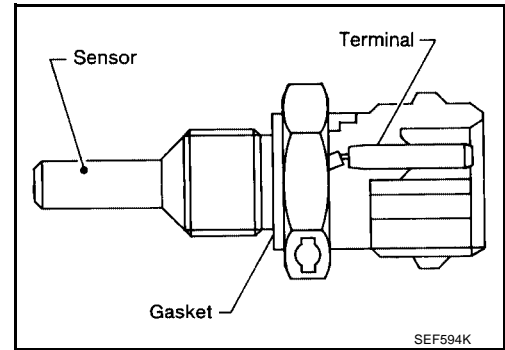
| Intake air temperature °C (°F) | Resistance kΩ |
|--------------------------------|---------------|
| 20 (68)                        | 2.1 - 2.9     |
| 80 (176)                       | 0.27 - 0.38   |



## DTC P0117, P0118 ECT SENSOR

### Component Description

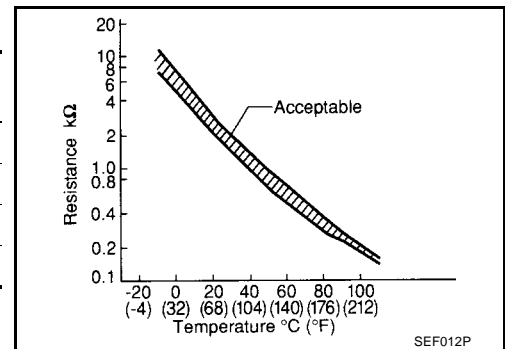
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



### <Reference data>

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

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

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.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Engine coolant temperature sensor</li> </ul> |
| 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".<br>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)<br>(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

UBS007JS

### 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-744, "Diagnostic Procedure"](#) .

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

### WITH GST

Follow the procedure "With CONSULT-II".

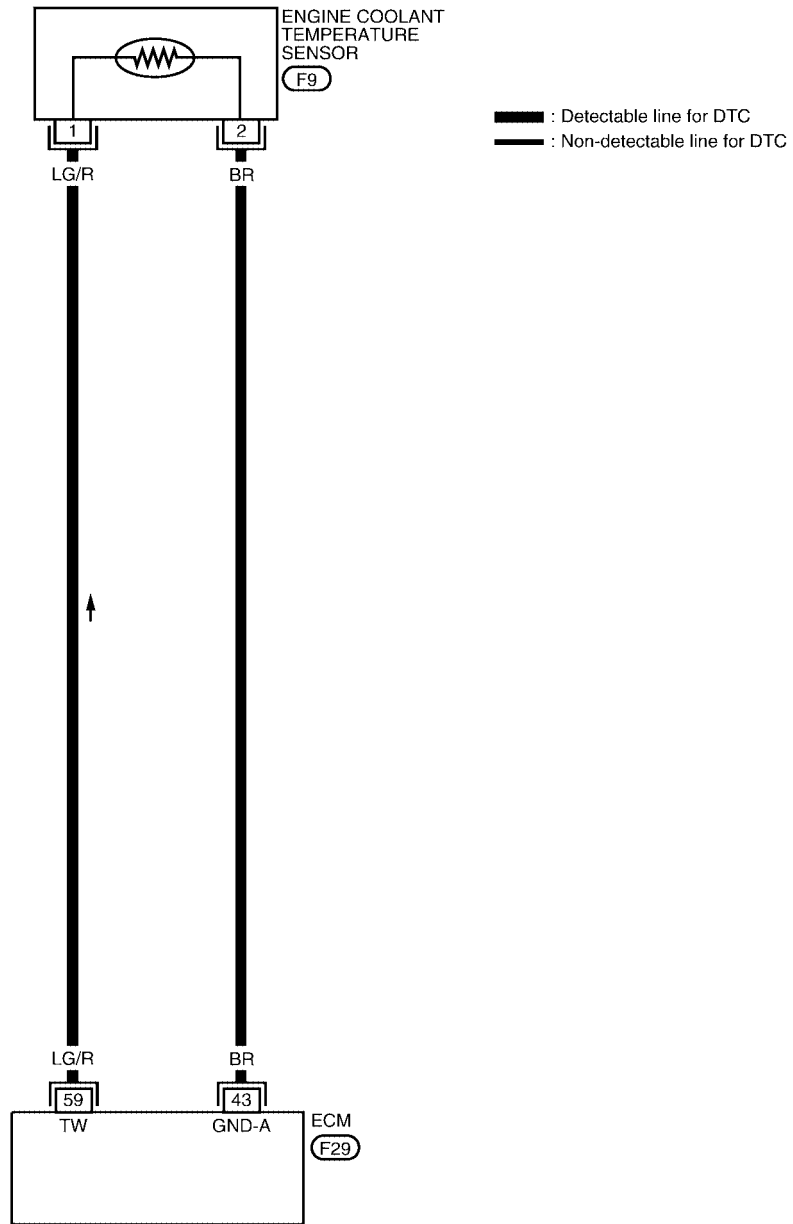
# DTC P0117, P0118 ECT SENSOR

[VG33E]

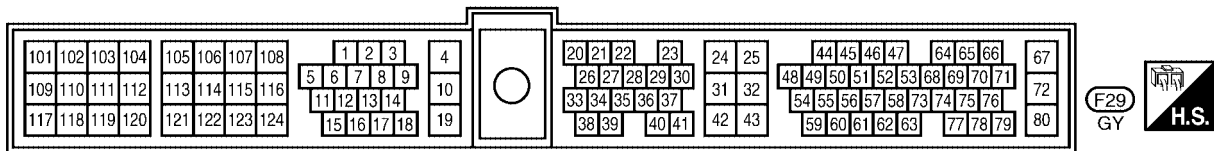
UBS007JT

## Wiring Diagram

EC-ECTS-01



A  
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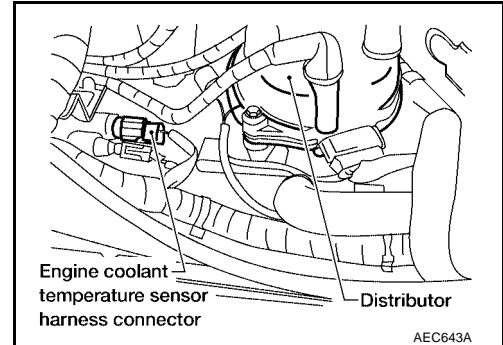


BBWA0472E

## Diagnostic Procedure

### 1. CHECK ECTS POWER SUPPLY CIRCUIT

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

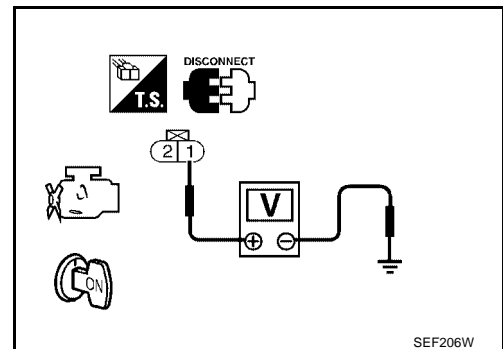


4. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

**Voltage** : Approximately 5V

OK or NG

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



### 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM and engine coolant temperature sensor

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

### 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ECT sensor terminal 2 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

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

### 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM and engine coolant temperature sensor

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



**5. CHECK ENGINE COOLANT TEMPERATURE SENSOR**

Refer to [EC-745, "Component Inspection"](#) .

OK or NG

OK >> GO TO 6.

NG >> Replace engine coolant temperature sensor.

**6. CHECK INTERMITTENT INCIDENT**

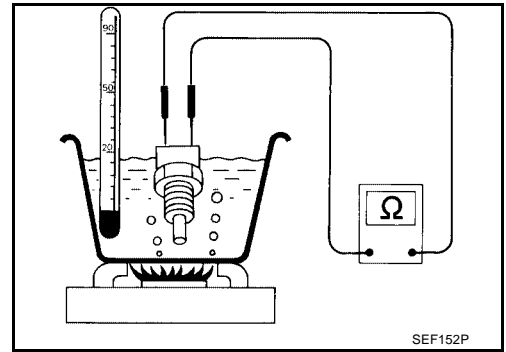
Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Component Inspection  
ENGINE COOLANT TEMPERATURE SENSOR**

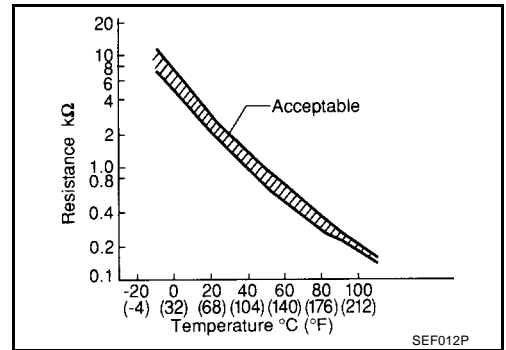
UBS007JV

Check resistance 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  
ENGINE COOLANT TEMPERATURE SENSOR**

UBS007JW

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

DTC P0121 TP SENSOR

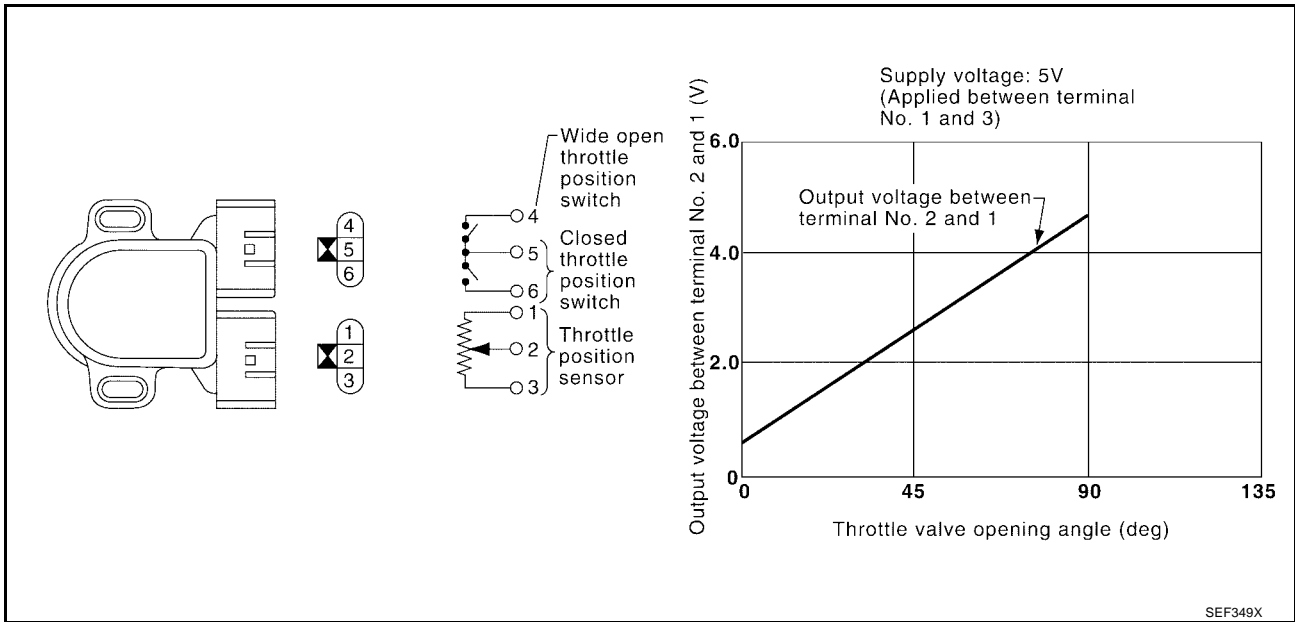
Component Description

NOTE:

If DTC P0121 is displayed with DTC P0510, first perform the trouble diagnosis for DTC P0510. Refer to EC-995.

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

Specification data are reference values.

| MONITOR ITEM  | CONDITION  | SPECIFICATION                                      |
|---------------|--|--|
| THRTL POS SEN | <ul style="list-style-type: none"> <li>Engine: After warming up, idle the engine</li> </ul>  | Throttle valve: fully closed (a) 0.15 - 0.85V      |
|               | <ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Ignition switch: ON (Engine stopped)</li> </ul>   | Throttle valve: Partially open Between (a) and (b) |
|               |  | Throttle valve: fully opened (b) 3.5 - 4.7V        |
| ABSOL TH-P/S  | <ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Ignition switch: ON</li> <li>More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.</li> </ul> | Throttle valve: fully closed 0.0%                  |
|               | <ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Ignition switch: ON (Engine stopped)</li> </ul>   | Throttle valve: fully opened Approx. 80%           |

## On Board Diagnosis Logic

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The TP sensor circuit is open or shorted.)</li> <li>● TP sensor</li> <li>● Fuel injector</li> <li>● Camshaft position sensor</li> <li>● Mass air flow sensor</li> </ul> |
|         |  | B)                      | A low voltage from the sensor is sent to ECM under heavy load driving condition.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The TP sensor circuit is open or shorted.)</li> <li>● Intake air leaks</li> <li>● TP sensor</li> </ul>  |

## DTC Confirmation Procedure

### 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.

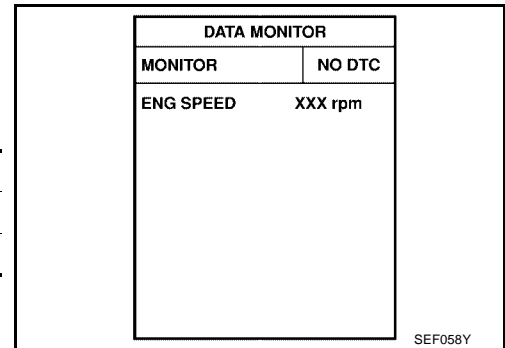
### PROCEDURE FOR MALFUNCTION A

#### ④ With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 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-750, "Diagnostic Procedure"](#)



#### ④ With GST

Follow the procedure “With CONSULT-II”.

### PROCEDURE FOR MALFUNCTION B

#### CAUTION:

**Always drive vehicle at a safe speed.**

#### ④ 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.

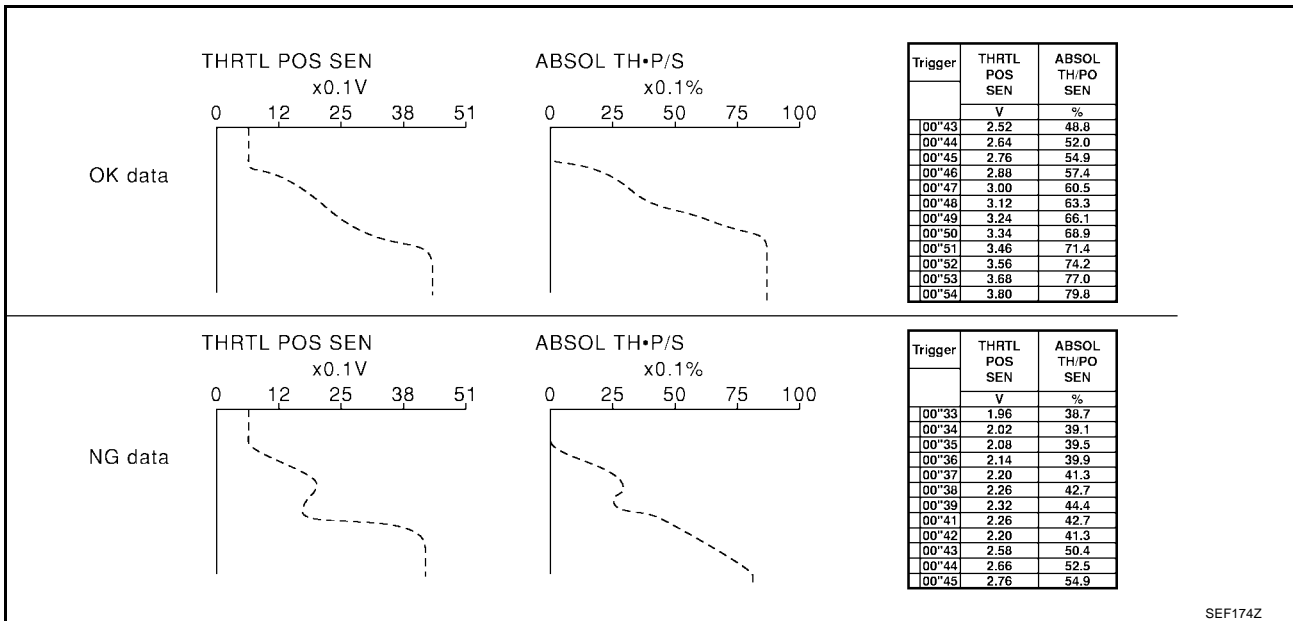
# DTC P0121 TP SENSOR

[VG33E]

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-750, "Diagnostic Procedure"](#) .  
 If OK, go to following step.

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

SEF177Y



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-750, "Diagnostic Procedure"](#) .

**With GST**

Follow the procedure "With CONSULT-II".

# DTC P0121 TP SENSOR

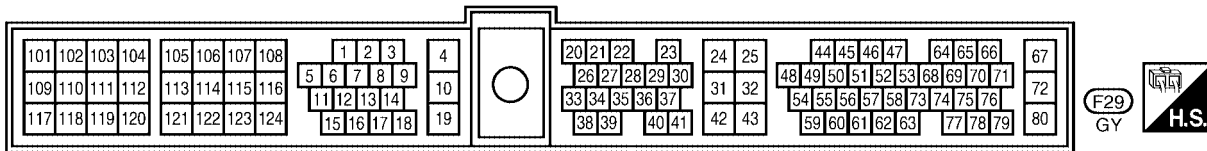
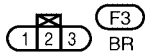
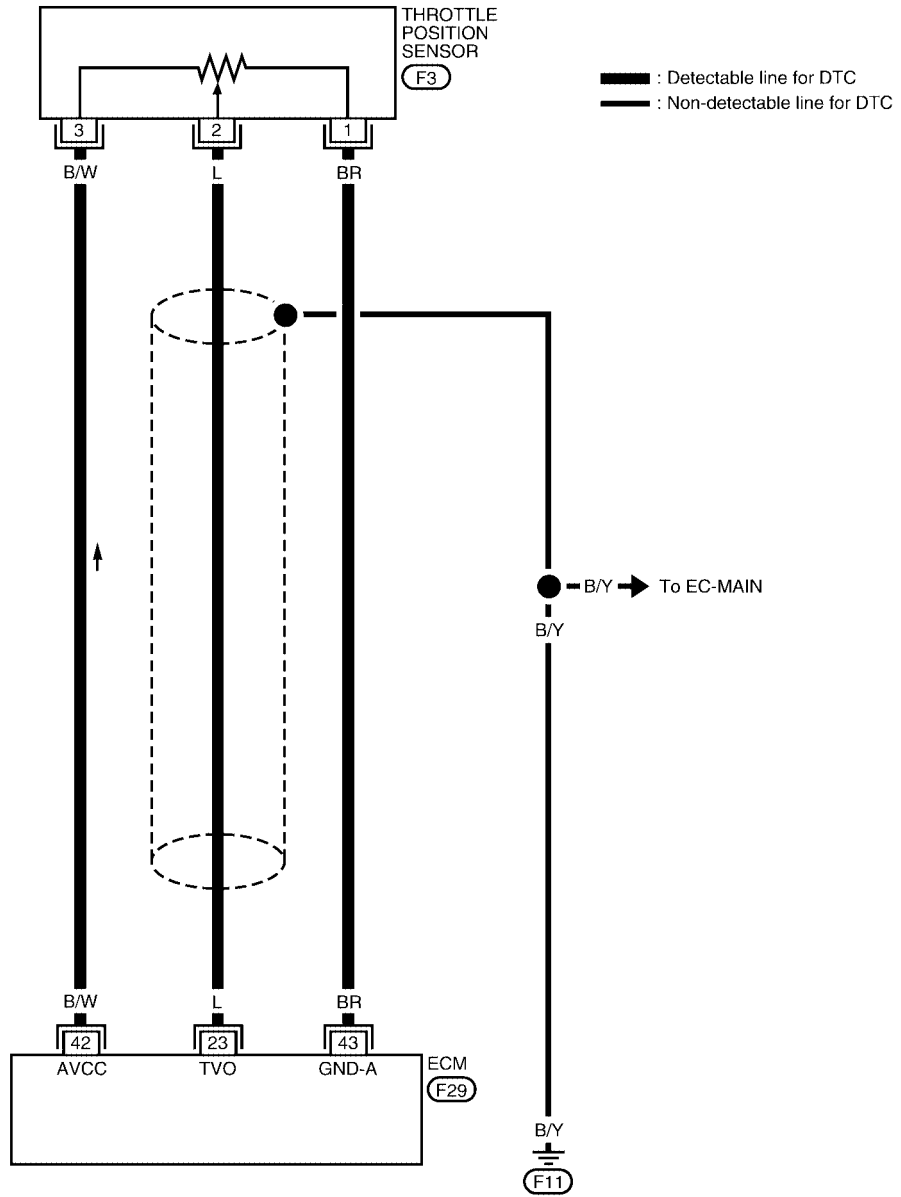
[VG33E]

UBS007K1

## Wiring Diagram

EC-TPS-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



BBWA0473E

# DTC P0121 TP SENSOR

[VG33E]

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

**CAUTION:**

**Do not use 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 COLO R | ITEM                     | CONDITION  | DATA (DC Voltage) |
|---------------|-------------|--------------------------|--|-------------------|
| 23            | L           | Throttle position sensor | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> <li>● Accelerator pedal fully released</li> </ul> | 0.15 - 0.85V      |
|               |             |                          | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"> <li>● Engine stopped</li> <li>● Accelerator pedal fully depressed</li> </ul>                        | 3.5 - 4.7V        |
| 42            | B/W         | Sensors' power supply    | <b>[Ignition switch ON]</b>  | Approximately 5V  |
| 43            | BR          | Sensors' ground          | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>   | Approximately 0V  |

## Diagnostic Procedure

UBS007K2

### 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-648, "Basic Inspection"](#) .

| Items  | Specifications   |
|--|--|
| Ignitions timing   | 10° ± 2° BTDC  |
| Base idle speed  | 700 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.3 mm (0.012 in): ON<br>0.4 mm (0.016 in): OFF |
| Target idle speed  | 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

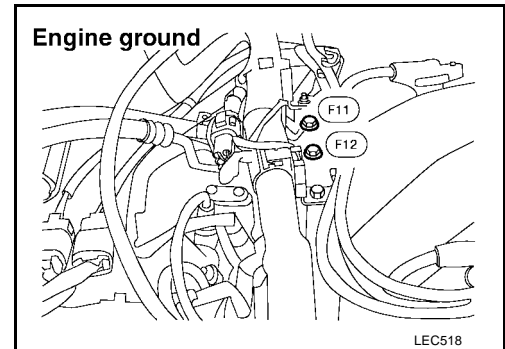
OK >> GO TO 4.

NG >> Reconnect the parts.

## 4. RETIGHTEN GROUND SCREWS

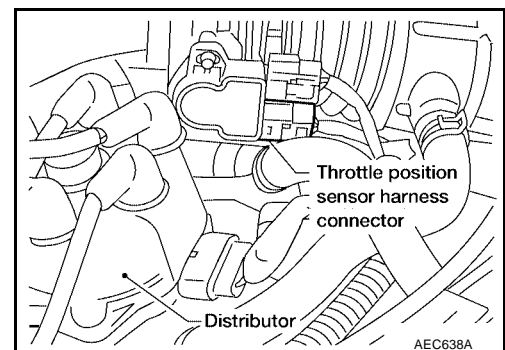
1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

>> GO TO 5.



## 5. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

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

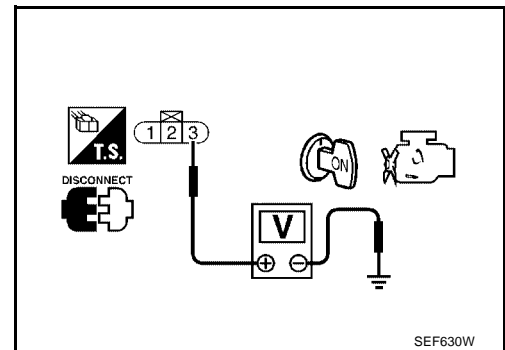


3. Check voltage between sensor terminal 3 and ground with CONSULT-II or tester.

**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. Check harness continuity between throttle position sensor terminal 1 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

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

## 7. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM and throttle position sensor.

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

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

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

**Continuity should exist.**

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

OK or NG

OK >> GO TO 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-754, "Component Inspection"](#) .

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

## 10. ADJUST CLOSED THROTTLE POSITION SWITCH

Adjust closed throttle position switch. Refer to [EC-648, "Basic Inspection"](#) .

| Items  | Specifications   |
|--|--|
| Ignitions timing   | 10° ± 2° BTDC  |
| Base idle speed  | 700 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.3 mm (0.012 in): ON<br>0.4 mm (0.016 in): OFF |
| Target idle speed  | 750 ± 50 rpm (in P or N position)  |

OK or NG

OK >> GO TO 11.

NG >> Replace throttle position sensor. To adjust it, perform [EC-648, "Basic Inspection"](#) .

## 11. CHECK MASS AIR FLOW SENSOR

Refer to [EC-729, "Component Inspection"](#) .

OK or NG

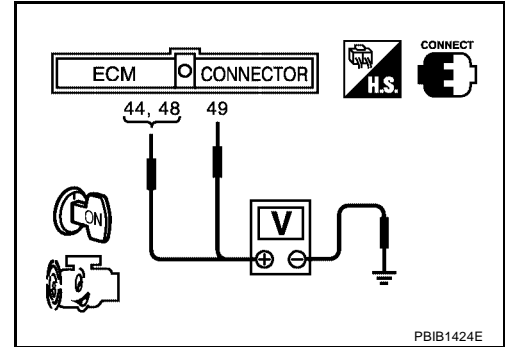
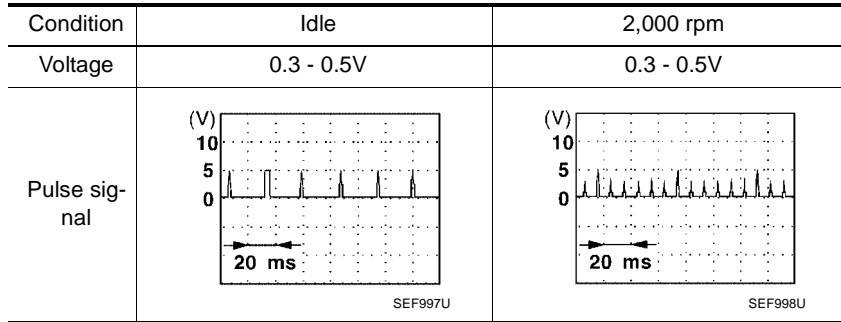
OK >> GO TO 12.

NG >> Replace mass air flow sensor.

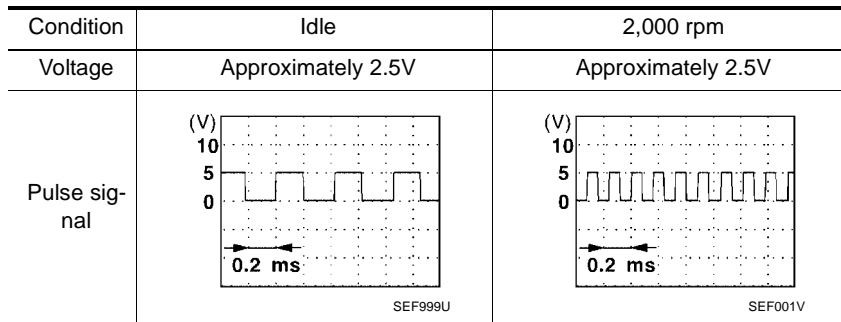


## 12. CHECK CAMSHAFT POSITION SENSOR

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.  
**<Terminal 44 or 48 and engine ground>**



### <Terminal 49 and engine ground>



### OK or NG

- OK >> GO TO 13.
- NG >> Replace distributor assembly with camshaft position sensor.

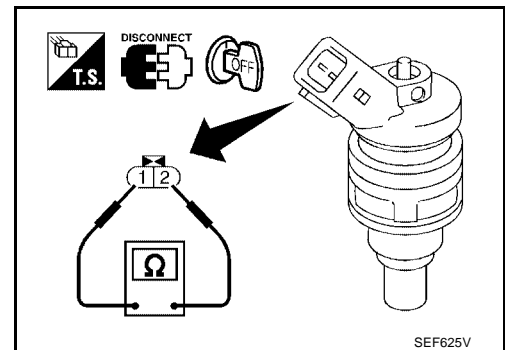
## 13. CHECK FUEL INJECTOR

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

**Resistance : 10 - 14Ω [at 25°C (77°F)]**

### OK or NG

- OK >> GO TO 14.
- NG >> Replace fuel injector.



## 14. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Component Inspection**  
**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 (a)     | 0.15 - 0.85V        |
| Partially open            | Between (a) and (b) |
| Completely open (b)       | 3.5 - 4.7V          |

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |
| THRTL POS SEN | XXX V   |

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**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 (a)     |
| Partially open            | Between (a) and (b) |
| Completely open           | 3.5 - 4.7 (b)       |

DTC P0122, P0123 TP SENSOR

PF3:16119

UBS007K5

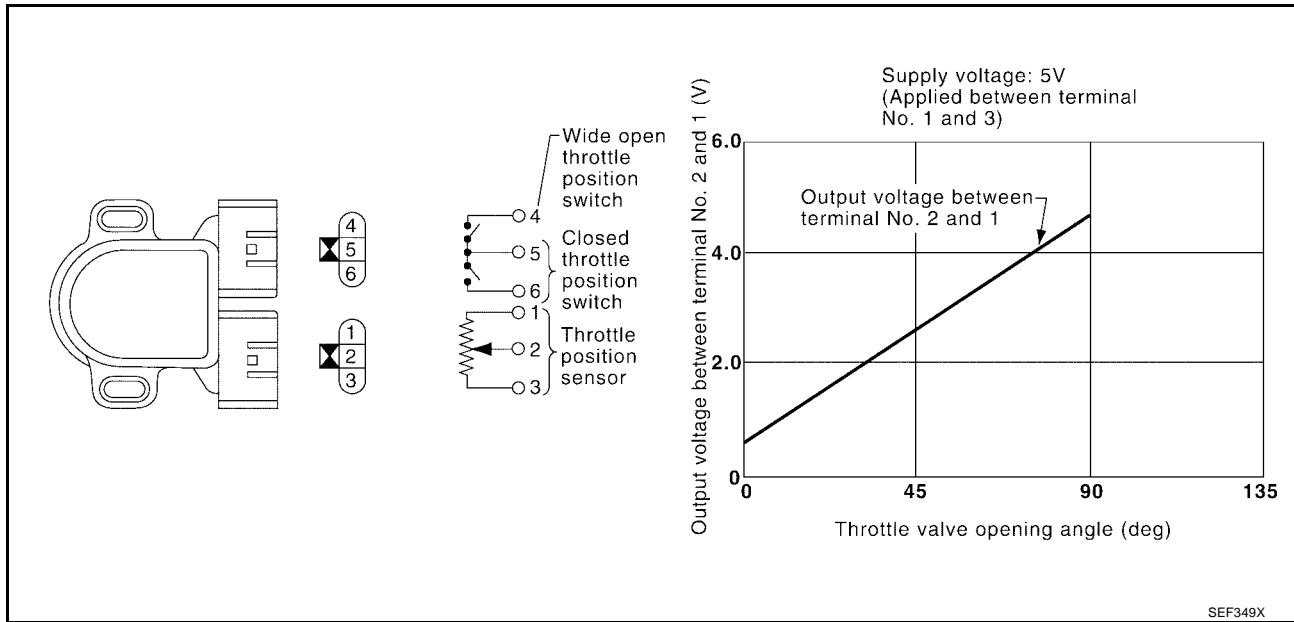
Component Description

NOTE:

If DTC P0122, P0123 is displayed with DTC P0510, first perform the trouble diagnosis for DTC P0510. Refer to EC-995.

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

UBS007K6

Specification data are reference values.

| MONITOR ITEM  | CONDITION  | SPECIFICATION   |
|---------------|--|---|
| THRTL POS SEN | <ul style="list-style-type: none"> <li>Engine: After warming up, idle the engine</li> </ul>  | Throttle valve: fully closed (a)<br>0.15 - 0.85V      |
|               | <ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Ignition switch: ON (Engine stopped)</li> </ul>   | Throttle valve: Partially open<br>Between (a) and (b) |
|               | <ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> </ul>   | Throttle valve: fully opened (b)<br>3.5 - 4.7V        |
| ABSOL TH-P/S  | <ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Ignition switch: ON</li> <li>More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.</li> </ul> | Throttle valve: fully closed<br>0.0%                  |
|               | <ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Ignition switch: ON (Engine stopped)</li> </ul>   | Throttle valve: fully opened<br>Approx. 80%           |

On Board Diagnosis Logic

UBS007K7

these self-diagnoses have one trip detection logic.

# DTC P0122, P0123 TP SENSOR

[VG33E]

| 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  | <ul style="list-style-type: none"> <li>● Harness or connectors (The TP sensor circuit is open or shorted.)</li> <li>● TP sensor</li> </ul> |
| 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

UBS007K8

### 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 1st trip DTC is detected, go to [EC-758, "Diagnostic Procedure"](#)

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| VHCL SPEED SE | XXX km/h |
| P/N POSI SW   | OFF      |

SEF065Y

### WITH GST

Follow the procedure "With CONSULT-II".

# DTC P0122, P0123 TP SENSOR

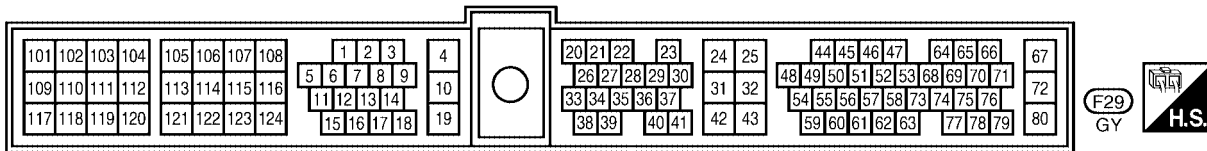
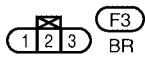
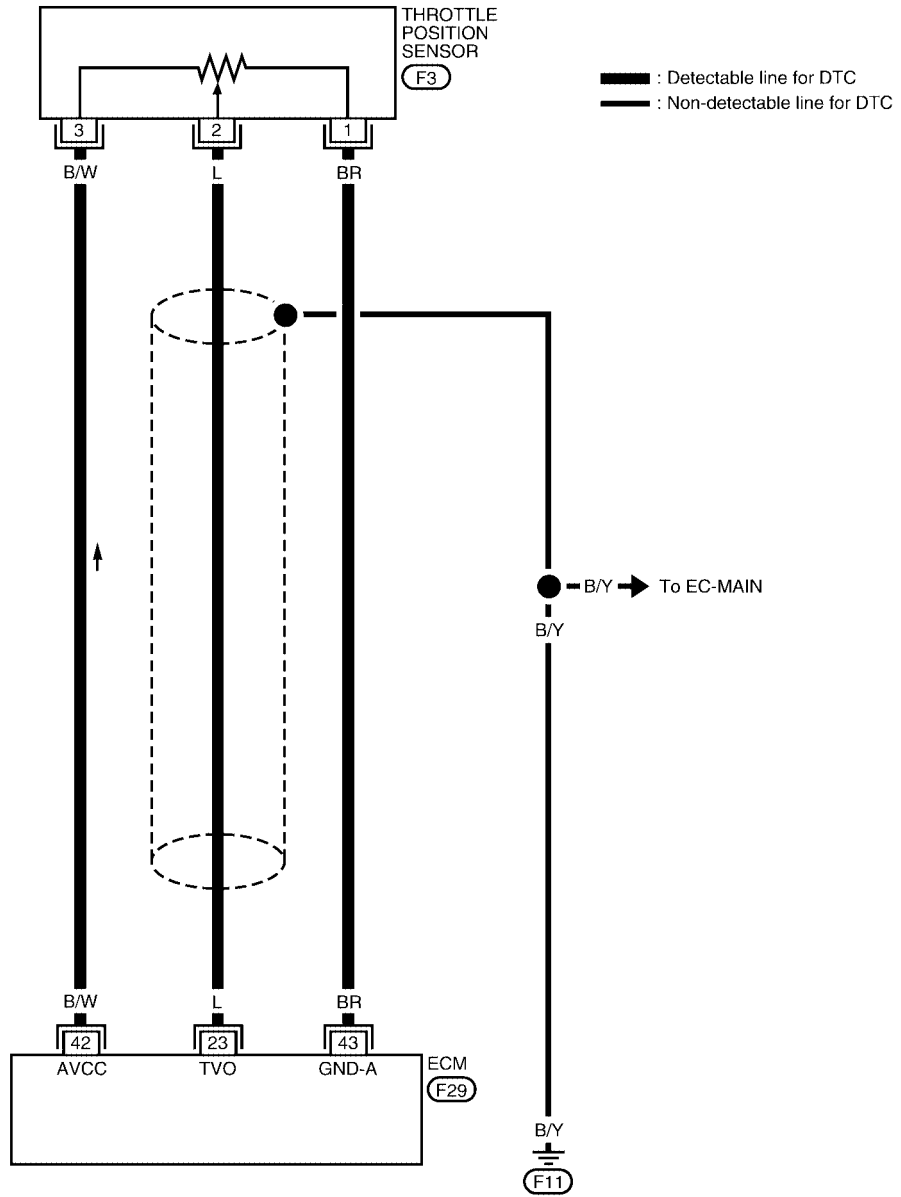
[VG33E]

UBS007K9

## Wiring Diagram

EC-TPS-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



BBWA0473E

# DTC P0122, P0123 TP SENSOR

[VG33E]

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

**CAUTION:**

**Do not use 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 COLO R | ITEM                     | CONDITION  | DATA (DC Voltage) |
|---------------|-------------|--------------------------|--|-------------------|
| 23            | L           | Throttle position sensor | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> <li>● Accelerator pedal fully released</li> </ul> | 0.15 - 0.85V      |
|               |             |                          | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"> <li>● Engine stopped</li> <li>● Accelerator pedal fully depressed</li> </ul>                        | 3.5 - 4.7V        |
| 42            | B/W         | Sensors' power supply    | <b>[Ignition switch ON]</b>  | Approximately 5V  |
| 43            | BR          | Sensors' ground          | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>   | Approximately 0V  |

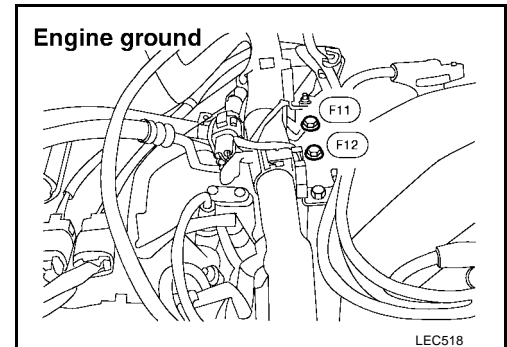
## Diagnostic Procedure

UBS007KA

### 1. RETIGHTEN GROUND SCREWS

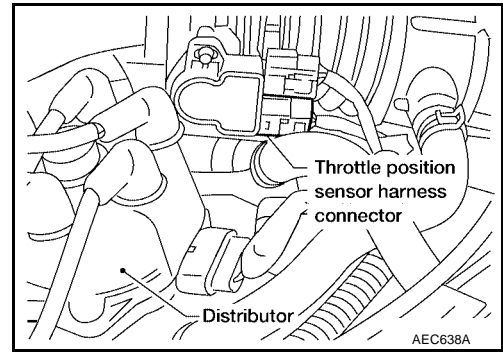
1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



**2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT**

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

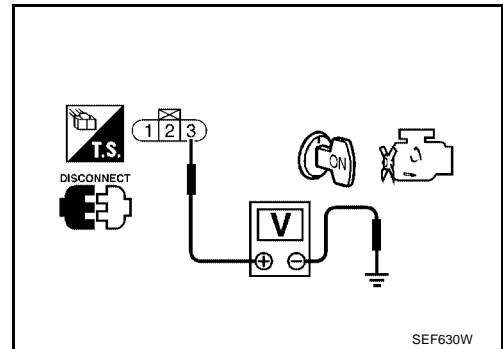


3. Check voltage between sensor terminal 3 and ground with CONSULT-II or tester.

**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. Check harness continuity between throttle position sensor terminal 1 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

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

**4. DETECT MALFUNCTIONING PART**

Check the harness for open or short between ECM and throttle position sensor.

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

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

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

**Continuity should exist.**

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

OK or NG

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

**6. CHECK THROTTLE POSITION SENSOR**

Refer to [EC-762, "Component Inspection"](#) .

OK or NG

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

**7. ADJUST CLOSED THROTTLE POSITION SWITCH**

Adjust closed throttle position switch. Refer to [EC-648, "Basic Inspection"](#) .

| Items  | Specifications   |
|--|--|
| Ignitions timing   | 10° ± 2° BTDC  |
| Base idle speed  | 700 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.3 mm (0.012 in): ON<br>0.4 mm (0.016 in): OFF |
| Target idle speed  | 750 ± 50 rpm (in P or N position)  |

OK or NG

- OK >> GO TO 8.
- NG >> Replace throttle position sensor. To adjust it, perform [EC-648, "Basic Inspection"](#) .

**8. CHECK MASS AIR FLOW SENSOR**

Refer to [EC-729, "Component Inspection"](#) .

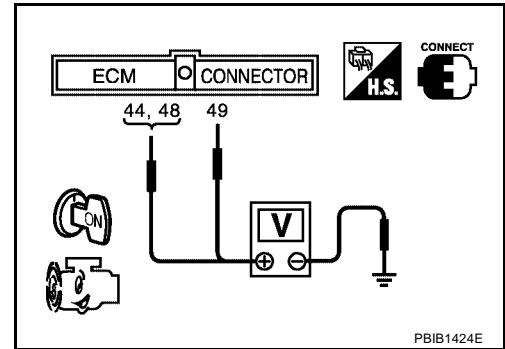
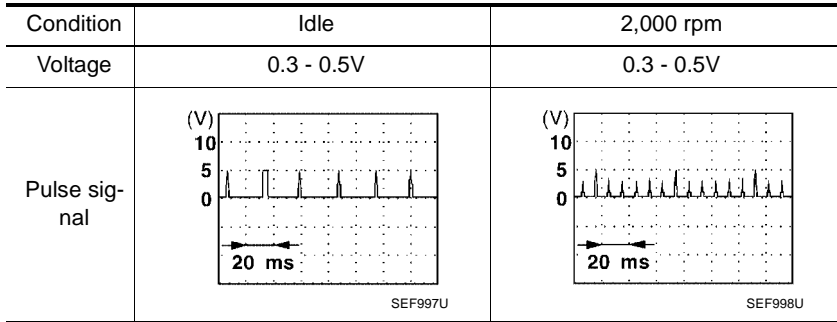
OK or NG

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

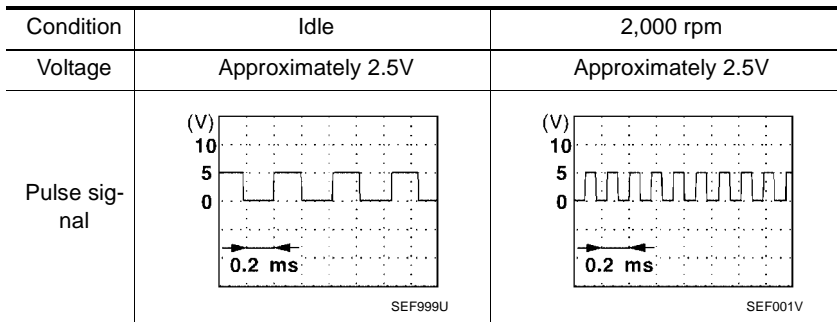


## 9. CHECK CAMSHAFT POSITION SENSOR

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.  
**<Terminal 44 or 48 and engine ground>**



### <Terminal 49 and engine ground>



### OK or NG

- OK >> GO TO 10.
- NG >> Replace distributor assembly with camshaft position sensor.

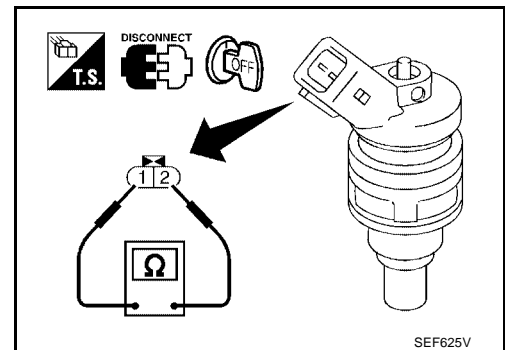
## 10. CHECK FUEL INJECTOR

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

**Resistance : 10 - 14Ω [at 25°C (77°F)]**

### OK or NG

- OK >> GO TO 11.
- NG >> Replace fuel injector.



## 11. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## Component Inspection 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 (a)     | 0.15 - 0.85V        |
| Partially open            | Between (a) and (b) |
| Completely open (b)       | 3.5 - 4.7V          |

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |
| THRTL POS SEN | XXX V   |

SEF719Y

### 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 (a)     |
| Partially open            | Between (a) and (b) |
| Completely open           | 3.5 - 4.7 (b)       |

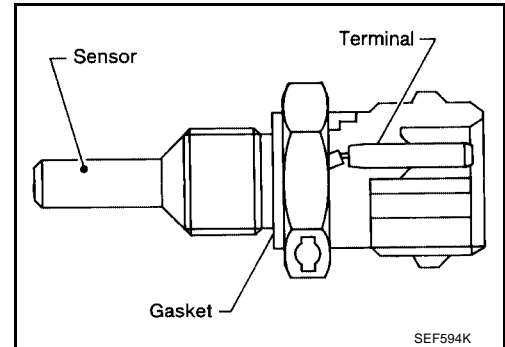
## DTC P0125 ECT SENSOR

### Component Description

**NOTE:**

If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to [EC-741, "DTC P0117, P0118 ECT SENSOR"](#).

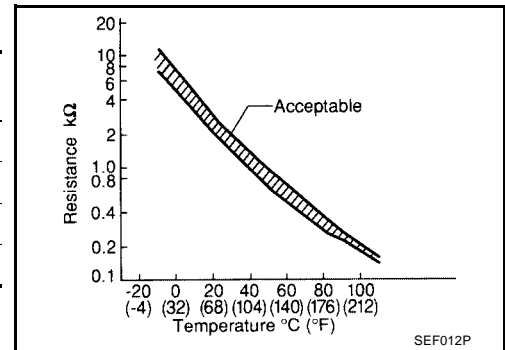
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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

| DTC No. | Trouble diagnosis name   | DTC detecting condition   | Possible cause  |
|---------|--|---|---|
| P0125   | Insufficient engine coolant temperature for closed loop fuel control | <ul style="list-style-type: none"> <li>● Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine.</li> <li>● Engine coolant temperature is insufficient for closed loop fuel control.</li> </ul> | <ul style="list-style-type: none"> <li>● Harness or connectors (High resistance in the circuit)</li> <li>● Engine coolant temperature sensor</li> <li>● Thermostat</li> </ul> |

### DTC Confirmation Procedure

**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-764, "Diagnostic Procedure"](#)

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

SEF174Y

 **WITH GST**

Follow the procedure "With CONSULT-II".

## Diagnostic Procedure

UBS007KF

### 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-764, "Component Inspection"](#) .

OK or NG

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

### 2. CHECK THERMOSTAT OPERATION

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

OK or NG

- OK >> GO TO 3.
- NG >> Replace thermostat. Refer to [CO-28, "THERMOSTAT"](#) .

### 3. CHECK INTERMITTENT INCIDENT

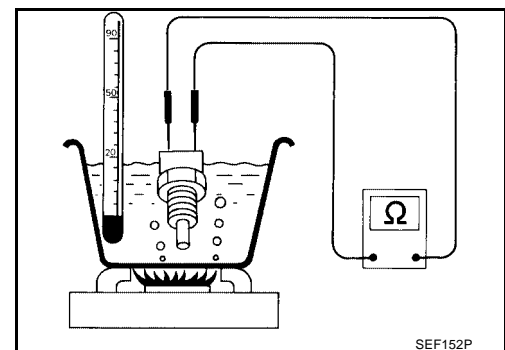
Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## Component Inspection ENGINE COOLANT TEMPERATURE SENSOR

UBS007KG

1. Check resistance as shown in the figure.

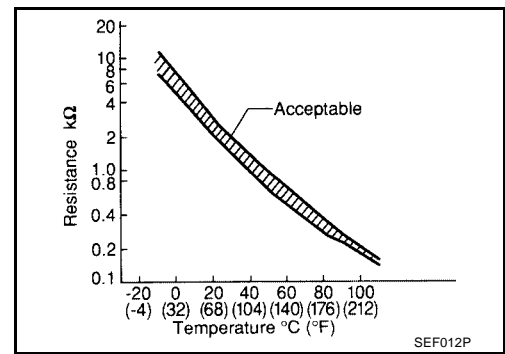


<Reference data>

# DTC P0125 ECT SENSOR

[VG33E]

| 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 ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

UBS007KH

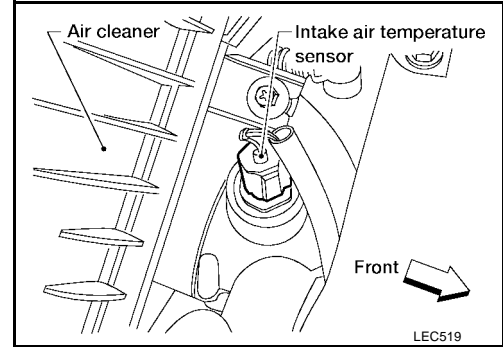
A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

**DTC P0127 IAT SENSOR**

**Component Description**

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.



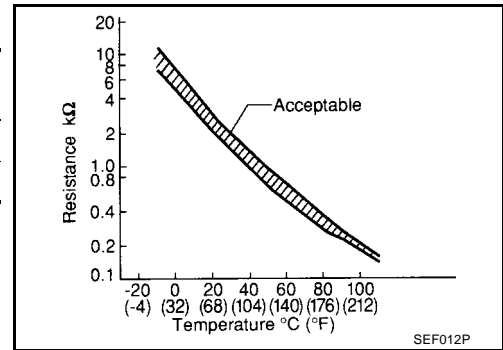
**<Reference data>**

| 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**

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Intake air temperature sensor</li> </ul> |

**DTC Confirmation Procedure**

**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.**

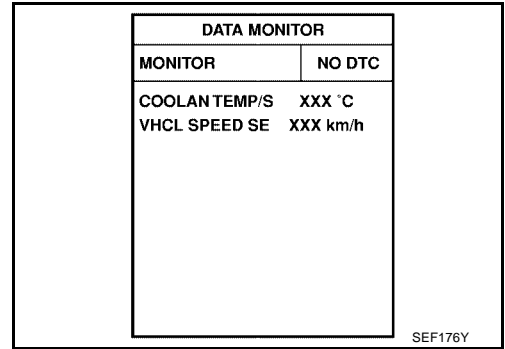
**WITH CONSULT-II**

1. Wait until engine coolant temperature is less than 90°C (194°F).
  - a. Turn ignition switch ON.

# DTC P0127 IAT SENSOR

[VG33E]

- 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-767, "Diagnostic Procedure"](#).



## WITH GST

Follow the procedure "With CONSULT-II".

## Diagnostic Procedure

UBS007KL

### 1. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-767, "Component Inspection"](#).

OK or NG

- OK >> GO TO 6.
- NG >> Replace intake air temperature sensor.

### 2. CHECK INTERMITTENT INCIDENT

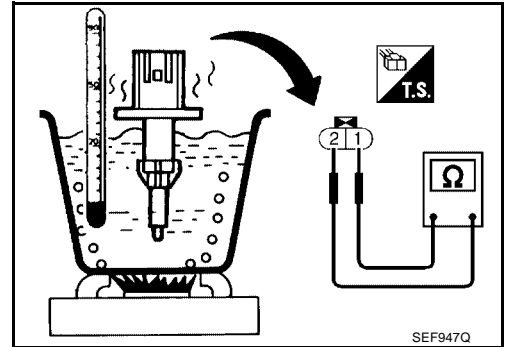
Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).  
For Wiring Diagram, refer to [EC-738, "Wiring Diagram"](#).

>> INSPECTION END.

## Component Inspection INTAKE AIR TEMPERATURE SENSOR

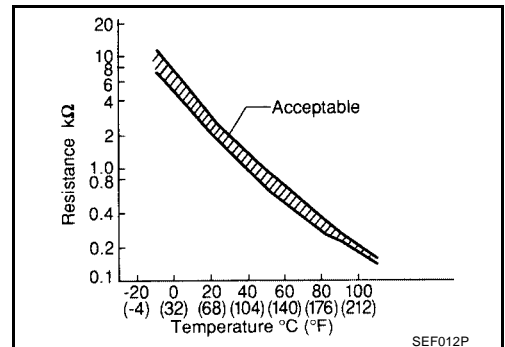
UBS007KM

1. Check resistance as shown in the figure.



### <Reference data>

| Intake air temperature °C (°F) | Resistance kΩ |
|--------------------------------|---------------|
| 20 (68)                        | 2.1 - 2.9     |
| 80 (176)                       | 0.27 - 0.38   |



2. If NG, replace in take air temperature sensor.



DTC P0128 THERMOSTAT FUNCTION

PF2:21200

On Board Diagnosis Logic

UBS007KO

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. | <ul style="list-style-type: none"> <li>● Thermostat</li> <li>● Leakage from sealing portion of thermostat</li> <li>● Engine coolant temperature sensor</li> </ul> |

DTC Confirmation Procedure

UBS007KP

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), stop engine and 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-769, "Diagnostic Procedure"](#) .

WITH GST

Follow the procedure "WITH CONSULT-II" above.

Diagnostic Procedure

UBS007KQ

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-770, "Component Inspection"](#) .

OK or NG

- OK >> INSPECTION END.
- NG >> Replace engine coolant temperature sensor.

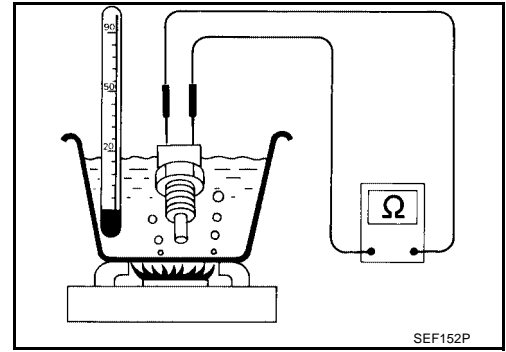
# DTC P0128 THERMOSTAT FUNCTION

[VG33E]

UBS007KR

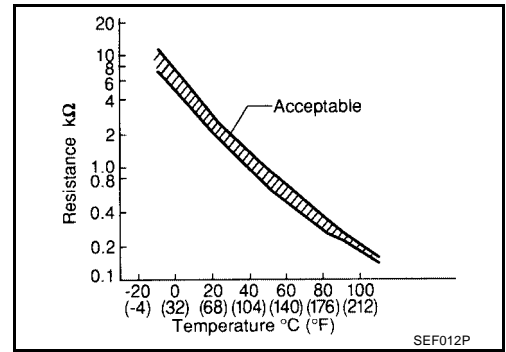
## Component Inspection ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance 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 ENGINE COOLANT TEMPERATURE SENSOR

UBS007KS

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

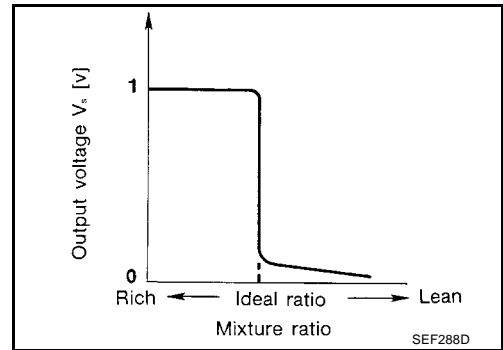
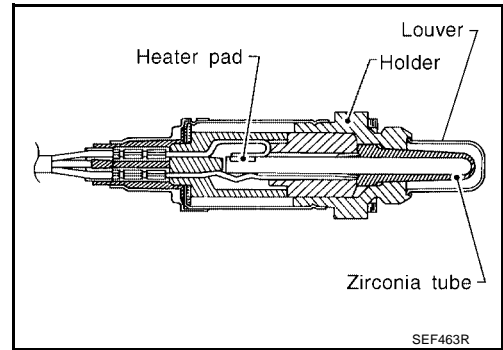
DTC P0132, P0152 HO2S1

PFP:22690

Component Description

UBS007KT

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

UBS007KU

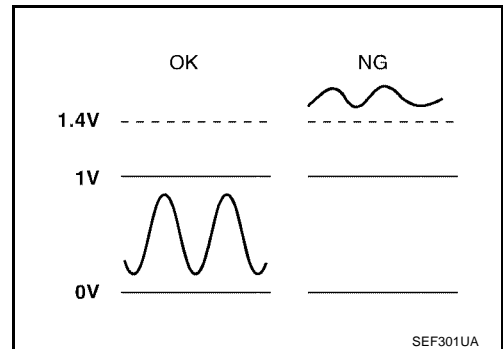
Specification data are reference values.

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

On Board Diagnosis Logic

UBS007KV

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) | Heated oxygen sensor 1 circuit high voltage | An excessively high voltage from the sensor is sent to ECM. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Heated oxygen sensor 1</li> </ul> |
| P0152 (Bank 2) |   |   |   |

## DTC Confirmation Procedure

### 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-776, "Diagnostic Procedure"](#)

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

SEF174Y

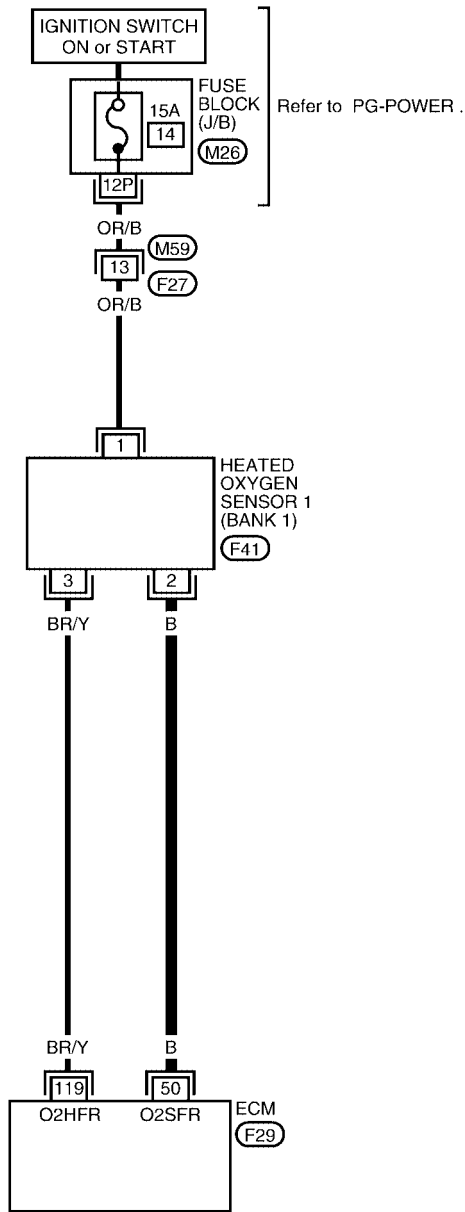
### Ⓢ WITH GST

1. Start engine and warm it up to normal operating temperature.
  2. Turn ignition switch "OFF" and wait at least 10 seconds.
  3. Restart engine and let it idle for 2 minutes.
  4. Turn ignition switch "OFF" and wait at least 10 seconds.
  5. Restart engine and let it idle for 2 minutes.
  6. Select "MODE 3" with GST.
  7. If DTC is detected, go to [EC-776, "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.**

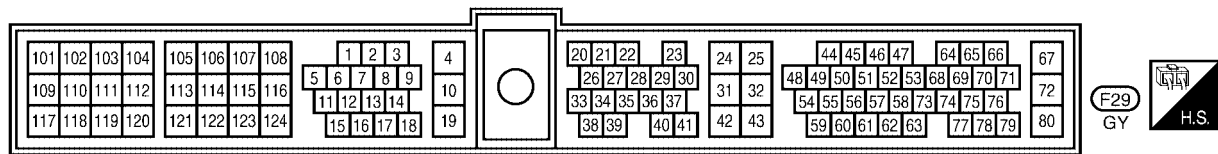
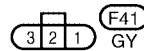
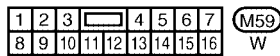
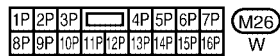
Wiring Diagram  
BANK 1

EC-O2S1B1-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



— : Detectable line for DTC  
— : Non-detectable line for DTC



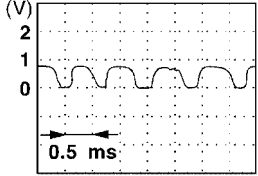
# DTC P0132, P0152 HO2S1

[VG33E]

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

**CAUTION:**

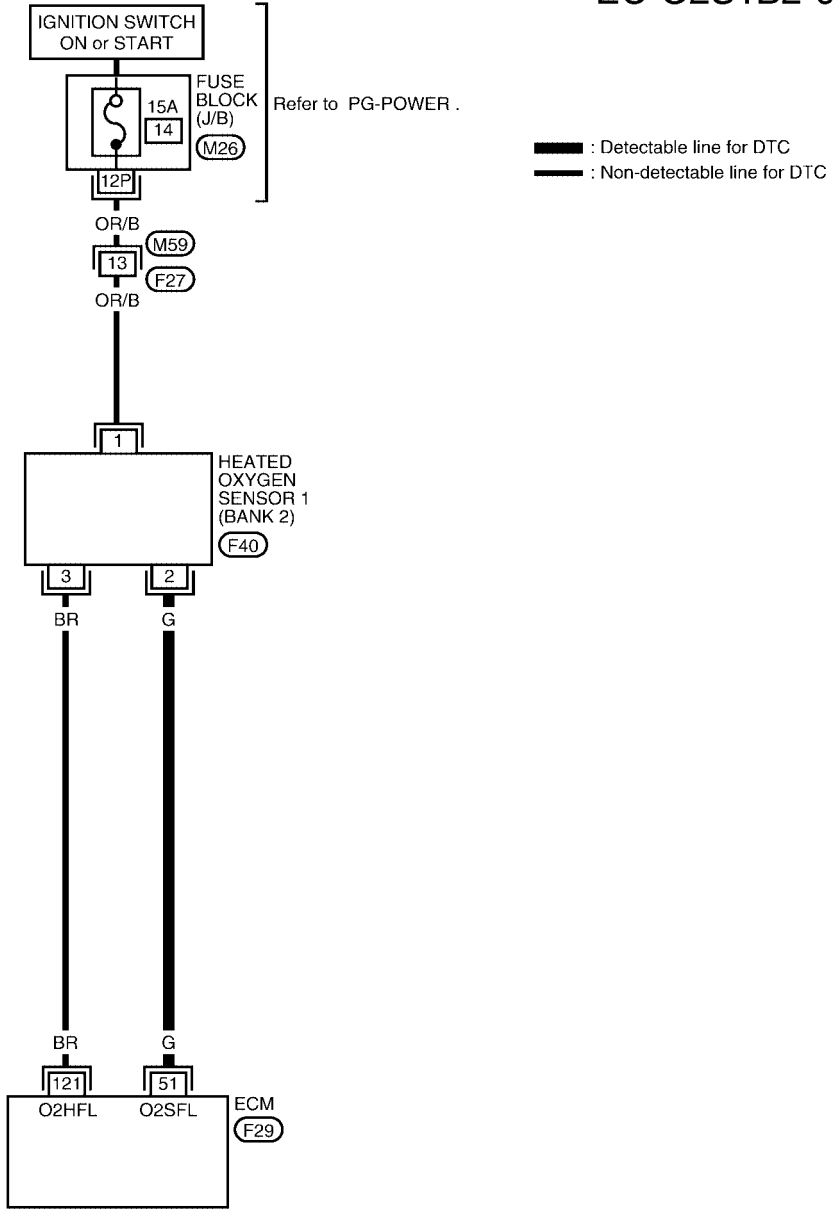
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

| TER-MINAL NO. | WIRE COLOR | ITEM                            | CONDITION  | DATA (DC Voltage)  |
|---------------|------------|---------------------------------|--|--|
| 50            | B          | Heated oxygen sensor 1 (bank 1) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>0 - Approximately 1.0V★</p>  <p style="text-align: right; font-size: small;">SEF002V</p> |

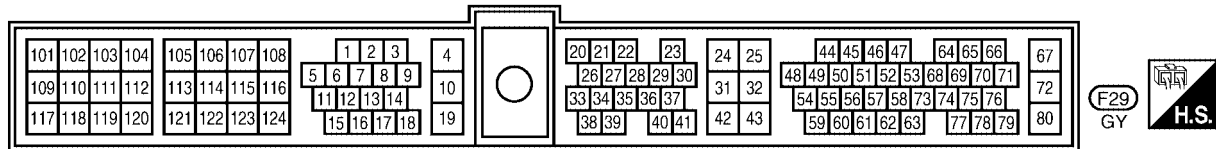
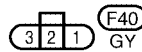
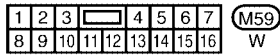
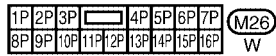
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope).

BANK 2

EC-O2S1B2-01



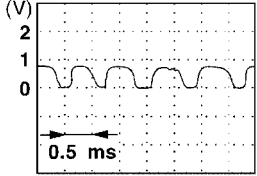
A  
 EC  
 C  
 D  
 E  
 F  
 G  
 H  
 I  
 J  
 K  
 L  
 M



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

**CAUTION:**

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

| TER-MINAL NO. | WIRE COLOR | ITEM                            | CONDITION   | DATA (DC Voltage)   |
|---------------|------------|---------------------------------|---|---|
| 51            | G          | Heated oxygen sensor 1 (bank 2) | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>0 - Approximately 1.0V★</p>  <p>SEF002V</p> |

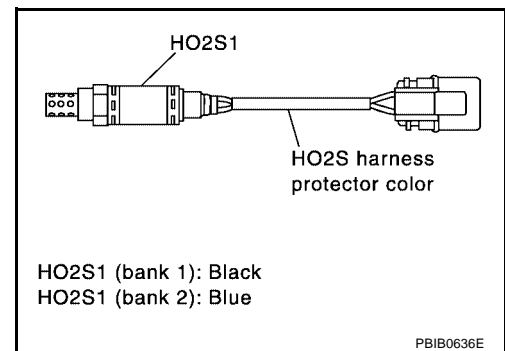
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope).

**Diagnostic Procedure**

UBS007KY

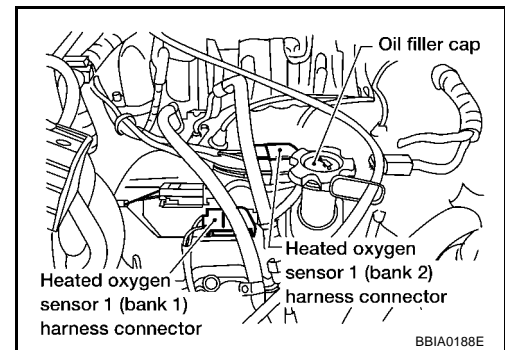
**1. INSPECTION START**

1. Turn ignition switch OFF.
2. Check heated oxygen sensor 1 harness protector.



3. Disconnect corresponding heated oxygen sensor 1 harness connector.

>> GO TO 2.



**2. RETIGHTEN HEATED OXYGEN SENSOR 1**

1. Loosen and retighten corresponding 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. 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.**

3. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows.

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P0132 | 50 or 2       | Ground | Bank 1 |
| P0152 | 51 or 2       | Ground | Bank 2 |

Refer to Wiring Diagram.

**Continuity should not exist.**

4. Also check harness for short to power.

OK or NG

OK >> GO TO 4.

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

### 4. CHECK HO2S1 CONNECTOR FOR WATER

1. Turn ignition switch "OFF".
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check connectors for water.

**Water should not exist.**

OK or NG

OK (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 |
| COOLAN TEMP/S | XXX °C  |
| HO2S1 (B1)    | XXX V   |
| HO2S2 (B2)    | XXX V   |

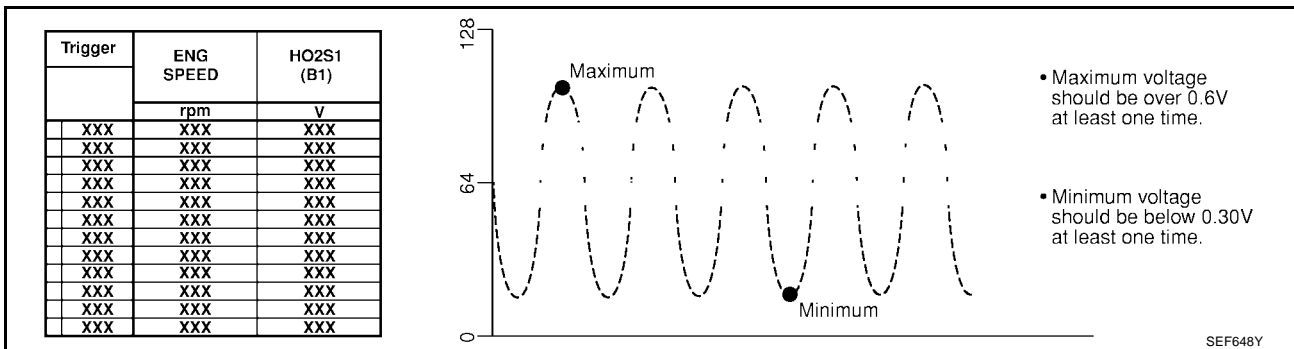
SEF967Y

5. Check the following.
  - "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown 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 |  |
| Bank 2 | cycle           |  | 1 |  | 2 |  | 3 |  | 4 |  | 5 |  |
|        | HO2S1 MNTR (B2) |  | R |  | L |  | R |  | L |  | R |  |

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

SEF647Y



**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 engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
  - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
  - The maximum voltage is over 0.6V at least one time.
  - The minimum voltage is below 0.3V at least one time.
  - The voltage never exceeds 1.0V.

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

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

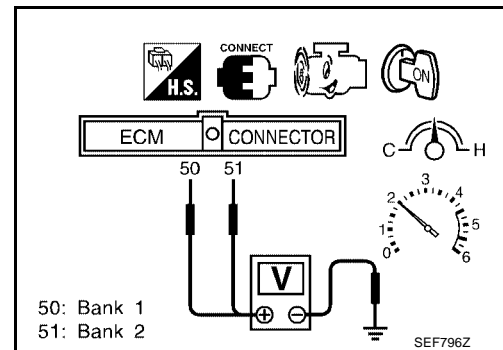
### CAUTION:

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

OK or NG

OK >> GO TO 7.

NG >> Replace malfunctioning heated oxygen sensor.



## 7. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 1

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

UBS007KZ

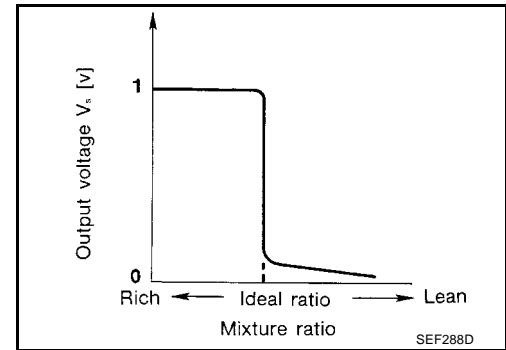
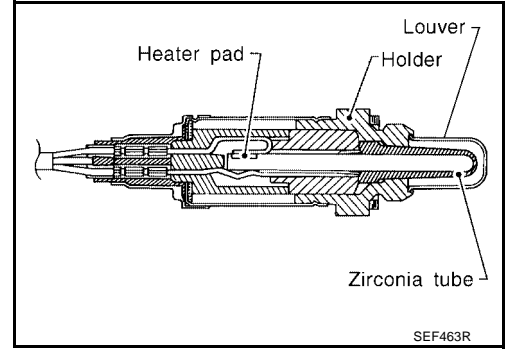
**DTC P0133, P0153 HO2S1**

PF:22690

**Component Description**

UBS007L0

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**

UBS007L1

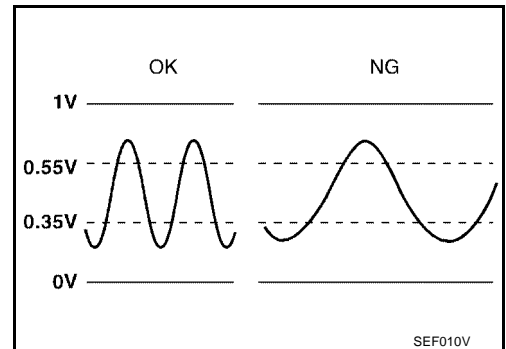
Specification data are reference values.

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

**On Board Diagnosis Logic**

UBS007L2

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<br>(Bank 1) | Heated oxygen sensor<br>1 circuit slow response | The response of the voltage signal from the<br>sensor takes more than the specified time. | <ul style="list-style-type: none"> <li>● Harness or connectors<br/>(The sensor circuit is open or shorted)</li> <li>● Heated oxygen sensor 1</li> <li>● Heated oxygen sensor 1 heater</li> <li>● Fuel pressure</li> <li>● Injectors</li> <li>● Intake air leaks</li> <li>● Exhaust gas leaks</li> <li>● PCV valve</li> <li>● Mass air flow sensor</li> </ul> |
| P0153<br>(Bank 2) |   |   |  |

**DTC Confirmation Procedure**

UBS007L3

**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  $-10^{\circ}\text{C}$  ( $14^{\circ}\text{F}$ ).
- 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”.

|                  |          |
|------------------|----------|
| 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

5. Start engine and let it idle for at least 3.5 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.)

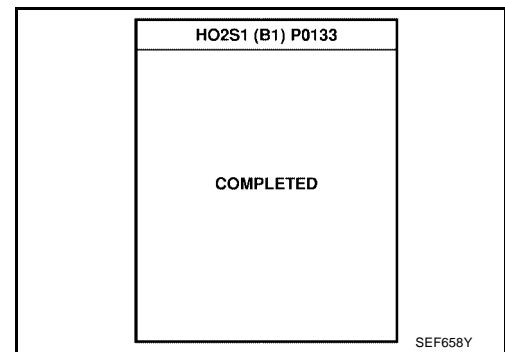
|                |                            |
|----------------|----------------------------|
| ENG SPEED      | 1,700 - 2,800 rpm          |
| Vehicle speed  | More than 80 km/h (50 MPH) |
| B/FUEL SCHDL   | 2.0 - 14.0 msec            |
| Selector lever | Suitable position          |

|                  |          |
|------------------|----------|
| 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-786, "Diagnostic Procedure"](#).



UBS007L4

## Overall Function Check

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

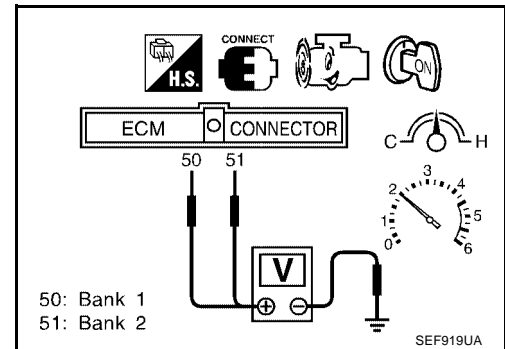
### WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HOS1 (B1) signal] or 51 [HOS1 (B2) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
  - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.

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

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

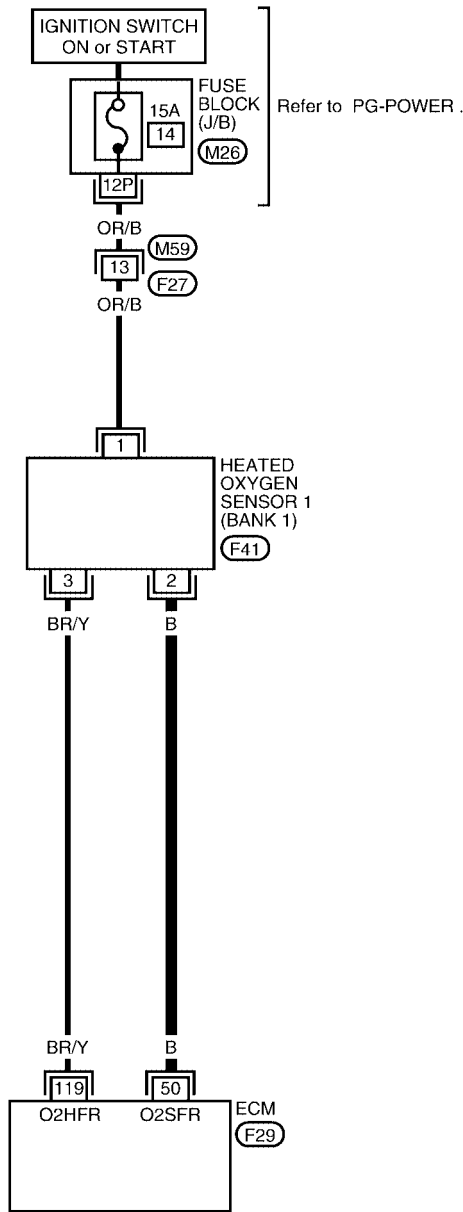
4. If NG, go to [EC-786, "Diagnostic Procedure"](#).



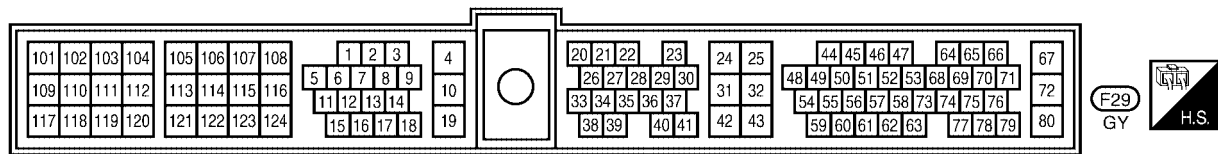
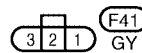
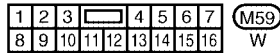
Wiring Diagram  
BANK 1

EC-O2S1B1-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



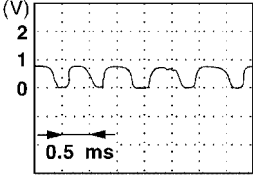
— : Detectable line for DTC  
— : Non-detectable line for DTC



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

**CAUTION:**

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

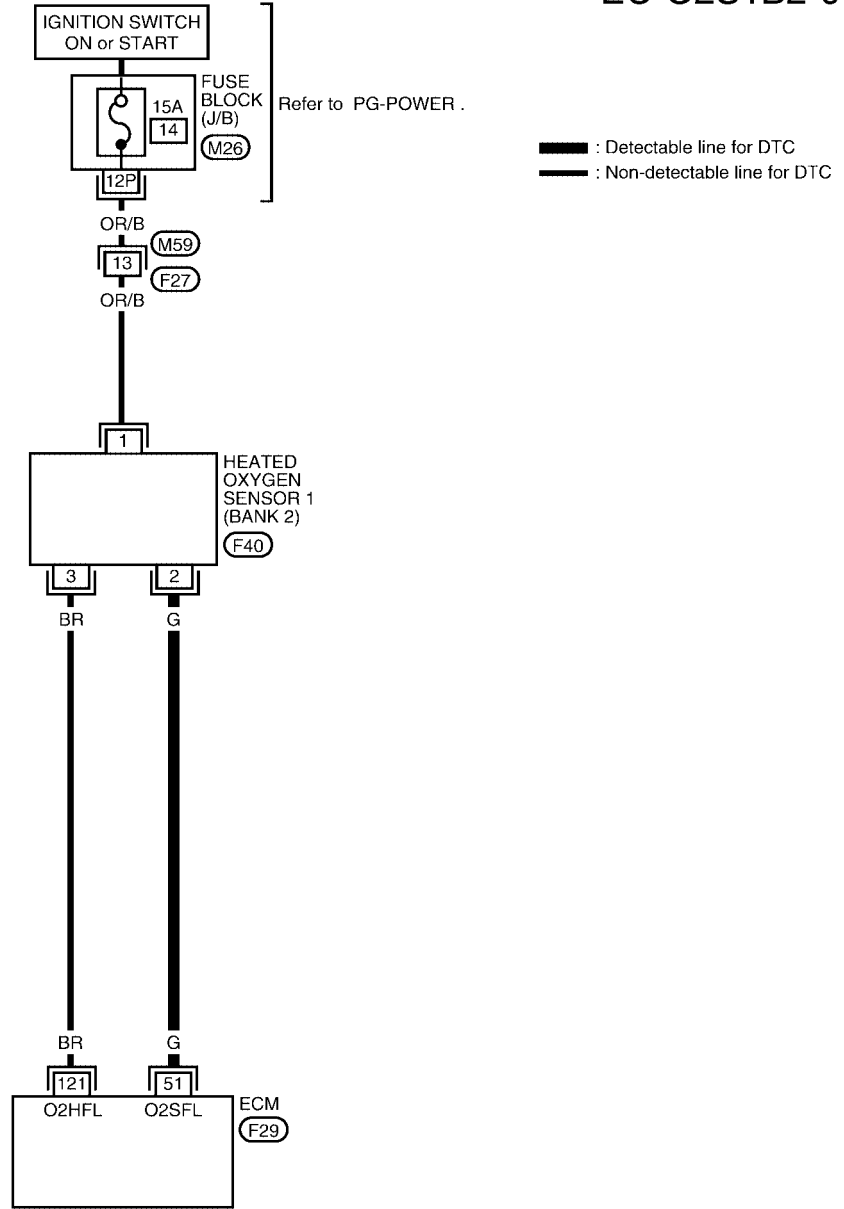
| TER-MINAL NO. | WIRE COLOR | ITEM                            | CONDITION   | DATA (DC Voltage)   |
|---------------|------------|---------------------------------|---|---|
| 50            | B          | Heated oxygen sensor 1 (bank 1) | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>0 - Approximately 1.0V★</p>  <p style="text-align: right;"><small>SEF002V</small></p> |

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

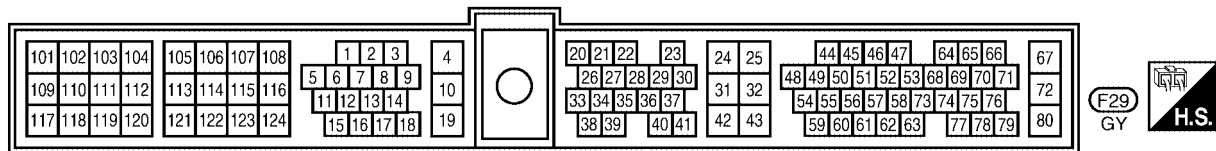
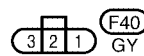
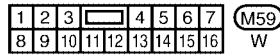


BANK 2

EC-O2S1B2-01



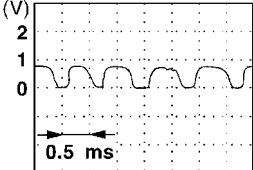
A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



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

**CAUTION:**

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

| TER-MINAL NO. | WIRE COLOR | ITEM                            | CONDITION   | DATA (DC Voltage)   |
|---------------|------------|---------------------------------|---|---|
| 51            | G          | Heated oxygen sensor 1 (bank 2) | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>0 - Approximately 1.0V★</p>  <p>SEF002V</p> |

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

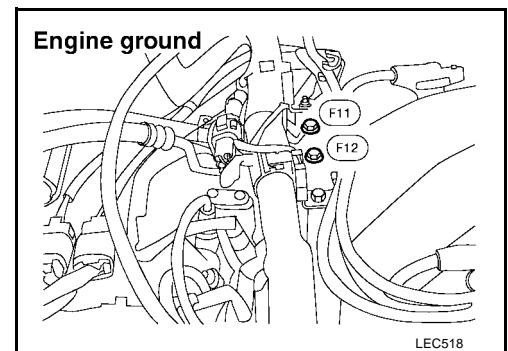
**Diagnostic Procedure**

UBS007L6

**1. RETIGHTEN GROUND SCREWS**

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

>> GO TO 2.



**2. RETIGHTEN HEATED OXYGEN SENSOR 1**

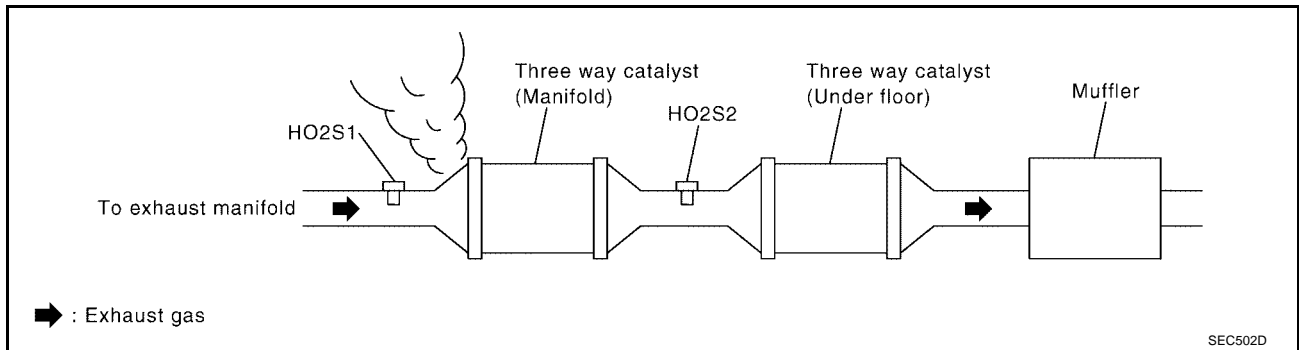
Loosen and retighten corresponding heated oxygen sensor 1.

**Tightening torque : 40 - 60 N-m (4.1 - 6.1 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.

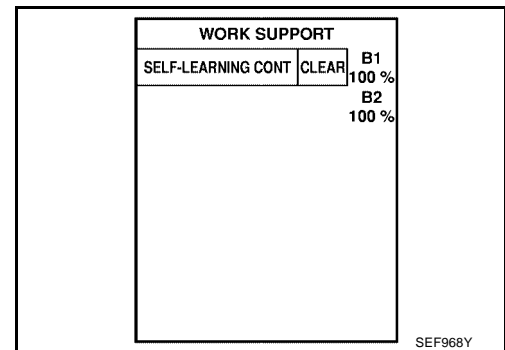
OK or NG

- 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, P0172, P0174 or P0175 detected?  
Is it difficult to start engine?**



### Without CONSULT-II

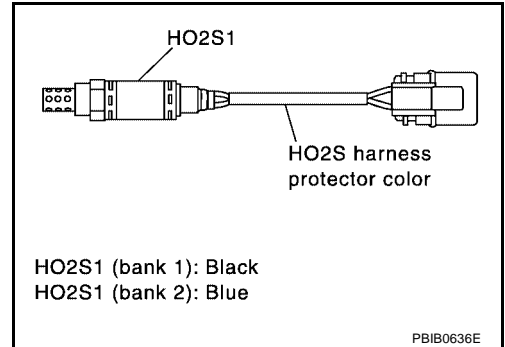
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to [EC-634, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#) .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?  
Is it difficult to start engine?**

#### Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to [EC-823](#) or [EC-831](#) .  
No >> GO TO 6.

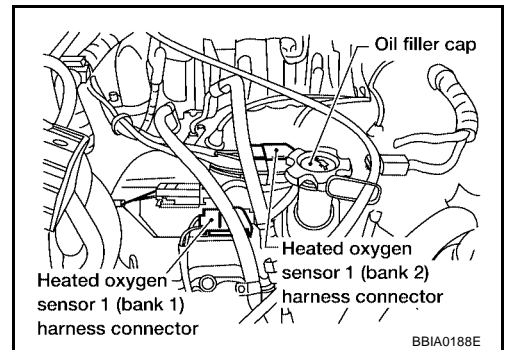
**6. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch OFF.
2. Check heated oxygen sensor 1 harness protector.



3. Disconnect corresponding heated oxygen sensor 1 harness connector.
4. Disconnect ECM harness connector.
5. 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.**

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

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P0133 | 50 or 2       | Ground | Bank 1 |
| P0153 | 51 or 2       | Ground | Bank 2 |

**Continuity should not exist.**

7. 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 HEATED OXYGEN SENSOR 1 HEATER

Check resistance between HO2S1 terminals 3 and 1.

**Resistance : 2.3 - 4.3Ω at 25°C (77°F)**

Check continuity between HO2S1 terminals 2 and 1, 3 and 2.

**Continuity should not exist.**

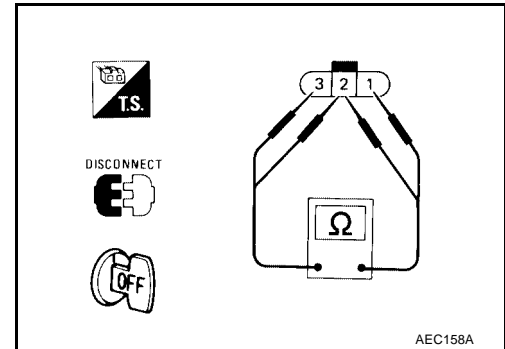
### CAUTION:

- 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 >> GO TO 8.

NG >> Replace malfunctioning heated oxygen sensor 1.



## 8. CHECK MASS AIR FLOW SENSOR

Refer to [EC-729, "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> Replace mass air flow sensor.

## 9. CHECK PCV VALVE

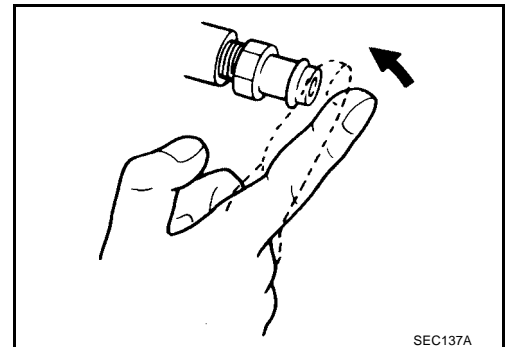
With engine running at idle, remove PCV valve from rocker cover; make sure that a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.

OK or NG

OK (With CONSULT-II)>>GO TO 10.

OK (Without CONSULT-II)>>GO TO 11.

NG >> Replace PCV valve.



10. 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 |
| COOLAN TEMP/S | XXX °C  |
| HO2S1 (B1)    | XXX V   |
| HO2S2 (B2)    | XXX V   |

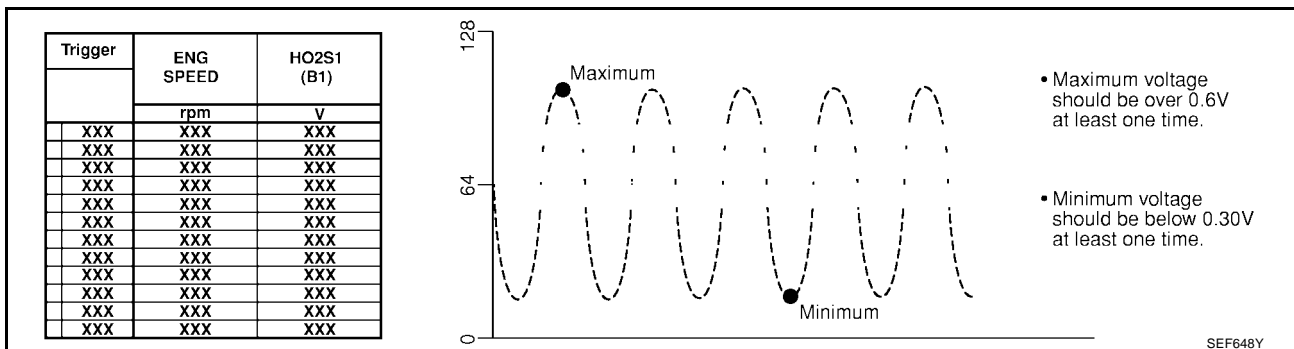
SEF967Y

5. Check the following.
  - "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown 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 |
| Bank 2 | cycle           | 1 | 2 | 3 | 4 | 5 |   |
|        | HO2S1 MNTR (B2) | R | L | R | L | R | L |

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

SEF647Y



**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 12.
- NG >> Replace malfunctioning heated oxygen sensor 1.

## 11. 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 engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

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

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

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

### CAUTION:

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

### OK or NG

OK >> GO TO 12.

NG >> Replace malfunctioning heated oxygen sensor 1.

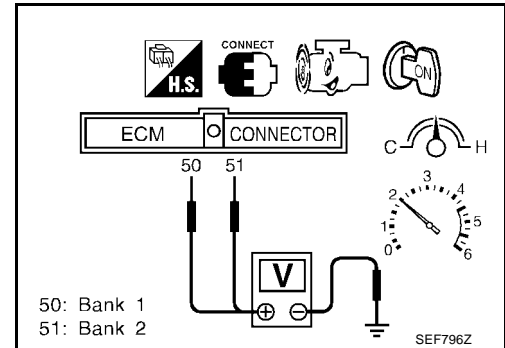
## 12. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 1

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .





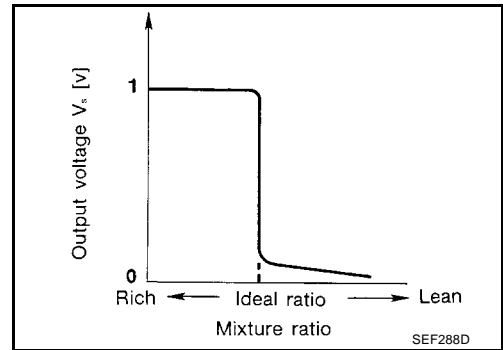
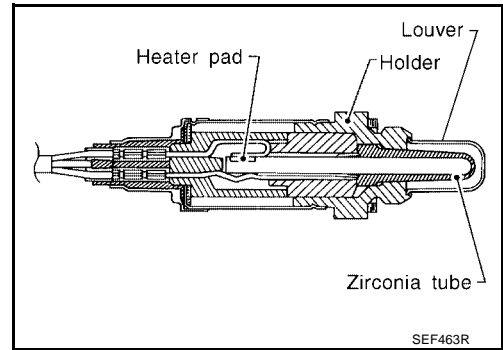
**DTC P0134, P0154 HO2S1**

PF2:22690

UBS007L8

**Component Description**

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**

UBS007L9

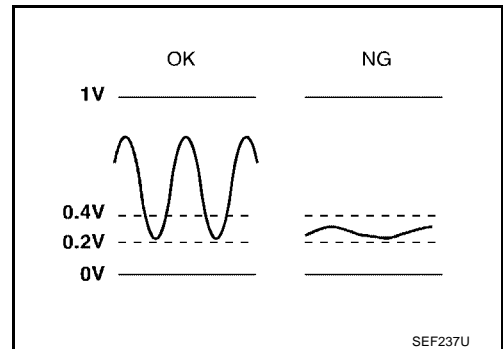
Specification data are reference values.

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

**On Board Diagnosis Logic**

UBS007LA

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) | Heated oxygen sensor 1 circuit no activity detected | The voltage from the sensor is constantly approx. 0.3V. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Heated oxygen sensor 1</li> </ul> |
| P0154 (Bank 2) |   |   |   |

**DTC Confirmation Procedure**

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 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 3.5 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      | 1,400 - 2,700 rpm          |
| Vehicle speed  | More than 65 km/h (40 MPH) |
| B/FUEL SCHDL   | 2.0 - 14.0 msec            |
| Selector lever | Suitable position          |

|                  |          |
|------------------|----------|
| 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

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-800, "Diagnostic Procedure"](#).  
During this test, P1148 and P1168 may be stored in ECM.

|                  |  |
|------------------|--|
| HO2S1 (B1) P0134 |  |
| COMPLETED        |  |

LEC034A

**Overall Function Check**

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

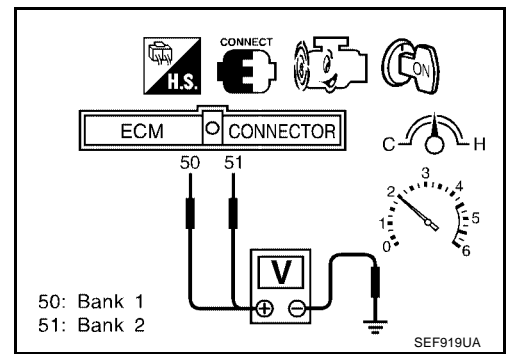
**WITH GST**

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and engine ground.

# DTC P0134, P0154 HO2S1

[VG33E]

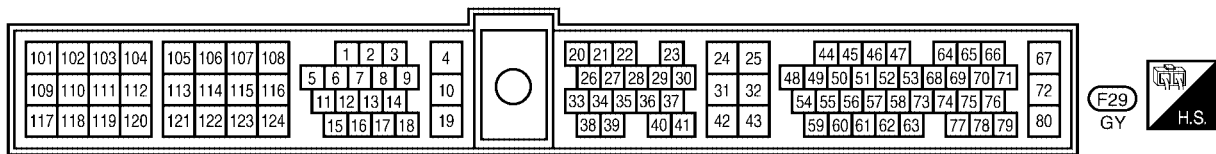
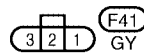
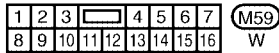
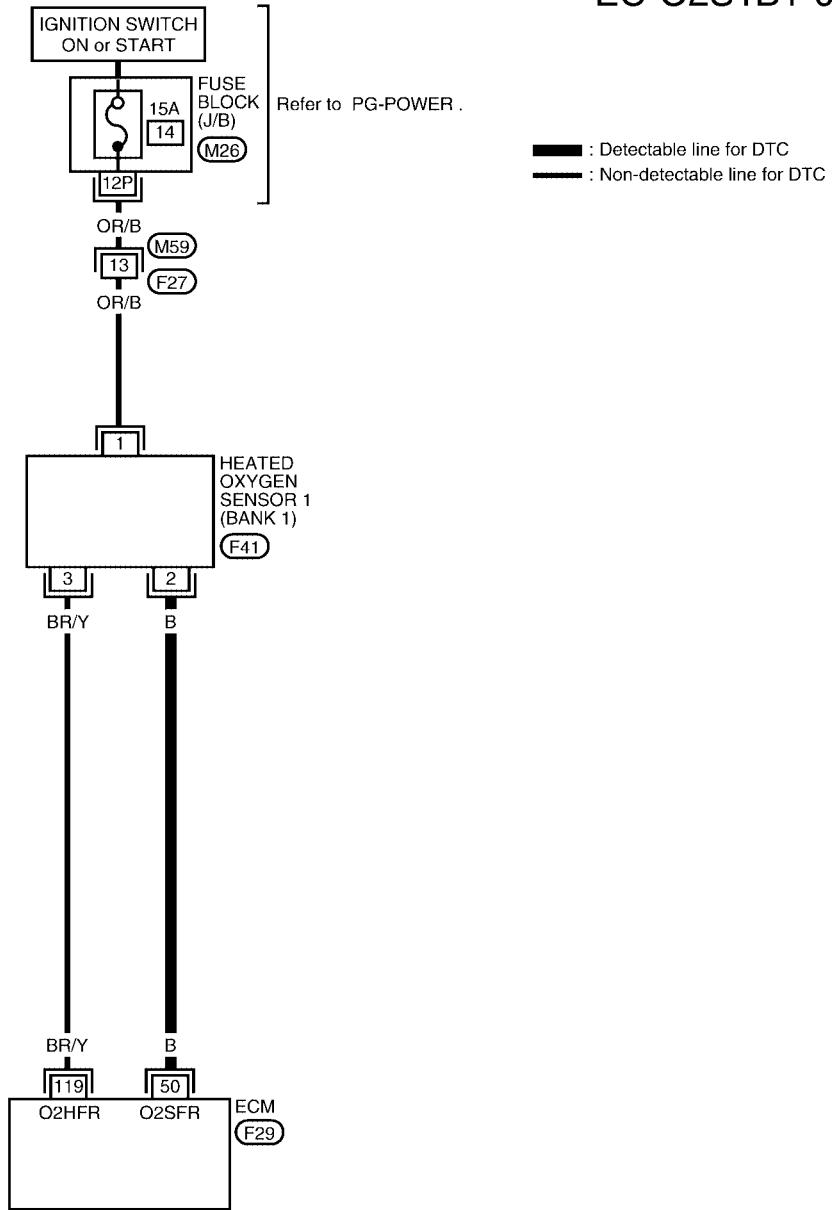
3. Check the following with engine speed held at 2,000 rpm constant under no load.
  - The voltage does not remain in the range of 0.2 to 0.4V.
4. If NG, go to [EC-800, "Diagnostic Procedure"](#) .



A  
EC  
C  
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I  
J  
K  
L  
M

Wiring Diagram  
BANK 1

EC-O2S1B1-01



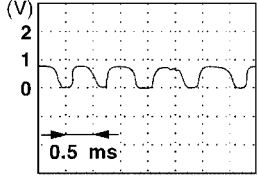
# DTC P0134, P0154 HO2S1

[VG33E]

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

**CAUTION:**

Do not use 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.

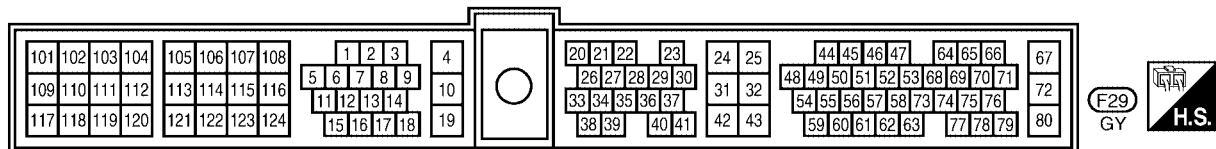
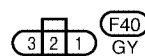
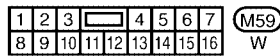
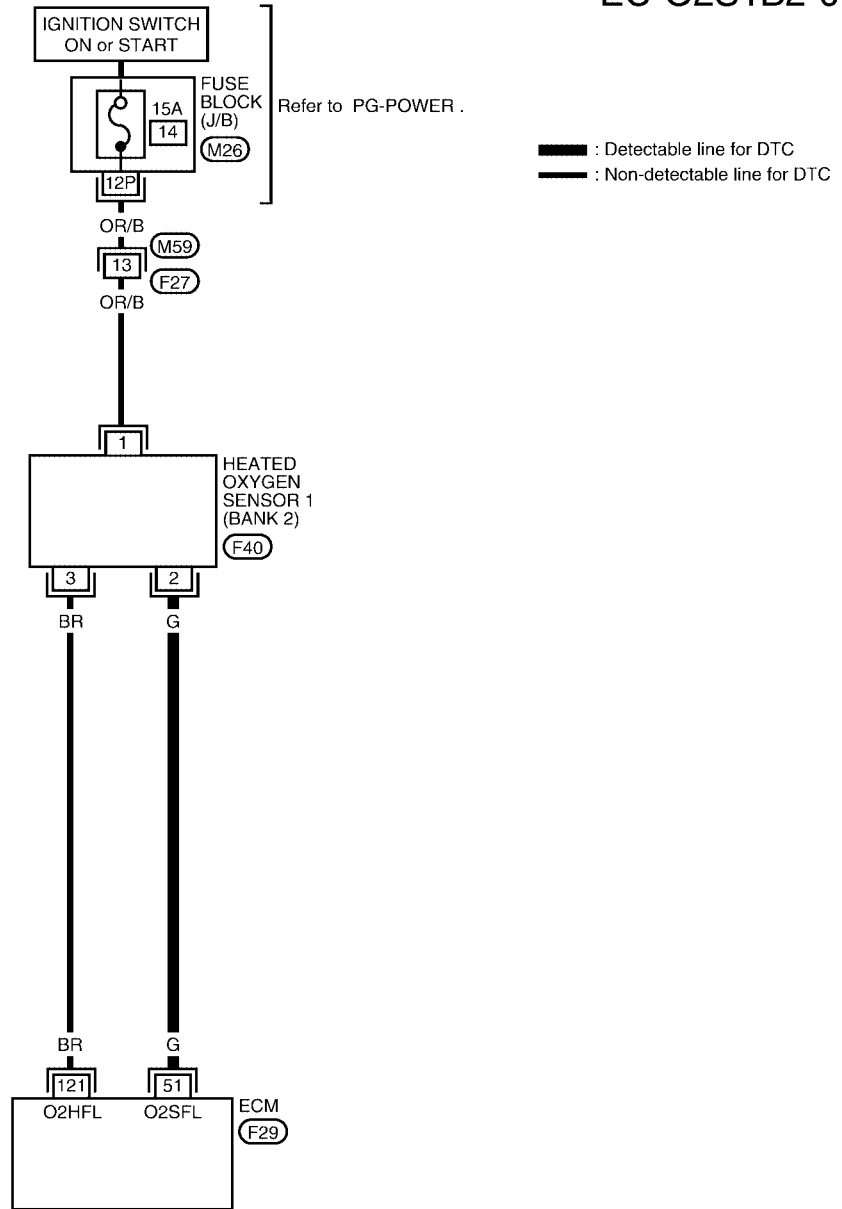
| TER-MINAL NO. | WIRE COLOR | ITEM                            | CONDITION   | DATA (DC Voltage)  |
|---------------|------------|---------------------------------|---|--|
| 50            | B          | Heated oxygen sensor 1 (bank 1) | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>0 - Approximately 1.0V★</p>  |

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

A  
EC  
C  
D  
E  
F  
G  
H  
I  
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BANK 2

EC-O2S1B2-01



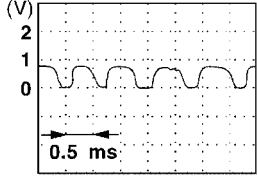
# DTC P0134, P0154 HO2S1

[VG33E]

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

**CAUTION:**

Do not use 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.

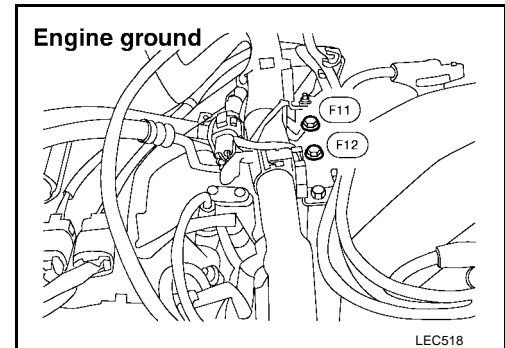
| TER-MINAL NO. | WIRE COLOR | ITEM                            | CONDITION   | DATA (DC Voltage)  |
|---------------|------------|---------------------------------|---|--|
| 51            | G          | Heated oxygen sensor 1 (bank 2) | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>0 - Approximately 1.0V★</p>  |

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

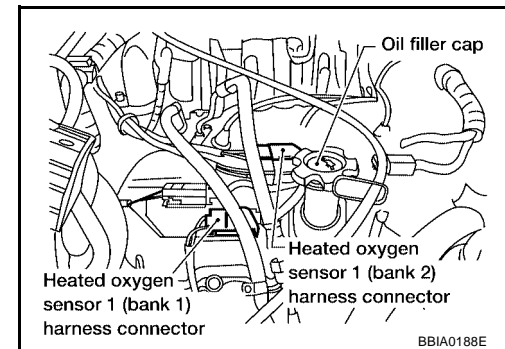
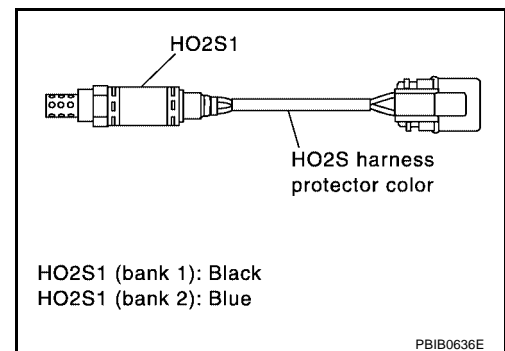
A  
EC  
C  
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M

**Diagnostic Procedure****1. INSPECTION START**

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



3. Make sure HO2S 1 harness protector color, and disconnect corresponding heated oxygen sensor 1 harness connector.



>> GO TO 2.



**2. CHECK HO2S 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

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

| DTC   | Terminals |        | Bank   |
|-------|-----------|--------|--------|
|       | ECM       | Sensor |        |
| P0134 | 50        | 2      | Bank 1 |
| P0154 | 51        | 2      | Bank 2 |

**Continuity should exist.**

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

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P0134 | 50 or 2       | Ground | Bank 1 |
| P0154 | 51 or 2       | Ground | Bank 2 |

**Continuity should not exist.**

4. 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.

A  
EC  
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L  
M

### 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 |
| COOLANT TEMP/S | XXX °C  |
| HO2S1 (B1)     | XXX V   |
| HO2S2 (B2)     | XXX V   |

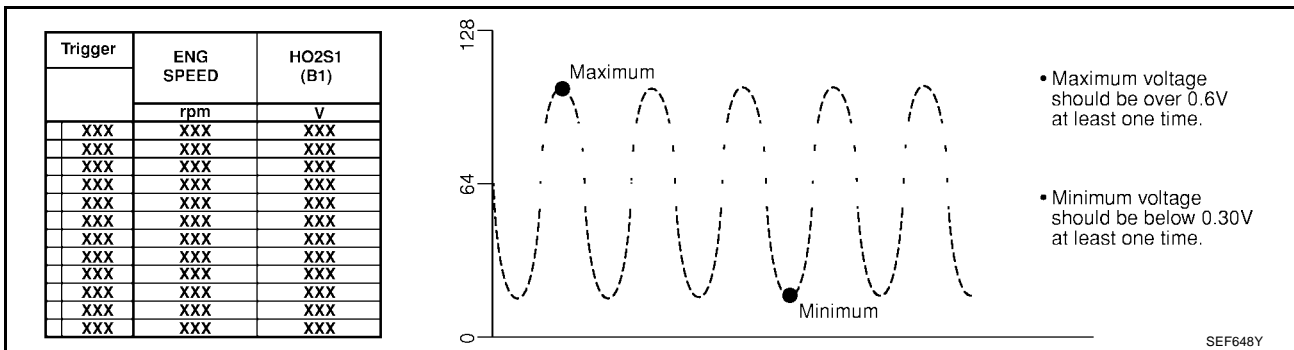
SEF967Y

5. Check the following.
  - "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown 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 |
| Bank 2 | cycle           | 1 | 2  | 3  | 4  | 5  |    |
|        | HO2S1 MNTR (B2) | R | -L | -R | -L | -R | -L |

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

SEF647Y



**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

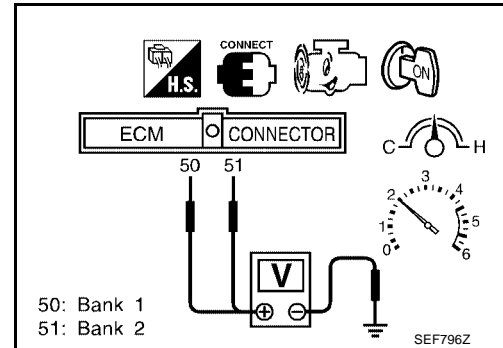
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B1) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
  - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
  - The maximum voltage is over 0.6V at least one time.
  - The minimum voltage is below 0.3V at least one time.
  - The voltage never exceeds 1.0V.

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

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

### CAUTION:

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



OK or NG

OK >> GO TO 5.

NG >> Replace malfunctioning heated oxygen sensor 1.

## 5. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

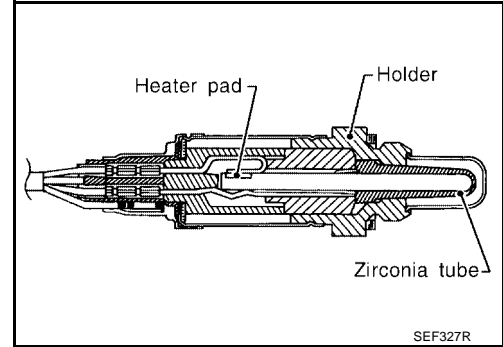
### Removal and Installation HEATED OXYGEN SENSOR 1

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

**DTC P0138, P0158 HO2S2**

**Component Description**

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.



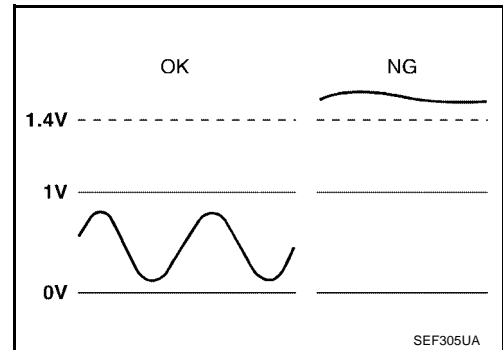
**CONSULT-II Reference Value in Data Monitor Mode**

Specification data are reference values.

| MONITOR ITEM                       | CONDITION  |  | SPECIFICATION                 |
|------------------------------------|--|--|-------------------------------|
| HO2S2 (B1)<br>HO2S2 (B2)           | <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● After keeping engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> | Revving engine from idle up to 3,000 rpm quickly | 0 - 0.3V ↔ Approx. 0.6 - 1.0V |
| HO2S2 MNTR (B1)<br>HO2S2 MNTR (B2) |  |  | LEAN ↔ RICH                   |

**On Board Diagnosis Logic**

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) | Heated oxygen sensor 2 circuit high voltage | An excessively high voltage from the sensor is sent to ECM. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Heated oxygen sensor 2</li> </ul> |
| P0158 (Bank 2) |   |   |   |

**DTC Confirmation Procedure**

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 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 one minute under no load.
5. Let engine idle for two minutes.
6. If 1st trip DTC is detected, go to [EC-809. "Diagnostic Procedure"](#)

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

 **WITH GST**

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for two minutes.
5. Turn ignition switch "OFF" and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
7. Let engine idle for two minutes.
8. Select "Mode 3" with GST.
9. If DTC is detected, go to [EC-809. "Diagnostic Procedure"](#) .

A

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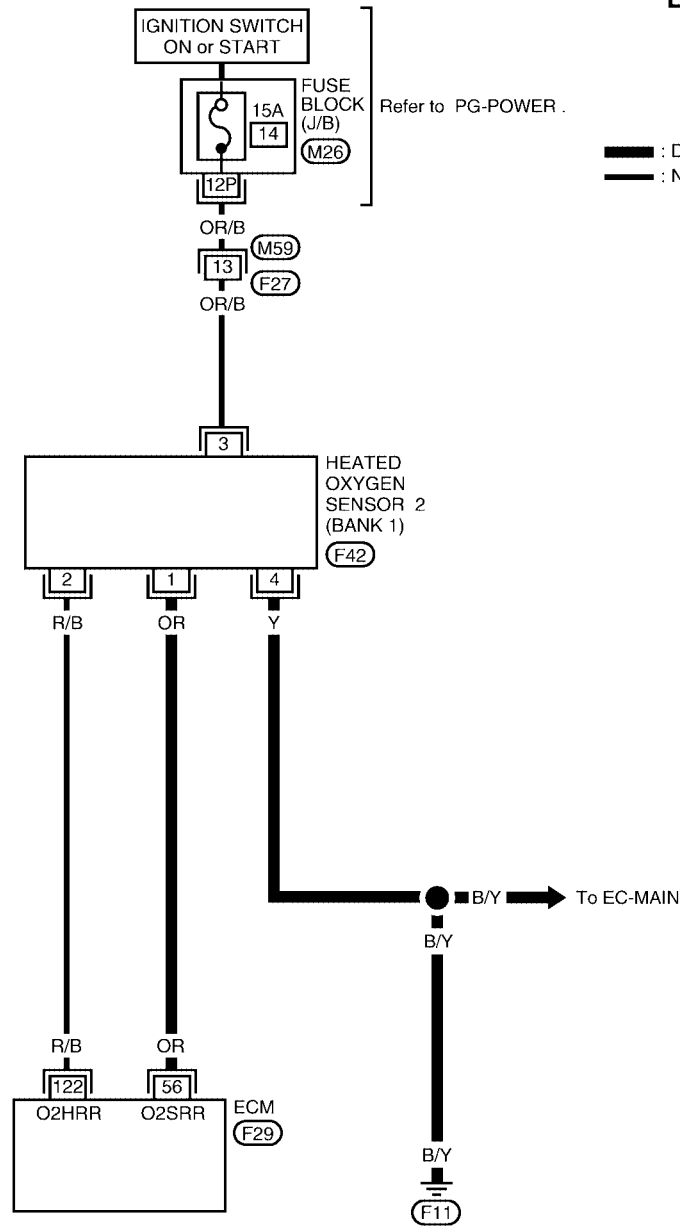
K

L

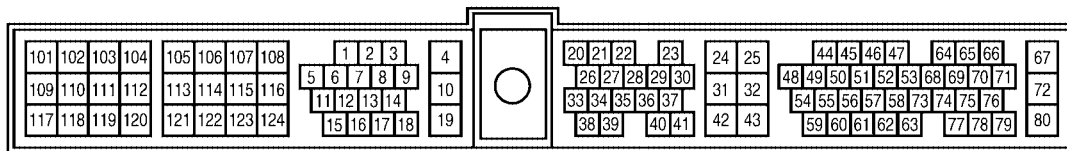
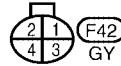
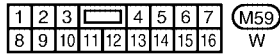
M

Wiring Diagram  
BANK 1

EC-O2S2B1-01



— : Detectable line for DTC  
— : Non-detectable line for DTC



# DTC P0138, P0158 HO2S2

[VG33E]

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

**CAUTION:**

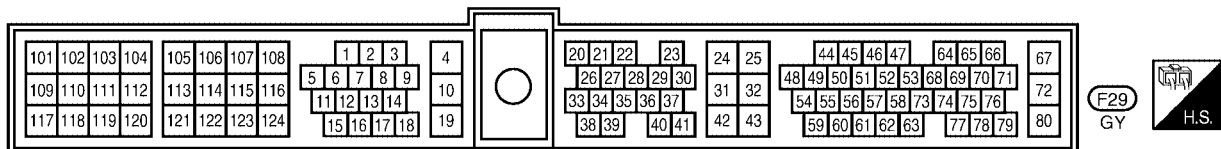
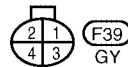
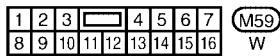
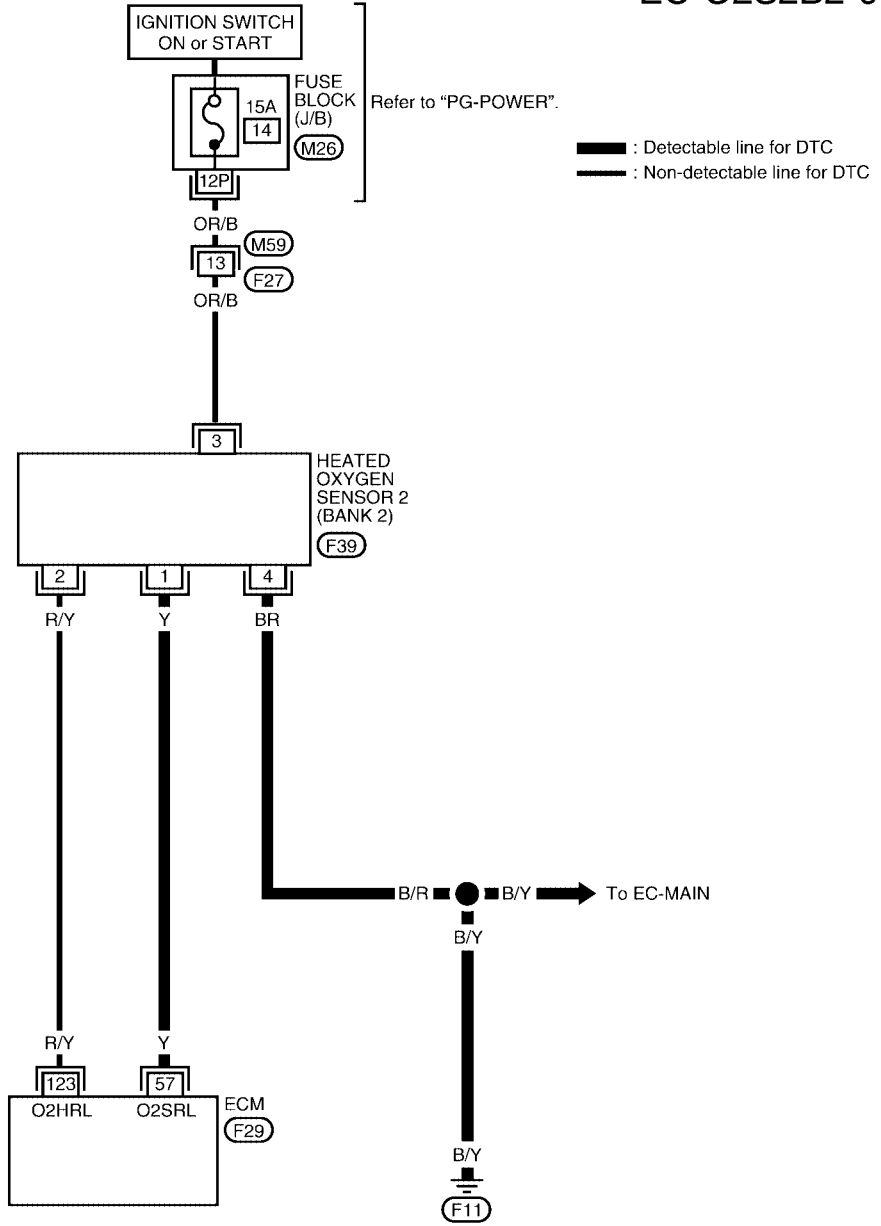
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

| TER-MINAL NO. | WIRE COLO R | ITEM                            | CONDITION   | DATA (DC Voltage)      |
|---------------|-------------|---------------------------------|---|------------------------|
| 56            | OR          | Heated oxygen sensor 2 (bank 1) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine after warming up.</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V |

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

BANK 2

EC-O2S2B2-01





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

**CAUTION:**

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

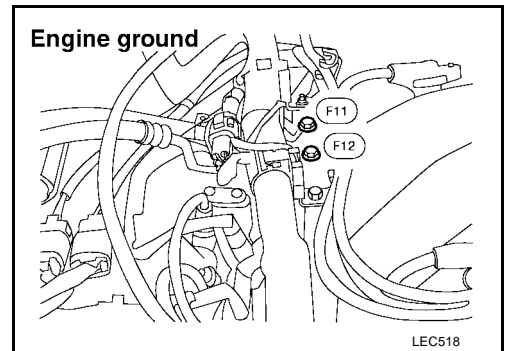
| TER-MINAL NO. | WIRE COLO R | ITEM                            | CONDITION   | DATA (DC Voltage)      |
|---------------|-------------|---------------------------------|---|------------------------|
| 57            | Y           | Heated oxygen sensor 2 (bank 2) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine after warming up.</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V |

**Diagnostic Procedure**

UBS007LL

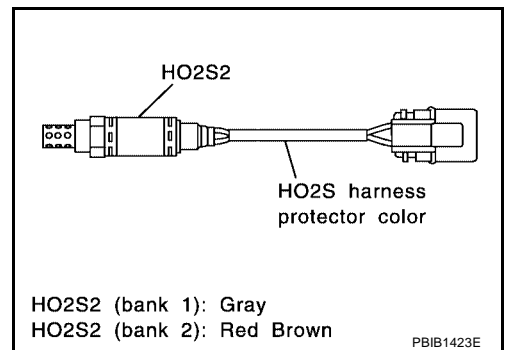
**1. INSPECTION START**

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



3. Check heated oxygen sensor 2 harness protector color.
4. Disconnect corresponding heated oxygen sensor 2 harness connector.
5. Disconnect ECM harness connector.

>> GO TO 2.



## 2. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows.  
Refer to Wiring Diagram.

| DTC   | Terminals |        | Bank   |
|-------|-----------|--------|--------|
|       | ECM       | Sensor |        |
| P0138 | 56        | 1      | Bank 1 |
| P0158 | 57        | 1      | Bank 2 |

**Continuity should exist.**

2. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows.

Refer to Wiring Diagram.

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P0138 | 56 or 1       | Ground | Bank 1 |
| P0158 | 57 or 1       | Ground | Bank 2 |

**Continuity should not exist.**

3. 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 engine ground.  
Refer to Wiring Diagram.

**Continuity should 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 following.

- Harness for open between heated oxygen sensor 2 and engine ground.

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

## 5. 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 6.
- OK (Without CONSULT-II)>>GO TO 7.
- NG >> Repair or replace harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 2

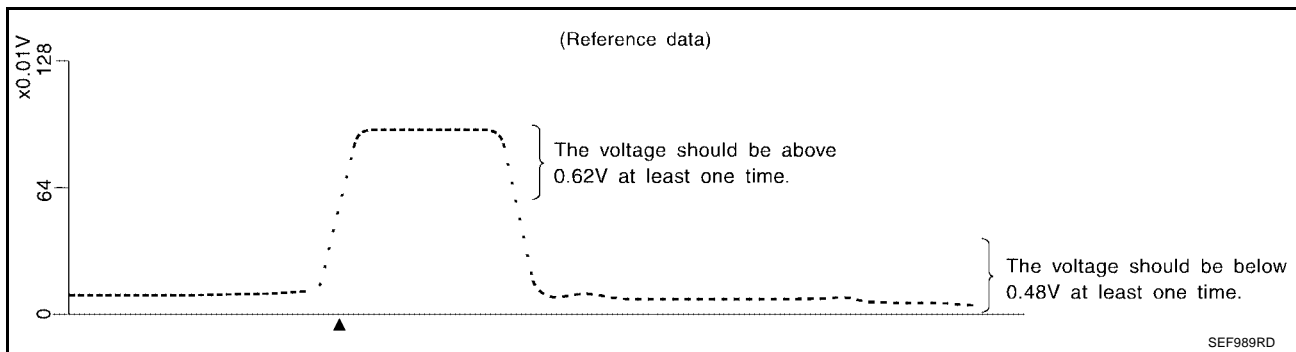
 With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch "OFF" and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
5. Let engine idle for one minutes.
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  $\pm 25\%$ .



"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 8.  
 NG >> Replace malfunctioning heated oxygen sensor 2.

## 7. 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 one minute under no load.
4. Let engine idle for one minutes.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
(Depress and release accelerator pedal as soon as possible.)

**The voltage should be above 0.62V 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 8.  
NG >> Replace malfunctioning heated oxygen sensor 2.

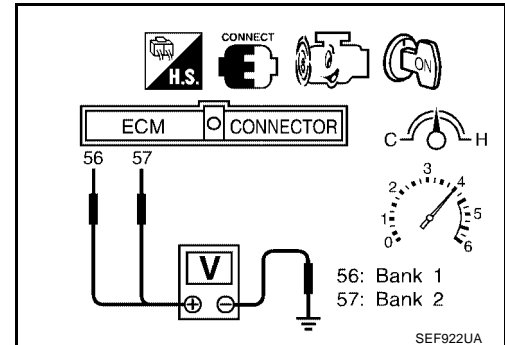
## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 2

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



**DTC P0139, P0159 HO2S2**

PF2:226A0

**Component Description**

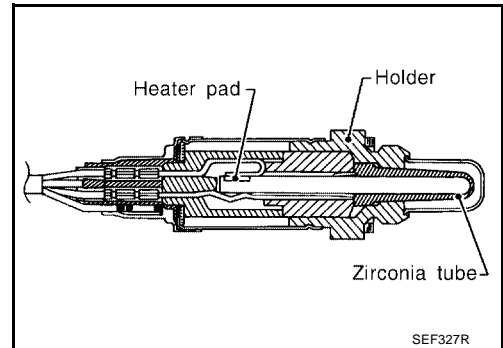
UBS007LN

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**

UBS007LO

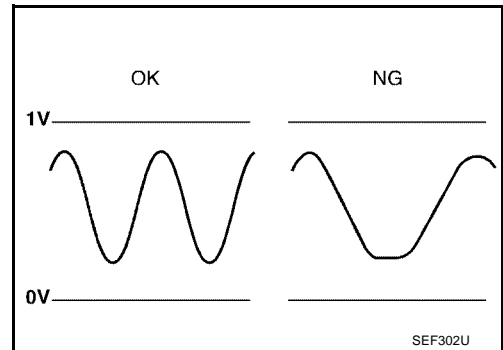
Specification data are reference values.

| MONITOR ITEM                       | CONDITION   | SPECIFICATION                 |
|------------------------------------|---|-------------------------------|
| HO2S2 (B1)<br>HO2S2 (B2)           | <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● After keeping engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> Revving engine from idle up to 3,000 rpm quickly | 0 - 0.3V ↔ Approx. 0.6 - 1.0V |
| HO2S2 MNTR (B1)<br>HO2S2 MNTR (B2) |   | LEAN ↔ RICH                   |

**On Board Diagnosis Logic**

UBS007LP

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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Heated oxygen sensor 2</li> <li>● Fuel pressure</li> <li>● Injectors</li> <li>● Intake air leaks</li> </ul> |
| P0159 (Bank 2) |  |   |   |

**DTC Confirmation Procedure**

UBS007LQ

**NOTE:**

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

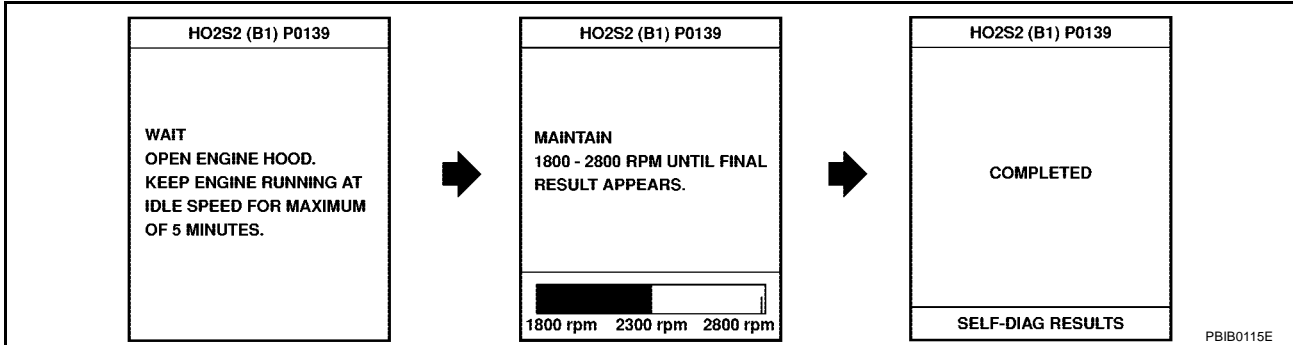
**TESTING CONDITION:**

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 one minute under no load.
4. Let engine idle for one minutes.
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-818, "Diagnostic Procedure"](#).  
If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
  - a. Turn ignition switch "OFF" and leave the vehicle in a cool place (soak the vehicle).
  - b. Turn ignition switch "ON" and select "COOLANTEMP/S" in "DATA MONITOR" mode with CONSULT-II.
  - c. Start engine and warm it up while monitoring "COOLANTEMP/S" indication on CONSULT-II.
  - d. When "COOLANTEMP/S" indication reaches to 70°C (158°F), go to step 3.

## Overall Function Check

UBS007LR

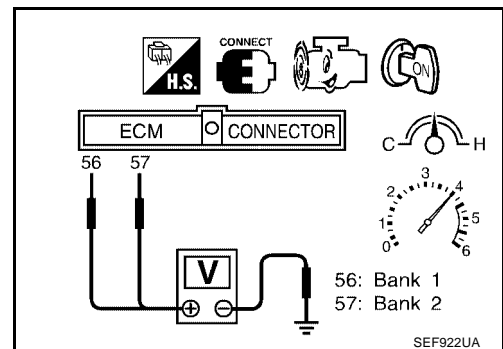
Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

### CAUTION:

**Always drive vehicle at a safe speed.**

### WITH GST

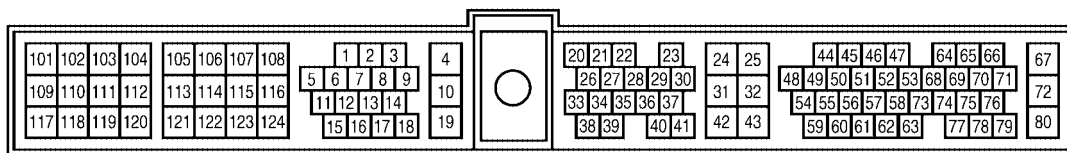
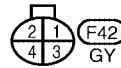
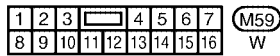
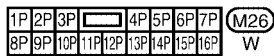
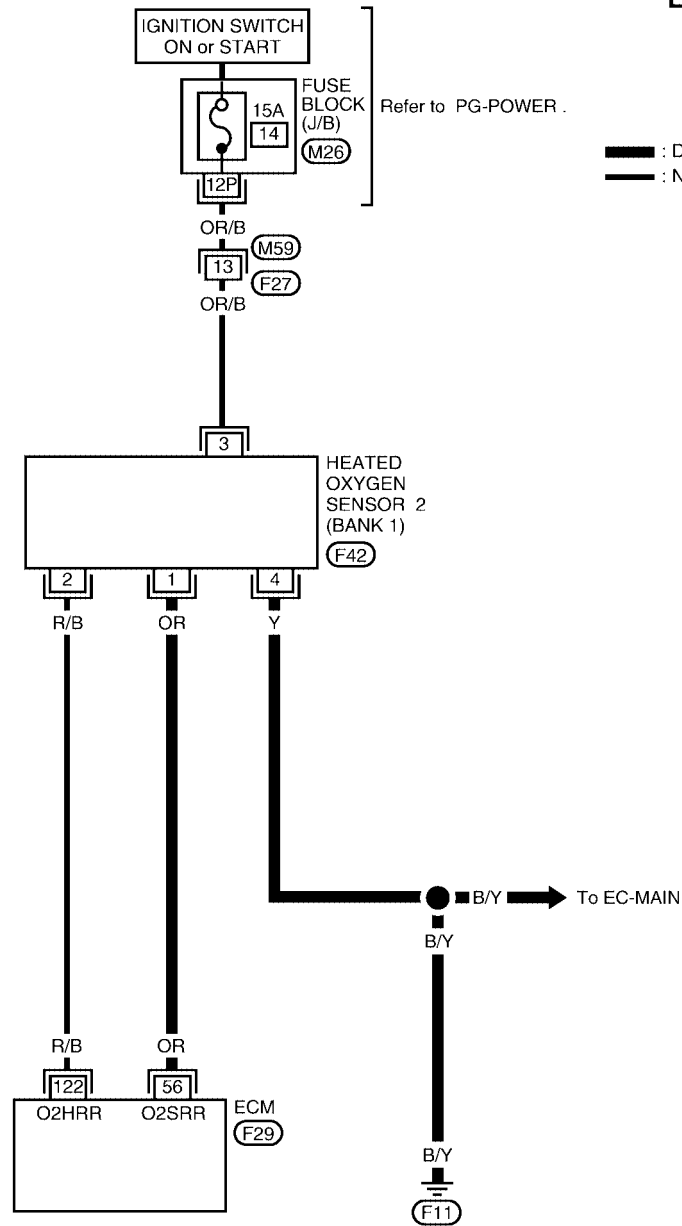
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between 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 change at more than 0.06V for 1 second during this procedure.**  
**If the voltage can be confirmed in step 6, step 7 is not necessary.**
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF (A/T), 3rd gear position (M/T).  
**The voltage should change at more than 0.06V for 1 second during this procedure.**
8. If NG, go to [EC-818, "Diagnostic Procedure"](#).



Wiring Diagram  
BANK 1

EC-O2S2B1-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



# DTC P0139, P0159 HO2S2

[VG33E]

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

**CAUTION:**

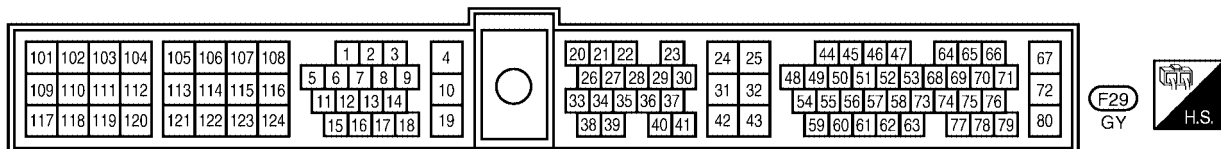
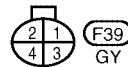
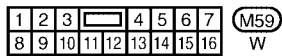
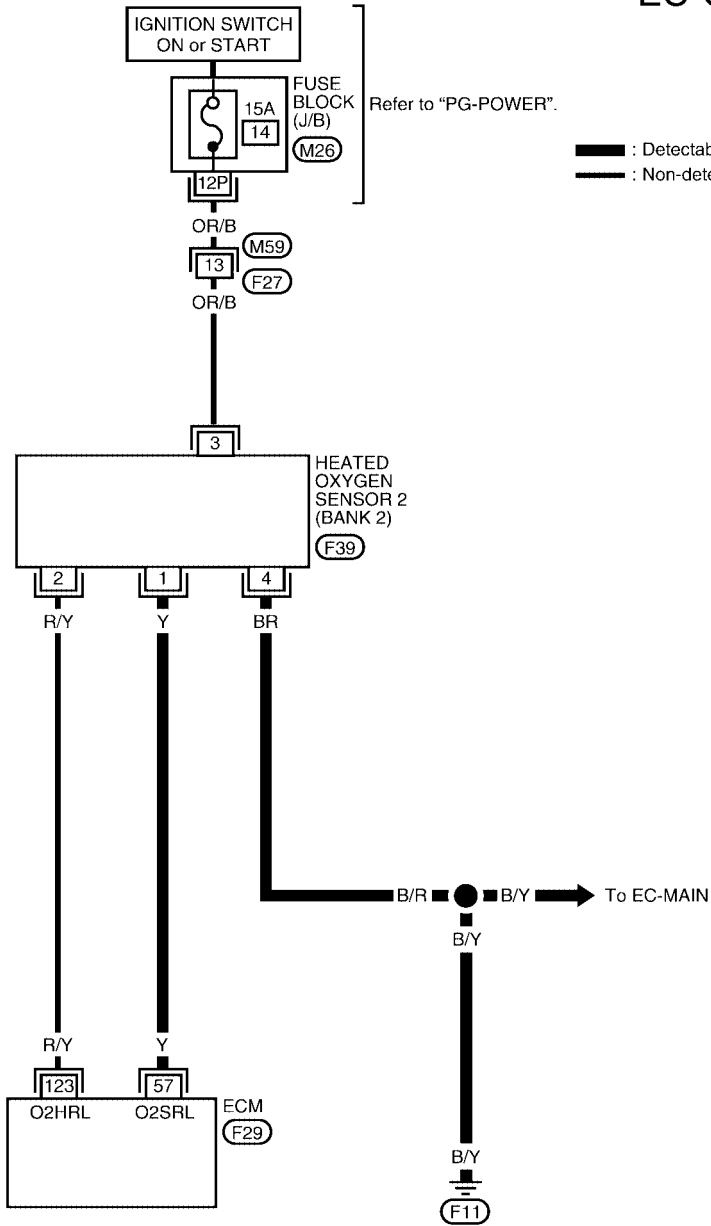
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

| TER-MINAL NO. | WIRE COLO R | ITEM                            | CONDITION   | DATA (DC Voltage)      |
|---------------|-------------|---------------------------------|---|------------------------|
| 56            | OR          | Heated oxygen sensor 2 (bank 1) | <b>[Engine is running]</b> <ul style="list-style-type: none"><li>● Engine speed is below 3.600 rpm after the following conditions are met.<ul style="list-style-type: none"><li>– Engine after warming up.</li><li>– Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li></ul></li><li>● Revving engine from idle to 3,000 rpm quickly.</li></ul> | 0 - Approximately 1.0V |



BANK 2

EC-O2S2B2-01



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

**CAUTION:**

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

| TER-MINAL NO. | WIRE COLO R | ITEM                            | CONDITION  | DATA (DC Voltage)      |
|---------------|-------------|---------------------------------|--|------------------------|
| 57            | Y           | Heated oxygen sensor 2 (bank 2) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine speed is below 3.600 rpm after the following conditions are met.                             <ul style="list-style-type: none"> <li>- Engine after warming up.</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> </li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V |

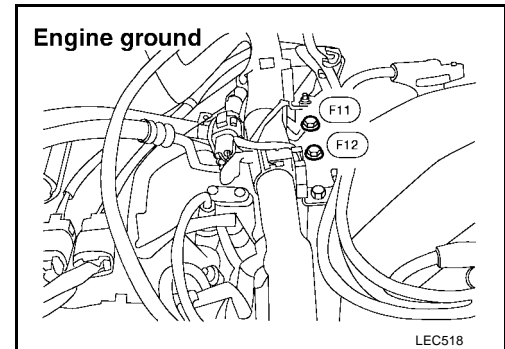
**Diagnostic Procedure**

UBS007LT

**1. RETIGHTEN GROUND SCREWS**

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

>> GO TO 2.

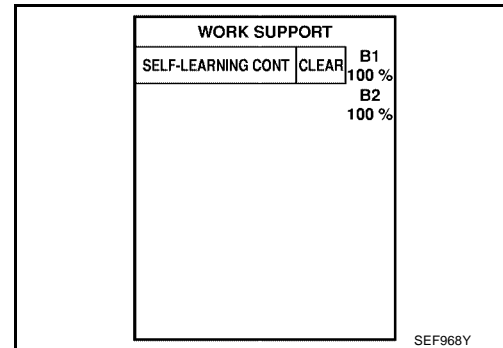


LEC518

## 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, P0172, P0174 or P0175 detected?  
Is it difficult to start engine?**



### WITHOUT CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to [EC-634, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#).
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?  
Is it difficult to start engine?**

Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to [EC-823](#) or [EC-831](#).
- No >> GO TO 3.

## 3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.  
Refer to Wiring Diagram.

**Continuity should exist.**

2. Also check harness for short to power.

OK or NG

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

## 4. DETECT MALFUNCTIONING PART

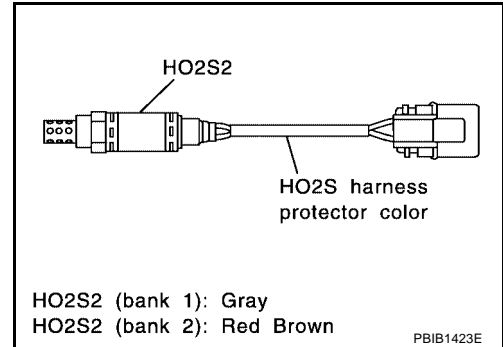
Check the following.

- Harness for open between heated oxygen sensor 2 and engine ground.

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

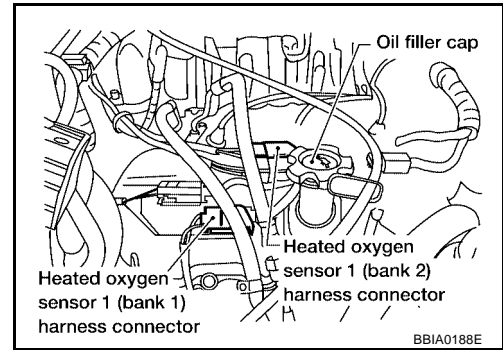
**5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 harness protector color.



3. Disconnect corresponding heated oxygen sensor 2 harness connector.
4. Disconnect ECM harness connector.
5. 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.**

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows.  
Refer to Wiring Diagram.

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P0139 | 56 or 1       | Ground | Bank 1 |
| P0159 | 57 or 1       | Ground | Bank 2 |

**Continuity should not exist.**

7. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 6.

OK (Without CONSULT-II)>>GO TO 7.

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

6. CHECK HEATED OXYGEN SENSOR 2

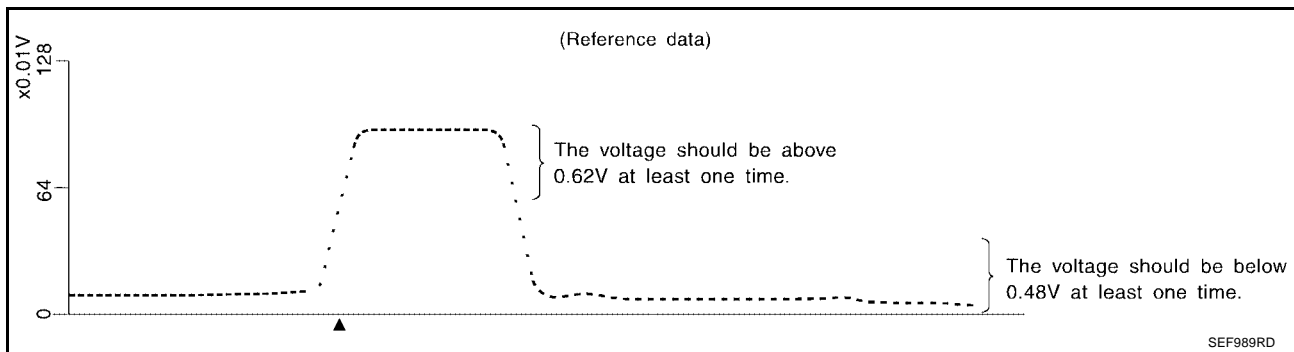
 With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch "OFF" and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
5. Let engine idle for one minutes.
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  $\pm 25\%$ .



"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 8.
- NG >> Replace malfunctioning heated oxygen sensor 2.

## 7. 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 one minute under no load.
4. Let engine idle for one minutes.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
(Depress and release accelerator pedal as soon as possible.)

**The voltage should be above 0.62V 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 8.  
NG >> Replace malfunctioning heated oxygen sensor 2.

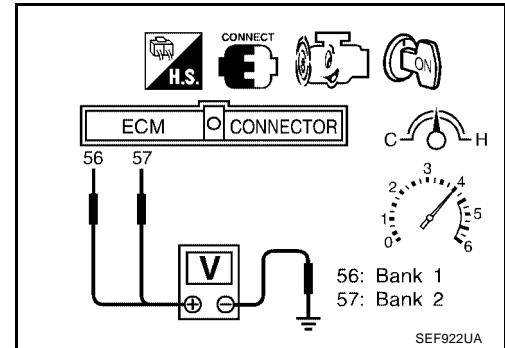
## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 2

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



## DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

### On Board Diagnosis Logic

UBS007LV

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

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

| DTC No.        | Trouble diagnosis name         | DTC detecting condition   | Possible cause   |
|----------------|--------------------------------|---|--|
| P0171 (Bank 1) | Fuel injection system too lean | <ul style="list-style-type: none"> <li>● Fuel injection system does not operate properly.</li> <li>● The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)</li> </ul> | <ul style="list-style-type: none"> <li>● Intake air leaks</li> <li>● Heated oxygen sensor 1</li> <li>● Injectors</li> <li>● Exhaust gas leaks</li> <li>● Incorrect fuel pressure</li> <li>● Lack of fuel</li> <li>● Mass air flow sensor</li> <li>● Incorrect PCV hose connection</li> </ul> |
| P0174 (Bank 2) |                                |   |  |

### DTC Confirmation Procedure

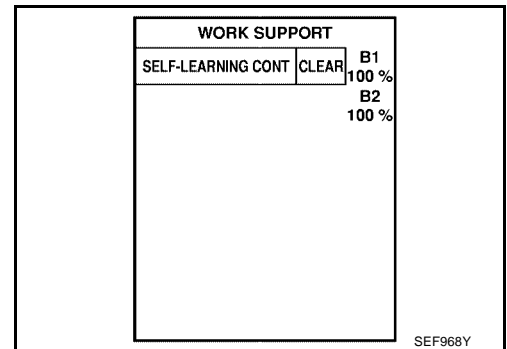
UBS007LW

**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-827, "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-827, "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.

## DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

[VG33E]

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-827, "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-827, "Diagnostic Procedure"](#). If engine does not start, check exhaust and intake air leak visually.



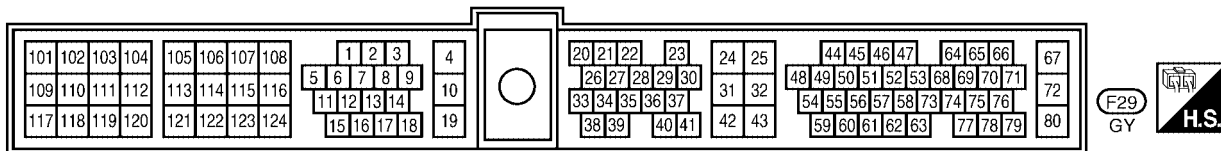
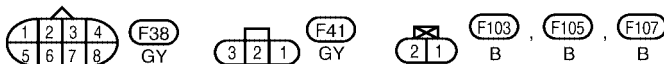
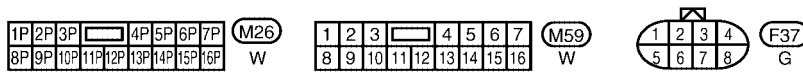
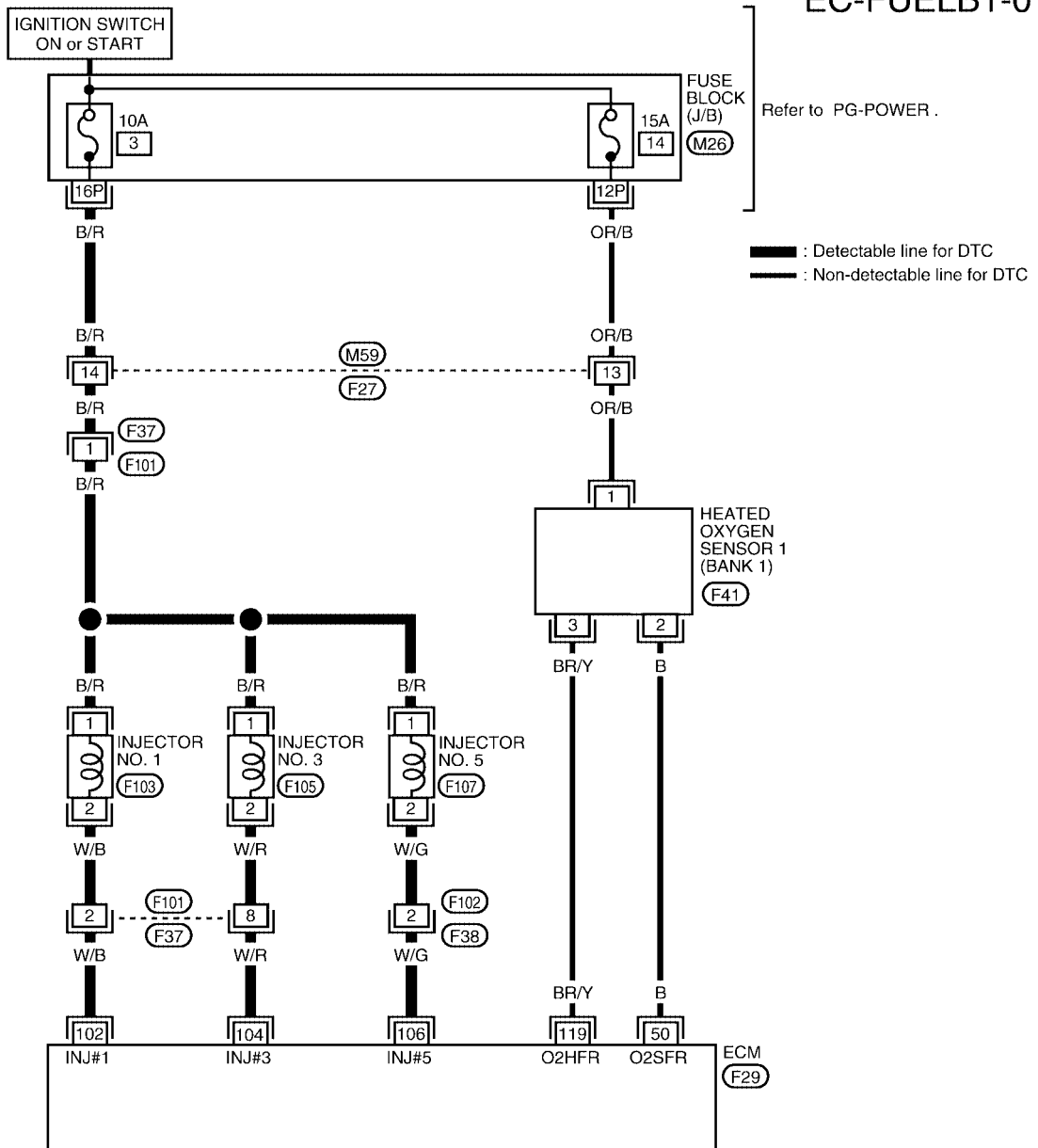
# DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

[VG33E]

UBS007LX

## Wiring Diagram BANK 1

EC-FUELB1-01

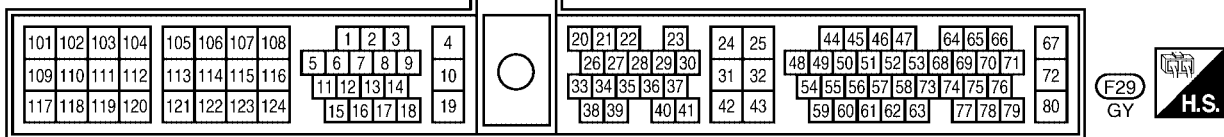
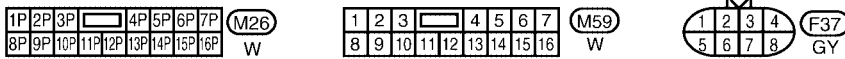
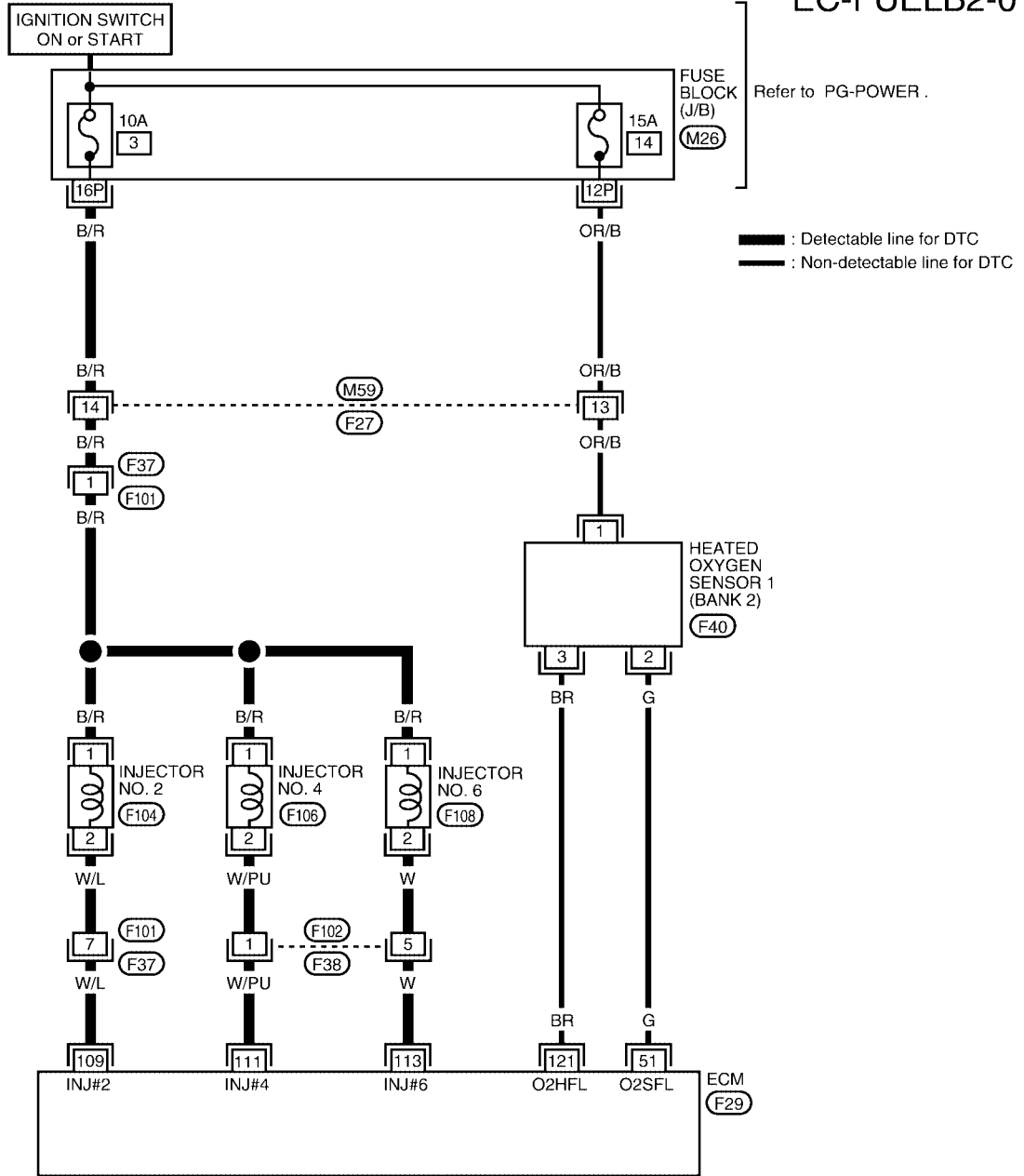


# DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

[VG33E]

## BANK 2

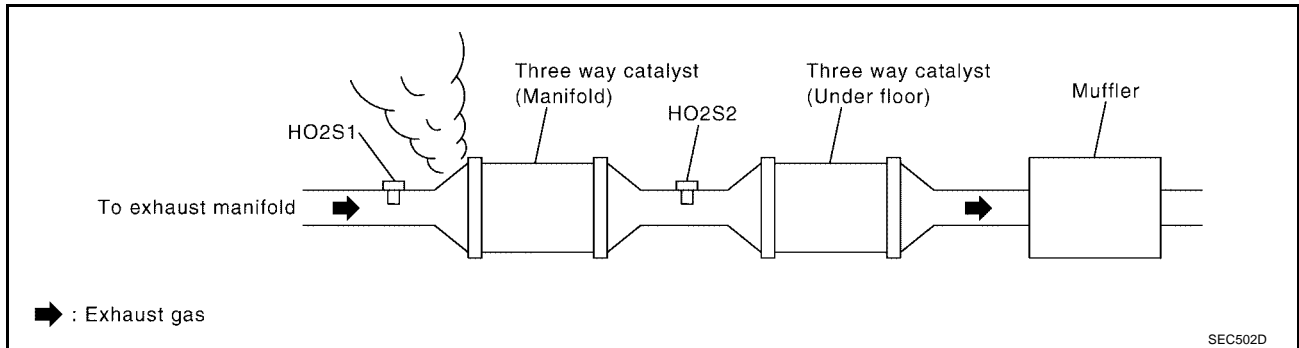
### EC-FUELB2-01



## Diagnostic Procedure

### 1. CHECK EXHAUST GAS LEAK

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



OK or NG

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

### 2. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the 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 corresponding 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 ECM terminal or HO2S1 terminal and ground as follows.  
Refer to Wiring Diagram.

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P0171 | 50 or 2       | Ground | Bank 1 |
| P0174 | 51 or 2       | Ground | 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-619, "FUEL PRESSURE RELEASE"](#) .
2. Install fuel pressure gauge and check fuel pressure. Refer to [EC-619, "FUEL PRESSURE CHECK"](#) .

At idling:

When fuel pressure regulator valve vacuum hose is connected.      235 kPa (2.4 kg/cm<sup>2</sup> , 34 psi)

When fuel pressure regulator valve vacuum hose is disconnected.      294 kPa (3.0 kg/cm<sup>2</sup> , 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-1154](#) .)
- Fuel pressure regulator (Refer to [EC-620](#) .)
- Fuel lines (Refer to [MA-24, "ENGINE MAINTENANCE \(VG33E AND VG33ER\)"](#) .)
- 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 engine grounds. Refer to [EC-723](#) .

**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.

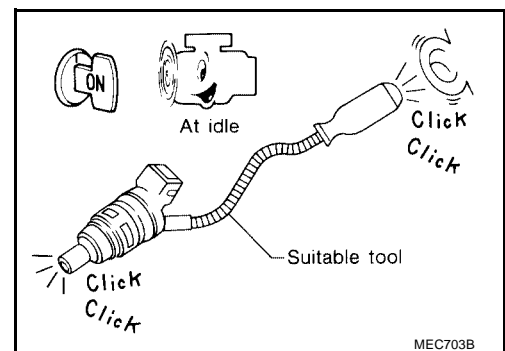
| ACTIVE TEST   |          |
|---------------|----------|
| POWER BALANCE |          |
| MONITOR       |          |
| ENG SPEED     | XXX rpm  |
| MAS AIF SE-B1 | XXX V    |
| IACV-AAC/V    | XXX step |
|               |          |
|               |          |
|               |          |
|               |          |

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 9.  
 NG >> Perform trouble diagnosis for [EC-1145, "INJECTOR CIRCUIT"](#) .

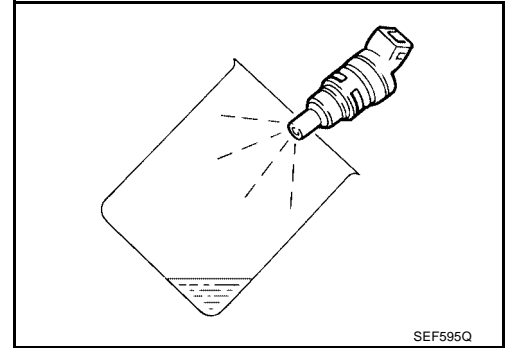
## 9. CHECK INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.
3. Disconnect injector harness connectors on left bank (for DTC P0171), right bank (for DTC P0174).
4. Remove injector gallery assembly. Refer to [EM-80](#) .  
Keep fuel hose and all injectors connected to injector gallery.  
The injector harness connectors on right bank (for DTC P0171), left bank (for DTC P0174) should remain connected.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each injector.
7. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.

**Fuel should be sprayed evenly for each injector.**

### 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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

### On Board Diagnosis Logic

UBS007LZ

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

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

| DTC No.        | Trouble diagnosis name         | DTC detecting condition   | Possible cause  |
|----------------|--------------------------------|---|---|
| P0172 (Bank 1) | Fuel injection system too rich | <ul style="list-style-type: none"> <li>● Fuel injection system does not operate properly.</li> <li>● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)</li> </ul> | <ul style="list-style-type: none"> <li>● Heated oxygen sensor 1</li> <li>● Injectors</li> <li>● Exhaust gas leaks</li> <li>● Incorrect fuel pressure</li> <li>● Mass air flow sensor</li> </ul> |
| P0175 (Bank 2) |                                |   |   |

### DTC Confirmation Procedure

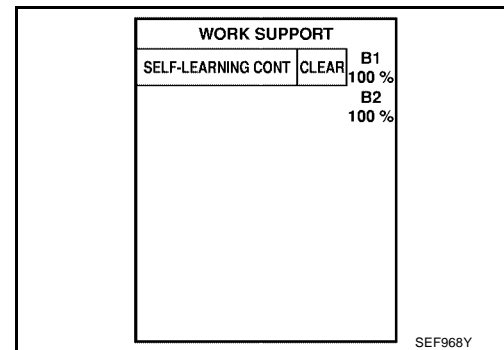
UBS007M0

**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-835, "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-835, "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-835, "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-835, "Diagnostic Procedure"](#) . If engine does not start, check exhaust and intake air leak visually.



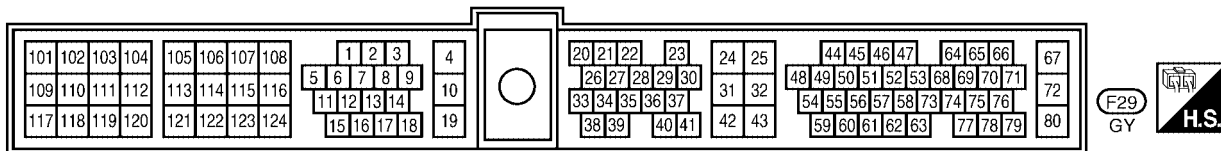
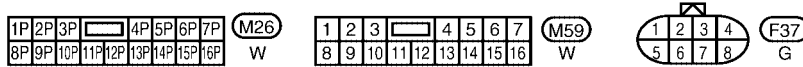
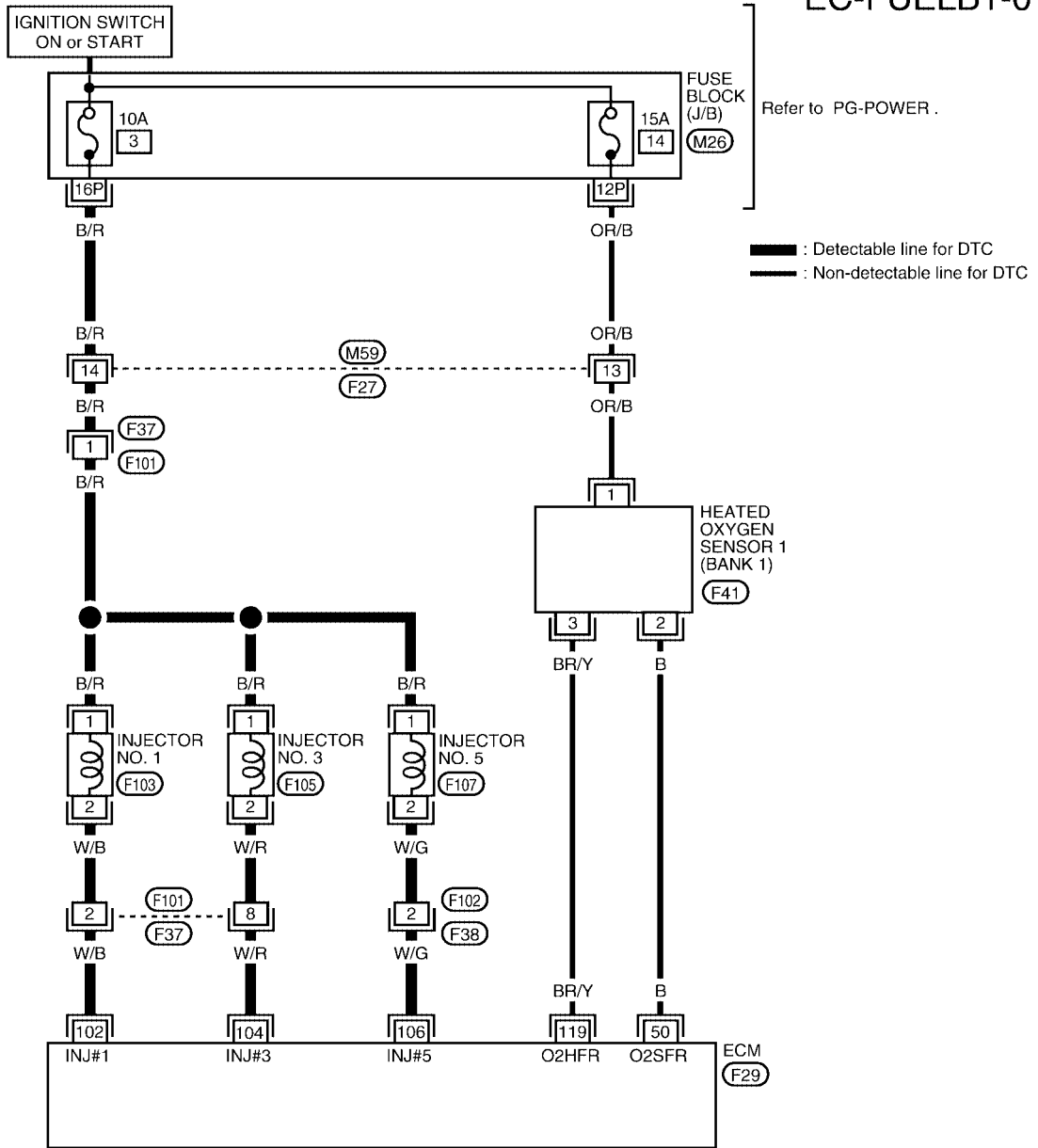
# DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

[VG33E]

UBS007M1

## Wiring Diagram BANK 1

EC-FUELB1-01



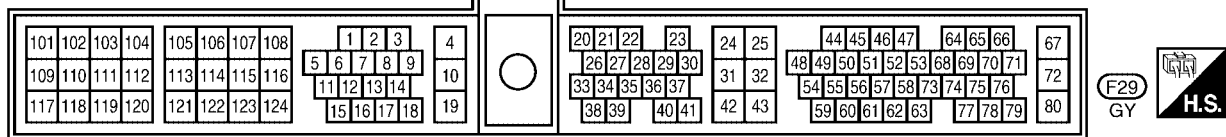
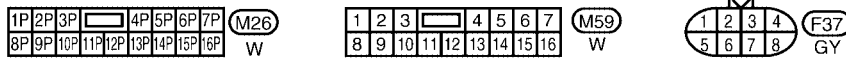
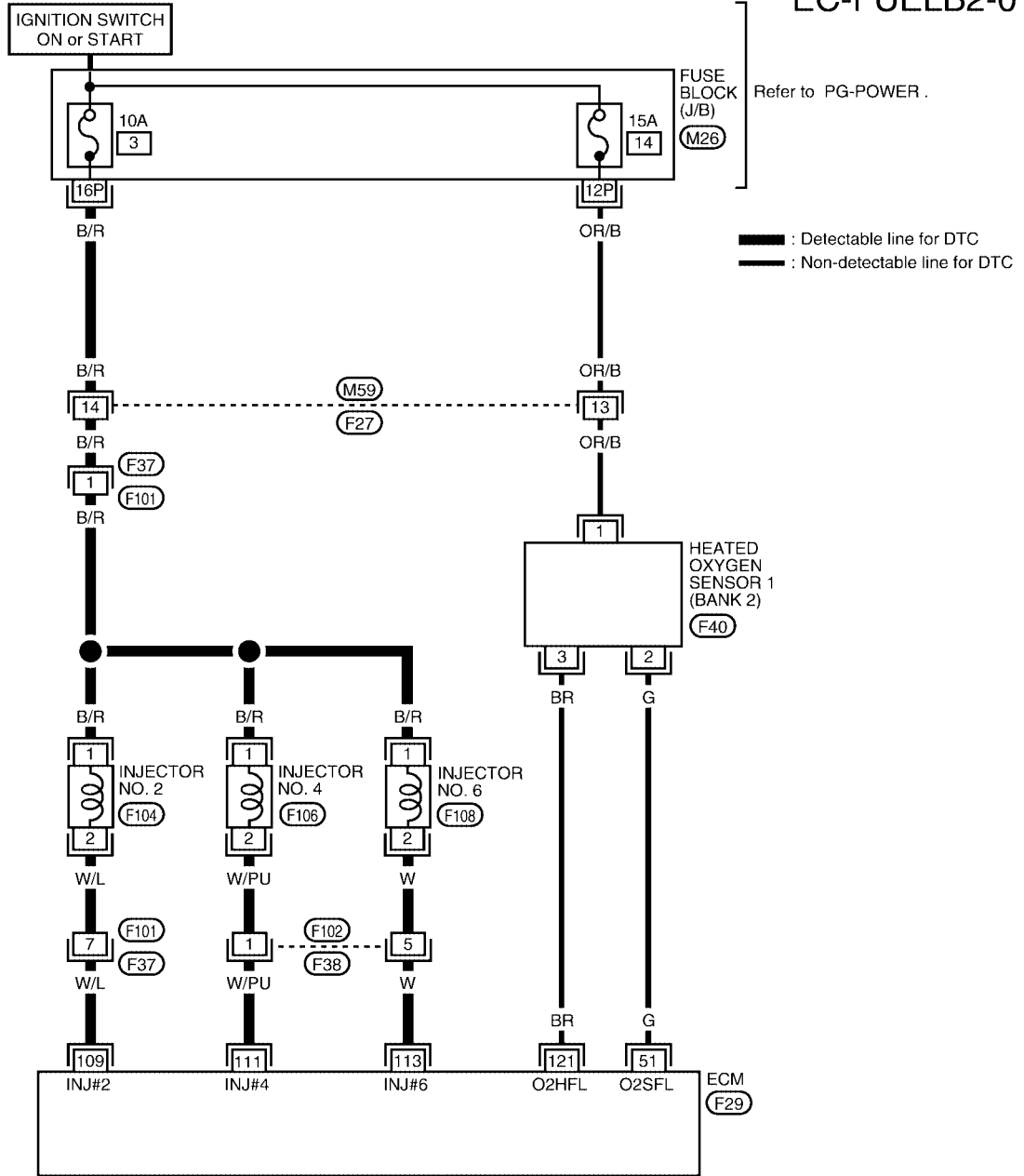
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# DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

[VG33E]

## BANK 2

### EC-FUELB2-01

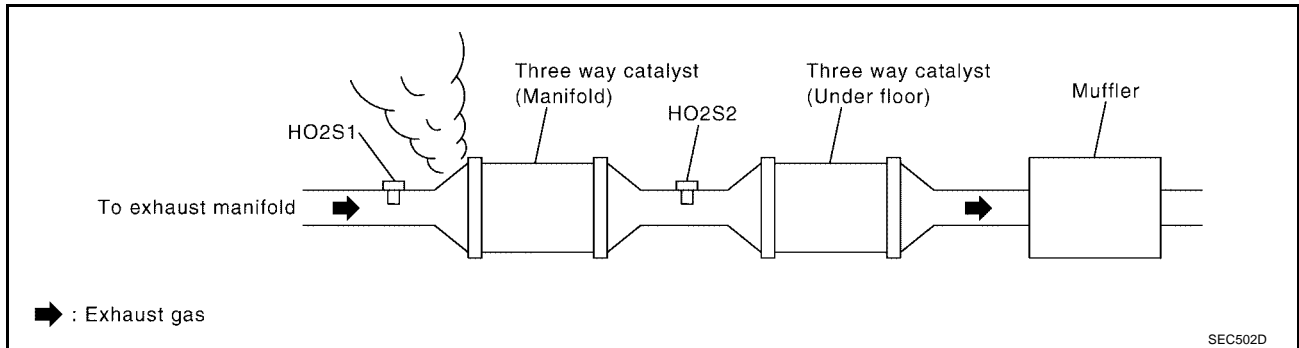


BBWA0479E

## Diagnostic Procedure

### 1. CHECK EXHAUST GAS LEAK

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



#### OK or NG

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

### 2. CHECK FOR INTAKE AIR LEAK

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

#### OK or NG

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

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

1. Turn ignition switch OFF.
2. Disconnect corresponding heated oxygen sensor 1 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 ECM terminal or HO2S1 terminal and ground as follows.

Refer to Wiring Diagram.

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P0172 | 50 or 2       | Ground | Bank 1 |
| P0175 | 51 or 2       | Ground | 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-619](#).
2. Install fuel pressure gauge and check fuel pressure. Refer to [EC-619, "Fuel Pressure Check"](#).

**At idling:**

**When fuel pressure regulator valve vacuum hose is connected.                      235 kPa (2.4 kg/cm<sup>2</sup> , 34 psi)**

**When fuel pressure regulator valve vacuum hose is disconnected.                      294 kPa (3.0 kg/cm<sup>2</sup> , 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-1154](#) .)
- Fuel pressure regulator (Refer to [EC-620](#) .)

>> 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 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 engine grounds. Refer to [EC-723, "DTC P0101 MAF SENSOR"](#) .

**7. CHECK FUNCTION OF INJECTORS**

**With CONSULT-II**

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

| ACTIVE TEST   |          |
|---------------|----------|
| POWER BALANCE |          |
| MONITOR       |          |
| ENG SPEED     | XXX rpm  |
| MAS AIF SE-B1 | XXX V    |
| IACV-AAC/V    | XXX step |
|               |          |
|               |          |
|               |          |
|               |          |

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**Without CONSULT-II**

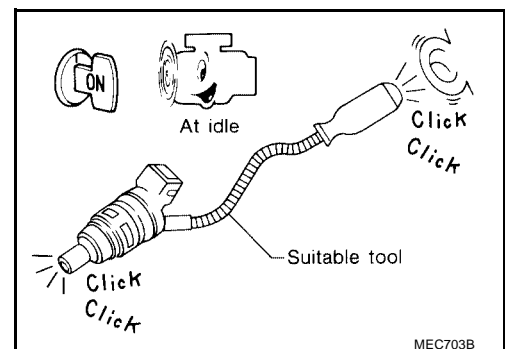
1. Start engine.
2. Listen to each injector operating sound.

**Clicking noise should be heard.**

OK or NG

OK >> GO TO 8.

NG >> Perform trouble diagnosis for [EC-1145, "INJECTOR CIRCUIT"](#) .



---

## 8. CHECK INJECTOR

---

1. Remove injector assembly. Refer to [EM-80](#) .  
Keep fuel hose and all injectors connected to injector gallery.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect injector harness connectors bank 2 (for DTC P0172), right bank (for P0175).  
The injector harness connectors on bank 1 (for P0172), left bank (for P0175) should remain connected.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injectors.
6. Crank engine for about 3 seconds.  
Make sure fuel does not drip from injector.

### OK or NG

OK (Does not drip)>>GO TO 9.

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

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## 9. CHECK INTERMITTENT INCIDENT

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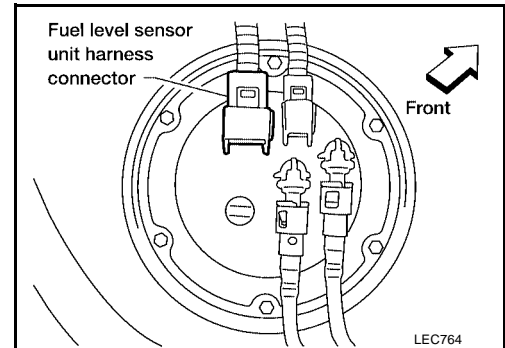
Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## DTC P0181 FTT SENSOR

### Component Description

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.



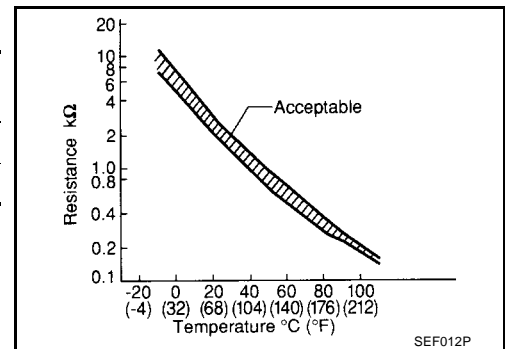
### <Reference data>

| Fluid temperature<br>°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

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Fuel tank temperature sensor</li> </ul> |

### DTC Confirmation Procedure

#### 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-842, "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-842, "Diagnostic Procedure"](#).

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

SEF174Y



**WITH GST**

Follow the procedure "With CONSULT-II".



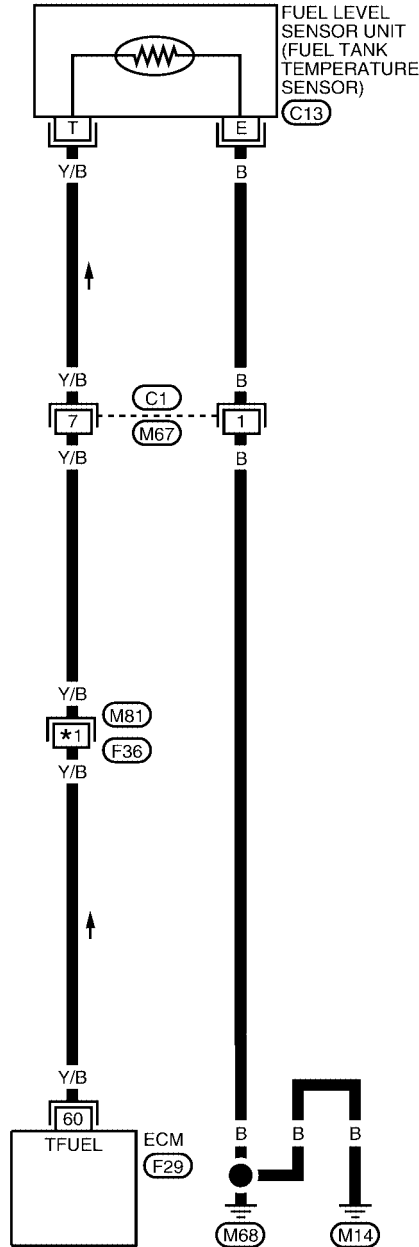
# DTC P0181 FTT SENSOR

[VG33E]

UBS007M6

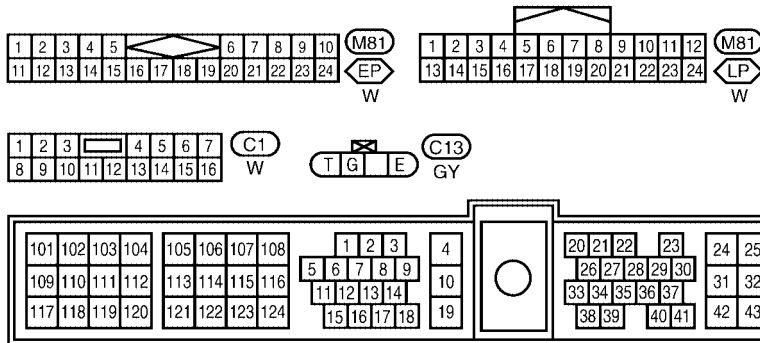
## Wiring Diagram

EC-FTTS-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- EP : 7
- \* LP : 10

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

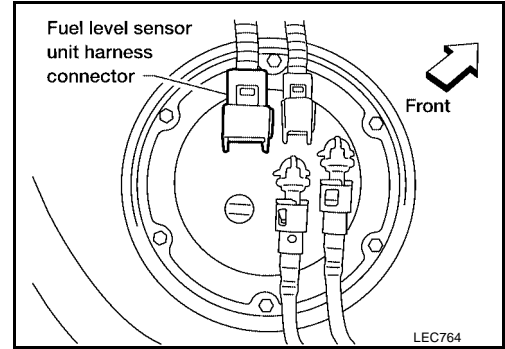


WBWA0059E

**Diagnostic Procedure**

**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.

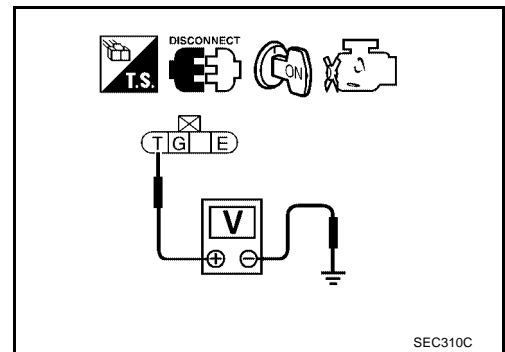


4. Check voltage between fuel level sensor unit terminal T and ground with CONSULT-II or tester.

**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 body 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 body ground
- Harness connectors C1, M67

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

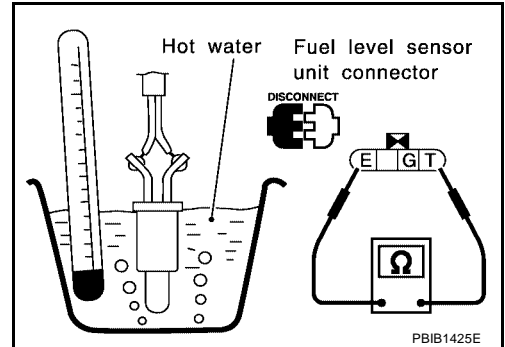
**5. CHECK FUEL TANK TEMPERATURE SENSOR**

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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Removal and Installation  
FUEL TANK TEMPERATURE SENSOR**

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

UBS007M8

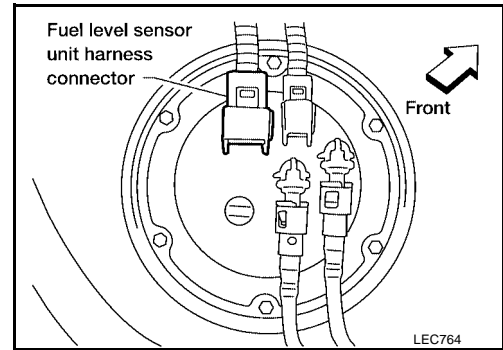
## DTC P0182, P0183 FTT SENSOR

PFP:22630

### Component Description

UBS007M9

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.



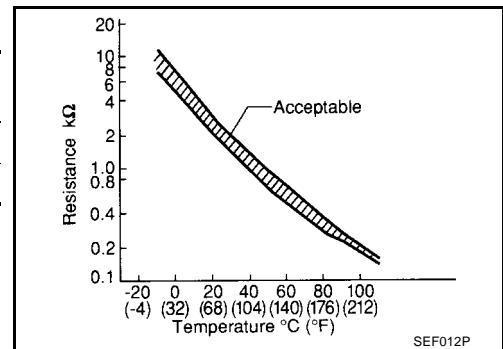
### <Reference data>

| Fluid temperature<br>°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

UBS007MA

| 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.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Fuel tank temperature sensor</li> </ul> |
| P0183   | Fuel tank temperature sensor circuit high input | An excessively high voltage from the sensor is sent to ECM. |  |

### DTC Confirmation Procedure

UBS007MB

#### 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-846, "Diagnostic Procedure"](#)

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

SEF174Y

#### WITH GST

Follow the procedure "With CONSULT-II".

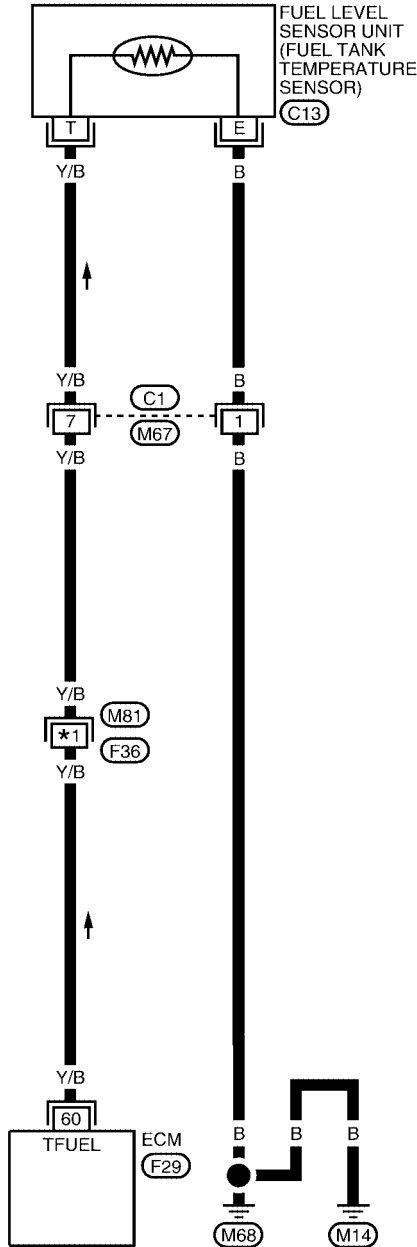
# DTC P0182, P0183 FTT SENSOR

[VG33E]

UBS007MC

## Wiring Diagram

EC-FTTS-01

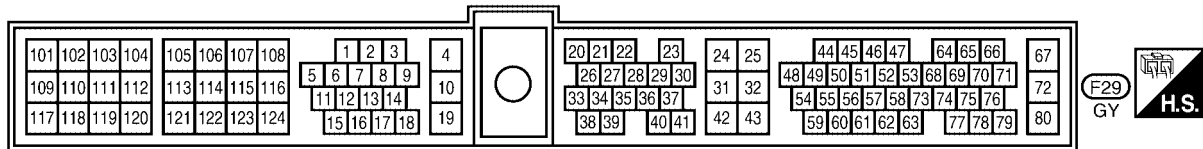
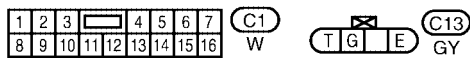
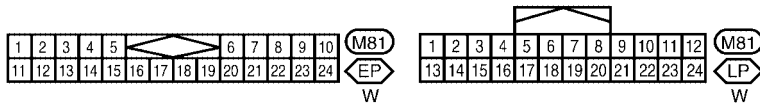


— : Detectable line for DTC  
 — : Non-detectable line for DTC

EP : EARLY PRODUCTION

LP : LATE PRODUCTION

\* EP : 7  
 LP : 10

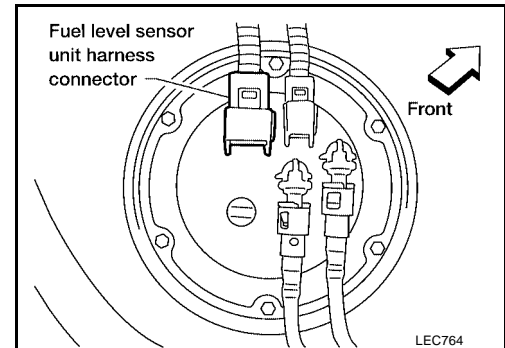


WBWA0059E

## Diagnostic Procedure

### 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.

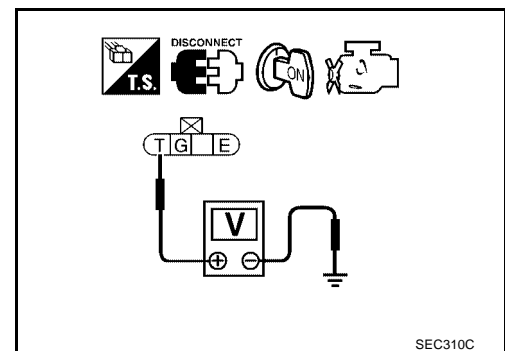


4. Check voltage between fuel level sensor unit terminal T and ground with CONSULT-II or tester.

**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 body 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 body ground
- Harness connectors C1, M67

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

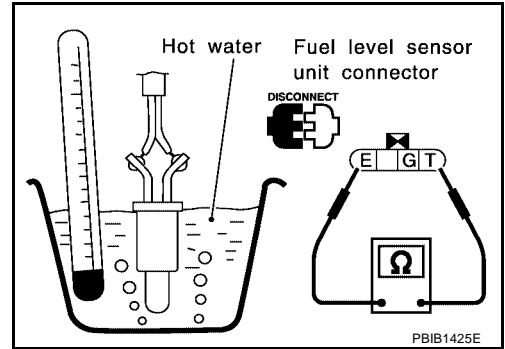
**5. CHECK FUEL TANK TEMPERATURE SENSOR**

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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Removal and Installation  
FUEL TANK TEMPERATURE SENSOR**

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

UBS007ME

# DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

[VG33E]

## DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

PF0:00019

### On Board Diagnosis Logic

UBS007MF

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy.

When malfunction is detected, the malfunction indicator lamp (MIL) will light up even in the first trip.

| 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. | <ul style="list-style-type: none"><li>● Cooling fan (crankshaft driven)</li><li>● Thermostat</li><li>● Improper ignition timing</li><li>● Engine coolant temperature sensor</li><li>● Blocked radiator</li><li>● Blocked front end (Improper fitting of nose mask)</li><li>● Crushed vehicle frontal area (Vehicle frontal is collided but not repaired)</li><li>● Blocked air passage by improper installation of front fog lamp or fog lamps</li><li>● Improper mixture ratio of coolant</li><li>● Damaged bumper</li></ul> For more information, refer to <a href="#">EC-852, "Main 12 Causes of Overheating"</a> . |

#### 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

UBS007MG

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.

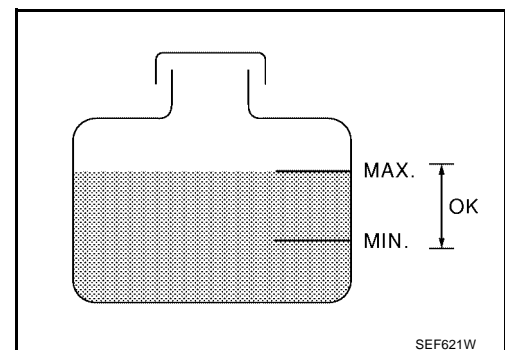
Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

#### Ⓟ 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-850, "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.

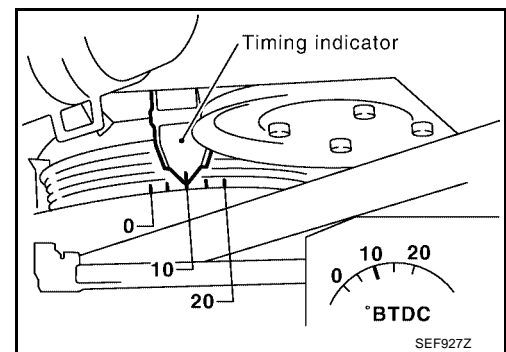




# DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

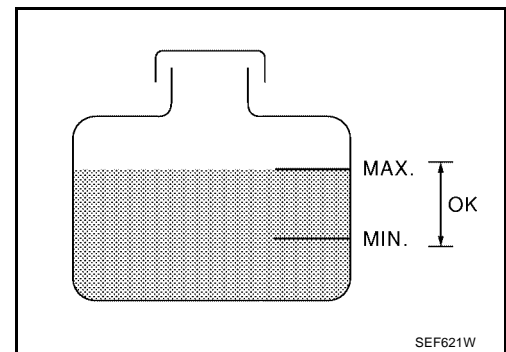
[VG33E]

- 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-850, "Diagnostic Procedure"](#).
- 3. Start engine and make sure that cooling fan (crankshaft driven) operates. If NG, go to [EC-850, "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-850, "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-850, "Diagnostic Procedure"](#). If NG, replace ECT sensor and go to next step.
- 7. Check ignition timing. Refer to [EC-648, "Basic Inspection"](#).  
Make sure that ignition timing is  $10^{\circ} \pm 2^{\circ}$  at  $700 \pm 50$  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-850, "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-850, "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-850, "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-850, "Diagnostic Procedure"](#). After repair, go to next step.

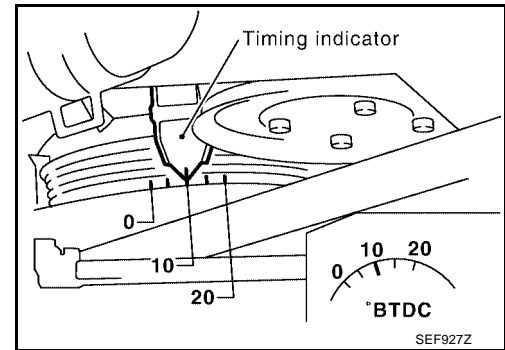


# DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

[VG33E]

**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-850, "Diagnostic Procedure"](#) . If NG, replace ECT sensor and go to next step.
7. Check ignition timing. Refer to [EC-648, "Basic Inspection"](#) .  
Make sure that ignition timing is  $10^{\circ} \pm 2^{\circ}$  at  $700 \pm 50$  rpm.  
If NG, adjust ignition timing and then recheck.



UBS007MH

## Diagnostic Procedure

### 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<sup>2</sup> , 23 psi)**

**Pressure should not drop.**

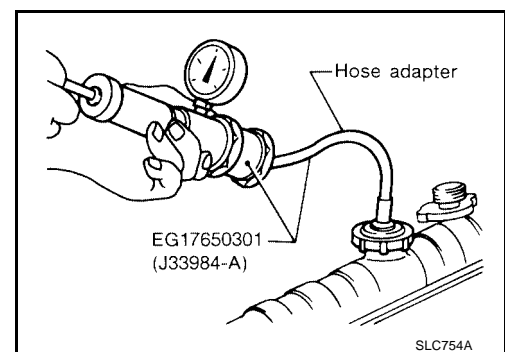
OK or NG

OK >> GO TO 3.

NG >> Check the following for leak:

- Hose
- Radiator
- Water pump

Refer to [CO-25, "WATER PUMP"](#) .



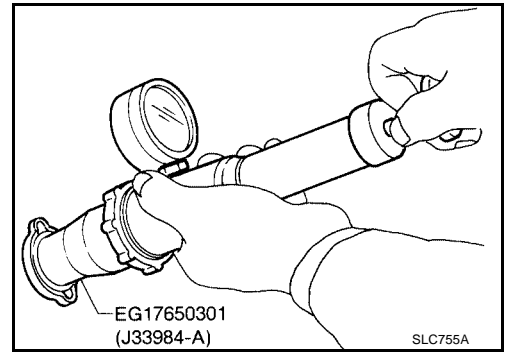
## 3. CHECK RADIATOR CAP

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<sup>2</sup>, 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] ture**

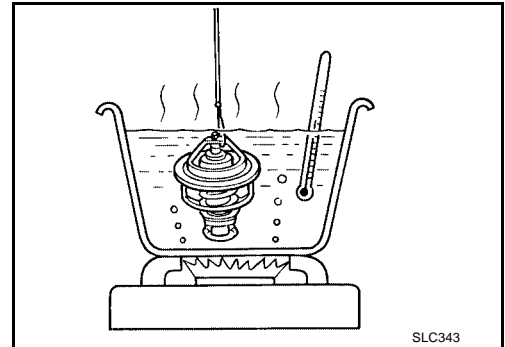
**Valve lift : More than 10 mm/90°C (0.31 in/194°F)**

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer to [CO-28, "THERMOSTAT"](#) .

OK or NG

- OK >> GO TO 5.
- NG >> Replace thermostat.

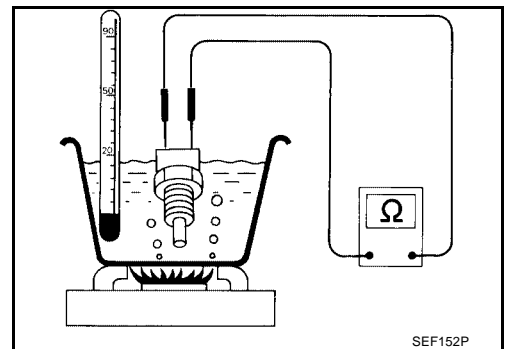


## 5. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

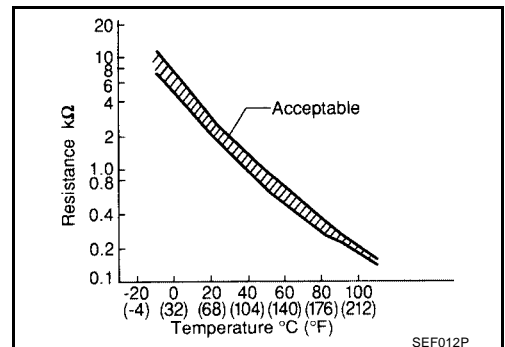
<Reference data>

| 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.



# DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

[VG33E]

## 6. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to [EC-852, "Main 12 Causes of Overheating"](#) .

>> INSPECTION END.

### Main 12 Causes of Overheating

UBS007MI

| Engine | Step | Inspection item  | Equipment  | Standard   | Reference page   |
|--------|------|--|--|--|--|
| OFF    | 1    | <ul style="list-style-type: none"> <li>Blocked radiator</li> <li>Blocked condenser</li> <li>Blocked radiator grille</li> <li>Blocked bumper</li> </ul> | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | No blocking  | —  |
|        | 2    | <ul style="list-style-type: none"> <li>Coolant mixture</li> </ul>  | <ul style="list-style-type: none"> <li>Coolant tester</li> </ul>                               | 50 - 50% coolant mixture   | See <a href="#">MA-12, "Recommended Fluids and Lubricants"</a> .     |
|        | 3    | <ul style="list-style-type: none"> <li>Coolant level</li> </ul>  | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | Coolant up to MAX level in reservoir tank and radiator filler neck | See <a href="#">MA-26, "Changing Engine Coolant"</a> .               |
|        | 4    | <ul style="list-style-type: none"> <li>Radiator cap</li> </ul>   | <ul style="list-style-type: none"> <li>Pressure tester</li> </ul>                              | 59 - 98 kPa (0.6 - 1.0 kg/cm <sup>2</sup> , 9 - 14 psi) (Limit)    | See <a href="#">CO-23, "System Check"</a> .                          |
| ON*1   | 5    | <ul style="list-style-type: none"> <li>Coolant leaks</li> </ul>  | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | No leaks   | See <a href="#">CO-23, "System Check"</a> .                          |
| ON*1   | 6    | <ul style="list-style-type: none"> <li>Thermostat</li> </ul>   | <ul style="list-style-type: none"> <li>Touch the upper and lower radiator hoses</li> </ul>     | Both hoses should be hot   | See <a href="#">CO-28, "THERMOSTAT"</a> .                            |
| ON*1   | 7    | <ul style="list-style-type: none"> <li>Cooling fan (Crankshaft driven)</li> </ul>  | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | Operating  | See <a href="#">CO-32, "COOLING FAN (CRANKSHAFT DRIVEN)"</a> .       |
| OFF    | 8    | <ul style="list-style-type: none"> <li>Combustion gas leak</li> </ul>  | <ul style="list-style-type: none"> <li>Color checker chemical tester 4 Gas analyzer</li> </ul> | Negative   | —  |
| ON*2   | 9    | <ul style="list-style-type: none"> <li>Coolant temperature gauge</li> </ul>  | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | Gauge less than 3/4 when driving                                   | —  |
|        |      | <ul style="list-style-type: none"> <li>Coolant overflow to reservoir tank</li> </ul>   | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | No overflow during driving and idling                              | See <a href="#">MA-26, "Changing Engine Coolant"</a> .               |
| OFF*3  | 10   | <ul style="list-style-type: none"> <li>Coolant return from reservoir tank to radiator</li> </ul>   | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | Should be initial level in reservoir tank                          | See <a href="#">MA-24, "ENGINE MAINTENANCE (VG33E AND VG33ER)"</a> . |
| OFF    | 11   | <ul style="list-style-type: none"> <li>Cylinder head</li> </ul>  | <ul style="list-style-type: none"> <li>Straight gauge feeler gauge</li> </ul>                  | 0.1 mm (0.004 in) Maximum distortion (warping)                     | See <a href="#">EM-110, "Inspection"</a> .                           |
|        | 12   | <ul style="list-style-type: none"> <li>Cylinder block and pistons</li> </ul>   | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | No scuffing on cylinder walls or piston                            | See <a href="#">EM-133, "Inspection"</a> .                           |

\*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

[VG33E]

## DTC P0300 - P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

PF0:0000

### On Board Diagnosis Logic

UBS007MJ

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.

- 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.
- 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. | <ul style="list-style-type: none"> <li>● Improper spark plug</li> <li>● Insufficient compression</li> <li>● Incorrect fuel pressure</li> <li>● The injector circuit is open or shorted</li> <li>● Fuel injectors</li> <li>● Intake air leak</li> <li>● The ignition secondary signal circuit is open or shorted</li> <li>● Lack of fuel</li> <li>● Signal plate or flywheel</li> <li>● Heated oxygen sensor 1</li> <li>● Incorrect PCV hose connection</li> </ul> |
| 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

UBS007MK

#### 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.

**④ WITH CONSULT-II**

1. Turn ignition switch ON, and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 5 seconds.
4. Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.

**Hold the accelerator pedal as steady as possible.**

**NOTE:**

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

5. If 1st trip DTC is detected, go to [EC-854, "Diagnostic Procedure"](#)

| DATA MONITOR   |          |
|----------------|----------|
| MONITOR        | NO DTC   |
| ENG SPEED      | XXX rpm  |
| COOLANT TEMP/S | XXX °C   |
| VHCL SPEED SE  | XXX km/h |
| P/N POSI SW    | OFF      |
| B/FUEL SCHDL   | XXX msec |

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**④ WITH GST**

Follow the procedure "With CONSULT-II".

## Diagnostic Procedure

UBS007ML

### 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 |
|               |          |
|               |          |
|               |          |
|               |          |

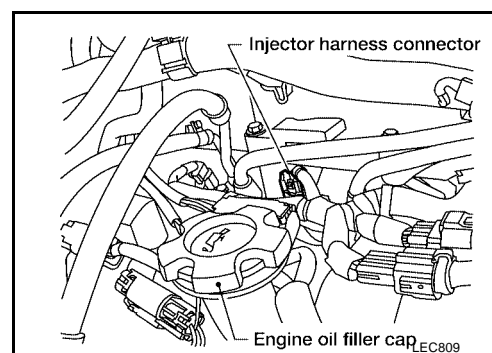
SEF070Y

### 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.

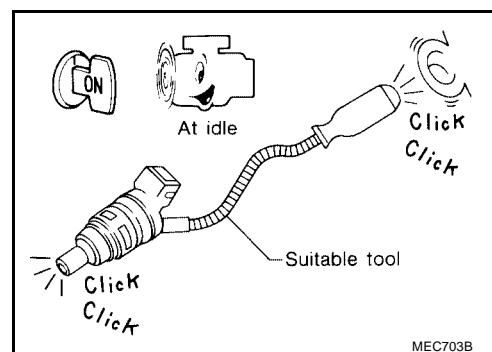


## 4. CHECK INJECTOR

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-1145](#), "[INJECTOR CIRCUIT](#)".

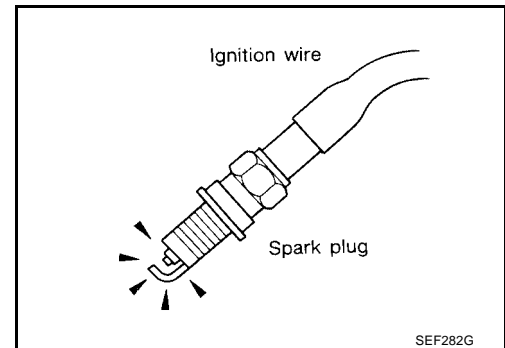


## 5. CHECK IGNITION SPARK

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

OK or NG

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

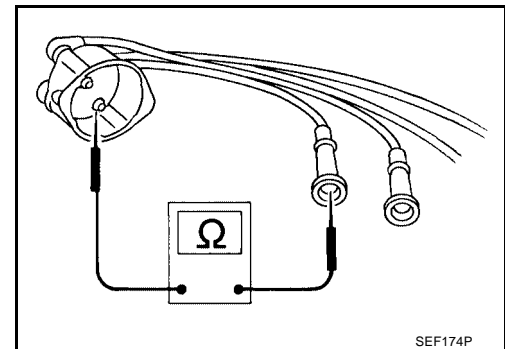


## 6. CHECK IGNITION WIRES

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

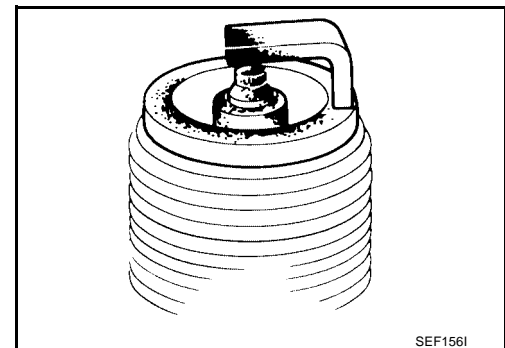
- OK >> Check the following:
- Distributor rotor head for incorrect parts
  - Ignition coil, power transistor and their circuits
- Refer to [EC-1139, "IGNITION SIGNAL"](#).
- NG >> Replace.

## 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-24, "ENGINE MAINTENANCE \(VG33E AND VG33ER\)"](#).





## 8. CHECK COMPRESSION PRESSURE

Refer to [EM-102, "Measurement of Compression"](#) .

- Check compression pressure.

**Standard** : 1,196 kPa (12.2 kg/cm<sup>2</sup> , 173 psi)/300 rpm

**Minimum** : 883 kPa (9.0 kg/cm<sup>2</sup> , 128 psi)/300 rpm

**Difference between each cylinder** : 98 kPa (1.0 kg/cm<sup>2</sup> , 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-619](#) .
3. Install fuel pressure gauge and check fuel pressure. Refer to [EC-619, "Fuel Pressure Check"](#) .

**At idle** : Approx. 235 kPa (2.4 kg/cm<sup>2</sup> , 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-1154](#) .)
- Fuel pressure regulator (Refer to [EC-620](#) .)
- Fuel lines (Refer to [MA-24](#) .)
- Fuel filter for clogging

>> Repair or replace.

## 11. CHECK IGNITION TIMING

Check the following items. Refer to [EC-648, "Basic Inspection"](#) .

| Items  | Specifications   |
|--|--|
| Ignitions timing   | 10° ± 2° BTDC  |
| Base idle speed  | 700 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.3 mm (0.012 in): ON<br>0.4 mm (0.016 in): OFF |
| Target idle speed  | 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 |
| COOLAN TEMP/S | XXX °C  |
| HO2S1 (B1)    | XXX V   |
| HO2S2 (B2)    | XXX V   |

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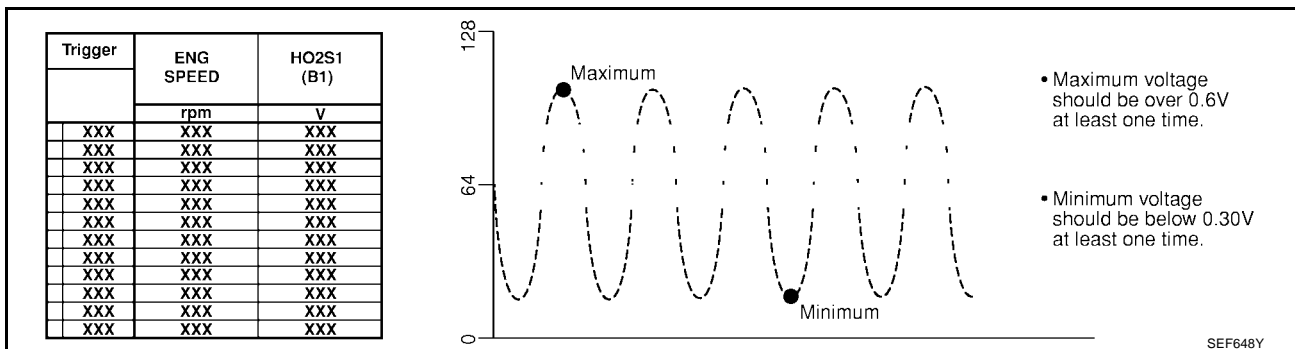
5. Check the following.

- "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown 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



**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 (bank 1 sensor signal) or 51 (bank 2 sensor signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
  - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
  - The maximum voltage is over 0.6V at least one time.
  - The minimum voltage is below 0.3V at least one time.
  - The voltage never exceeds 1.0V.

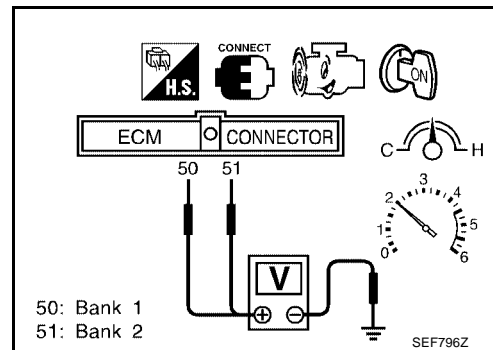
1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V  
 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V

**CAUTION:**

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

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 engine grounds. Refer to [EC-723, "DTC P0101 MAF SENSOR"](#) .

### 15. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in [EC-661, "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-634](#) .

>> GO TO 17.

**DTC P0300 - P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MIS-  
FIRE**

**[VG33E]**

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**17. CHECK INTERMITTENT INCIDENT**

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Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

**>> INSPECTION END.**

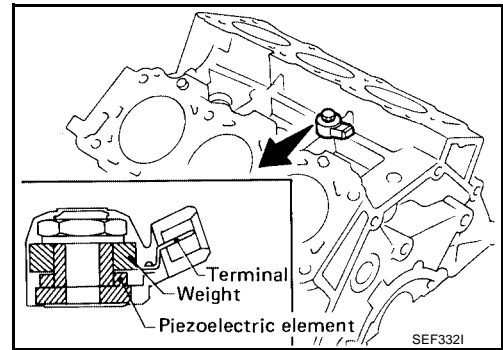
DTC P0327, P0328 KS

PF2:22060

Component Description

UBS007MM

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.



UBS007MN

On Board Diagnosis Logic

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.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Knock sensor</li> </ul> |
| P0328   | Knock sensor circuit high input | An excessively high voltage from the sensor is sent to ECM. |  |

DTC Confirmation Procedure

UBS007MO

NOTE:

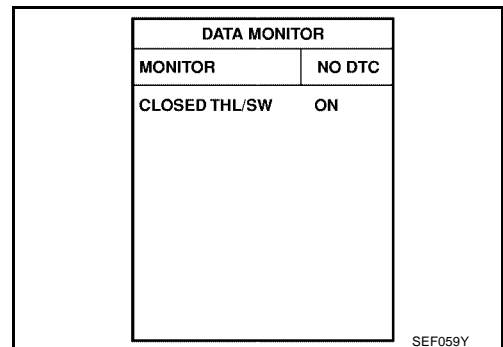
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

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-863, "Diagnostic Procedure"](#)



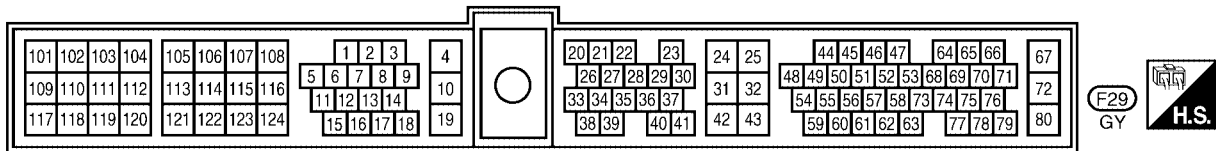
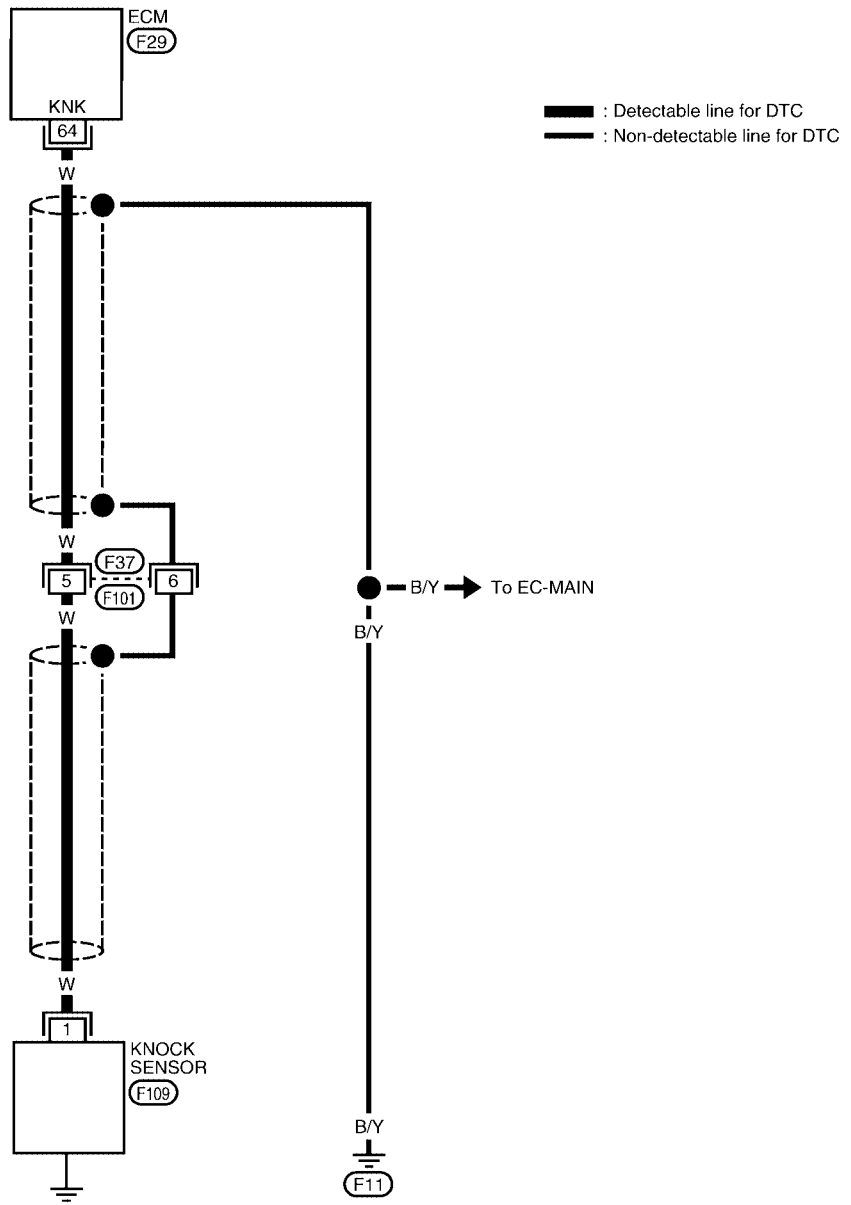
WITH GST

Follow the procedure "With CONSULT-II".

Wiring Diagram

UBS007MP

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.

| TER-MINAL NO. | WIRE COLOR | ITEM         | CONDITION                           | DATA (DC Voltage)  |
|---------------|------------|--------------|-------------------------------------|--------------------|
| 64            | W          | Knock sensor | [Engine is running]<br>● Idle speed | Approximately 2.5V |

**Diagnostic Procedure**

UBS007MQ

**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 engine 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 4.  
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 M $\Omega$ .

1. Disconnect knock sensor harness connector.
2. Check resistance between terminal 1 and ground.

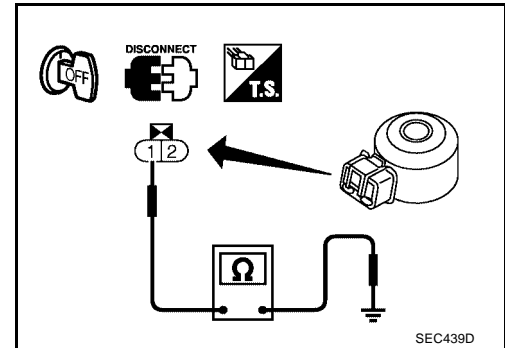
**Resistance: 500 - 620 k $\Omega$  [at 25°C (77°F)]**

### CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

OK or NG

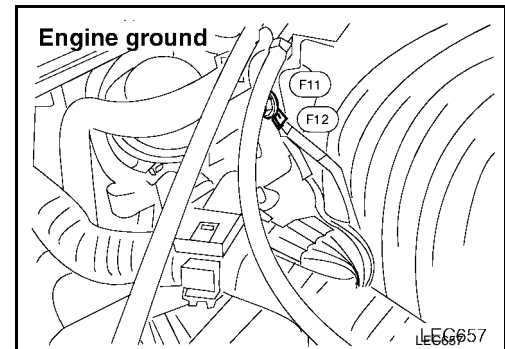
- OK >> GO TO 5.  
 NG >> Replace knock sensor.



## 5. RETIGHTEN GROUND SCREWS

Loose and retighten engine ground screws.

>> GO TO 6.



## 6. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.



**DTC P0335 CKP SENSOR (OBD)**

**Component Description**

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.

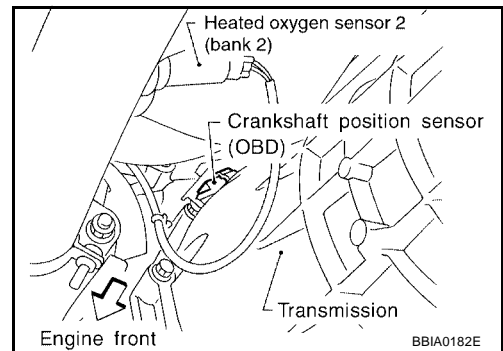
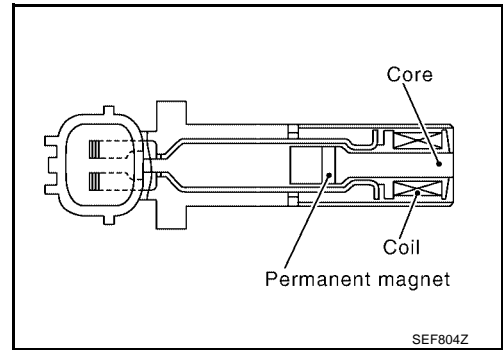
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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**

Specification data are reference values.

| MONITOR ITEM | CONDITION  | SPECIFICATION                                  |
|--------------|--|--|
| ENG SPEED    | <ul style="list-style-type: none"> <li>● Tachometer: Connect</li> <li>● Run engine and compare tachometer indication with the CONSULT-II value.</li> </ul> | Almost the same speed as the CONSULT-II value. |

**On Board Diagnosis Logic**

| DTC No. | Trouble diagnosis name                   | DTC detecting condition   | Possible cause  |
|---------|--|---|---|
| P0335   | Crankshaft position sensor (OBD) circuit | <ul style="list-style-type: none"> <li>● 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.</li> </ul> | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Crankshaft position sensor (OBD)</li> </ul> |

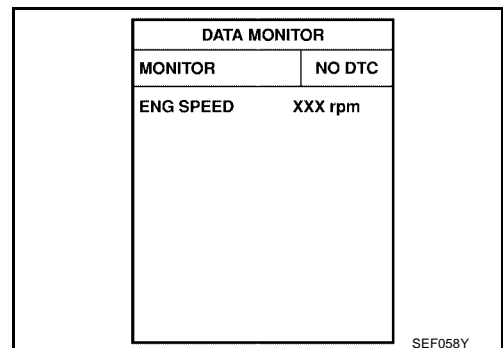
**DTC Confirmation Procedure**

**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-868, "Diagnostic Procedure"](#)





**WITH GST**

Follow the procedure "With CONSULT-II".

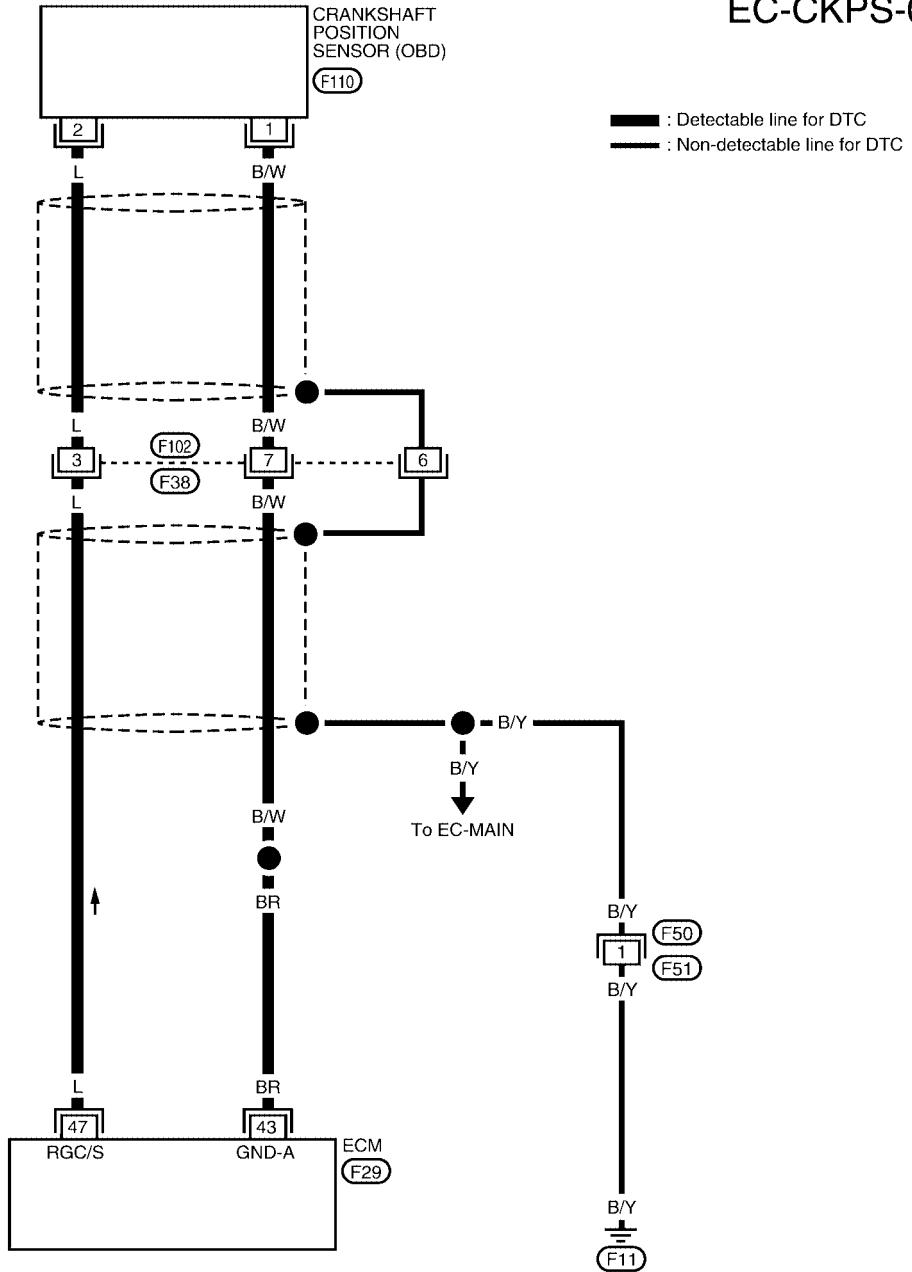
# DTC P0335 CKP SENSOR (OBD)

[VG33E]

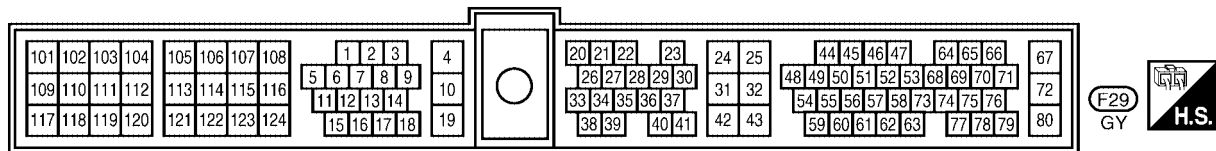
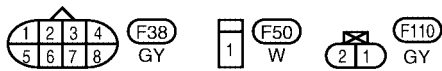
UBS007MW

## Wiring Diagram

EC-CKPS-01



A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



BBWA0481E

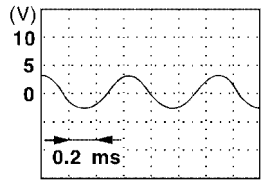
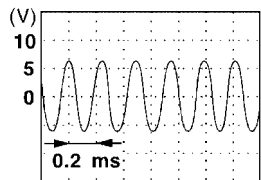
# DTC P0335 CKP SENSOR (OBD)

[VG33E]

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

**CAUTION:**

Do not use 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 (AC Voltage)   |
|---------------|------------|----------------------------------|--|---|
| 47            | L          | Crankshaft position sensor (OBD) | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul> | <p>1 - 2V★<br/>(AC range)</p>  |
|               |            |                                  | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>               | <p>3 - 4V★<br/>(AC range)</p>  |

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

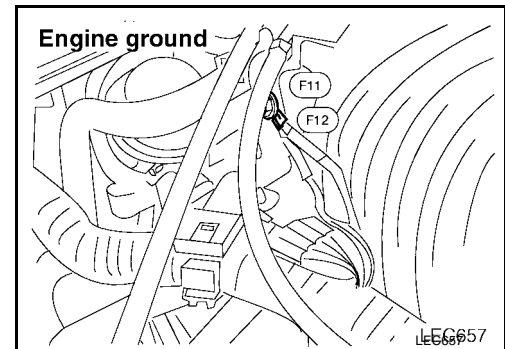
## Diagnostic Procedure

UBS007MX

### 1. RETIGHTEN GROUND SCREWS

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

>> GO TO 2.



### 2. CHECK CKP SENSOR (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

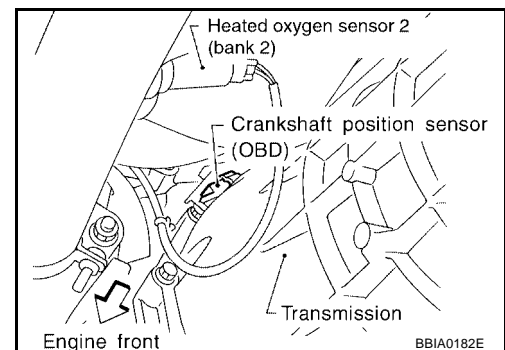
1. Disconnect crankshaft position (CKP) sensor (OBD) and ECM harness connectors.
2. Check continuity between ECM terminal 47 and sensor terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

- OK >> GO TO 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. Reconnect ECM harness connector.
2. Check harness continuity between sensor terminal 1 and engine ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

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

## 5. DETECT MALFUNCTIONING PART

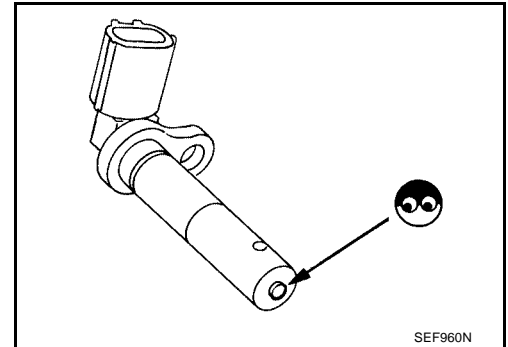
Check the following.

- Harness connectors F38, F102
- Harness for open between crankshaft position sensor (OBD) and ECM

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

## 6. 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.

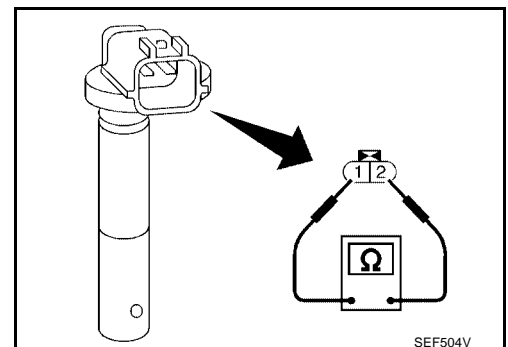


5. Check resistance as shown in the figure.

**Resistance : Approximately 512 - 632Ω [at 20°C (68°F)]**

OK or NG

- OK >> GO TO 7.
- NG >> Replace crankshaft position sensor (OBD).



---

**7. CHECK INTERMITTENT INCIDENT**

---

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**DTC P0340 CMP SENSOR**

**Component Description**

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.

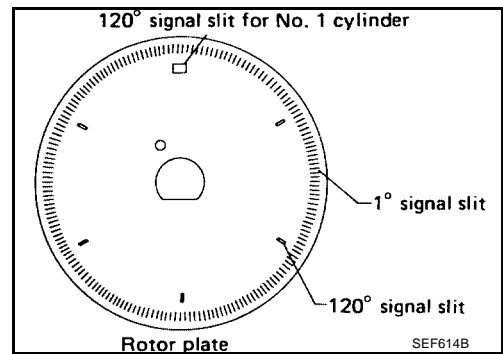
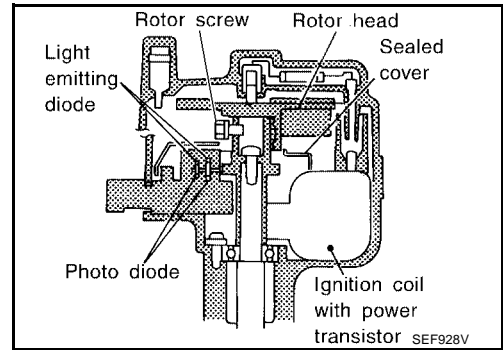
The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into on-off signals by the wave-forming circuit and sent to the ECM.

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**

| DTC No. | Trouble diagnosis name           | DTC detecting condition |  | Possible cause   |
|---------|----------------------------------|-------------------------|--|--|
| P0340   | Camshaft position sensor circuit | A)                      | <ul style="list-style-type: none"> <li>Either 1° or 120° signal is not sent to ECM for the first few seconds during engine cranking.</li> </ul>                              | <ul style="list-style-type: none"> <li>Harness or connectors (The CMP sensor circuit is open or shorted)</li> <li>Camshaft position sensor</li> <li>Starter motor (Refer to <a href="#">SC-9</a>.)</li> <li>Starting system circuit (Refer to <a href="#">SC-9</a>.)</li> <li>Dead (Weak) battery</li> </ul> |
|         |                                  | B)                      | <ul style="list-style-type: none"> <li>Either 1° or 120° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed.</li> </ul> |  |
|         |                                  | C)                      | <ul style="list-style-type: none"> <li>The relation between 1° and 120° signal is not in the normal range during the specified engine speed.</li> </ul>                      |  |

**DTC Confirmation Procedure**

**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.

# DTC P0340 CMP SENSOR

[VG33E]

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-875, "Diagnostic Procedure"](#)

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

## WITH GST

Follow the procedure "With CONSULT-II".

### 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-875, "Diagnostic Procedure"](#)

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

## WITH GST

Follow the procedure "With CONSULT-II".



# DTC P0340 CMP SENSOR

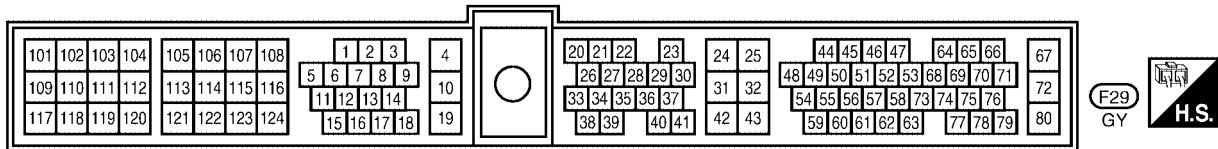
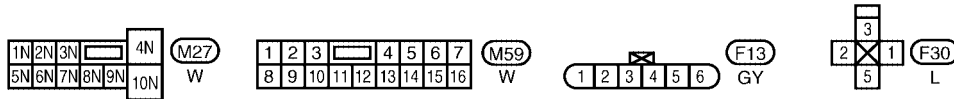
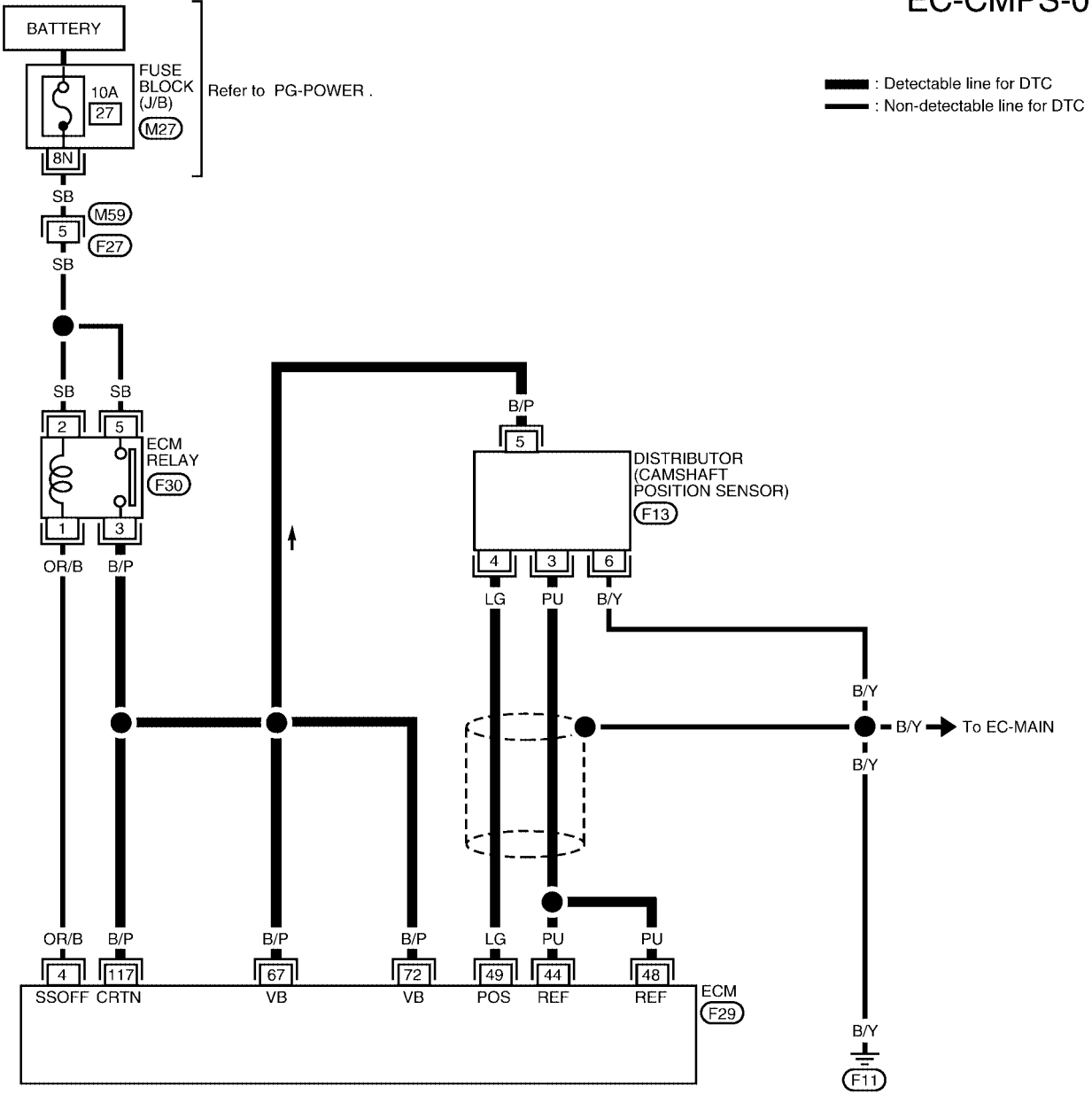
[VG33E]

UBS007N2

## Wiring Diagram

EC-CMPS-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



BBWA0482E

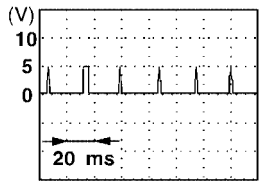
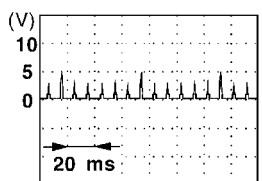
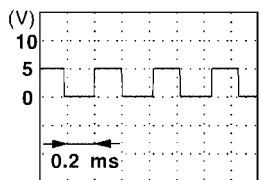
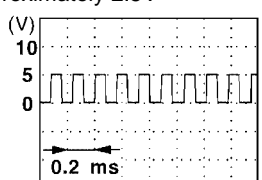
# DTC P0340 CMP SENSOR

[VG33E]

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

**CAUTION:**

**Do not use 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.**

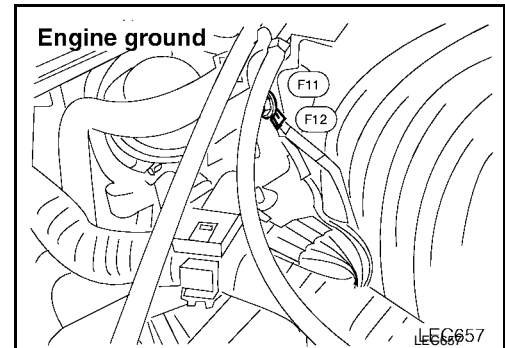
| TER-MINAL NO. | WIRE COLOR | ITEM  | CONDITION  | DATA (DC Voltage)  |
|---------------|------------|---|--|--|
| 4             | OR/B       | ECM relay (Self shut-off)                   | <b>[Engine is running]</b><br><b>[Ignition switch OFF]</b> <ul style="list-style-type: none"> <li>● For a few seconds after turning ignition switch OFF</li> </ul> | 0 - 1.5V   |
|               |            |   | <b>[Ignition switch OFF]</b> <ul style="list-style-type: none"> <li>● A few seconds passed after turning ignition switch OFF</li> </ul>                            | BATTERY VOLTAGE<br>(11 - 14V)  |
| 44            | PU         | Camshaft position sensor (Reference signal) | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>  | 0.3 - 0.5V★<br><br><small>SEF997U</small>           |
|               |            |   | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>   | 0.3 - 0.5V★<br><br><small>SEF998U</small>          |
| 49            | LG         | Camshaft position sensor (Position signal)  | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>   | Approximately 2.5V★<br><br><small>SEF999U</small> |
|               |            |   | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>   | Approximately 2.5V★<br><br><small>SEF001V</small> |
| 67            | B/P        | Power supply for ECM                        | <b>[Ignition switch ON]</b>  | BATTERY VOLTAGE<br>(11 - 14V)  |
| 72            | B/P        |   | <b>[Ignition switch ON]</b>  | BATTERY VOLTAGE<br>(11 - 14V)  |
| 117           | B/P        | Current return                              | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>  | BATTERY VOLTAGE<br>(11 - 14V)  |

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

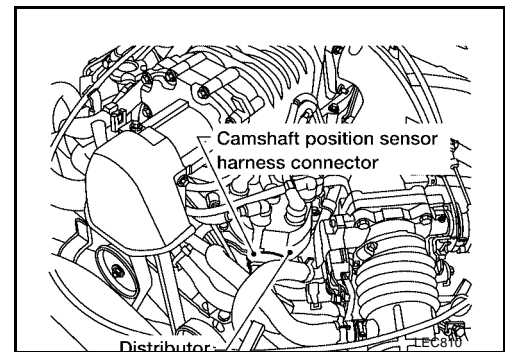
**Diagnostic Procedure****1. RETIGHTEN GROUND SCREWS**

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

>> GO TO 2.

**2. CHECK CMP SENSOR POWER SUPPLY CIRCUIT**

1. Disconnect camshaft position (CMP) sensor harness connector.
2. Turn ignition switch ON.

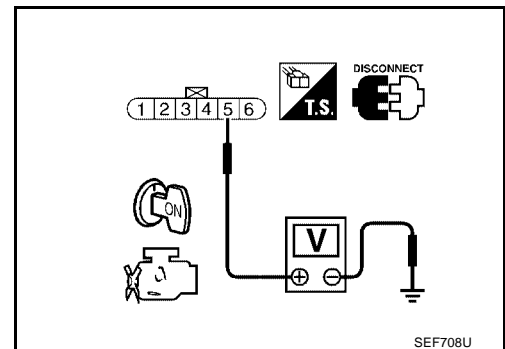


3. Check voltage between CMP sensor terminal 5 and ground with CONSULT-II or tester.

**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. Turn ignition switch OFF.
2. Check harness continuity between CMPS terminal 6 and engine ground.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.

NG >> GO TO 6.

---

## 6. DETECT MALFUNCTIONING PART

---

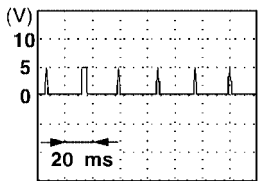
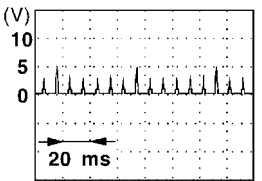
Check the following.

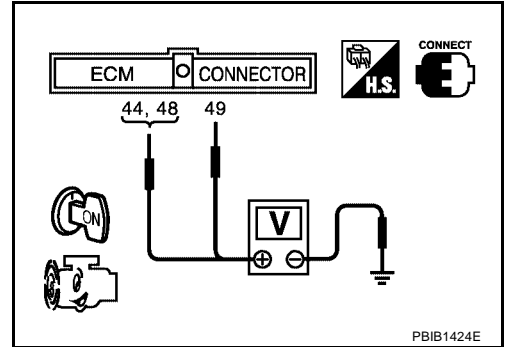
- Harness for open between camshaft position sensor and engine ground

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

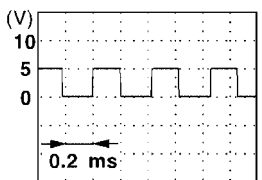
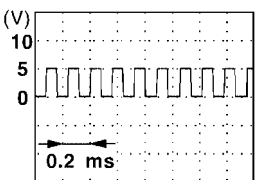
**7. CHECK CAMSHAFT POSITION SENSOR**

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.  
**<Terminal 44 or 48 and engine ground>**

| Condition    | Idle  | 2,000 rpm   |
|--------------|---|---|
| Voltage      | 0.3 - 0.5V  | 0.3 - 0.5V  |
| Pulse signal |  |  |



**<Terminal 49 and engine ground>**

| Condition    | Idle   | 2,000 rpm  |
|--------------|--|--|
| Voltage      | Approximately 2.5V   | Approximately 2.5V   |
| Pulse signal |  |  |

OK or NG

- OK >> GO TO 8.
- NG >> Replace distributor assembly with camshaft position sensor.

**8. CHECK INTERMITTENT INCIDENT**

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Removal and Installation  
DISTRIBUTOR**

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

UBS007N4

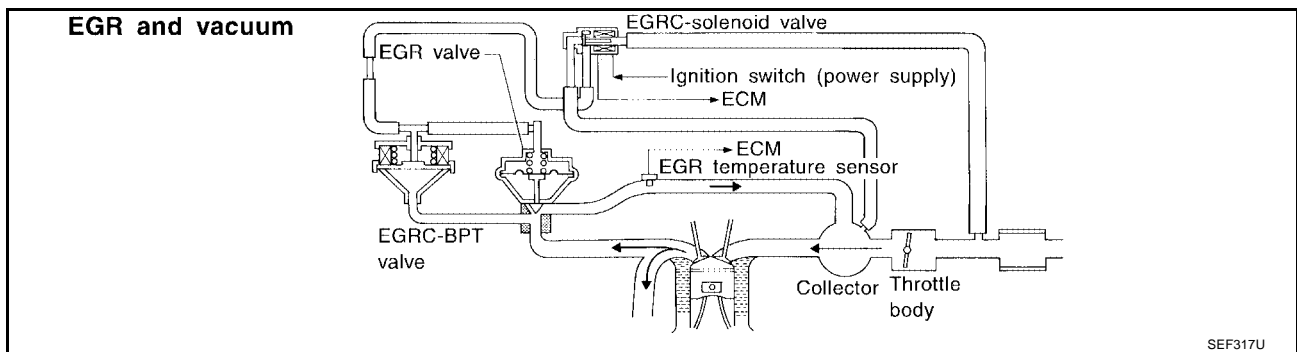
## DTC P0400 EGR FUNCTION

### Description 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.

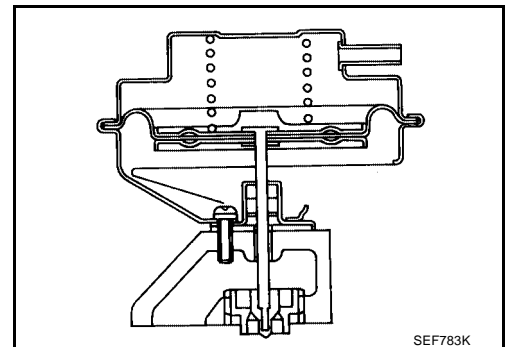
- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction



### COMPONENT DESCRIPTION

#### Exhaust Gas Recirculation (EGR) Valve

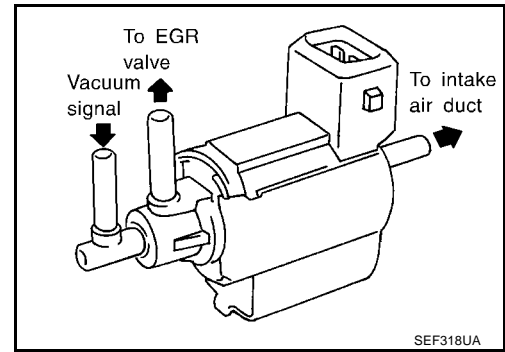
The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening and EGRC-BPT valve operation. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.



## EGRC-Solenoid Valve

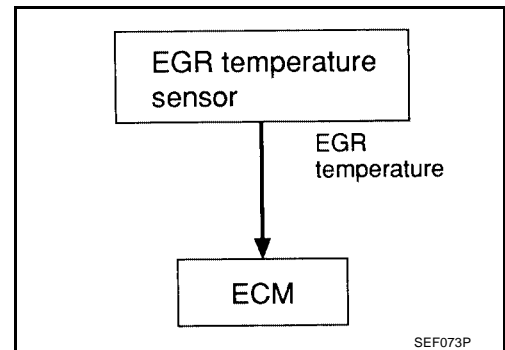
The EGRC-solenoid valve responds to signals from the ECM. When the ECM sends an ON (ground) signal, the coil in the solenoid valve is energized. The vacuum signal (from the intake manifold collector to the EGR valve) passes through the solenoid valve. The signal then reaches the EGR valve.

When the ECM sends an OFF signal, a plunger will then move to cut the vacuum signal from the intake manifold to the EGR valve.



## On Board Diagnosis Logic

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 | <ul style="list-style-type: none"> <li>No EGR flow is detected under conditions that call for EGR.</li> </ul> | <ul style="list-style-type: none"> <li>EGR valve stuck closed</li> <li>EGRC-BPT valve</li> <li>Vacuum hose</li> <li>EGRC-solenoid valve</li> <li>EGR passage</li> <li>EGR temperature sensor</li> <li>Exhaust gas leaks</li> </ul> |

## DTC Confirmation Procedure

### CAUTION:

Always drive vehicle at a safe speed.

### NOTE:

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

- Turn ignition switch "ON".
- 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)**

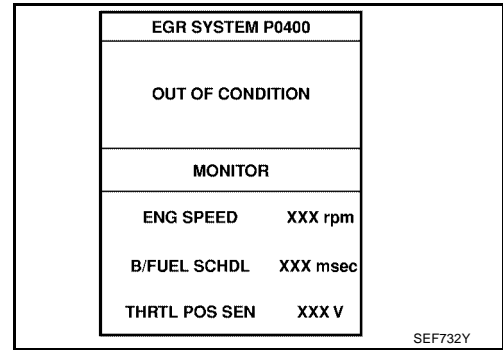
If the value is out of range, park the vehicle in a cool place and allow the engine temperature to stabilize. Do not attempt to lower the engine coolant temperature with a fan or means other than ambient air. Doing so may produce an inaccurate diagnostic result.

- 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.

# DTC P0400 EGR FUNCTION

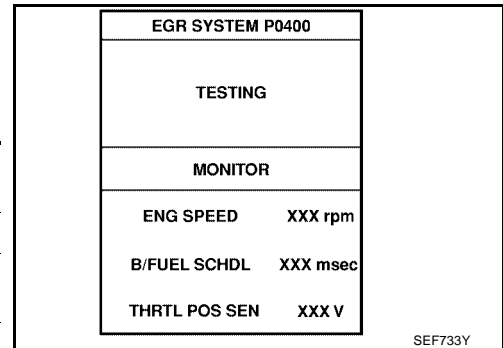
[VG33E]

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.



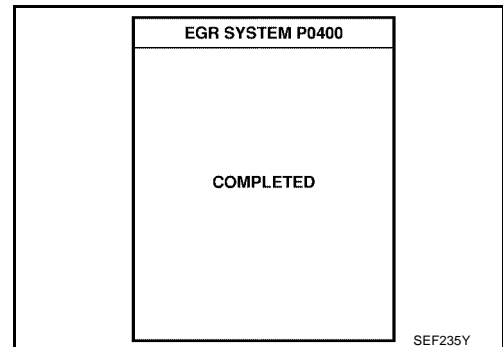
8. When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen. Maintain the conditions until "TESTING" changes to "COMPLETED". (It will take approximately 60 seconds or more.)

|                |  |
|----------------|--|
| ENG SPEED      | 1,600 - 2,400 rpm (A/T)<br>1,800 - 2,600 rpm (M/T)         |
| B/FUEL SCHDL   | 6 - 9 msec   |
| THRTL POS SEN  | $X - (X + 0.82) V$<br>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-883, "Diagnostic Procedure"](#).



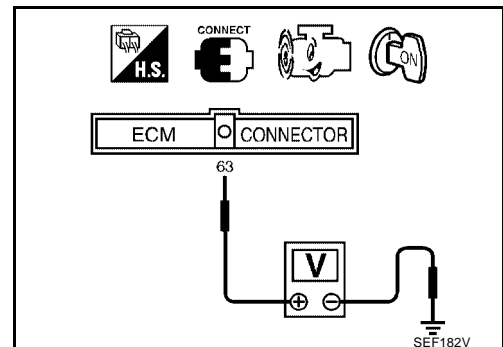
## Overall Function Check

UBS0060L

Use this procedure to check the overall EGR function. During this check, a 1st trip DTC might not be confirmed.

### ⊗ WITHOUT CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check the EGR valve lifting when revving engine from idle up to 3,000 rpm quickly under no load.  
**EGR valve should lift up and down without sticking.**  
If NG, go to [EC-883, "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".

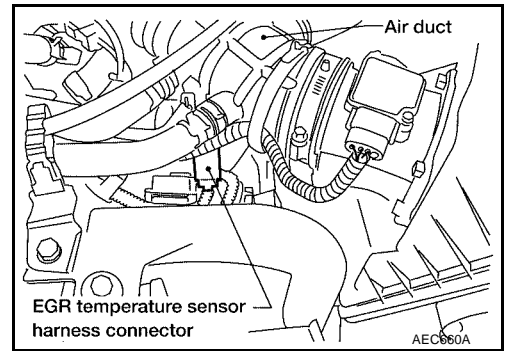




# DTC P0400 EGR FUNCTION

[VG33E]

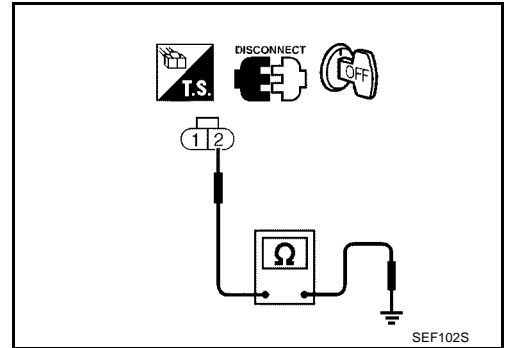
5. Disconnect EGR temperature sensor harness connector.



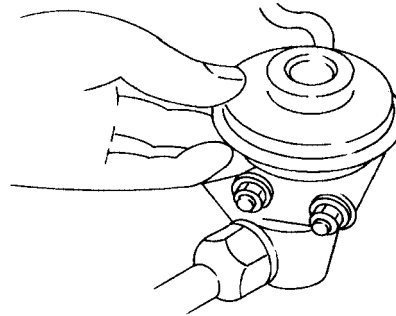
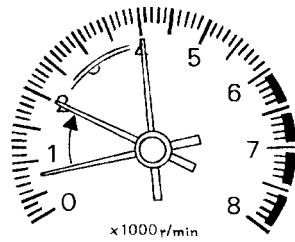
6. Check harness continuity between EGR temperature sensor harness connector terminal 2 and ground.

**Continuity should exist.**

7. Perform [EC-898, "Component Inspection"](#) .



## Overall function check



Check the EGR valve lifting when revving engine from 2,000 rpm up to 4,000 rpm.

SEF642Q

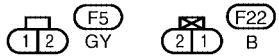
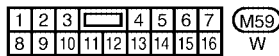
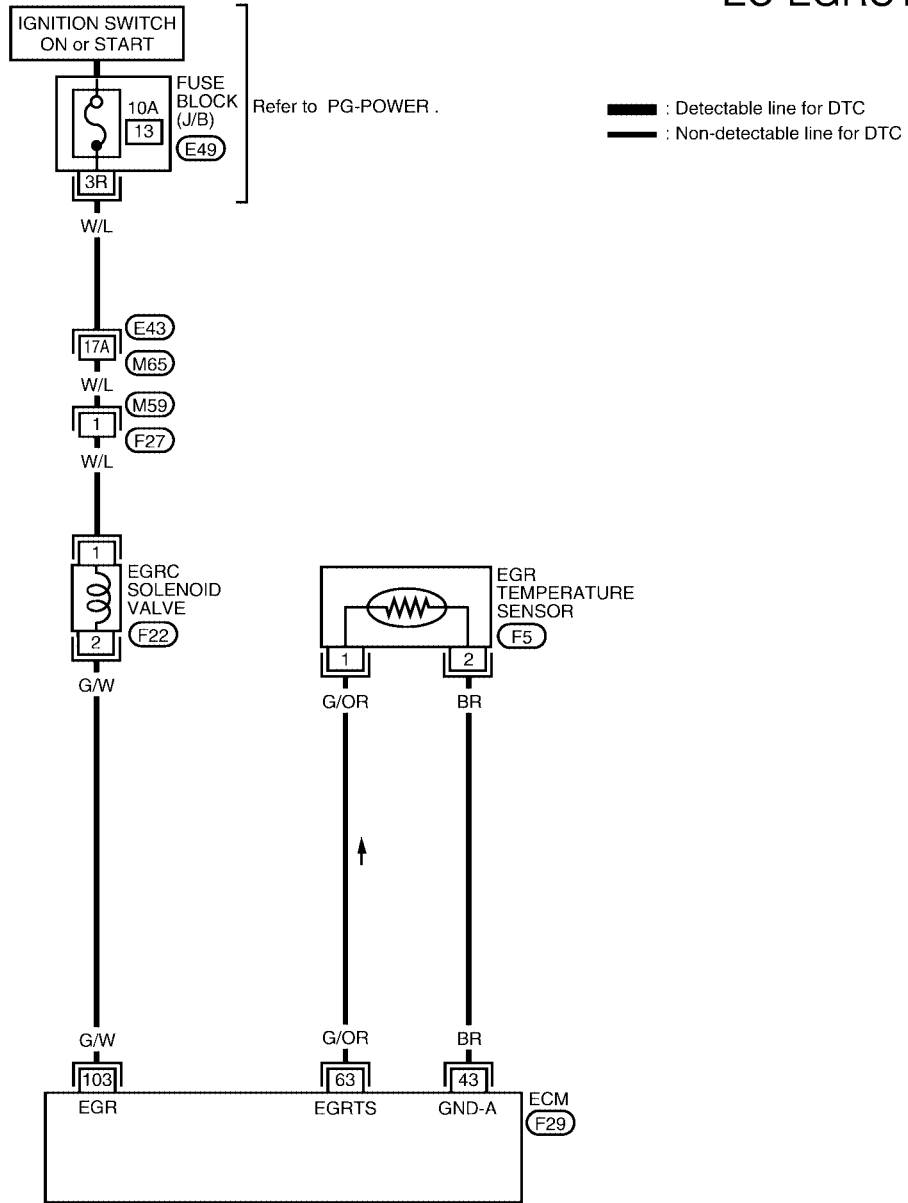
# DTC P0400 EGR FUNCTION

[VG33E]

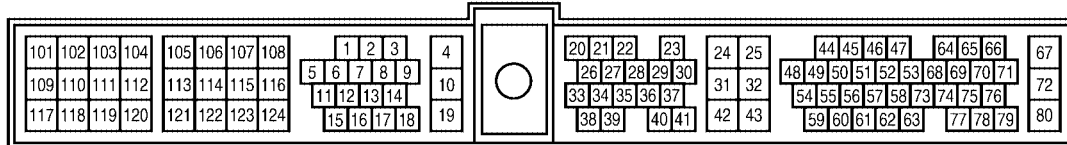
UBS0060M

## Wiring Diagram

EC-EGRC1-01



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

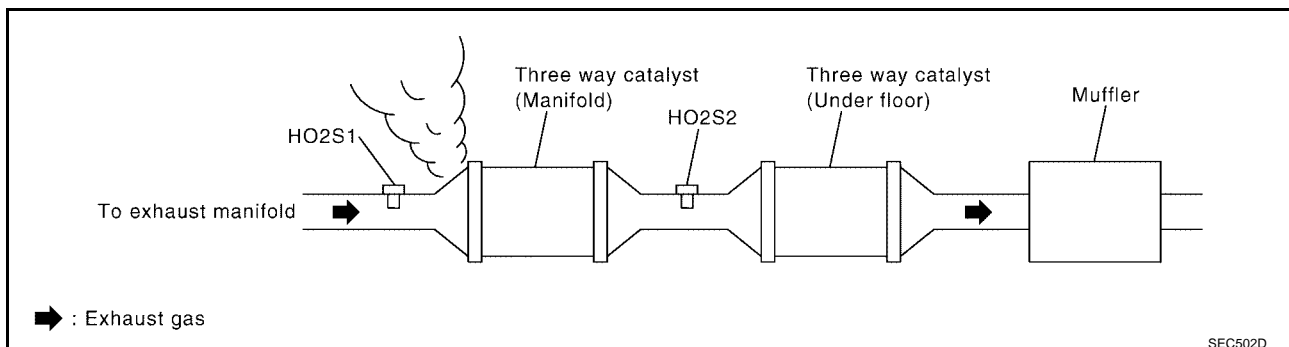


BBWA0504E

## Diagnostic Procedure

### 1. CHECK EXHAUST GAS LEAK

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



OK or NG

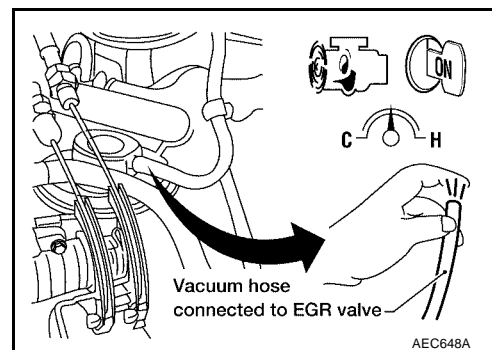
- OK (With CONSULT-II)>>GO TO 2.
- OK (Without CONSULT-II)>>GO TO 3.
- NG >> Repair or replace.

### 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.**

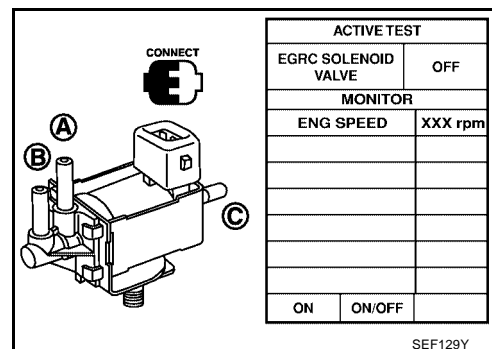


4. Select "EGRC SOLENOID VALVE" in "ACTIVE TEST" mode with CONSULT-II and turn the solenoid valve ON.
5. Check for vacuum existence when revving engine from idle up to 3,000rpm.

**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.

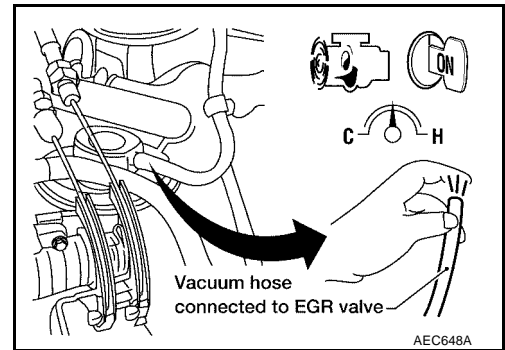
**Vacuum should not exist at idle.**

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-886, "Component Inspection"](#) .

OK or NG

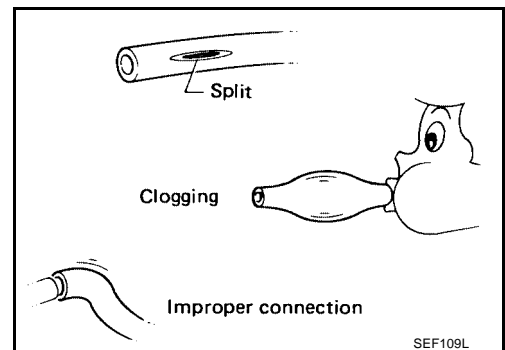
- OK >> GO TO 11.
- NG >> Replace EGR valve.

### 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

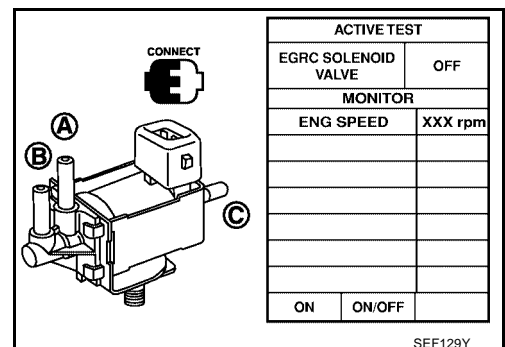
Ⓜ **With CONSULT-II**

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 engine 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.

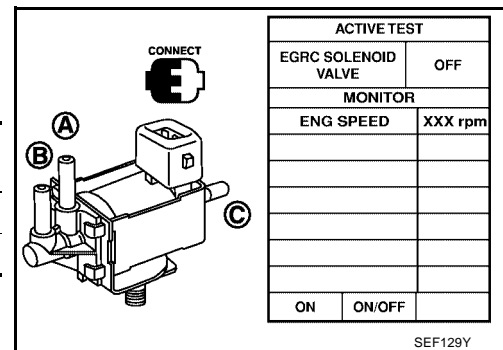
8. CHECK EGRC-SOLENOID VALVE

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.



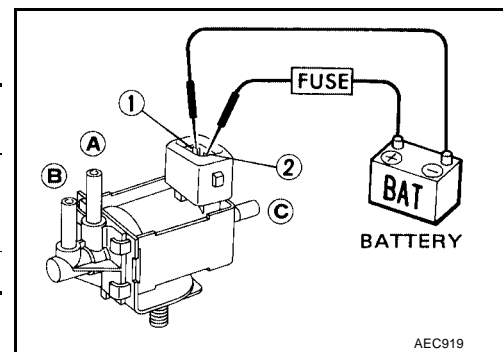
9. CHECK EGRC-SOLENOID VALVE

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-886, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 11.
- NG >> Replace EGRC-BPT valve.

11. CHECK EGR TEMPERATURE SENSOR

Refer to [EC-898, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 12.
- NG >> Replace EGR temperature sensor.

12. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

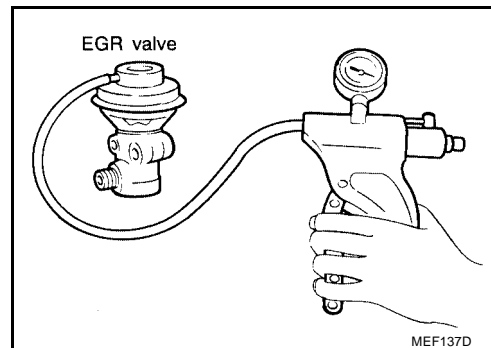
**Component Inspection**  
**EGR VALVE**

UBS006ZJ

1. Apply vacuum to EGR vacuum port with a hand vacuum pump.

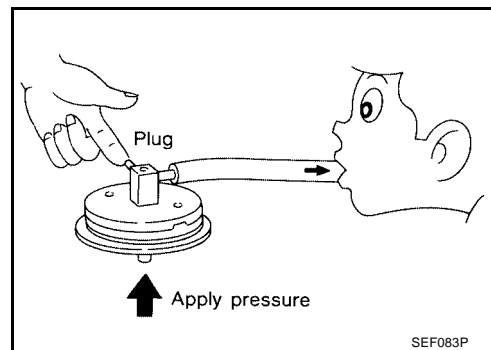
**EGR valve spring should lift.**

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<sub>2</sub> O, 3.94 inH<sub>2</sub> O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.



**Removal and Installation**  
**EGR VALVE**

UBS007F7

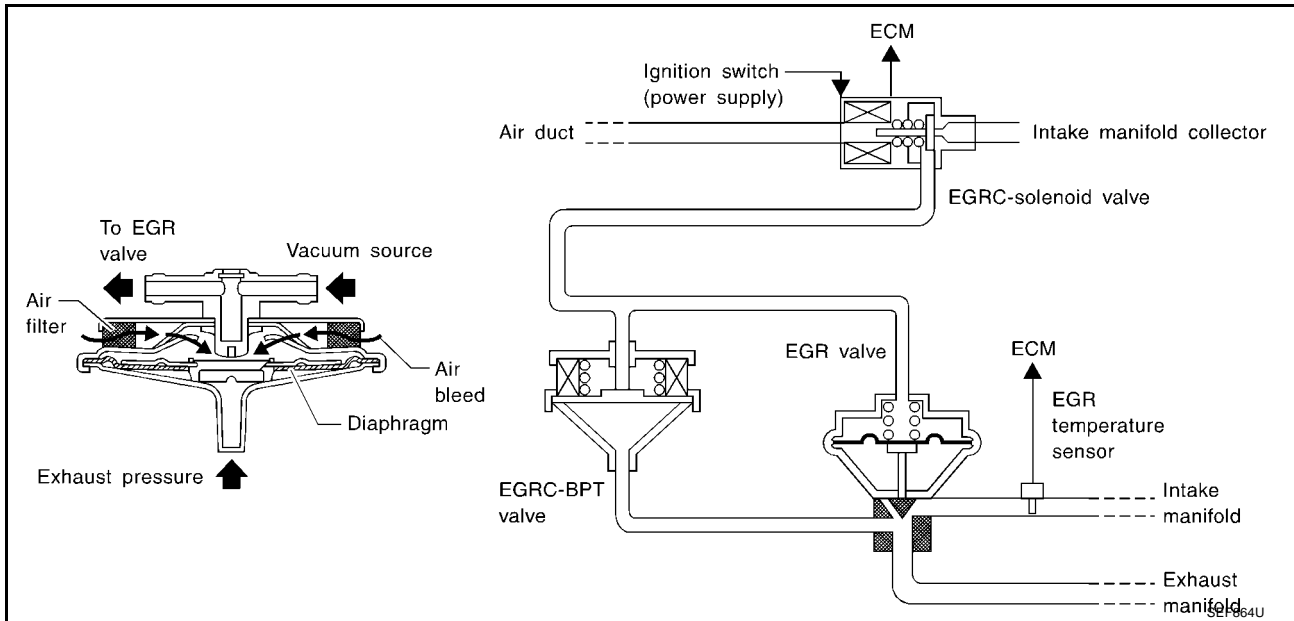
Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

DTC P0402 EGRC-BPT VALVE FUNCTION

PF0:14741

Description

UBS00600



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

UBS0060P

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 | <ul style="list-style-type: none"> <li>The EGRC-BPT valve does not operate properly.</li> </ul> | <ul style="list-style-type: none"> <li>EGRC-BPT valve</li> <li>EGR valve</li> <li>Loose or disconnected rubber tube</li> <li>Blocked rubber tube</li> <li>Camshaft position sensor</li> <li>Blocked exhaust system</li> <li>Orifice</li> <li>Mass air flow sensor</li> <li>EGRC-solenoid valve</li> </ul> |

DTC Confirmation Procedure

UBS0060Q

**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:**

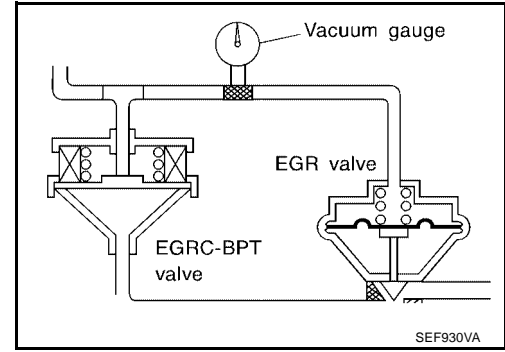
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

# DTC P0402 EGRC-BPT VALVE FUNCTION

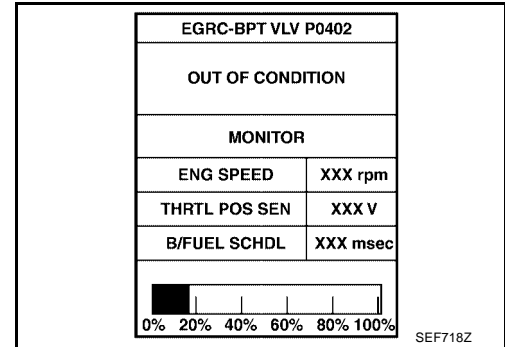
[VG33E]

## 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.

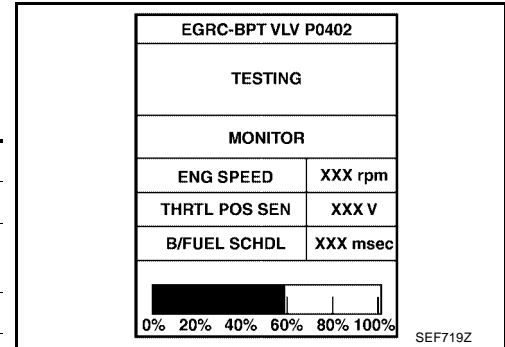


6. Touch "START".
7. Check the output voltage of "THRTL POS SEN" (at closed throttle position) and note it.



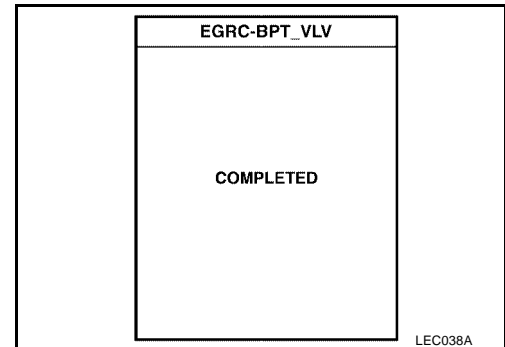
8. When the following conditions are met, "TESTING" will be displayed on the CONSULT-II screen and the bar chart may increase. Maintain the conditions many times until "COMPLETED" appears.

|                |   |
|----------------|---|
| Selector lever | Suitable position   |
| ENG SPEED      | 1,000 - 1,600 rpm   |
| Vehicle speed  | 30 - 60 km/h (19 - 37 MPH) (A/T models)<br>30 - 100 km/h (19 - 62 MPH) (M/T models) |
| B/FUEL SCHDL   | 3.5 - 5.2 msec  |
| THRTL POS SEN  | $X - (X + 0.9) V$<br>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-890, "Diagnostic Procedure"](#).
  10. Open engine hood.

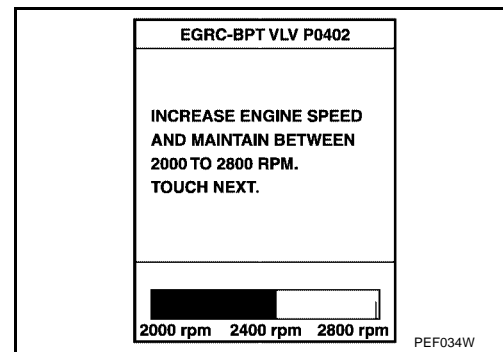




# DTC P0402 EGRC-BPT VALVE FUNCTION

[VG33E]

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).**

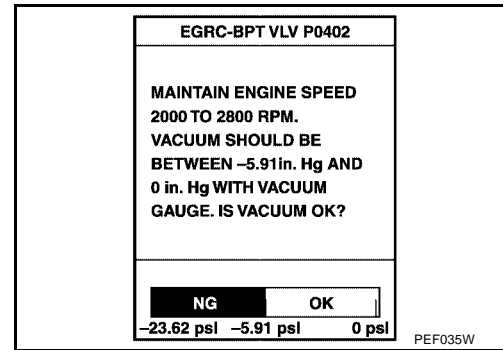
If NG, go to [EC-890, "Diagnostic Procedure"](#).

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

UBS006OR

Use this procedure to check the overall function of the EGRC-BPT valve. During this check, a 1st trip DTC might not be confirmed.

### ⊗ WITHOUT CONSULT-II

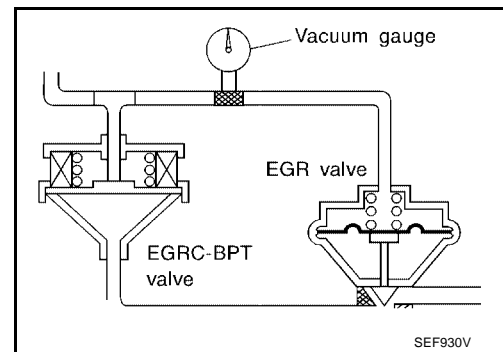
1. Install vacuum gauge between EGRC-BPT valve and EGR valve as shown in the illustration.
2. Lift up vehicle.
3. Start engine and shift to 1st gear position.
4. Check vacuum gauge while keeping engine speed at 2,000 to 2,800 rpm.

**Vacuum should be 0 to -20 kPa (0 to -150 mmHg, 0 to -5.91 inHg).**

If NG, go to [EC-890, "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-890, "Diagnostic Procedure"](#).



---

## Diagnostic Procedure

### 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-892, "Component Inspection"](#).

OK or NG

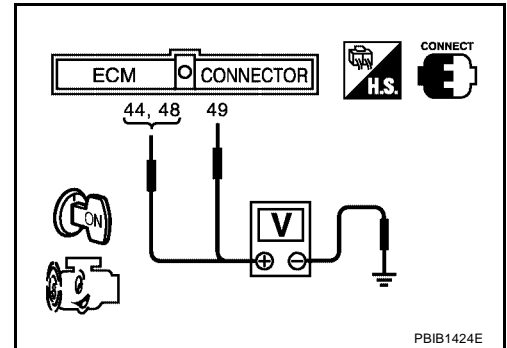
OK >> GO TO 5.

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.  
**<Terminal 44 or 48 and engine ground>**

| Condition    | Idle       | 2,000 rpm  |
|--------------|------------|------------|
| Voltage      | 0.3 - 0.5V | 0.3 - 0.5V |
| Pulse signal |            |            |



**<Terminal 49 and engine ground>**

| Condition    | Idle               | 2,000 rpm          |
|--------------|--------------------|--------------------|
| Voltage      | Approximately 2.5V | Approximately 2.5V |
| Pulse signal |                    |                    |

**OK or NG**

- OK >> GO TO 6.
- NG >> Replace camshaft position sensor.

**6. CHECK MASS AIR FLOW SENSOR**

Refer to [EC-729, "Component Inspection"](#) .

**OK or NG**

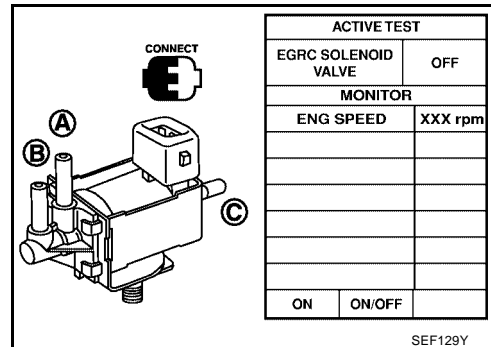
- OK >> GO TO 7.
- NG >> Replace mass air flow sensor.

## 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.

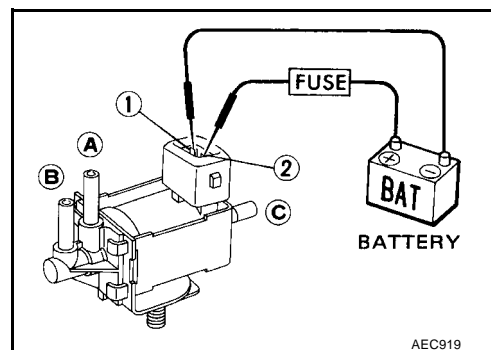
| Conditions | Air passage continuity between A and B | Air passage continuity between A and C |
|------------|--|--|
| ON         | Yes                                    | No                                     |
| OFF        | No                                     | Yes                                    |



### 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-886, "Component Inspection"](#) .

**OK or NG**

- OK >> GO TO 9.
- NG >> Replace EGR valve.

## 9. CHECK INTERMITTENT INCIDENT

Perform [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

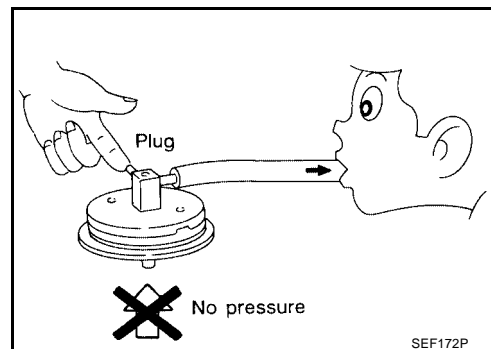
**>> INSPECTION END.**

### Component Inspection EGRC-BPT VALVE

UBS006ZK

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.

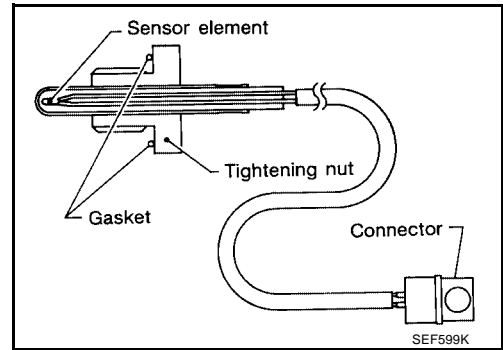


**DTC P0405, P0406 EGRT SENSOR**

**Component Description**

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.



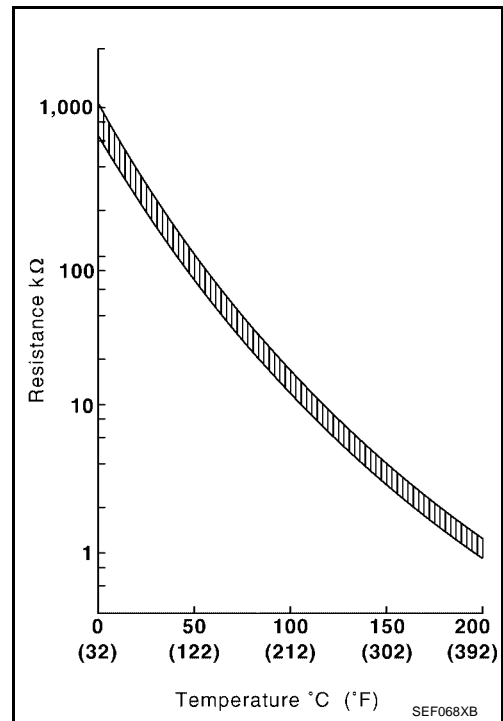
<Reference data>

| EGR temperature<br>°C (°F) | Voltage*<br>V | Resistance<br>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**

| 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.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The EGR temperature sensor circuit is shorted.)</li> <li>● EGR temperature sensor</li> <li>● Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve</li> </ul> |
| P0406   | EGR temperature circuit high input | An excessively high voltage from the EGR temperature sensor is sent to ECM. | <ul style="list-style-type: none"> <li>● Harness or connectors (The EGR temperature sensor circuit is open.)</li> <li>● EGR temperature sensor</li> <li>● Malfunction of EGR function, EGRC-BPT valve or EGRC-solenoid valve</li> </ul>    |

**DTC Confirmation Procedure**

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-897, "Diagnostic Procedure"](#)

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

SEF174Y

**With GST**

- Follow the procedure “With CONSULT-II”.

**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-1063](#) .
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-897, "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.

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| COOLAN TEMP/S | XXX °C   |
| VHCL SPEED SE | XXX km/h |
| THRTL POS SEN | XXX V    |
| B/FUEL SCHDL  | XXX msec |

SEF201Y

|                |  |
|----------------|--|
| ENG SPEED      | 1,600 - 2,400 rpm (A/T models)<br>1,800 - 2,600 rpm (M/T models) |
| VHCL SPEED SE  | Above 80°C (176°F)   |
| B/FUEL SCHDL   | 6 - 9 msec   |
| THRTL POS SEN  | X – (X + 0.82) V<br>X = Voltage value measured at step 7         |
| Selector lever | Suitable position  |

10. If 1st trip DTC is detected, go to [EC-897, "Diagnostic Procedure"](#) .

**Overall Function Check**

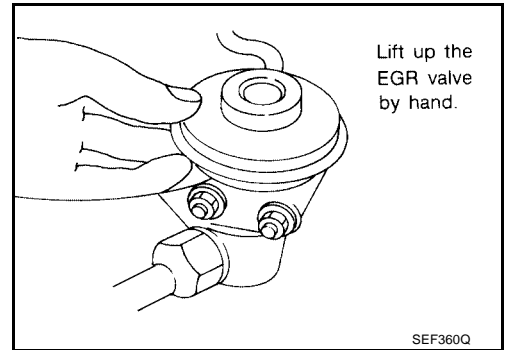
UBS0060W

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

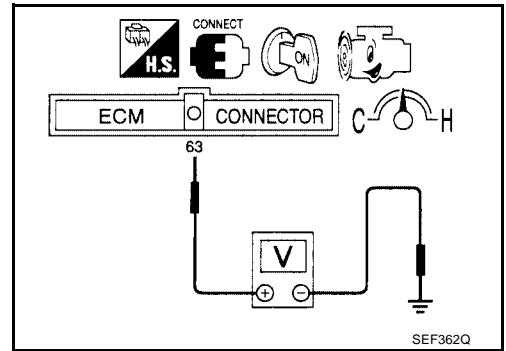
## PROCEDURE FOR DTC P0406

⊗ **Without CONSULT-II**

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-1063](#).



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-897, "Diagnostic Procedure"](#).  
If OK, perform trouble diagnoses for DTC P0400 and P1400. Refer to P0400 [EC-878](#) and P1400 [EC-1057](#).



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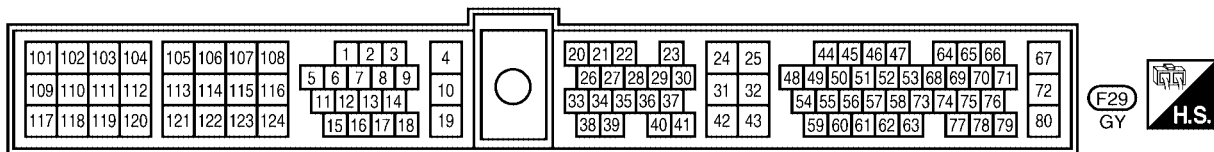
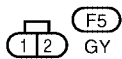
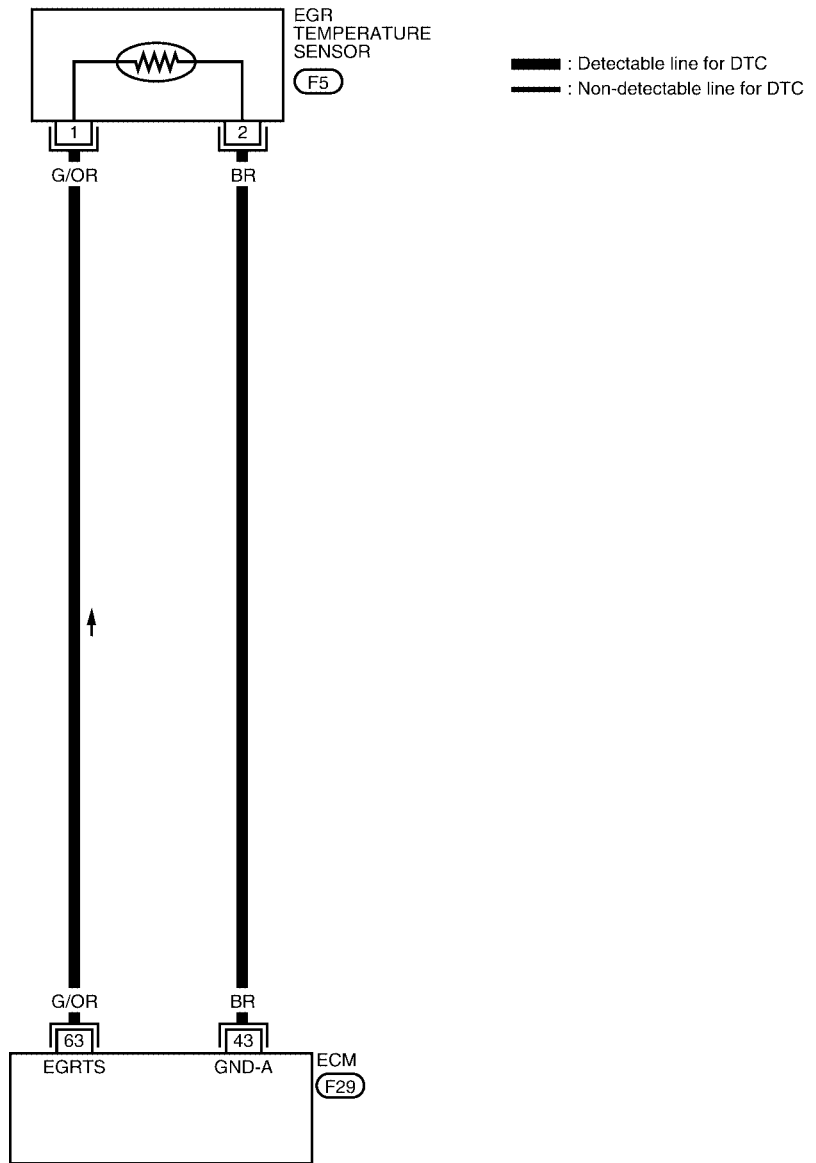
# DTC P0405, P0406 EGRT SENSOR

[VG33E]

UBS0060X

## Wiring Diagram

EC-EGR/TS-01



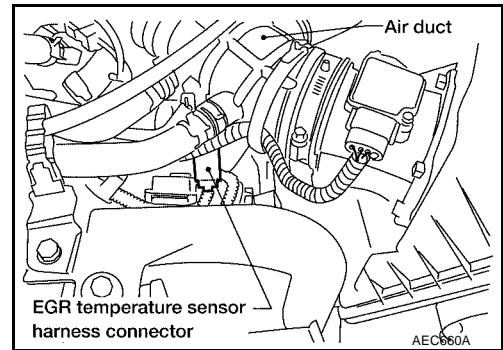
BBWA0506E



## Diagnostic Procedure

### 1. CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EGR temperature sensor harness connector.
3. Turn ignition switch ON.

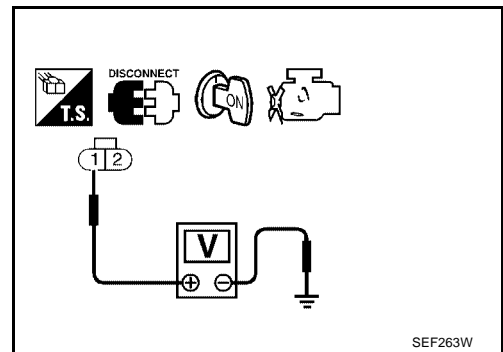


4. Check voltage between terminal 1 and ground with CONSULT-II or tester.

**Voltage : Approximately 5V**

OK or NG

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



### 2. CHECK GROUND CIRCUIT

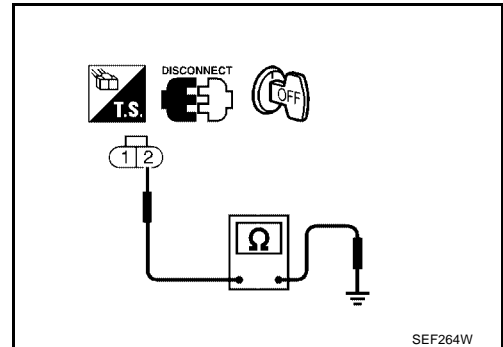
1. Turn ignition switch OFF.
2. Check harness continuity between EGR temperature sensor terminal 2 and engine ground. Refer to the Wiring Diagram.

**Continuity should exist.**

3. Also check harness for 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 EGR temperature sensor and ECM.

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

### 4. CHECK EGR TEMPERATURE SENSOR

Refer to [EC-898, "Component Inspection"](#).

OK or NG

- OK >> GO TO 5.
- NG >> Replace EGR temperature sensor.

**5. CHECK INTERMITTENT INCIDENT**

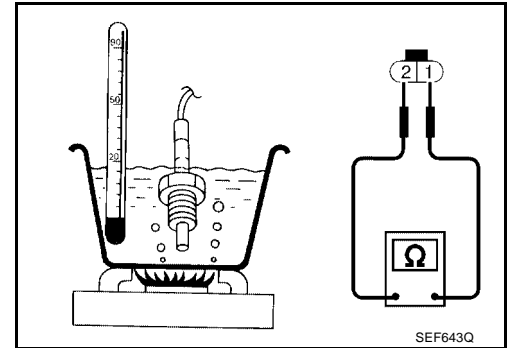
Perform [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Component Inspection**  
**EGR TEMPERATURE SENSOR**

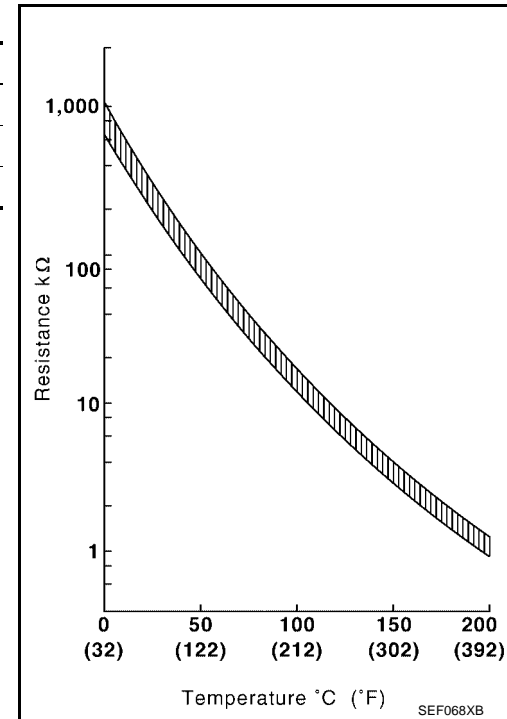
UBS006ZL

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**  
**EGR TEMPERATURE SENSOR**

UBS007FG

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

## DTC P0420, P0430 THREE WAY CATALYST FUNCTION

PFP:20905

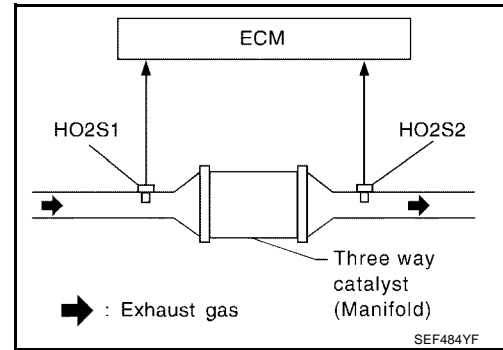
### On Board Diagnosis Logic

UBS007N5

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<br>(Bank 1) | Catalyst system efficiency below threshold | <ul style="list-style-type: none"> <li>● Three way catalyst (Manifold) does not operate properly.</li> <li>● Three way catalyst (Manifold) does not have enough oxygen storage capacity.</li> </ul> | <ul style="list-style-type: none"> <li>● Three way catalyst (Manifold)</li> <li>● Exhaust tube</li> <li>● Intake air leaks</li> <li>● Fuel injectors</li> <li>● Fuel injector leaks</li> <li>● Spark plug</li> <li>● Improper ignition timing</li> </ul> |
| P0430<br>(Bank 2) |  |   |  |

### DTC Confirmation Procedure

UBS007N6

**NOTE:**

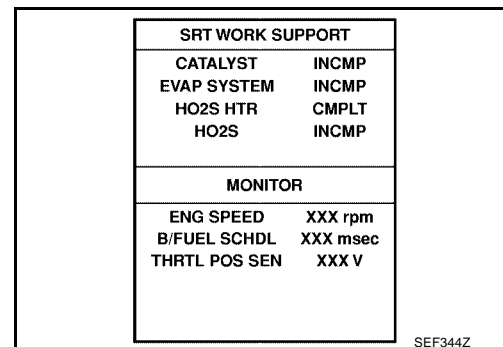
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 10 seconds before conducting the next test.

**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 one minute under no load.
4. Let engine idle for one 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.



# DTC P0420, P0430 THREE WAY CATALYST FUNCTION

[VG33E]

- 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.

| SRT WORK SUPPORT |          |
|------------------|----------|
| CATALYST         | CMPLT    |
| EVAP SYSTEM      | INCMP    |
| HO2S HTR         | CMPLT    |
| HO2S             | INCMP    |
| MONITOR          |          |
| ENG SPEED        | XXX rpm  |
| B/FUEL SCHDL     | XXX msec |
| THRTL POS SEN    | XXX V    |

SEF345Z

- Select "SELF-DIAG RESULTS" mode with CONSULT-II.
- Confirm that the 1st trip DTC is not detected.  
If the 1st trip DTC is detected, go to [EC-901, "Diagnostic Procedure"](#).

| SELF DIAG RESULTS  |      |
|--|------|
| DTC RESULTS  | TIME |
| NO DTC IS DETECTED.<br>FURTHER TESTING<br>MAY BE REQUIRED. |      |
|  |      |
|  |      |

SEF560X

## Overall Function Check

UBS007N7

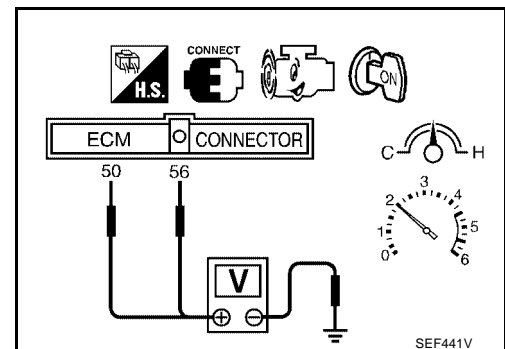
Use this procedure to check the overall function of the three way catalyst (manifold). During this check, a DTC might not be confirmed.

### CAUTION:

**Always drive vehicle at a safe speed.**

### WITH GST

- Start engine and warm it up to the normal operation temperature.
- Turn ignition switch "OFF" and wait at least 10 seconds.
- Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
- Let engine idle for one minutes.
- Set voltmeters probes between ECM terminals 50 [HO2S1 (bank 1) signal], 51 [HO2S1 (bank 2) signal] and engine ground, and ECM terminals 56 [HO2S2 (bank 1) signal], 57 [HO2S2 (bank 2) signal] and engine ground.
- Keep engine speed at 2,000 rpm constant under no load.



# DTC P0420, P0430 THREE WAY CATALYST FUNCTION

[VG33E]

7. Make sure that the voltage switching frequency (high & low) between ECM terminals 56 and engine ground, or 57 and engine ground is very less than that of ECM terminals 50 and engine ground, or 51 and engine ground.

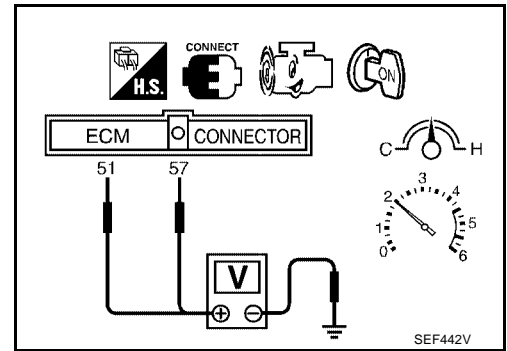
**Switching frequency ratio = A/B**

**A: Heated oxygen sensor 2 voltage switching frequency**

**B: Heated oxygen sensor 1 voltage switching frequency**

**This ratio should be less than 0.75.**

If the ratio is greater than above, it means three way catalyst (manifold) does not operate properly. Go to [EC-901, "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-780, "DTC P0133, P0153 HO2S1"](#).)

## Diagnostic Procedure

UBS007N8

### 1. CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.

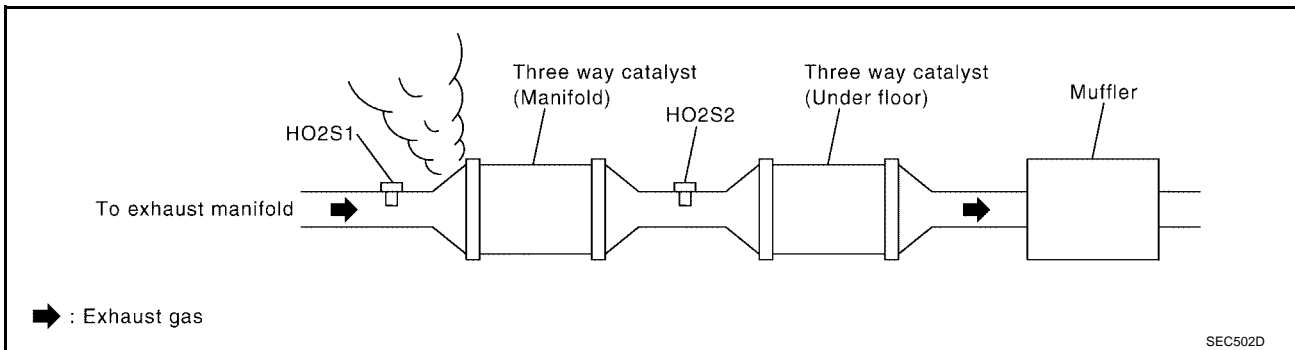
OK or NG

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-648, "Basic Inspection"](#) .

| Items  | Specifications   |
|--|--|
| Ignitions timing   | 10° ± 2° BTDC  |
| Base idle speed  | 700 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.3 mm (0.012 in): ON<br>0.4 mm (0.016 in): OFF |
| Target idle speed  | 750 ± 50 rpm (in P or N position)  |

OK or NG

- OK >> GO TO 5.
- NG >> Adjust ignition timing.

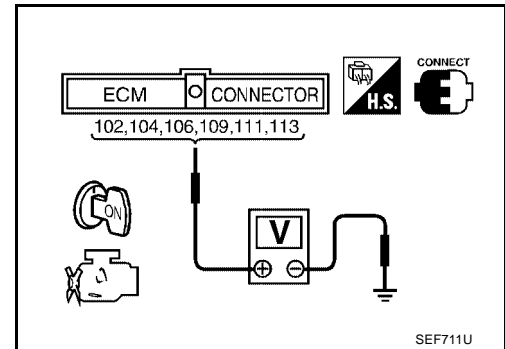
## 5. CHECK INJECTORS

1. Refer to WIRING DIAGRAM for Injectors, [EC-1146](#) .
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-1145, "INJECTOR CIRCUIT"](#) .

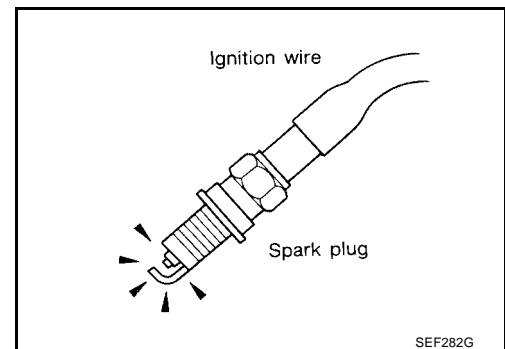


## 6. CHECK IGNITION SPARK

1. Turn ignition switch OFF.
2. Disconnect ignition wire from spark plug.
3. Connect a known good spark plug to the ignition wire.
4. Place end of spark plug against a suitable ground and crank engine.
5. Check for spark.

OK or NG

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

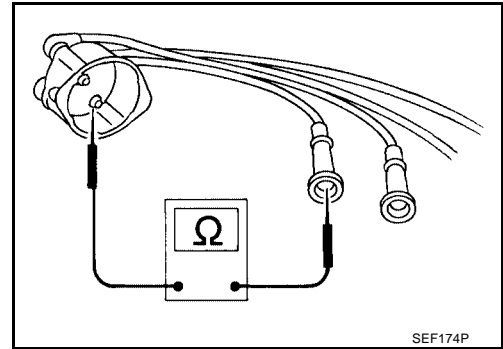


**7. CHECK IGNITION WIRES**

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-1139, "IGNITION SIGNAL"](#) .
- NG >> Replace.

**8. CHECK INJECTOR**

1. Turn ignition switch OFF.
2. Remove injector assembly.  
Refer to [EM-80](#) .  
Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect all ignition coil harness connectors.
4. Turn ignition switch ON.  
Make sure fuel does not drip from injector.

OK or NG

- OK (Does not drip)>>GO TO 9.
- NG (Drips)>>Replace the injector(s) from which fuel is dripping.

**9. CHECK INTERMITTENT INCIDENT**

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

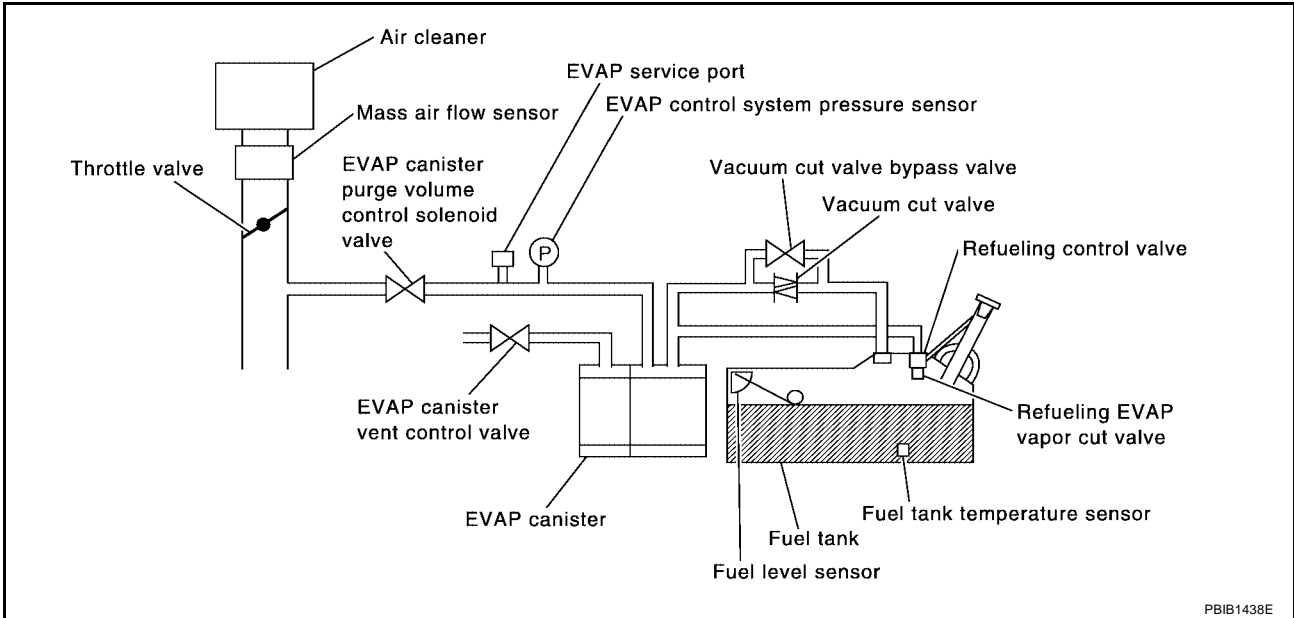
- Trouble is fixed>>**INSPECTION END.**
- Trouble is not fixed>>Replace three way catalyst (manifold).

DTC P0441 EVAP CONTROL SYSTEM

System Description

NOTE:

If DTC P0441 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See [EC-995](#).)



PBIB1438E

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

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. | <ul style="list-style-type: none"> <li>● EVAP canister purge volume control solenoid valve stuck closed</li> <li>● EVAP control system pressure sensor and the circuit</li> <li>● Loose, disconnected or improper connection of rubber tube</li> <li>● Blocked rubber tube</li> <li>● Blocked or bent rubber tube to MAP/BARO switch solenoid valve</li> <li>● Cracked EVAP canister</li> <li>● EVAP canister purge volume control solenoid valve circuit</li> <li>● Closed throttle position switch</li> <li>● Blocked purge port</li> <li>● EVAP canister vent control valve</li> </ul> |

DTC Confirmation Procedure

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

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

**TESTING CONDITION:**

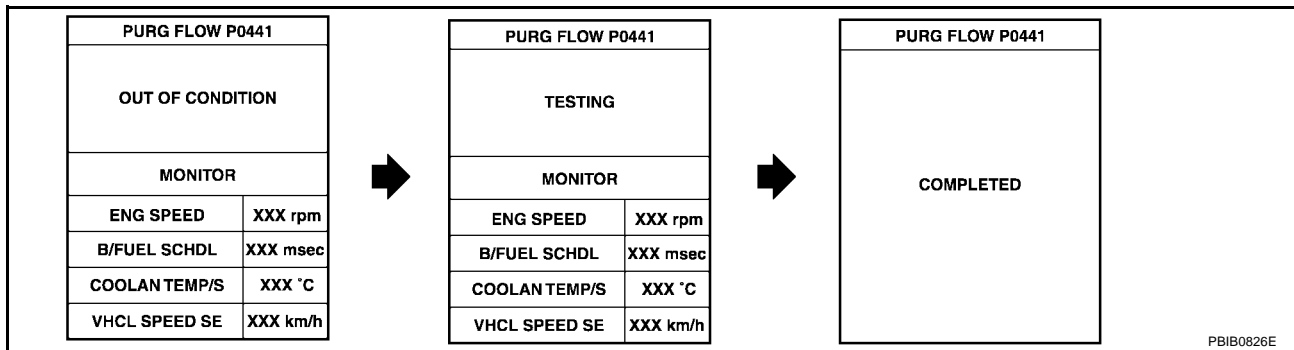


**Always perform test at a temperature of 5°C (41°F) or more.**

**Ⓜ 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 P0442" 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           |
| Vehicle speed              | 32 - 120 km/h (20 - 75 MPH) |
| ENG SPEED                  | 500 - 3,400 rpm             |
| B/FUEL SCHDL               | 1.0 - 11.0 msec             |
| Engine coolant temperature | 70 - 100°C (158 - 212°F)    |



**If "TESTING" is not changed for a long time, retry from step 2.**

7. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to [EC-906, "Diagnostic Procedure"](#).

## Overall Function Check

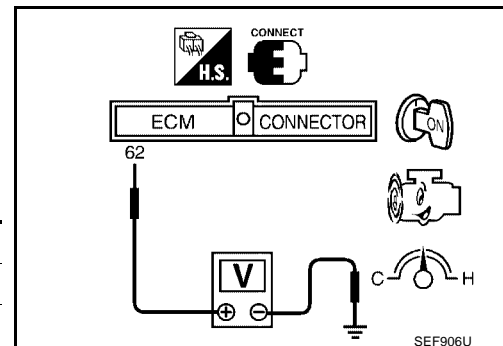
UBS007NC

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, 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-906, "Diagnostic Procedure"](#) .

## Diagnostic Procedure

UBS007ND

### 1. CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

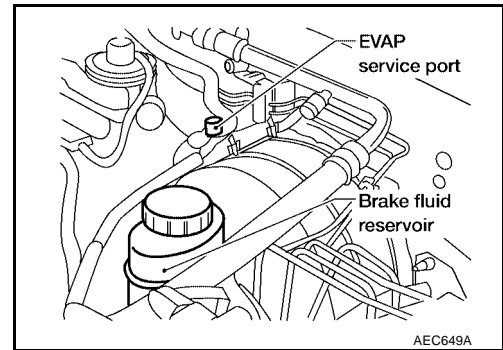
**OK or NG**

- 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           |
|-----------------|------------------|
| 100.0%          | Should exist     |
| 0.0%            | Should not exist |

**OK or NG**

- OK >> GO TO 7.
- NG >> GO TO 4.

| 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 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.

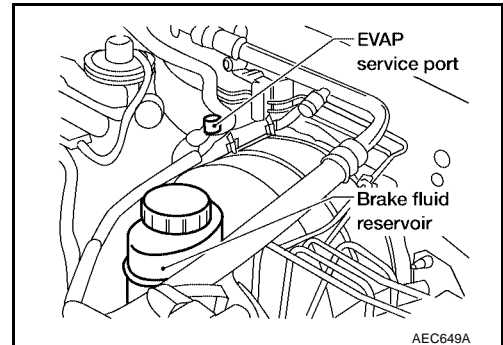
**Vacuum should exist.**

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**

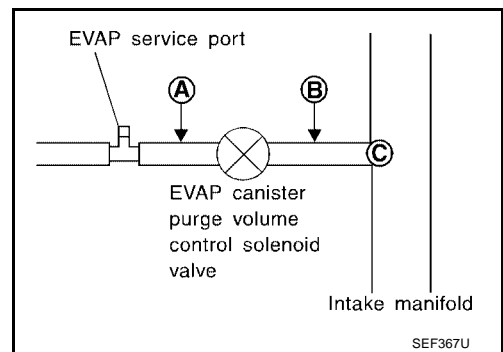
1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection. Refer to [EC-1170, "EVAPORATIVE EMISSION LINE DRAWING"](#).

OK or NG

- OK >> GO TO 5.
- NG >> Repair it.

**5. CHECK EVAP PURGE HOSE AND PURGE PORT**

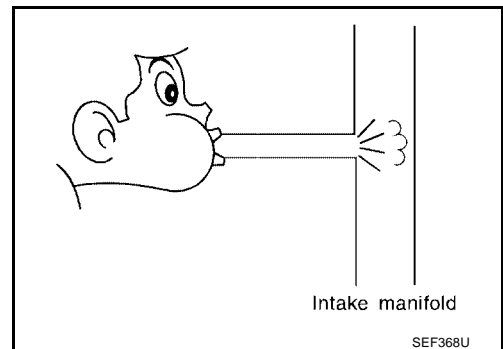
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.
2. Blow air into each hose and EVAP purge port **C**.



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

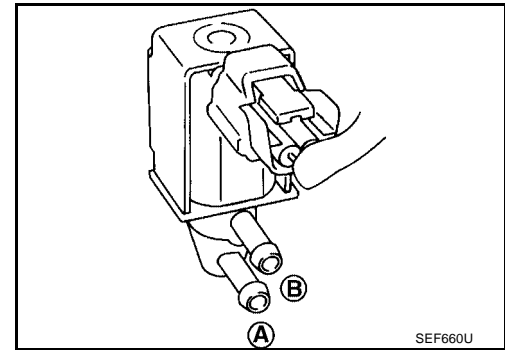
3. Check air passage continuity.

| Condition<br>PURG VOL CONT/V value | Air passage continuity between A<br>and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |

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**

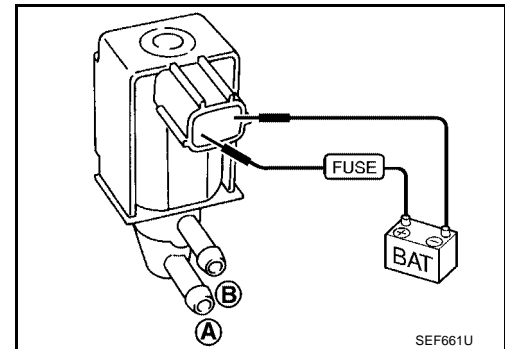
Check air passage continuity.

| Condition  | Air passage continuity between A<br>and B |
|--|---|
| 12V direct current supply<br>between terminals 1 and 2 | Yes                                       |
| No supply  | No  |

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

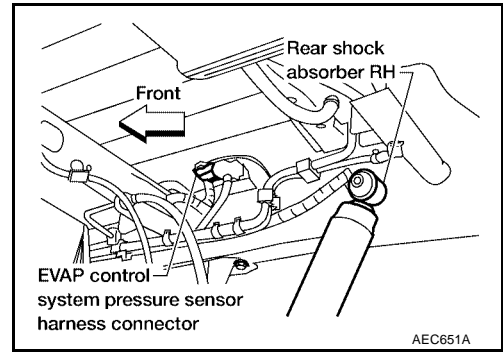
- OK >> GO TO 9.
- NG >> Repair it.

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-937](#) or P0453, [EC-943](#) .

OK or NG

- OK >> GO TO 11.
- NG >> Replace EVAP control system pressure sensor.

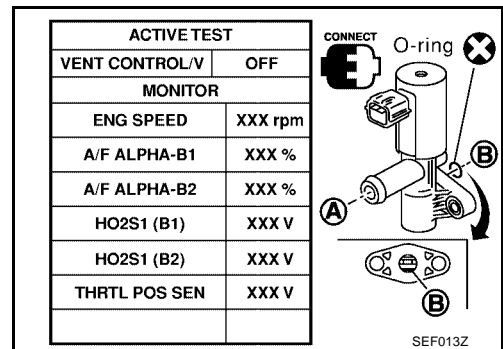
11. CHECK EVAP CANISTER VENT CONTROL VALVE

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.**

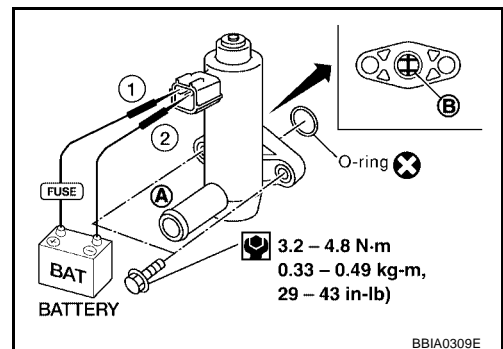
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If portion **B** is rusted, replace control valve.

**Make sure new O-ring is installed properly.**

OK 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-648, "Basic Inspection"](#).

| Items  | Specifications   |
|--|--|
| Ignitions timing   | 10° ± 2° BTDC  |
| Base idle speed  | 700 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.3 mm (0.012 in): ON<br>0.4 mm (0.016 in): OFF |
| Target idle speed  | 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-648, "Basic Inspection"](#).

| Items  | Specifications   |
|--|--|
| Ignitions timing   | 10° ± 2° BTDC  |
| Base idle speed  | 700 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.3 mm (0.012 in): ON<br>0.4 mm (0.016 in): OFF |
| Target idle speed  | 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-1170, "EVAPORATIVE EMISSION LINE DRAWING"](#).

**OK or NG**

- OK >> GO TO 15.
- NG >> Replace it.

### 15. CLEAN EVAP PURGE LINE

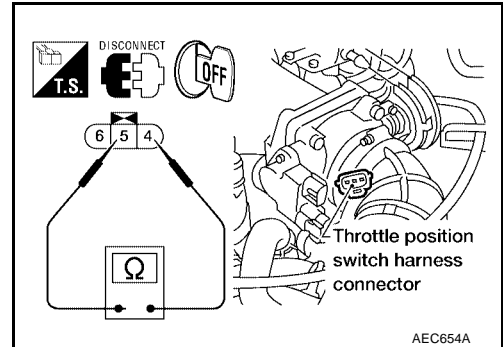
Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 16.

### 16. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END.



A  
EC  
C  
D  
E  
F  
G  
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M

**DTC P0442 EVAP CONTROL SYSTEM**

**On Board Diagnosis Logic**

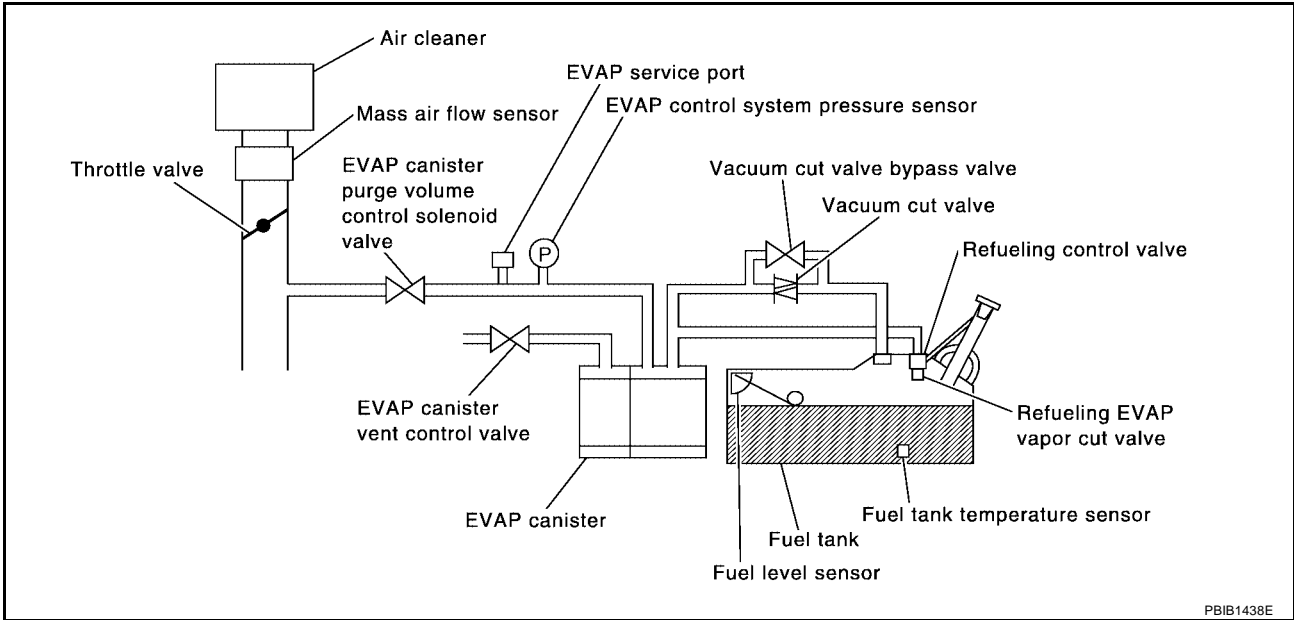
**NOTE:**

If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See [EC-1088](#).)

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.



PBIB1438E



# DTC P0442 EVAP CONTROL SYSTEM

[VG33E]

| 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. | <ul style="list-style-type: none"> <li>● Incorrect fuel tank vacuum relief valve</li> <li>● Incorrect fuel filler cap used</li> <li>● Fuel filler cap remains open or fails to close.</li> <li>● Foreign matter caught in fuel filler cap.</li> <li>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>● Foreign matter caught in EVAP canister vent control valve.</li> <li>● EVAP canister or fuel tank leaks</li> <li>● EVAP purge line (pipe and rubber tube) leaks</li> <li>● EVAP purge line rubber tube bent</li> <li>● Blocked or bent rubber tube to EVAP control system pressure sensor</li> <li>● Loose or disconnected rubber tube</li> <li>● EVAP canister vent control valve and the circuit</li> <li>● EVAP canister purge volume control solenoid valve and the circuit</li> <li>● Fuel tank temperature sensor</li> <li>● O-ring of EVAP canister vent control valve is missing or damaged</li> <li>● water separator</li> <li>● EVAP canister is saturated with water</li> <li>● EVAP control system pressure sensor</li> <li>● Fuel level sensor and the circuit</li> <li>● Refueling EVAP vapor cut</li> <li>● ORVR system leaks</li> </ul> |

**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

UBS007NF

**NOTE:**

- If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See [EC-1088](#).)
- If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

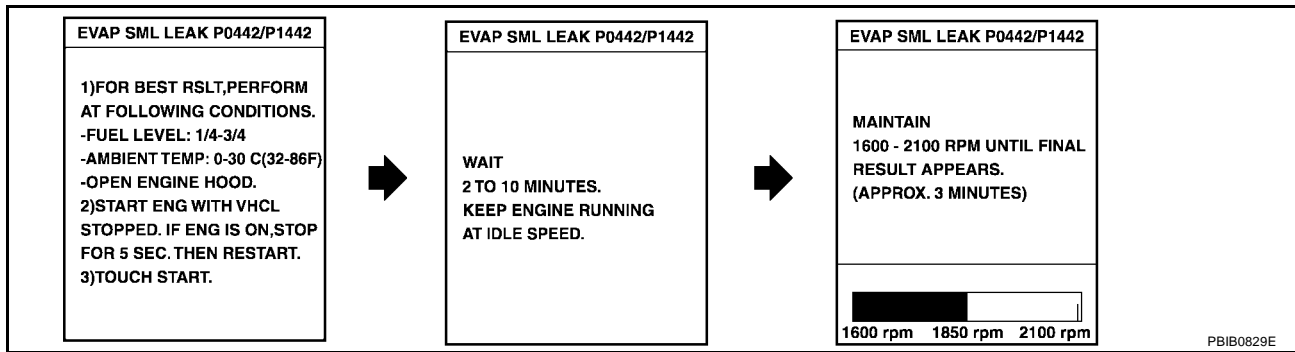
**TESTING CONDITION:**

- 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” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.

Follow the instruction displayed.



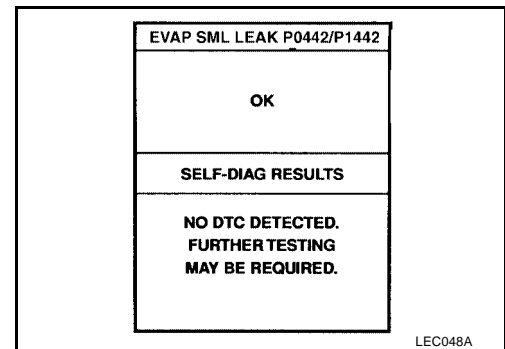
**NOTE:**

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to [EC-648, "Basic Inspection"](#).

6. Make sure that "OK" is displayed.  
If "NG" is displayed, refer to [EC-915, "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-631, "Driving Pattern"](#) before driving vehicle.

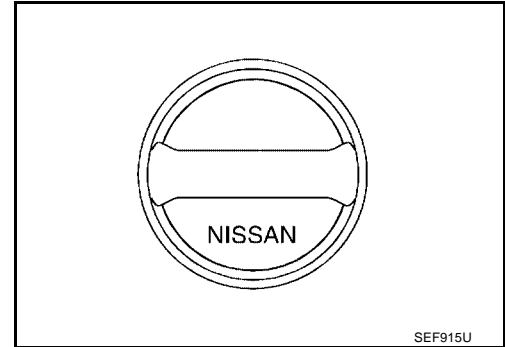
1. Start engine.
2. Drive vehicle according to [EC-631, "Driving Pattern"](#).
3. Stop vehicle.
4. Select "MODE 1" with GST.
  - If SRT of EVAP system is not set yet, go to the following step.
  - If SRT of EVAP system is set, the result will be OK.
5. Turn ignition switch OFF and wait at least 5 seconds.
6. Start engine.  
**It is not necessary to cool engine down before driving.**
7. Drive vehicle again according to the [EC-631, "Driving Pattern"](#).
8. Stop vehicle.
9. Select "MODE 3" with GST.
  - If P0442 is displayed on the screen, go to [EC-915, "Diagnostic Procedure"](#).
  - If P0441 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P0441", [EC-906](#).
  - 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****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**

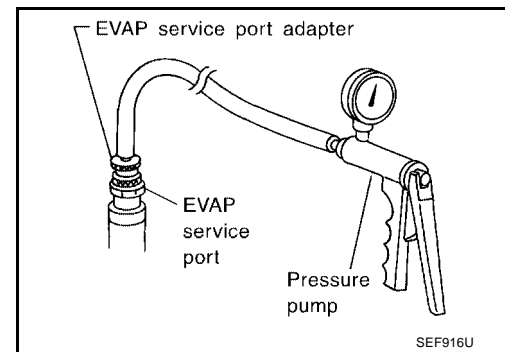
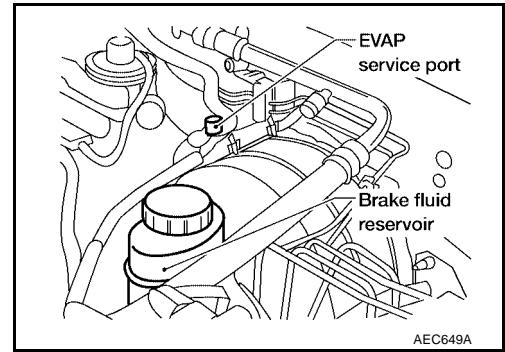
Refer to [EC-1172, "FUEL TANK VACUUM RELIEF VALVE \(BUILT INTO FUEL FULLER CAP\)"](#).

OK or NG

- OK >> GO TO 5.  
 NG >> Replace fuel filler cap with a genuine one.

## 5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



**NOTE:**

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II>>GO TO 6.

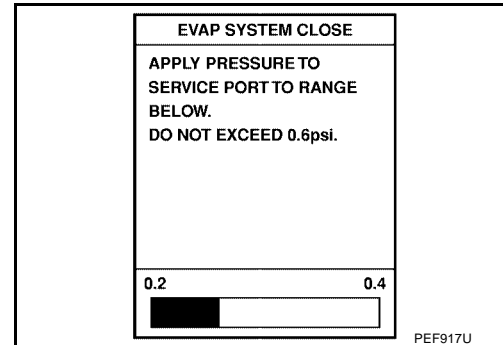
Models without CONSULT-II>>GO TO 7.

**6. CHECK FOR EVAP LEAK****With CONSULT-II**

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

**NOTE:**

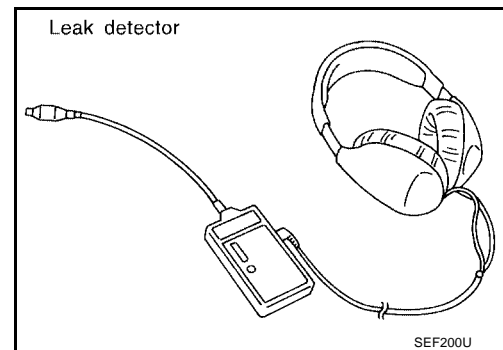
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-1170, "EVAPORATIVE EMISSION LINE DRAWING"](#).

**OK or NG**

- OK >> GO TO 8.  
 NG >> Repair or replace.



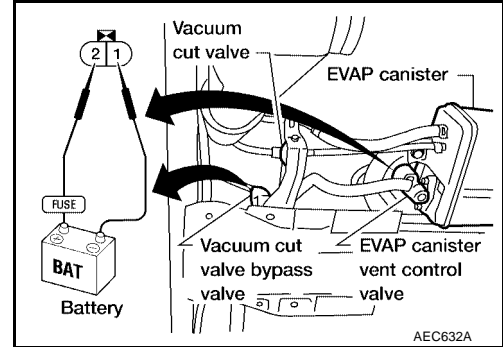
**7. CHECK FOR EVAP LEAK**

⊗ **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:**

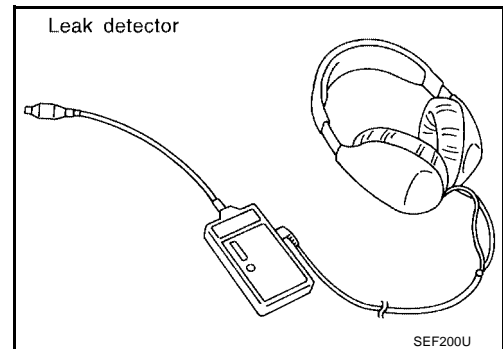
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-1170, "EVAPORATIVE EMISSION LINE DRAWING"](#) .

OK or NG

- OK >> GO TO 8.  
 NG >> Repair or replace.



**8. CHECK WATER SEPARATOR**

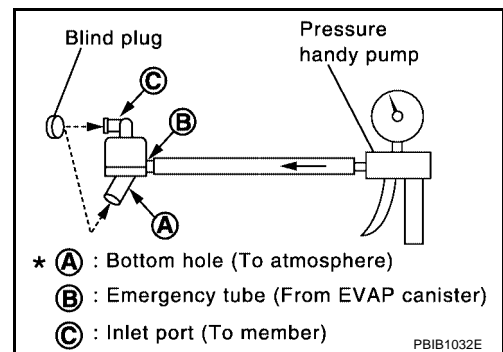
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG 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-1085, "Diagnostic Procedure"](#) .

OK or NG

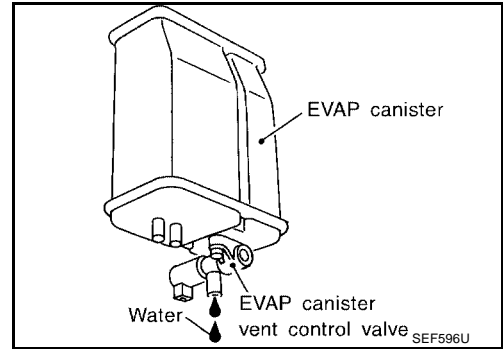
- OK >> GO TO 10.  
 NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

**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 100.0%.
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.

| 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   |
|                 |         |

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**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-601, "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.

| 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   |
|                 |         |

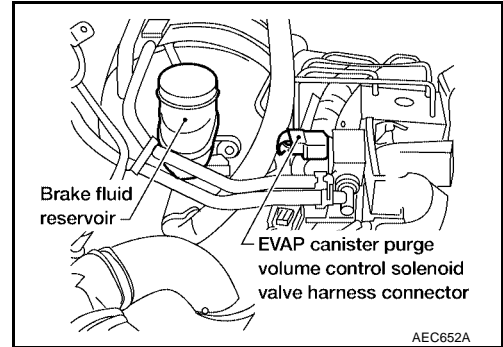
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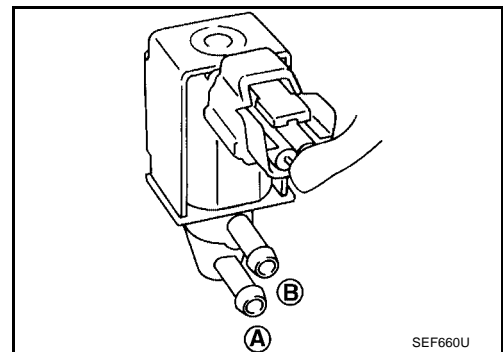
17. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

 With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

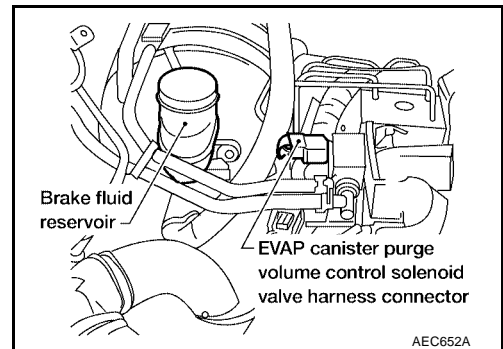


| Condition PURG VOL CONT/V value | Air passage continuity between A or B |
|---------------------------------|---------------------------------------|
| 100.0%                          | Yes                                   |
| 0.0%                            | No                                    |

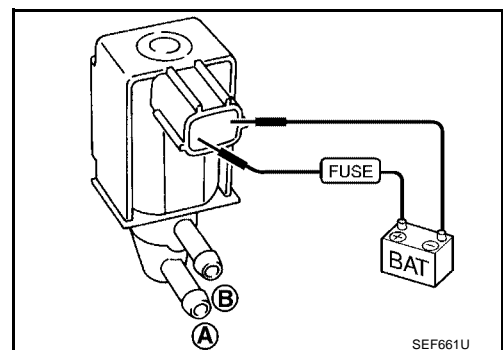


 Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



| Condition   | Air passage continuity between A 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.

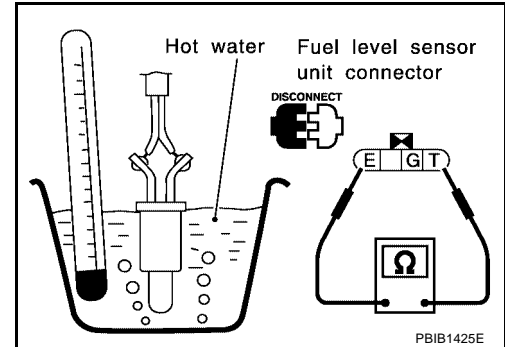
## 18. CHECK FUEL TANK TEMPERATURE SENSOR

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.

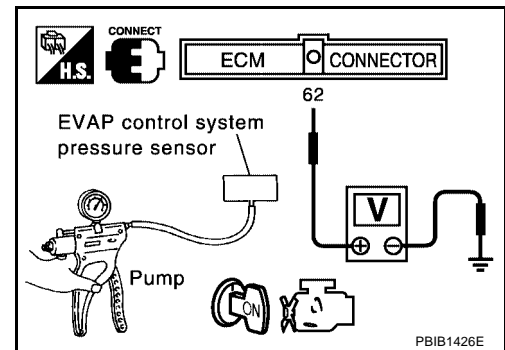
| Applied vacuum                    | Voltage V                          |
|-----------------------------------|------------------------------------|
| Not applied                       | 1.8 - 4.8                          |
| -26.7 kpa (-200 mmHg, -7.87 inHg) | 2.1 to 2.5V lower than above value |

**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-1170, "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**

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Check refueling EVAP vapor line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to [EC-1177, "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-1177, "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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

A

EC

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# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VG33E]

## DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

### Description SYSTEM DESCRIPTION

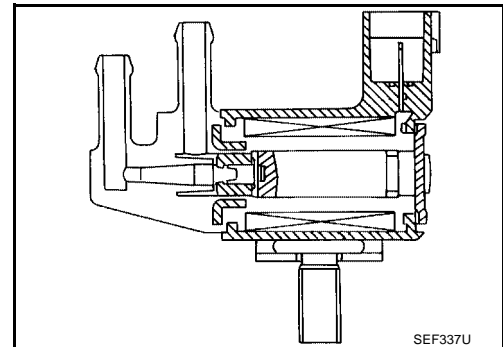
UBS007NH

| 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 sensors 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

UBS007NI

Specification data are reference values.

| MONITOR ITEM | CONDITION   | SPECIFICATION                |
|--------------|---|------------------------------|
| PURG VOL C/V | ● Engine: After warming up<br>● Air conditioner switch OFF<br>● Shift lever: "N"<br>● No-load | Idle (Vehicle stopped)<br>0% |
|              | 2,000 rpm   | —                            |

# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VG33E]

UBS007NK

## On Board Diagnosis Logic

| 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  | <ul style="list-style-type: none"> <li>● Harness or connectors (The solenoid valve circuit is open or shorted.)</li> <li>● EVAP canister purge volume control solenoid valve</li> </ul> |
| P0445   | EVAP canister purge volume control solenoid valve circuit shorted | An excessively high voltage signal is sent to ECM through the valve | <ul style="list-style-type: none"> <li>● Harness or connectors (The solenoid valve circuit is shorted.)</li> <li>● EVAP canister purge volume control solenoid valve</li> </ul>         |

## DTC Confirmation Procedure

UBS007NK

### 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-928, "Diagnostic Procedure"](#)

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

### WITH GST

Follow the procedure "With CONSULT-II".

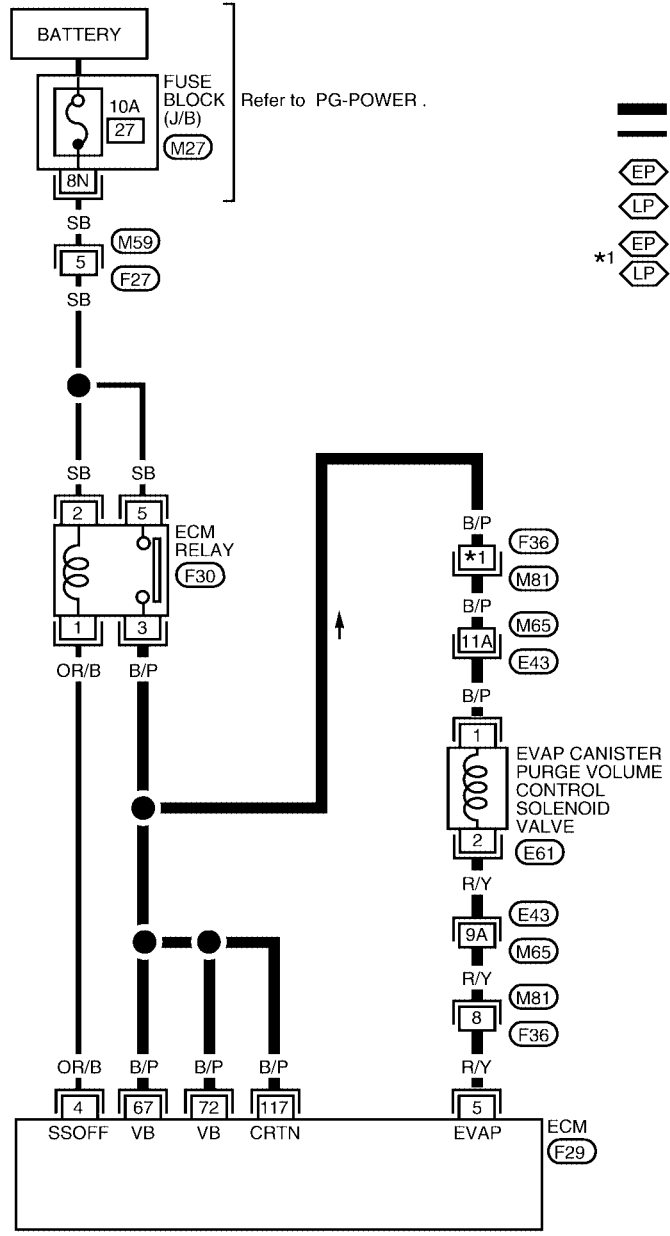
# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VG33E]

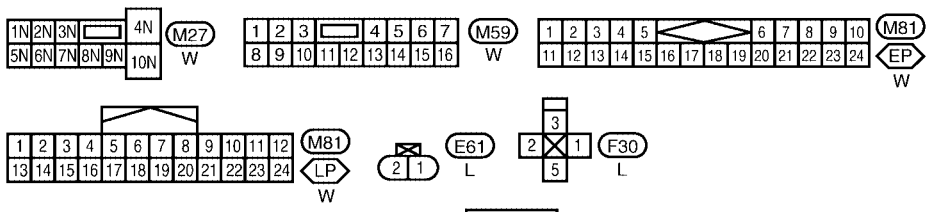
UBS007NL

## Wiring Diagram

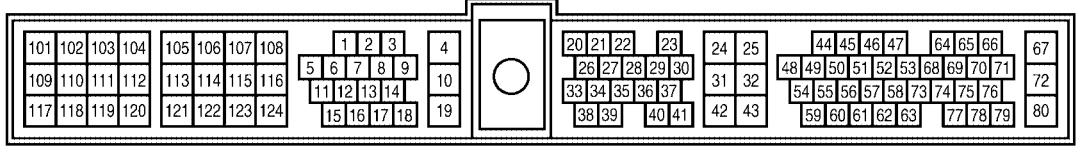
EC-PGC/V-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- ⬡EP⬡ : EARLY PRODUCTION
- ⬡LP⬡ : LATE PRODUCTION
- \*1 ⬡EP⬡ : 13
- \*1 ⬡LP⬡ : 15



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



WBWA0030E

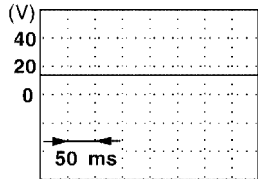
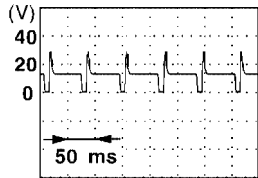
# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VG33E]

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

**CAUTION:**

**Do not use 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.**

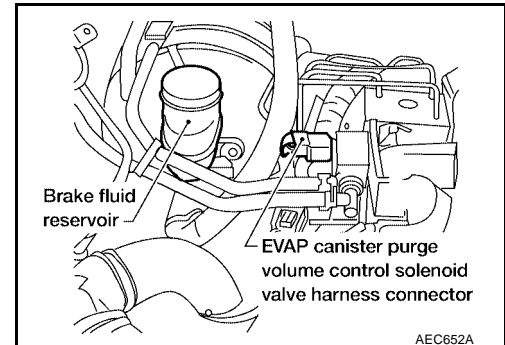
| TER-MINAL NO. | WIRE COLOR | ITEM  | CONDITION   | DATA (DC Voltage)   |
|---------------|------------|---|---|---|
| 4             | OR/B       | ECM relay (Self shut-off)                         | <b>[Engine is running]</b><br><b>[Ignition switch OFF]</b><br><ul style="list-style-type: none"> <li>For a few seconds after turning ignition switch OFF</li> </ul> | 0 - 1.5V  |
|               |            |   | <b>[Ignition switch OFF]</b><br><ul style="list-style-type: none"> <li>A few seconds passed after turning ignition switch OFF</li> </ul>                            | BATTERY VOLTAGE (11 - 14V)  |
| 5             | R/Y        | EVAP canister purge volume control solenoid valve | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>Idle speed</li> </ul>  | BATTERY VOLTAGE (11 - 14V)★<br><br><small>SEF994U</small>  |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>Engine speed is 2,000 rpm (More than 100 seconds after starting engine)</li> </ul>             | BATTERY VOLTAGE (11 - 14V)★<br><br><small>SEF995U</small> |
| 67            | B/P        | Power supply for ECM                              | <b>[Ignition switch ON]</b>   | BATTERY VOLTAGE (11 - 14V)  |
| 72            | B/P        | Power supply for ECM                              | <b>[Ignition switch ON]</b>   | BATTERY VOLTAGE (11 - 14V)  |
| 117           | B/P        | Current return                                    | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>Idle speed</li> </ul>  | BATTERY VOLTAGE (11 - 14V)  |

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

## Diagnostic Procedure

### 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.

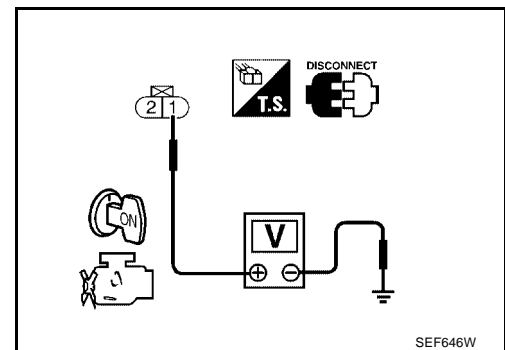


4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.

**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

>> 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 solenoid 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.



# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VG33E]

## 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   |

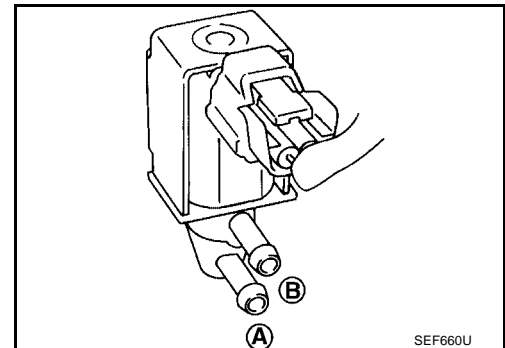
SEF985Y

## 6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

### Ⓜ With CONSULT-II

1. Check air passage continuity under the following conditions.

| Condition<br>PURG VOL CONT/V value | Air passage continuity<br>between A and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |



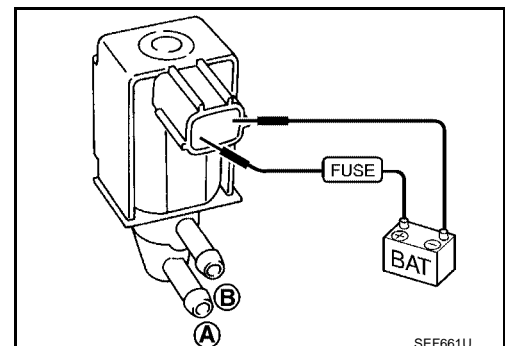
### ⊗ Without CONSULT-II

1. Check air passage continuity under the following conditions.

| Condition   | Air passage continuity<br>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.



**DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID  
VALVE**

**[VG33E]**

---

**7. CHECK INTERMITTENT INCIDENT**

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Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

**>> INSPECTION END.**

## DTC P0447 EVAP CANISTER VENT CONTROL VALVE

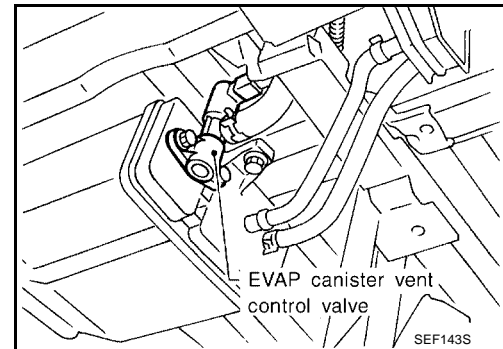
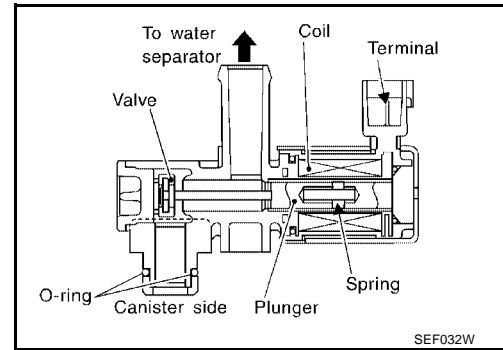
### Component Description

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

Specification data are reference values.

| MONITOR ITEM | CONDITION             | SPECIFICATION |
|--------------|-----------------------|---------------|
| VENT CONT/V  | ● Ignition switch: ON | OFF           |

### On Board Diagnosis Logic

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The valve circuit is open or shorted.)</li> <li>● EVAP canister vent control valve</li> </ul> |

### DTC Confirmation Procedure

#### 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.

# DTC P0447 EVAP CANISTER VENT CONTROL VALVE

[VG33E]

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-934, "Diagnostic Procedure"](#)

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y



## WITH GST

Follow the procedure "With CONSULT-II".

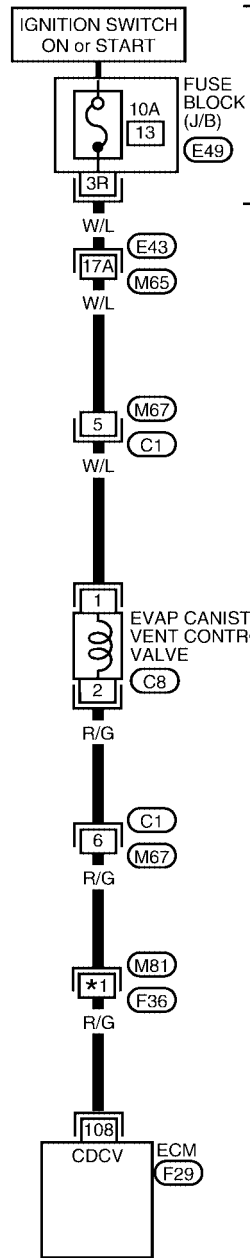
# DTC P0447 EVAP CANISTER VENT CONTROL VALVE

[VG33E]

UBS007NS

## Wiring Diagram

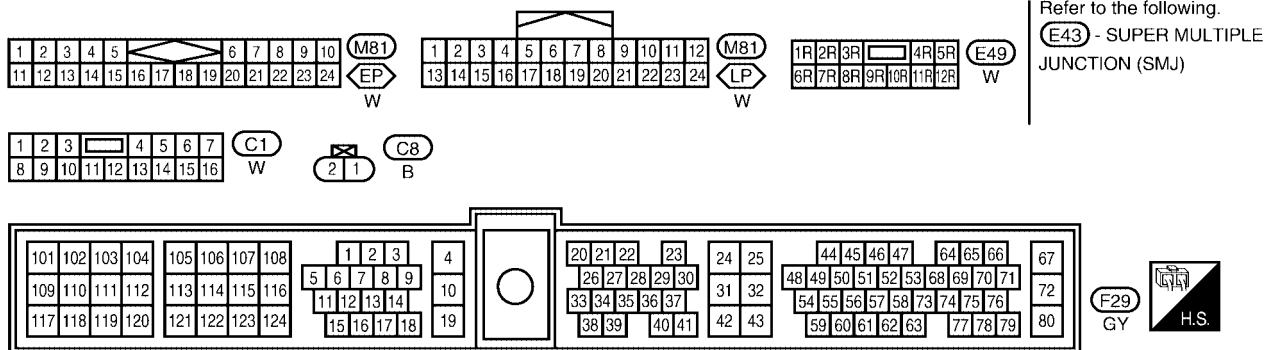
EC-VENT/V-01



Refer to PG-POWER .

- : Detectable line for DTC
- : Non-detectable line for DTC
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 21
- \*1 : 23

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WBWA0060E

# DTC P0447 EVAP CANISTER VENT CONTROL VALVE

[VG33E]

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

**CAUTION:**

**Do not use 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 COLO R | ITEM                             | CONDITION            | DATA (DC Voltage)          |
|---------------|-------------|----------------------------------|----------------------|----------------------------|
| 108           | R/G         | EVAP canister vent control valve | [Ignition switch ON] | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

UBS007NT

### 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

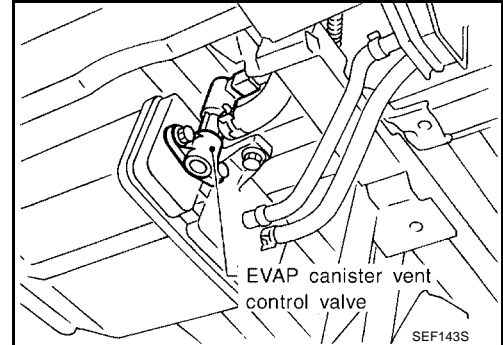
- OK >> GO TO 7.
- NG >> GO TO 3.

| 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   |
|                |         |

SEF989Y

## 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".

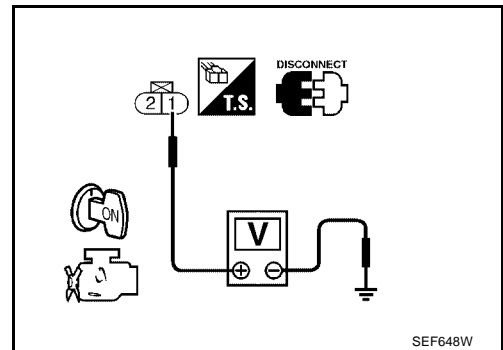


4. Check voltage between terminal 1 and ground with CONSULT-II or tester.

**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.

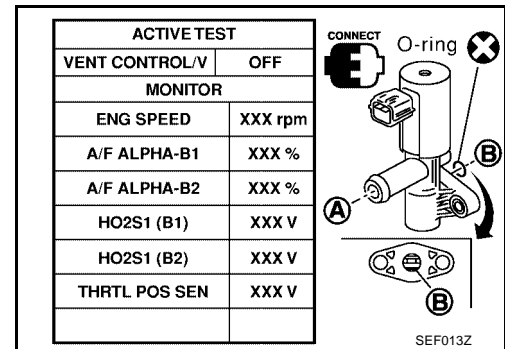
## 7. CHECK EVAP CANISTER VENT CONTROL VALVE

### Ⓟ With CONSULT-II

1. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time.

| Condition<br>VENT CONTROL/V | Air passage continuity between<br>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.

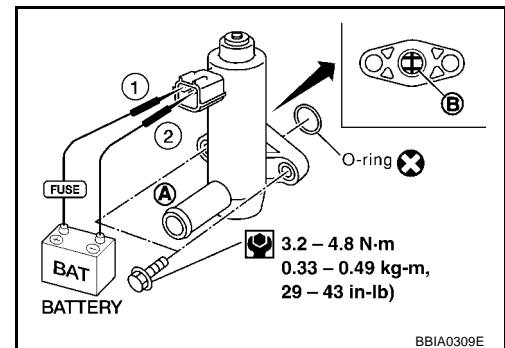
| Condition  | Air passage continuity between<br>A and B |
|--|---|
| 12V direct current supply between<br>terminals 1 and 2 | No  |
| OFF  | Yes                                       |

**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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.



# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

[VG33E]

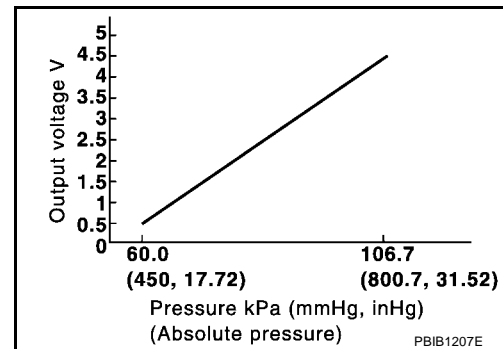
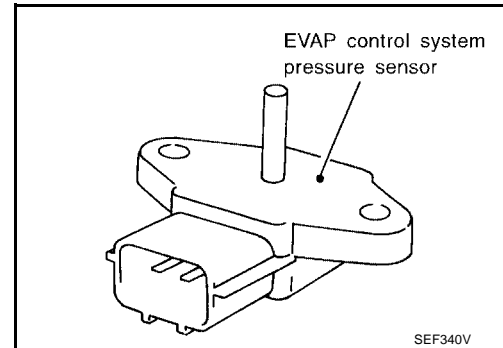
## DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

PF2:25085

### Component Description

UBS007NU

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

UBS007NV

Specification data are reference values.

| MONITOR ITEM  | CONDITION             | SPECIFICATION      |
|---------------|-----------------------|--------------------|
| EVAP SYS PRES | ● Ignition switch: ON | Approx. 1.8 - 4.8V |

### On Board Diagnosis Logic

UBS007NW

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● EVAP control system pressure sensor</li> </ul> |

### DTC Confirmation Procedure

UBS007NX

#### 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.

# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

[VG33E]

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-940, "Diagnostic Procedure"](#).

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLANTEMP/S  | XXX °C  |
| FUEL T/TMP SE | XXX °C  |

SEP194Y



## 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-940, "Diagnostic Procedure"](#).

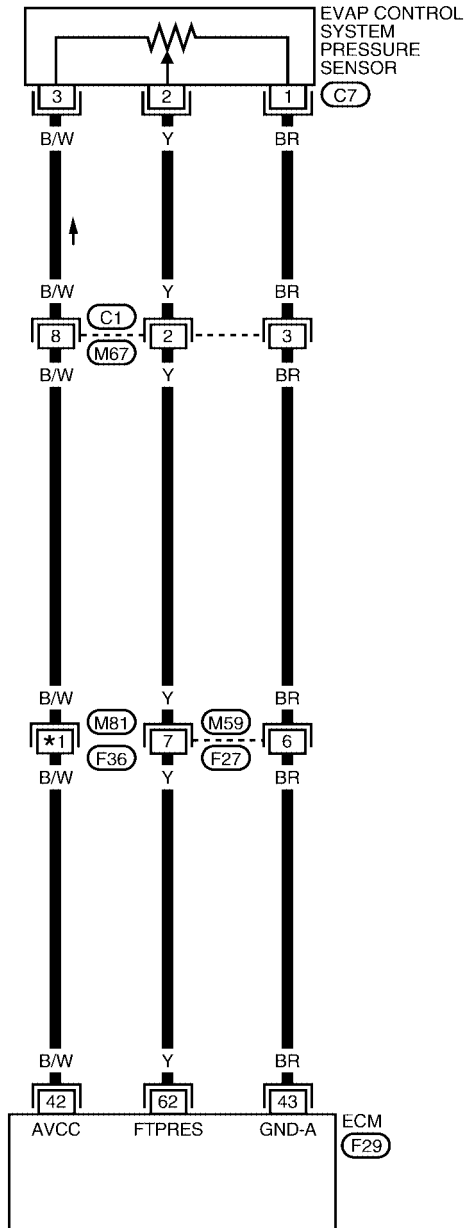
# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

[VG33E]

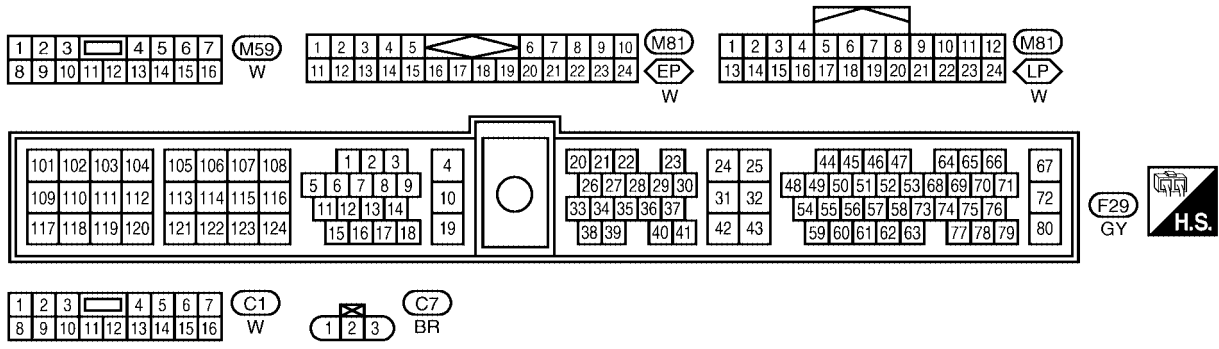
UBS007NY

## Wiring Diagram

EC-PRE/SE-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- \*1 EP : 19
- LP : 21



WBWA0061E

# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

[VG33E]

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

**CAUTION:**

**Do not use 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 COLO R | ITEM                                     | CONDITION  | DATA (DC Voltage)        |
|---------------|-------------|--|--|--------------------------|
| 42            | B/W         | Sensors' power supply                    | [Ignition switch ON]                                       | Approximately 5V         |
| 43            | BR          | Sensors' ground                          | [Engine is running]<br>● Warm-up condition<br>● Idle speed | Approximately 0V         |
| 62            | Y           | EVAP control system pres-<br>sure sensor | [Ignition switch ON]                                       | Approximately 1.8 - 4.8V |

## Diagnostic Procedure

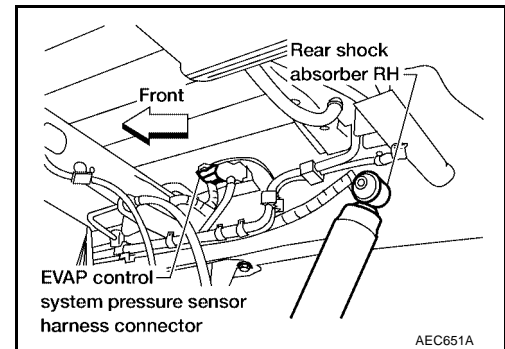
UBS007NZ

### 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

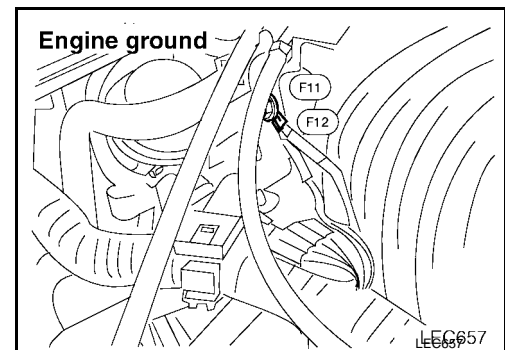
- OK >> GO TO 2.  
NG >> Reconnect, repair or replace.



### 2. RETIGHTEN GROUND SCREWS

1. Loosen and retighten engine ground screws.

>> GO TO 3.



### 3. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.  
**Water should not exist.**

OK or NG

- OK >> GO TO 4.  
NG >> Repair or replace harness connector.

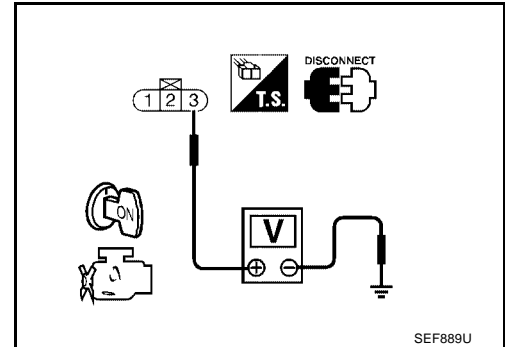
## 4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "ON".
2. Check voltage between 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 C3, B113 and B101, M67
- Harness connectors M58, F28
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair harness or connectors.

## 6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch "OFF".
2. Check harness continuity between EVAP control system pressure sensor terminal 1 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

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

## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C3, B113 and B101, M67
- Harness connectors M59, F27
- Joint connector-4
- Harness for open or short between EVAP control system pressure sensor and ECM

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

## 8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 62 and EVAP control system pressure sensor terminal 2.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C3, B113 and B101, 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.

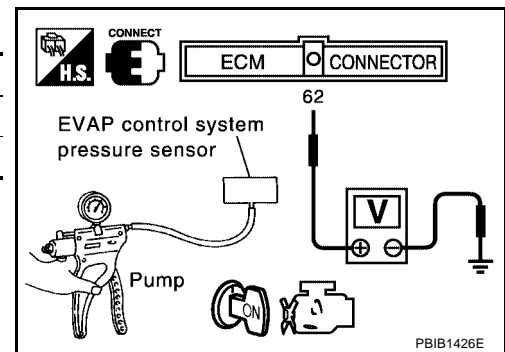
| Applied vacuum                    | Voltage V                           |
|-----------------------------------|-------------------------------------|
| Not applied                       | 1.8 - 4.8                           |
| -26.7 kpa (-200 mmHg, -7.87 inHg) | 2.1 to 2.5 V lower than above value |

**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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

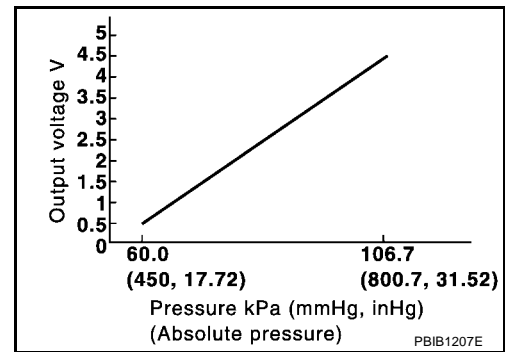
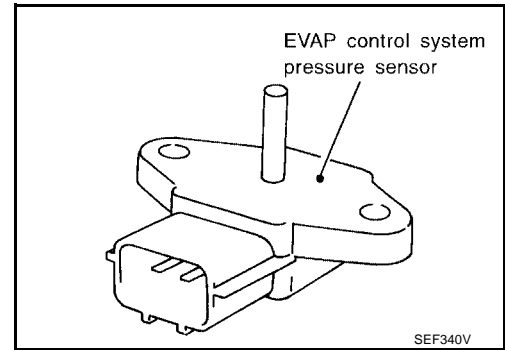
## DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

PFP:25085

### Component Description

UBS00701

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

UBS00702

Specification data are reference values.

| MONITOR ITEM  | CONDITION             | SPECIFICATION      |
|---------------|-----------------------|--------------------|
| EVAP SYS PRES | ● Ignition switch: ON | Approx. 1.8 - 4.8V |

### On Board Diagnosis Logic

UBS00703

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● EVAP control system pressure sensor</li> <li>● EVAP canister vent control valve</li> <li>● EVAP canister</li> <li>● Water separator</li> <li>● Rubber hose from EVAP canister vent control valve to water separator</li> </ul> |

### DTC Confirmation Procedure

UBS00704

**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.

# DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

[VG33E]

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-946, "Diagnostic Procedure"](#).

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLANTEMP/S  | XXX °C  |
| FUEL T/TMP SE | XXX °C  |

SEF194Y



## 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-940, "Diagnostic Procedure"](#).



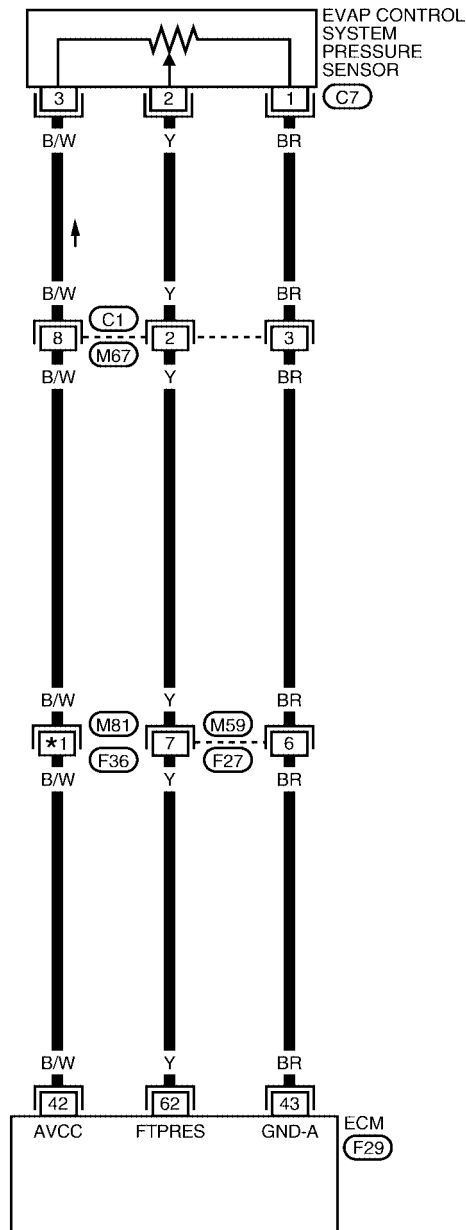
# DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

[VG33E]

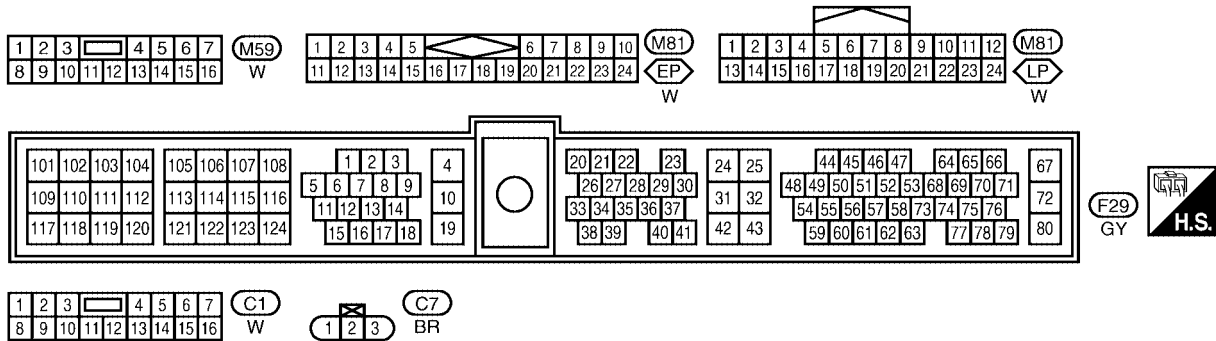
UBS00705

## Wiring Diagram

EC-PRE/SE-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- \*1 EP : 19
- LP : 21



WBWA0061E

# DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

[VG33E]

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

## CAUTION:

Do not use 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 COLO R | ITEM                                | CONDITION  | DATA (DC Voltage)        |
|---------------|-------------|-------------------------------------|--|--------------------------|
| 42            | B/W         | Sensors' power supply               | [Ignition switch ON]                                       | Approximately 5V         |
| 43            | BR          | Sensors' ground                     | [Engine is running]<br>● Warm-up condition<br>● Idle speed | Approximately 0V         |
| 62            | Y           | EVAP control system pressure sensor | [Ignition switch ON]                                       | Approximately 1.8 - 4.8V |

## Diagnostic Procedure

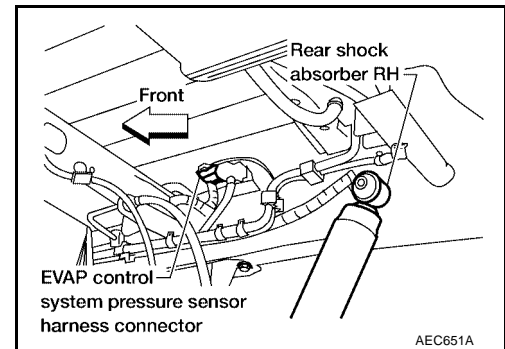
UBS00706

### 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

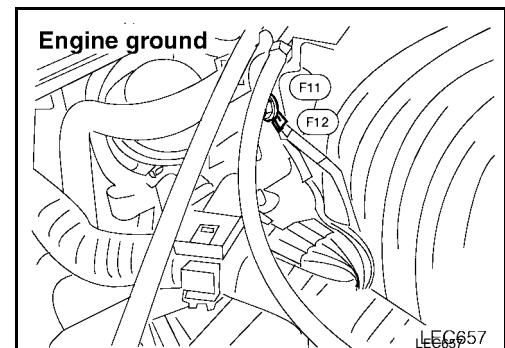
- OK >> GO TO 2.  
NG >> Reconnect, repair or replace.



### 2. RETIGHTEN GROUND SCREWS

1. Loosen and retighten engine ground screws.

>> GO TO 3.



### 3. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.  
**Water should not exist.**

#### OK or NG

- OK >> GO TO 4.  
NG >> Repair or replace harness connector.

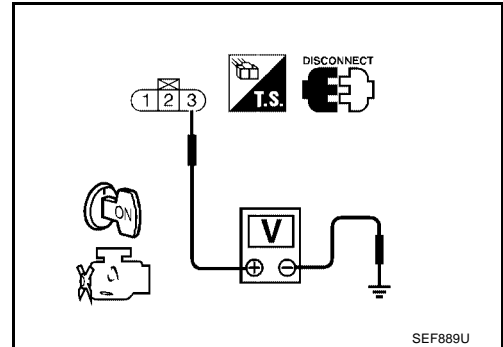
**4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT**

1. Turn ignition switch "ON".
2. Check voltage between 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 C3, B113 and B101, M67
- Harness connectors M58, F28
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair harness or connectors.

**6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch "OFF".
2. Check harness continuity between EVAP control system pressure sensor terminal 1 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

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

**7. DETECT MALFUNCTIONING PART**

Check the following.

- Harness connectors C3, B113 and B101, M67
- Harness connectors M59, F27
- Joint connector-4
- Harness for open or short between EVAP control system pressure sensor and ECM

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

---

## 8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

---

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 62 and EVAP control system pressure sensor terminal 2.  
Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

---

## 9. DETECT MALFUNCTIONING PART

---

Check the following.

- Harness connectors C3, B113 and B101, 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.

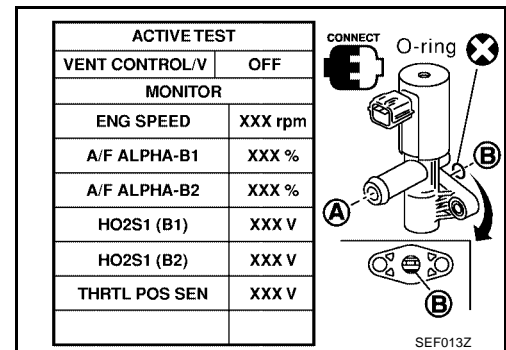
## 10. CHECK EVAP CANISTER VENT CONTROL VALVE

### 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<br>VENT CONTROL/V | Air passage continuity<br>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.

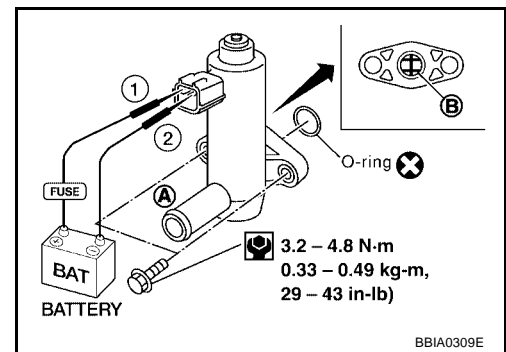
| Condition  | Air passage continuity<br>between A and B |
|--|---|
| 12V direct current supply between<br>terminals 1 and 2 | No  |
| OFF  | Yes                                       |

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 |

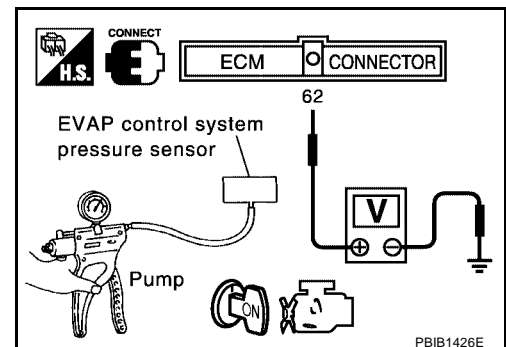
### CAUTION:

- 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

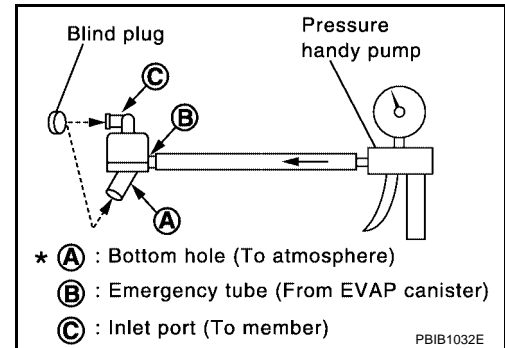
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

**NOTE:**

- Do not disassemble water separator.

OK or NG

- OK >> GO TO 14.
- NG >> Replace water separator.

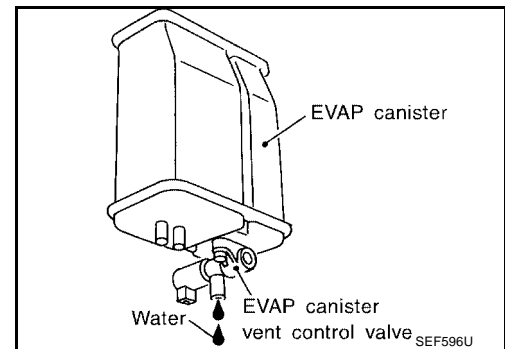


## 14. CHECK IF EVAP CANISTER SATURATED WITH WATER

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 EVAP CONTROL SYSTEM PRESSURE SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT**

---

1. Reconnect harness connectors disconnected.
2. Disconnect harness connectors C3, B113.
3. Check harness continuity between harness connector B113 terminal 6 and engine ground.

**Continuity should exist.**

4. Also check harness for short to power.

OK or NG

- OK >> GO TO 19.  
NG >> GO TO 18.

---

**18. DETECT MALFUNCTIONING PART**

---

Check the following.

- Harness connector B113 and B101, M67
- Harness connectors M59, F27
- Joint connector-1
- Harness for open between harness connector B113 and engine ground

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

---

**19. CHECK INTERMITTENT INCIDENT**

---

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

A

EC

C

D

E

F

G

H

I

J

K

L

M

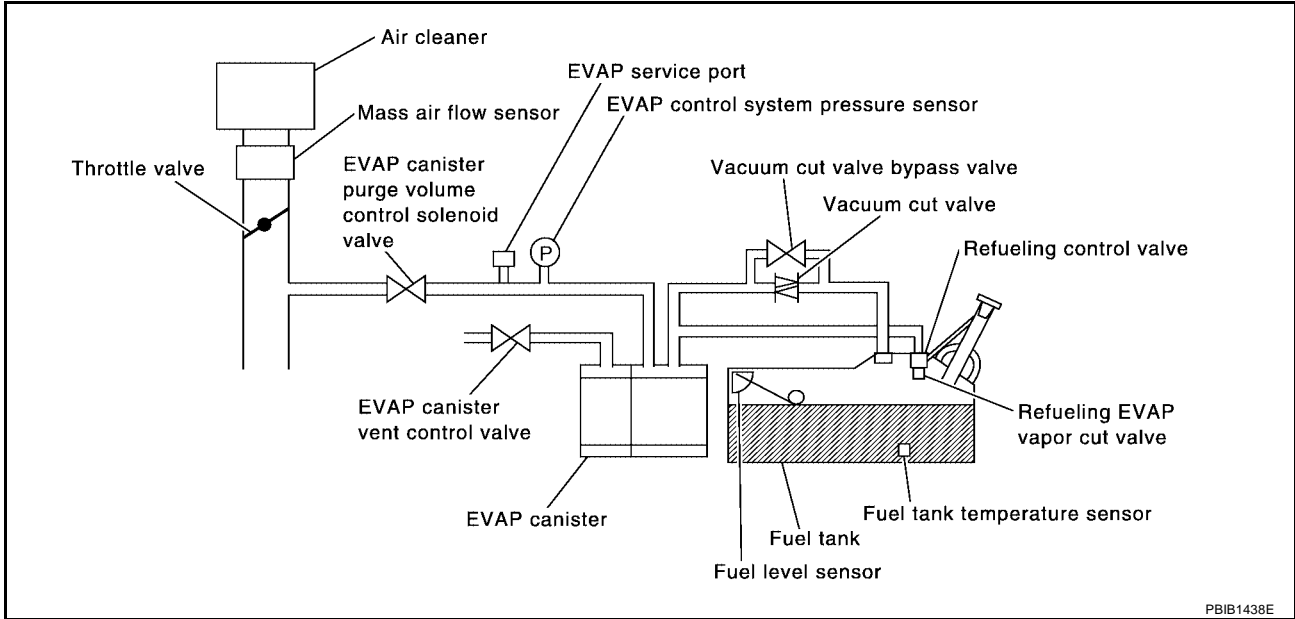
DTC P0455 EVAP CONTROL SYSTEM

On Board Diagnosis Logic

NOTE:

If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (EC-1088.)

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.



PBIB1438E

| 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. | <ul style="list-style-type: none"> <li>● Fuel filler cap remains open or fails to close.</li> <li>● Incorrect fuel tank vacuum relief valve</li> <li>● Incorrect fuel filler cap used</li> <li>● Foreign matter caught in fuel filler cap.</li> <li>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>● Foreign matter caught in EVAP canister vent control valve.</li> <li>● EVAP canister or fuel tank leaks</li> <li>● EVAP purge line (pipe and rubber tube) leaks</li> <li>● EVAP purge line rubber tube bent.</li> <li>● Blocked or bent rubber tube to EVAP control system pressure sensor</li> <li>● Loose or disconnected rubber tube</li> <li>● EVAP canister vent control valve and the circuit</li> <li>● EVAP canister purge volume control solenoid valve and the circuit</li> <li>● Fuel tank temperature sensor</li> <li>● O-ring of EVAP canister vent control valve is missing or damaged.</li> <li>● EVAP control system pressure sensor</li> <li>● Refueling control valve</li> <li>● ORVR system leaks</li> </ul> |



**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

UBS00709

**CAUTION:**

Never remove fuel filter cap during the DTC confirmation procedure.

**NOTE:**

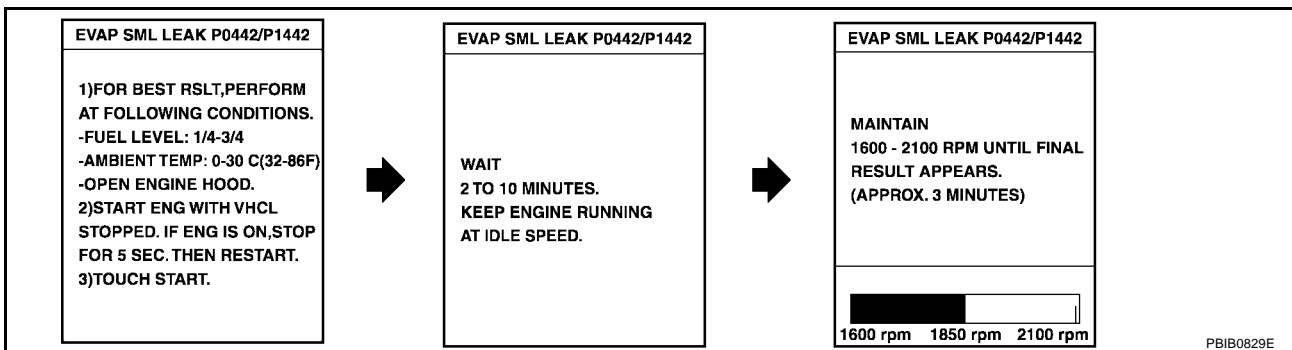
- If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See [EC-1088](#).)
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch 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**

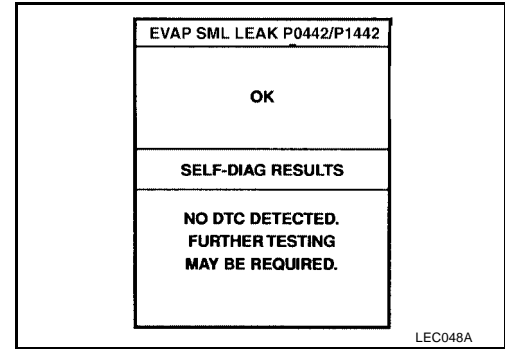
1. Tighten fuel filler cap securely until ratcheting sound is heard.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 5 seconds.
4. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
5. Make sure that the following conditions are met.  
**COOLAN TEMP/S: 0 - 32°C (32 - 90°F)**  
**INT/A TEMP SE: More than 0°C (32°F)**
6. Select "EVAP SML LEAK P0442" 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-648, "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-954, "Diagnostic Procedure"](#) .  
If P0442 is displayed, perform "Diagnostic Procedure" for DTC P0442 [EC-912](#) .



## WITH GST

### NOTE:

Be sure to read the explanation of "Driving Pattern" on [EC-631](#) before driving vehicle.

1. Start engine.
2. Drive vehicle according to "Driving Pattern", [EC-631](#) .
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 "Driving Pattern", [EC-631](#) .
8. Stop vehicle.
9. Select "MODE 3" with GST.
  - If P0455 is displayed on the screen, go to "Diagnostic Procedure", [EC-954](#) .
  - If P0442 or P1442 is displayed on the screen, go to "Diagnostic Procedure", for DTC P0442 [EC-915](#) or for DTC P1442 [EC-1072](#) .
  - If P0441 is displayed on the screen, go to "Diagnostic Procedure" for "DTC P0441", [EC-906](#) .
  - 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.

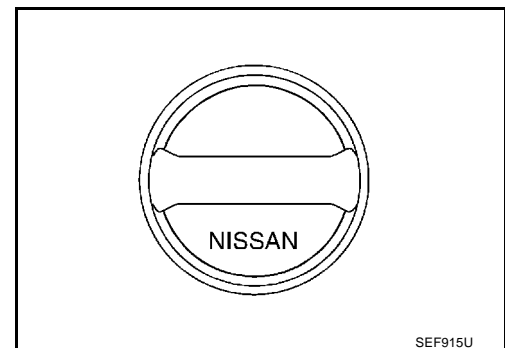
## Diagnostic Procedure

### 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-1172, "FUEL TANK VACUUM RELIEF VALVE \(BUILT INTO FUEL FULLER CAP\)"](#)

OK or NG

OK >> GO TO 5.

NG >> Replace fuel filler cap with a genuine one.

## 5. 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-1170, "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-1088, "DTC Confirmation Procedure"](#) .

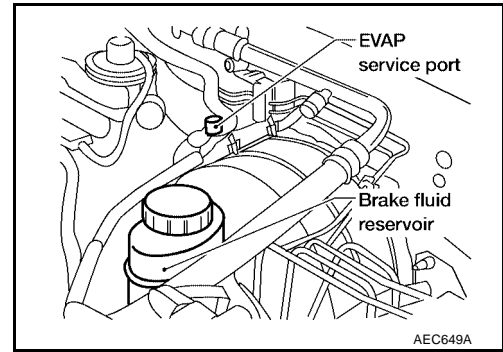
OK or NG

OK >> GO TO 8.

NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

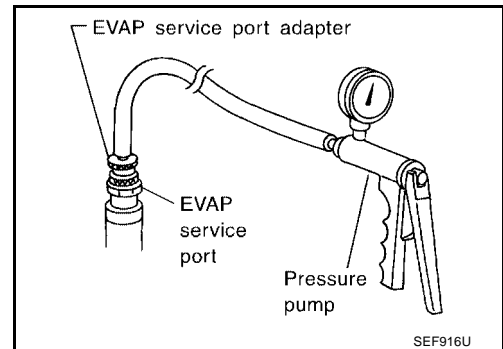
## 8. INSTALL THE PRESSURE PUMP

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.



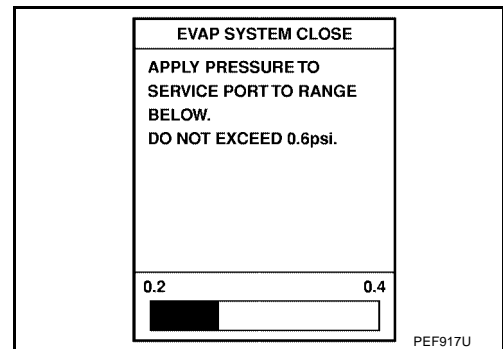
## 9. CHECK FOR EVAP LEAK

### 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:**

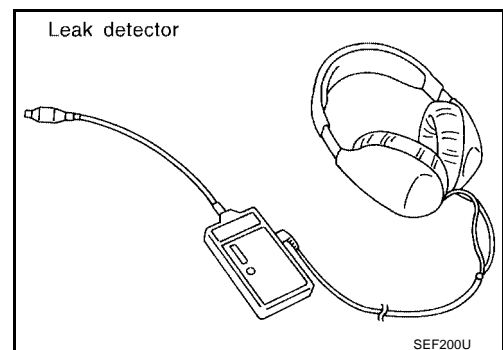
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in the system.



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-1170, "EVAPORATIVE EMISSION LINE DRAWING"](#).

**OK or NG**

- OK >> GO TO 11.  
NG >> Repair or replace.



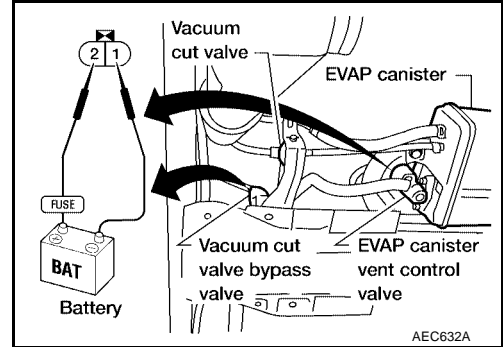
10. CHECK FOR EVAP LEAK

⊗ 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:**

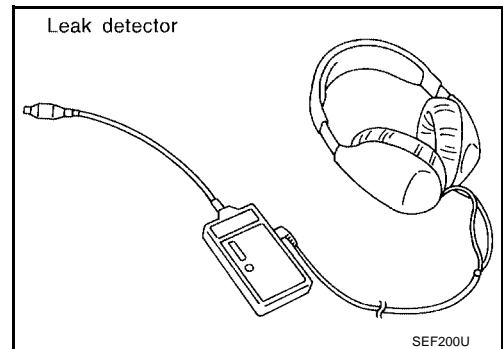
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-1170, "EVAPORATIVE EMISSION LINE DRAWING"](#).

OK or NG

- OK >> GO TO 12.
- NG >> Repair or replace.



11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Ⓜ With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

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-601, "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   |

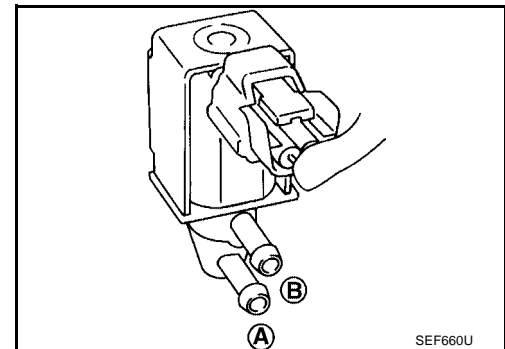
SEF985Y

3. Check air passage continuity.

| Condition<br>PURG VOL CONT/V value | Air passage continuity between A<br>and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |

OK or NG

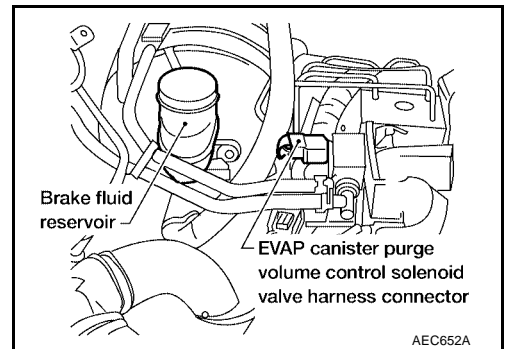
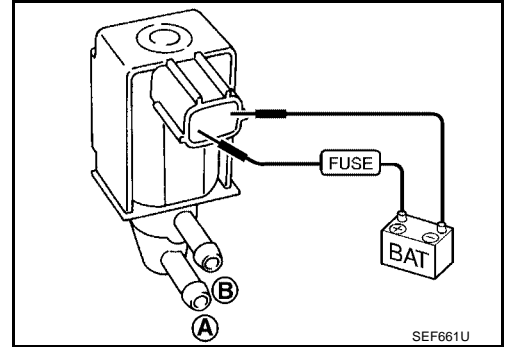
- OK >> GO TO 16.
- NG >> Replace EVAP canister purge volume control solenoid valve.



**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.

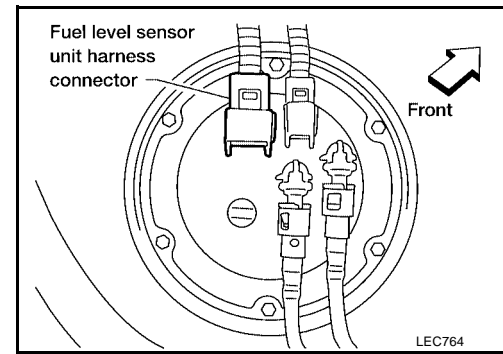
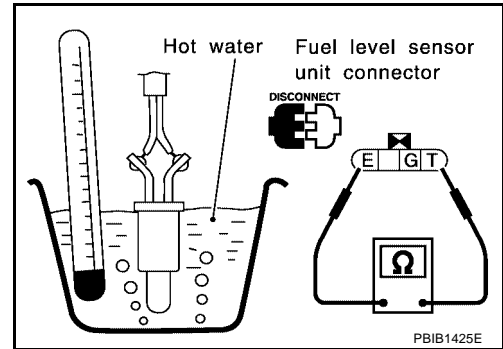
NG >> Replace EVAP canister purge volume control solenoid valve.

A  
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H  
I  
J  
K  
L  
M

**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   |



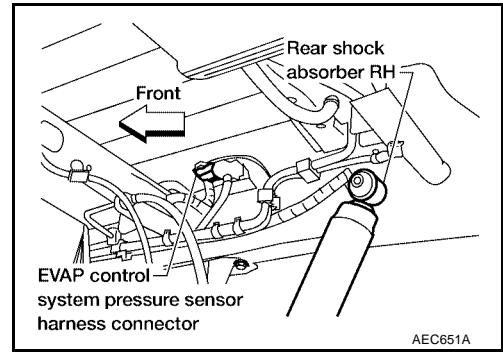
OK or NG

- 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.

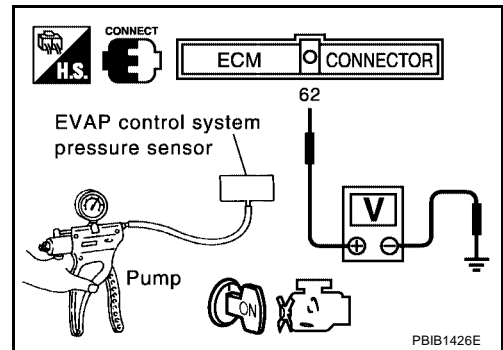


5. Check input voltage between ECM terminal 62 and ground.

| 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 INTERMITTENT INCIDENT**

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

A  
EC  
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L  
M

## DTC P0456 EVAP CONTROL SYSTEM

PF0:14950

### On Board Diagnosis Logic

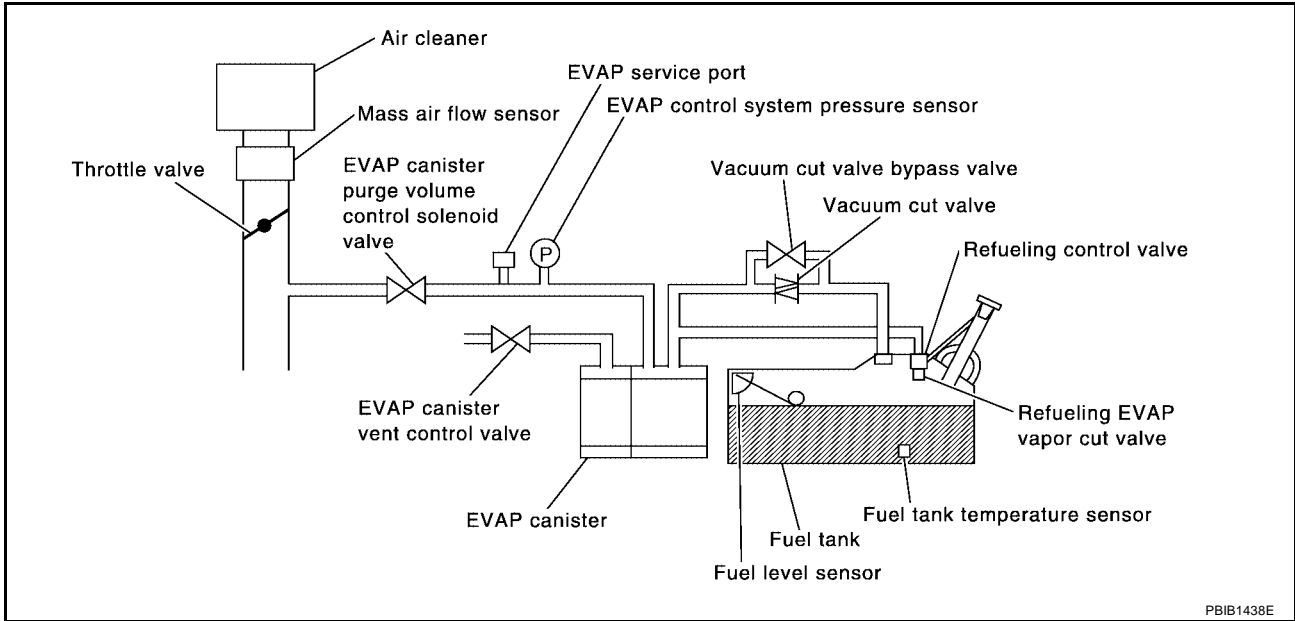
UBS0070B

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 P0456 EVAP CONTROL SYSTEM

[VG33E]

| DTC No. | Trouble diagnosis name  | DTC detecting condition  | Possible cause  |
|---------|---|--|---|
| P0456   | Evaporative emission control system very small leak (negative pressure check) | <ul style="list-style-type: none"> <li>● EVAP system has a very small leak.</li> <li>● EVAP system does not operate properly.</li> </ul> | <ul style="list-style-type: none"> <li>● Incorrect fuel tank vacuum relief valve</li> <li>● Incorrect fuel filler cap used</li> <li>● Fuel filler cap remains open or fails to close.</li> <li>● Foreign matter caught in fuel filler cap.</li> <li>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>● Foreign matter caught in EVAP canister vent control valve.</li> <li>● EVAP canister or fuel tank leaks</li> <li>● EVAP purge line (pipe and rubber tube) leaks</li> <li>● EVAP purge line rubber tube bent</li> <li>● Blocked or bent rubber tube to EVAP control system pressure sensor</li> <li>● Loose or disconnected rubber tube</li> <li>● EVAP canister vent control valve and the circuit</li> <li>● EVAP canister purge volume control solenoid valve and the circuit</li> <li>● Fuel tank temperature sensor</li> <li>● O-ring of EVAP canister vent control valve is missing or damaged</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water</li> <li>● EVAP control system pressure sensor</li> <li>● Refueling control valve</li> <li>● ORVR system leaks</li> <li>● Fuel level sensor and the circuit</li> <li>● Foreign matter caught in EVAP canister purge volume control solenoid valve</li> </ul> |

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J

**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.

K  
L

## DTC Confirmation Procedure

*UBS0070C*

**CAUTION:**

Never remove fuel filler cap during the DTC confirmation procedure.

M

**NOTE:**

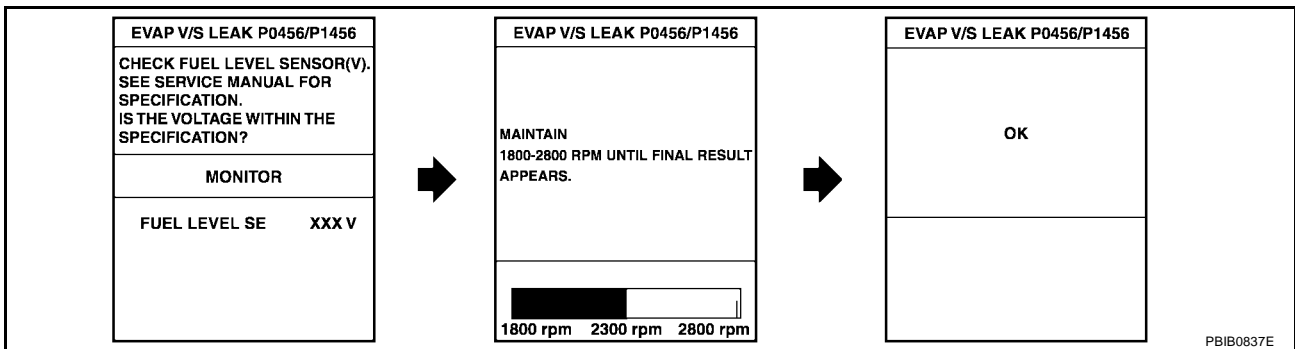
- If DTC P0456 or P1456 is displayed with P0442, first perform trouble diagnosis for DTC P0456 or P1456.
- After repair, make sure that the hoses and clips are installed properly.
- If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds 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-965, "Diagnostic Procedure"](#).

**NOTE:**

- If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to [EC-648, "Basic Inspection"](#).
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

**Overall Function Check**

UBS0070D

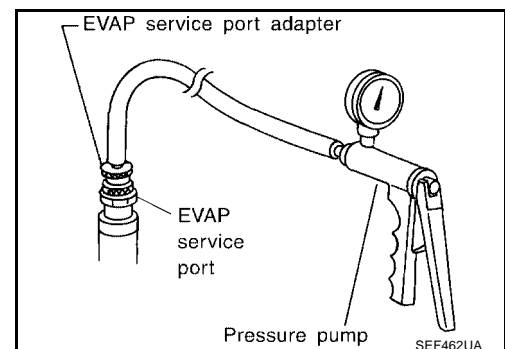
**WITH GST**

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<sup>2</sup>, 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-965, "Diagnostic Procedure"](#) .

**NOTE:**

For more information, refer to GST instruction manual.

**Diagnostic Procedure**

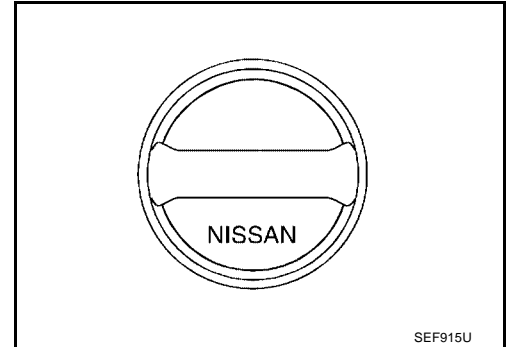
UBS0070E

**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**

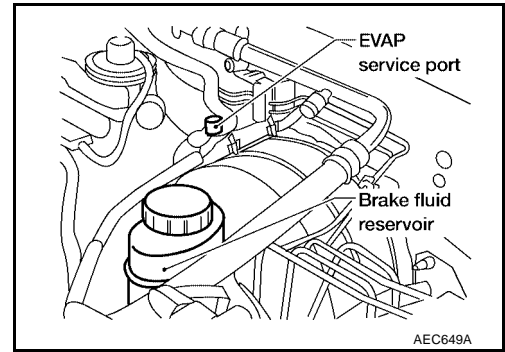
Refer to [EC-1172, "FUEL TANK VACUUM RELIEF VALVE \(BUILT INTO FUEL FULLER CAP\)"](#) .

OK or NG

- OK >> GO TO 5.  
 NG >> Replace fuel filler cap with a genuine one.

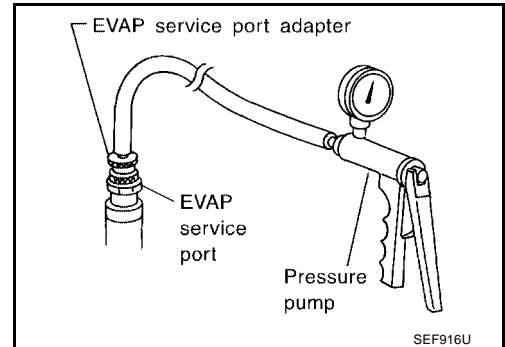
## 5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



**NOTE:**  
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II >> GO TO 6.  
Models without CONSULT-II >> GO TO 7.



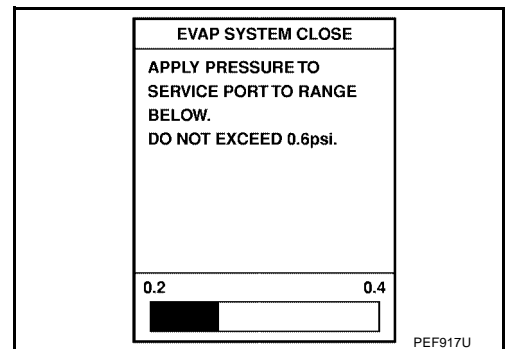
## 6. CHECK FOR EVAP LEAK

### With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

**NOTE:**

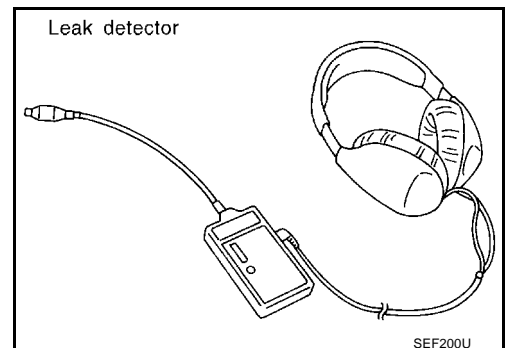
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-1170, "EVAPORATIVE EMISSION LINE DRAWING"](#).

**OK or NG**

- OK >> GO TO 8.  
NG >> Repair or replace.



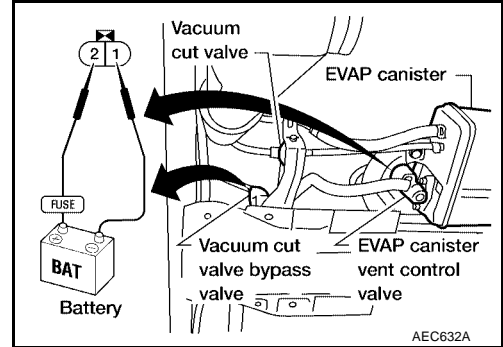
**7. CHECK FOR EVAP LEAK**

⊗ **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:**

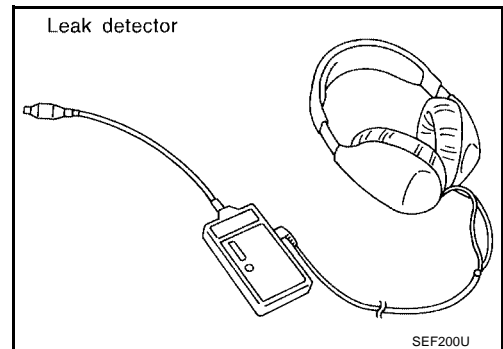
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-1170, "EVAPORATIVE EMISSION LINE DRAWING"](#) .

OK or NG

- OK >> GO TO 8.  
 NG >> Repair or replace.



**8. CHECK WATER SEPARATOR**

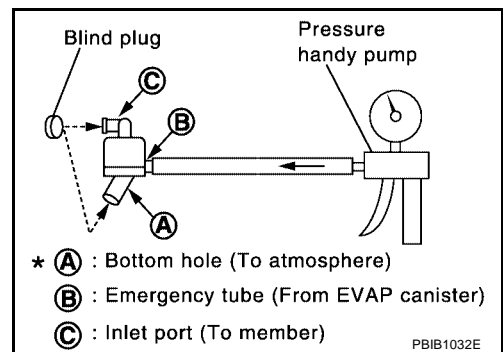
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG 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-1082, "DTC Confirmation Procedure"](#) .

OK or NG

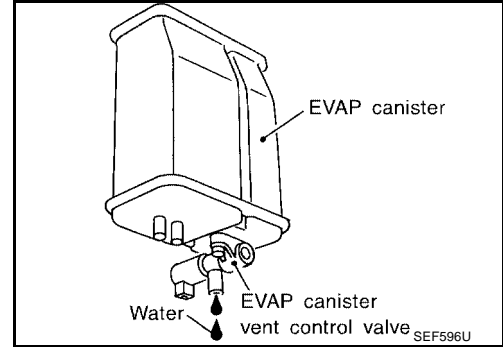
- OK >> GO TO 10.  
 NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

**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 100.0%.
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 |
|                 |         |

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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-601, "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.

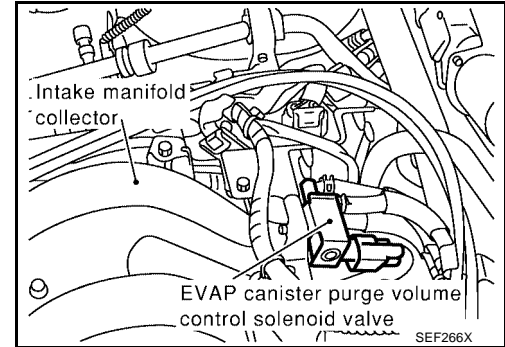
| ACTIVE TEST     |         |
|-----------------|---------|
| PURG VOL CONT/V | 0.0%    |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| A/F ALPHA-B2    | XXX %   |
| HO2S1 MNTR (B1) | RICH    |
| HO2S1 MNTR (B2) | RICH    |
| THRTL POS SEN   | XXX V   |
|                 |         |

SEF985Y

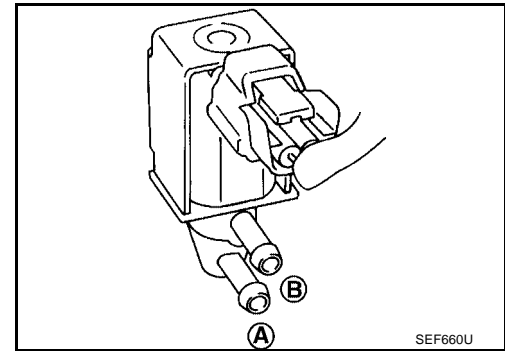
## 17. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

### Ⓜ With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

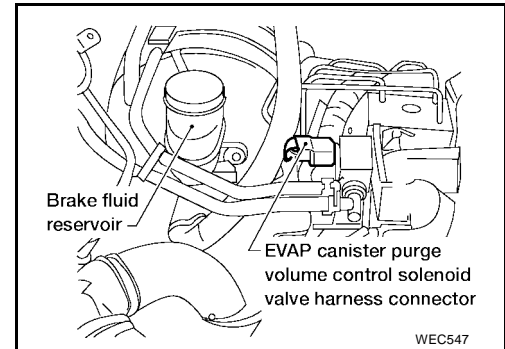


| Condition<br>PURG VOL CONT/V value | Air passage continuity between A and B |
|------------------------------------|--|
| 100.0 %                            | Yes                                    |
| 0.0%                               | No                                     |



### ⊗ Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

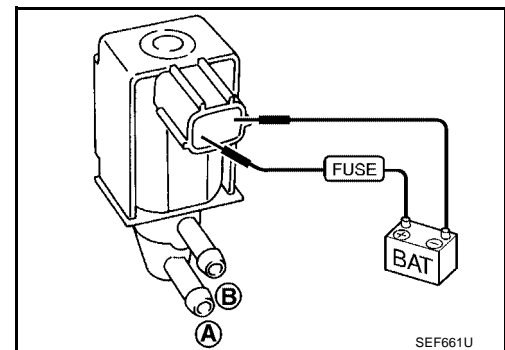


| Condition   | Air passage continuity between A and B |
|---|--|
| 12V direct current supply between terminals 1 and 2 | Yes                                    |
| No supply   | No                                     |

### OK or NG

OK >> GO TO 18.

NG >> Replace EVAP canister purge volume control solenoid valve.



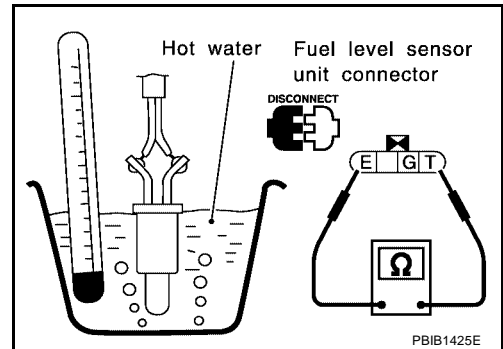
**18. CHECK FUEL TANK TEMPERATURE SENSOR**

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.

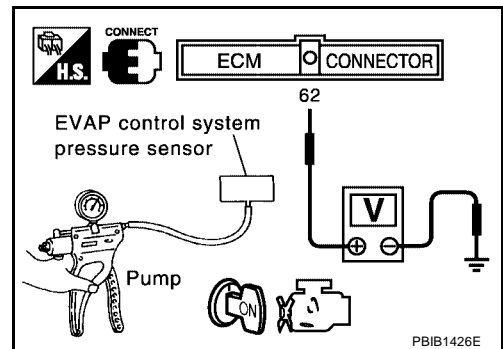
| Applied vacuum                    | Voltage V                          |
|-----------------------------------|------------------------------------|
| Not applied                       | 1.8 - 4.8                          |
| -26.7 kpa (-200 mmHg, -7.87 inHg) | 2.1 to 2.5V lower than above value |

**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-1170](#).

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 FUEL LEVEL SENSOR**

Refer to [DI-18. "FUEL LEVEL SENSOR UNIT CHECK"](#).

OK or NG

- OK >> GO TO 23.
- NG >> Replace fuel level sensor unit.

---

**23. CHECK INTERMITTENT INCIDENT**

---

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

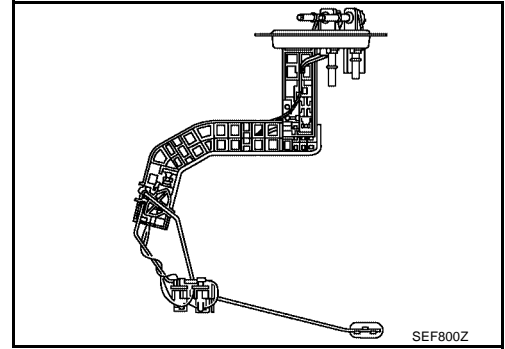
>> INSPECTION END.

**DTC P0460 FUEL LEVEL SENSOR**

**Component Description**

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



UBS0070G

**On Board Diagnosis Logic**

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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Fuel level sensor</li> </ul> |

**DTC Confirmation Procedure**

UBS0070H

**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-975, "Diagnostic Procedure"](#)

| DATA MONITOR  |        |
|---------------|--------|
| MONITOR       | NO DTC |
| FUEL T/TMP SE | XXX °C |
| FUEL LEVEL SE | XXX V  |

SEF195Y

**WITH GST**

Follow the procedure “WITH CONSULT-II” above.

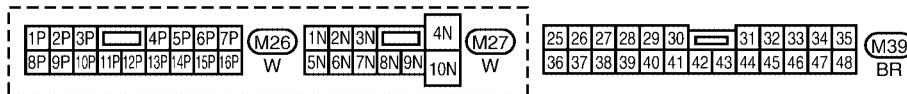
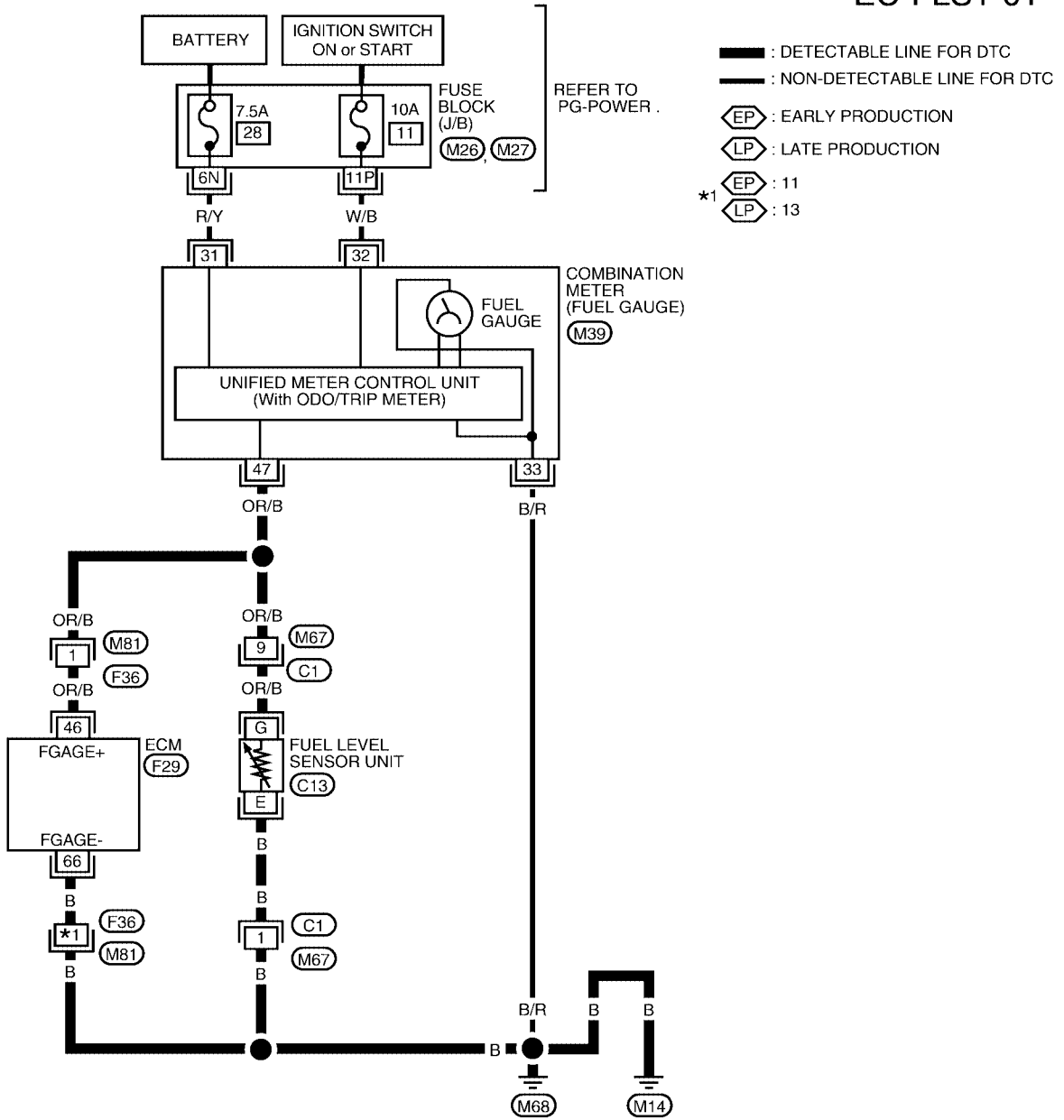
# DTC P0460 FUEL LEVEL SENSOR

[VG33E]

UBS00701

## Wiring Diagram

EC-FLS1-01



Refer to the following.  
 F29 - ELECTRICAL UNITS

WBWA0062E

# DTC P0460 FUEL LEVEL SENSOR

[VG33E]

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

## CAUTION:

Do not use ECM ground terminals when measuring input/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)  |
|---------------|------------|--------------------------|-------------------------------------|--|
| 46            | G          | Fuel level sensor        | [Ignition switch ON]                | Approximately 0 - 4.8V<br>Output voltage varies with fuel level. |
| 66            | B          | Fuel level sensor ground | [Engine is running]<br>● Idle speed | Approximately 0V   |

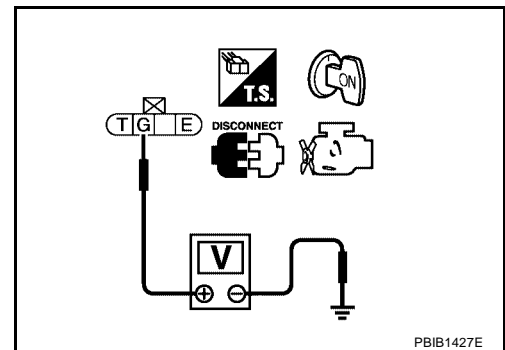
## Diagnostic Procedure

UBS0070J

### 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: Approximately 12V**



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 body 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 fuel level sensor unit terminal E. 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

>> 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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

### Removal and Installation FUEL LEVEL SENSOR

UBS0070K

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

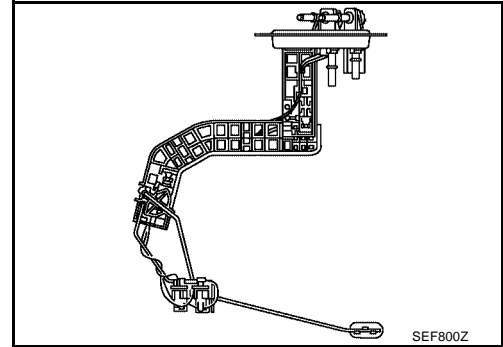


## DTC P0461 FUEL LEVEL SENSOR

### Component Description

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



UBS0070L

UBS0070M

### On Board Diagnosis Logic

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. | <ul style="list-style-type: none"> <li>● Harness or connectors<br/>(The sensor circuit is open or shorted)</li> <li>● Fuel level sensor</li> </ul> |

### Overall Function Check

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-619, "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. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
11. Check "FUEL LEVEL SE" output voltage and note it.
12. Check "FUEL LEVEL SE" output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 11.

If NG, check the fuel level sensor, refer to [DI-18, "FUEL LEVEL SENSOR UNIT CHECK"](#).

| DATA MONITOR  |        |
|---------------|--------|
| MONITOR       | NO DTC |
| FUEL T/TMP SE | XXX °C |
| FUEL LEVEL SE | XXX V  |

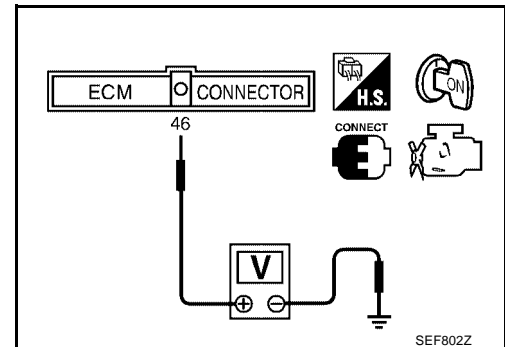
SEF195Y

 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-619, "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"](#) .

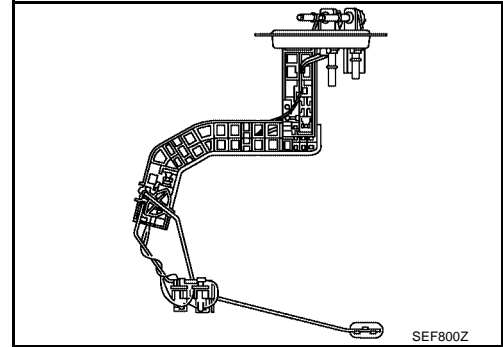


## DTC P0462, P0463 FUEL LEVEL SENSOR

### Component Description

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



### On Board Diagnosis Logic

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.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Fuel level sensor</li> </ul> |
| P0463   | Fuel level sensor circuit high input | An excessively high voltage is sent from the sensor is sent to ECM. |  |

### DTC Confirmation Procedure

#### 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-981, "Diagnostic Procedure"](#)

| DATA MONITOR  |        |
|---------------|--------|
| MONITOR       | NO DTC |
| FUEL T/TMP SE | XXX °C |
| FUEL LEVEL SE | XXX V  |

#### WITH GST

Follow the procedure "WITH CONSULT-II" above.

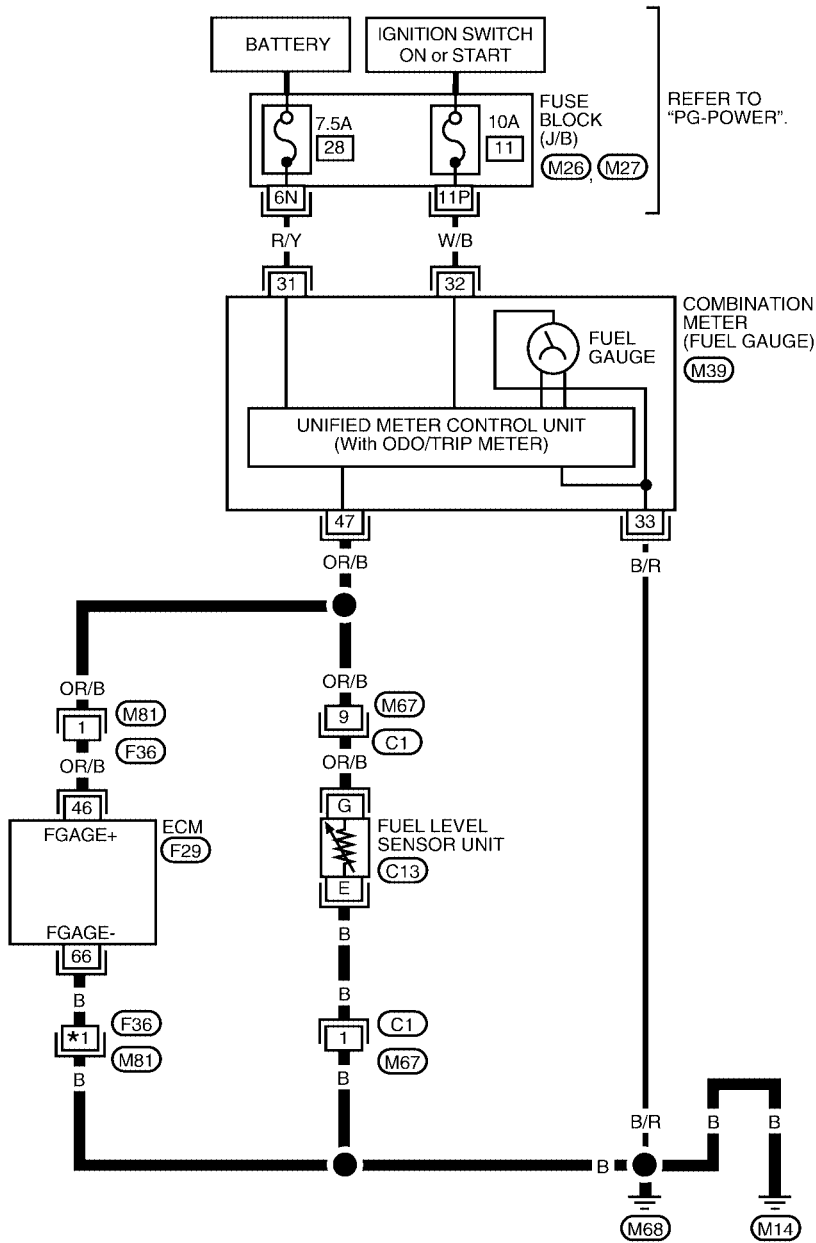
# DTC P0462, P0463 FUEL LEVEL SENSOR

[VG33E]

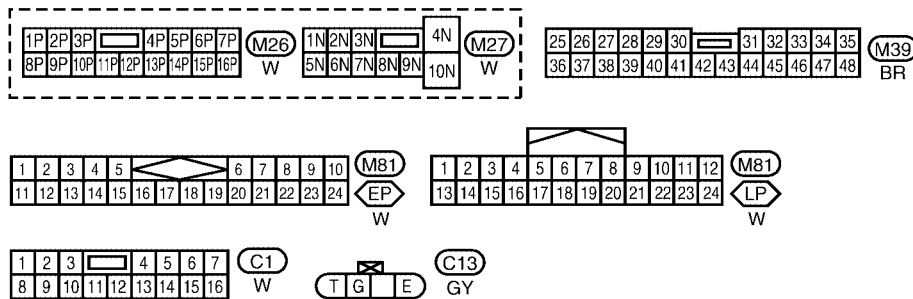
UBS007OR

## Wiring Diagram

EC-FLS2-01



- : DETECTABLE LINE FOR DTC
- : NON-DETECTABLE LINE FOR DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- EP : 11
- LP : 13



Refer to the following.  
 F29 - ELECTRICAL UNITS

WBWA0063E

# DTC P0462, P0463 FUEL LEVEL SENSOR

[VG33E]

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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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)  |
|---------------|------------|--------------------------|-------------------------------------|--|
| 46            | G          | Fuel level sensor        | [Ignition switch "ON"]              | Approximately 0 - 4.8V<br>Output voltage varies with fuel level. |
| 66            | B          | Fuel level sensor ground | [Engine is running]<br>● Idle speed | Approximately 0V   |

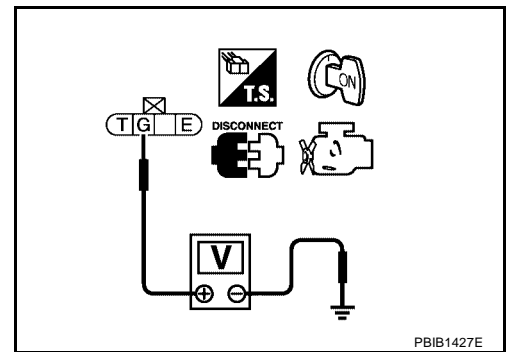
## Diagnostic Procedure

UBS0070S

### 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: Approximately 12V**



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 body 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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

### Removal and Installation FUEL LEVEL SENSOR

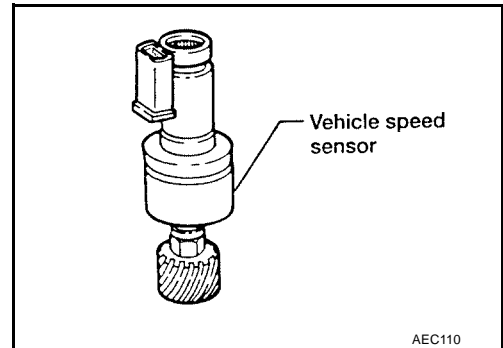
UBS0070T

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

**DTC P0500 VSS**

**Component Description**

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**

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The vehicle speed sensor circuit is open or shorted.)</li> <li>● Vehicle speed sensor</li> </ul> |

**DTC Confirmation Procedure**

**CAUTION:**  
Always drive vehicle at a safe speed.

**NOTE:**

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 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-986, "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.

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| COOLAN TEMP/S | XXX °C   |
| B/FUEL SCHDL  | XXX msec |
| PW/ST SIGNAL  | OFF      |
| VHCL SPEED SE | XXX km/h |

SEF196Y

|                |  |
|----------------|--|
| END SPEED      | More than 1,800 rpm (A/T models)<br>More than 1,900 rpm (M/T models) |
| COOLAN TEMP/S  | More than 70°C (158°F)   |
| B/FUEL SCHDL   | 5.5 - 16.0 msec  |
| Selector lever | Suitable position  |
| PW/ST SIGNAL   | OFF  |

6. If 1st trip DTC is detected, go to [EC-986, "Diagnostic Procedure"](#).

**Overall Function Check**

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.



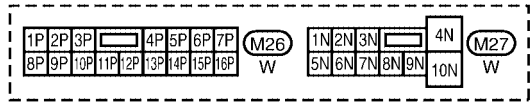
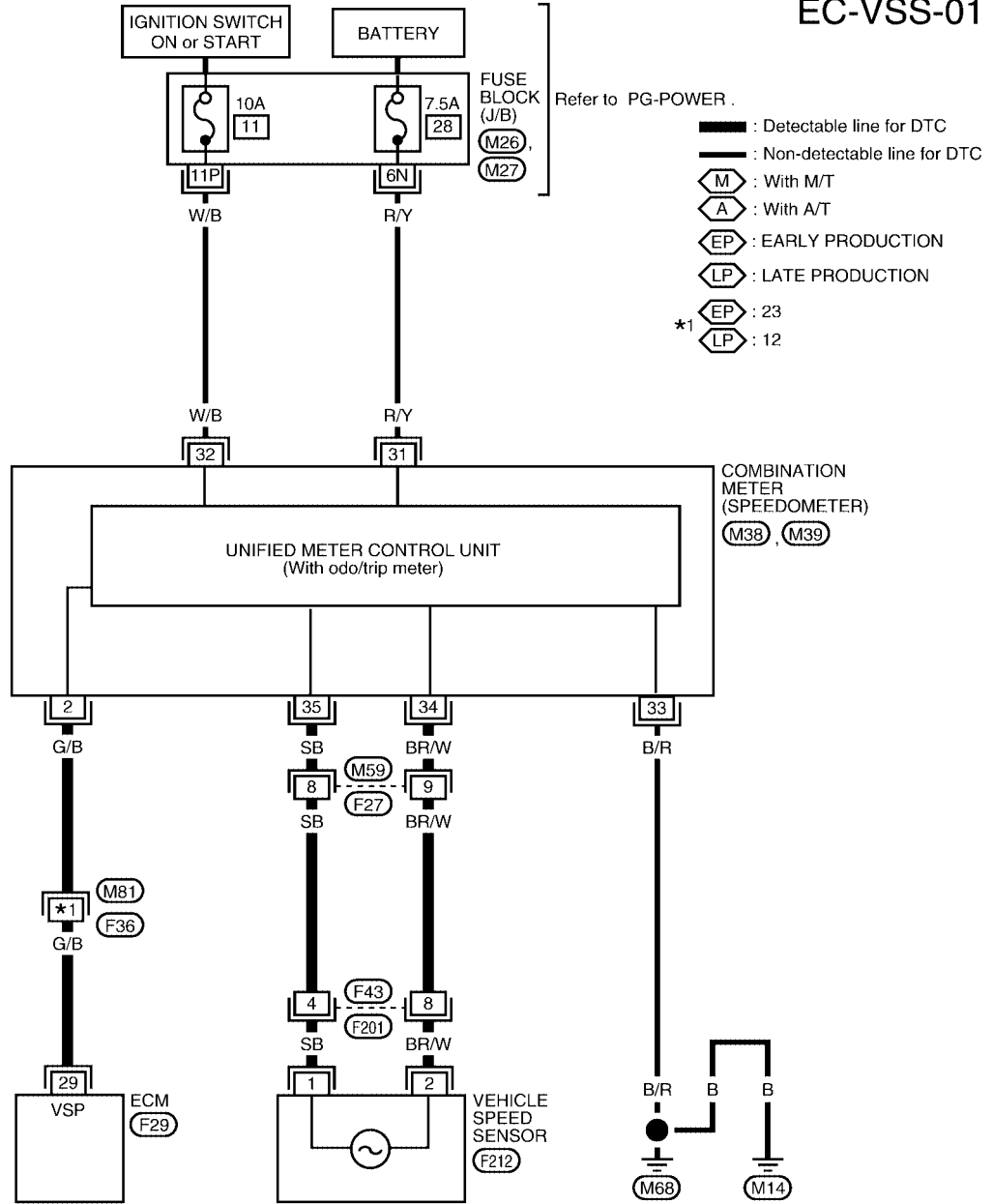
## WITH GST

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-986, "Diagnostic Procedure"](#) .

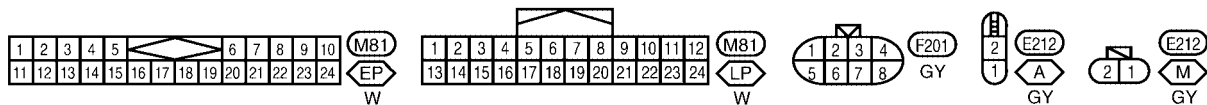
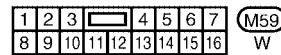
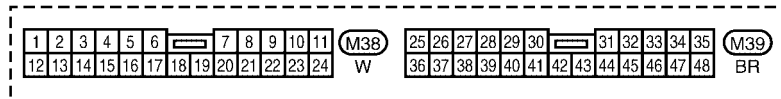


Wiring Diagram

EC-VSS-01



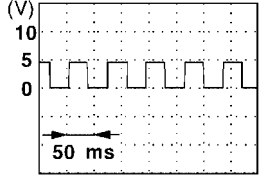
Refer to the following.  
F29 - ELECTRICAL UNITS



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

**CAUTION:**

**Do not use 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)   |
|---------------|------------|----------------------|---|---|
| 29            | G/B        | Vehicle speed sensor | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Lift up the vehicle.</li> <li>● In 2nd gear position</li> <li>● Vehicle speed is 40 km/h (25 MPH)</li> </ul> | <p>2 - 3V★</p>  <p>SEF996U</p> |

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

**Diagnostic Procedure**

UBS0070Z

**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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

A

EC

C

D

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**DTC P0505 ISC SYSTEM**

**Description  
SYSTEM DESCRIPTION**

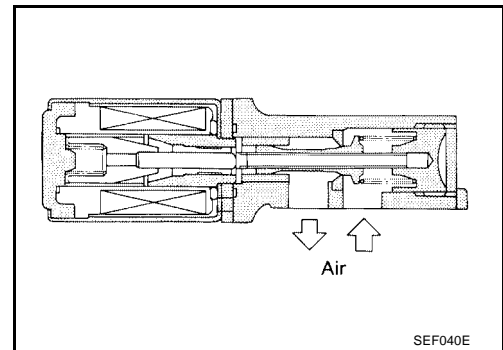
| Sensor                             | Input Signal to ECM        | ECM function     | Actuator       |
|------------------------------------|----------------------------|------------------|----------------|
| Camshaft position sensor           | Engine speed               | Idle air control | IACV-AAC 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**

Specification data are reference values.

| MONITOR ITEM | CONDITION  |           | SPECIFICATION |
|--------------|--|-----------|---------------|
| IACV-AAC/V   | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: "OFF"</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 10 - 20%      |
|              |  | 2,000 rpm | —             |

**On Board Diagnosis Logic**

| 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 | <ul style="list-style-type: none"> <li>● Harness or connectors (The IACV-AAC valve circuit is open)</li> <li>● IACV-AAC valve</li> </ul> |
|         | B)                     | Idle speed control system RPM lower than expected  | The IACV-AAC valve does not operate properly | <ul style="list-style-type: none"> <li>● Harness or connectors (The IACV-AAC valve circuit is open)</li> <li>● IACV-AAC valve</li> </ul> |
|         | C)                     | Idle speed control system RPM higher than expected | The IACV-AAC valve does not operate properly | <ul style="list-style-type: none"> <li>● Harness or connectors (The IACV-AAC valve circuit is open)</li> <li>● IACV-AAC valve</li> </ul> |

**DTC Confirmation Procedure**

**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".

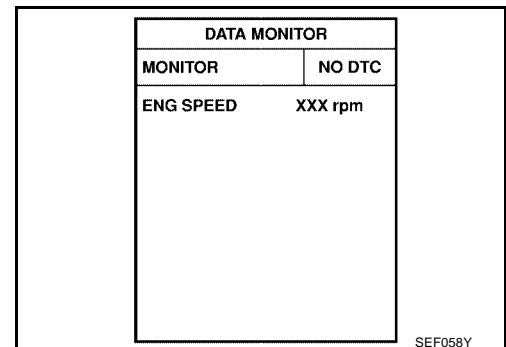
**PROCEDURE FOR MALFUNCTION A**

**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-992, "Diagnostic Procedure"](#)



**With GST**

Follow the procedure "With CONSULT-II".

**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.

# DTC P0505 ISC SYSTEM

[VG33E]

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-992, "Diagnostic Procedure"](#)

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

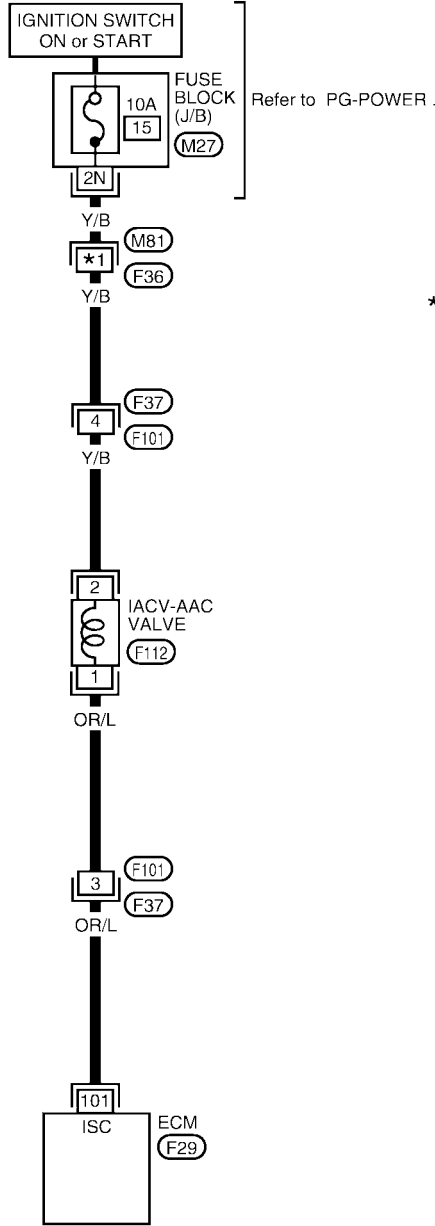
SEF174Y

## With GST

Follow the procedure "With CONSULT-II".

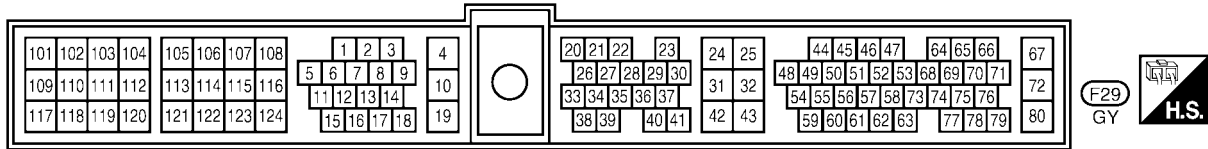
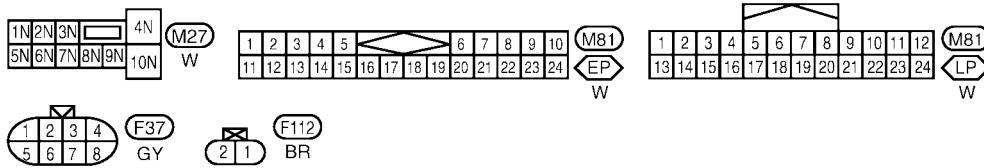
Wiring Diagram

EC-AAC/V-01



: Detectable line for DTC  
 : Non-detectable line for DTC  
EP : EARLY PRODUCTION  
LP : LATE PRODUCTION  
 \*1 EP : 14  
       LP : 16

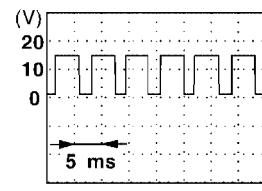
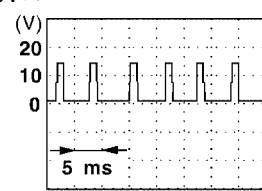
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Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

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

| TER-MINAL NO. | WIRE COLOR | ITEM           | CONDITION   | DATA (DC Voltage)   |
|---------------|------------|----------------|---|---|
| 101           | OR/L       | IACV-AAC valve | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>                | <p>8 - 11V★</p>  |
|               |            |                | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 3,000 rpm</li> </ul> | <p>7 - 10V★</p>  |

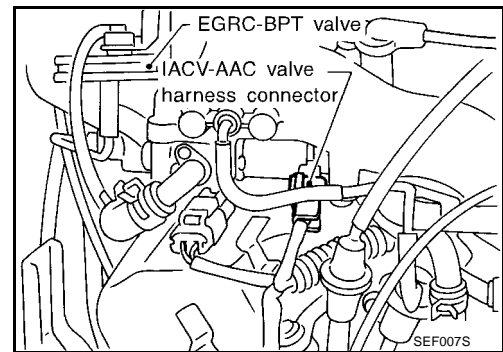
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnostic Procedure

UBS007P6

### 1. CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.
3. Turn ignition switch ON.

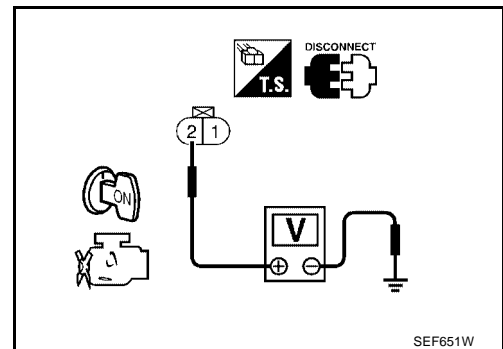


4. Check voltage between terminal 2 and ground with CONSULT-II or tester.

**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. Disconnect IACV-AAC valve harness connector.
2. Remove IACV-AAC valve.
- Check IACV-AAC valve resistance.

**Resistance : Approximately 10Ω [at 20°C (68°F)]**

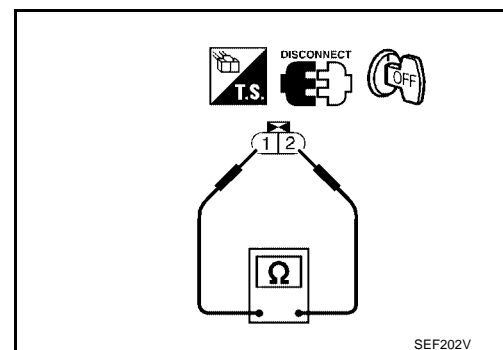
- Check plunger for seizing or sticking.
- Check for broken spring.
- 3. Supply battery voltage between IACV-AAC valve connector terminals.

**Plunger should move.**

OK or NG

OK >> GO TO 6.

NG >> Replace IACV-AAC valve.



## 6. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END.

---

**Removal and Installation**

**IACV-AAC VALVE**

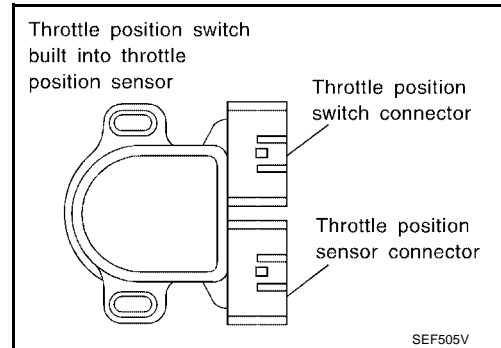
Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

## DTC P0510 CLOSED TP SWITCH

### Component Description

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

Specification data are reference values.

| MONITOR ITEM  | CONDITION                                   | SPECIFICATION                        |
|---------------|---|--------------------------------------|
| CLSD THL/P SW | ● Engine: After warming up, idle the engine | Throttle valve: Idle position<br>ON  |
|               |   | Throttle valve: Slightly open<br>OFF |

### On Board Diagnosis Logic

| 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 | <ul style="list-style-type: none"> <li>● Harness or connectors (The closed throttle position switch circuit is open or shorted)</li> <li>● Closed throttle position switch</li> <li>● Throttle position sensor</li> </ul> |

### DTC Confirmation Procedure

**CAUTION:**

**Always drive vehicle at a safe speed.**

**NOTE:**

If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 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-998, "Diagnostic Procedure"](#) .  
If OK, go to following step.

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |
| CLSD THL/P SW | ON      |

SEF197Y

# DTC P0510 CLOSED TP SWITCH

[VG33E]

- Select "DATA MONITOR" mode with CONSULT-II.
- 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. |

| DATA MONITOR   |          |
|----------------|----------|
| MONITOR        | NO DTC   |
| COOLANT TEMP/S | XXX °C   |
| VHCL SPEED SE  | XXX km/h |
| THRTL POS SEN  | XXX V    |

SEF198Y

- If 1st trip DTC is detected, go to [EC-998, "Diagnostic Procedure"](#)

## Overall Function Check

UBS007PQ

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.

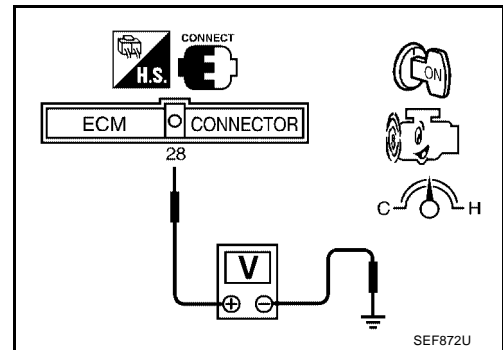
### WITH GST

- Start engine and warm it up to normal operating temperature.
- 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**

- If NG, go to [EC-998, "Diagnostic Procedure"](#).



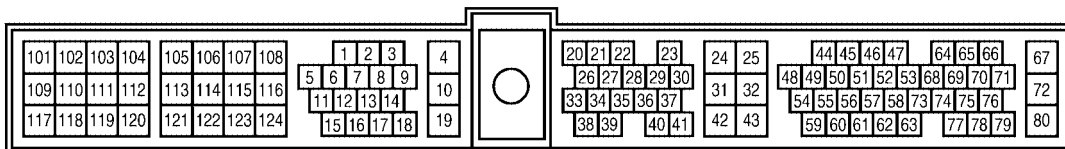
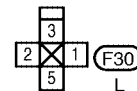
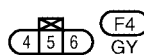
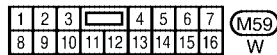
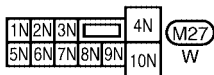
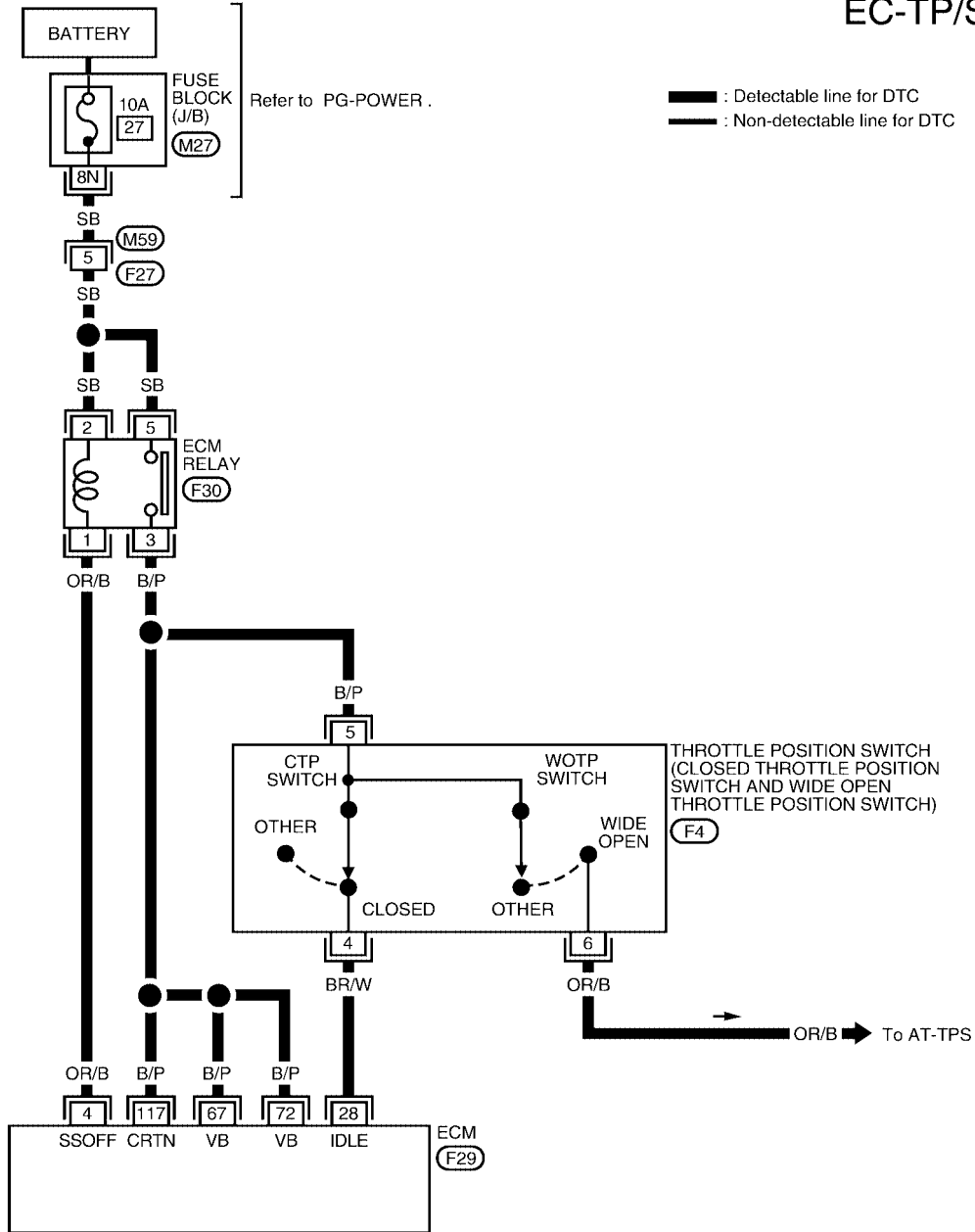
# DTC P0510 CLOSED TP SWITCH

[VG33E]

UBS007PR

## Wiring Diagram

EC-TP/SW-01



BBWA0490E

# DTC P0510 CLOSED TP SWITCH

[VG33E]

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

**CAUTION:**

**Do not use 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.**

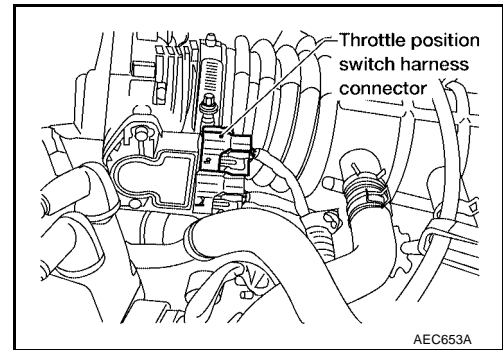
| TER-MINAL NO. | WIRE COLO R | ITEM                                       | CONDITION  | DATA (DC Voltage)          |
|---------------|-------------|--|--|----------------------------|
| 28            | BR/W        | Throttle position switch (Closed position) | [Engine is running]<br>● Warm-up condition<br>● Accelerator pedal fully released | BATTERY VOLTAGE (11 - 14V) |
|               |             |  | [Ignition switch "ON"]<br>● Accelerator pedal depressed                          | Approximately 0V           |

## Diagnostic Procedure

UBS007PS

### 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.

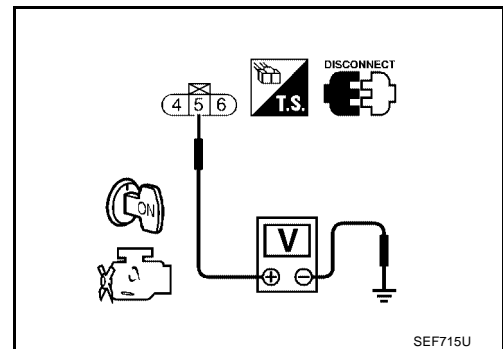


4. Check voltage between terminal 5 and engine ground with CONSULT-II or tester.

**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-648, "Basic Inspection"](#) .

| Items             | Specifications                    |
|-------------------|-----------------------------------|
| Ignition timing   | 10° ± 2° BTDC                     |
| Base idle speed   | 700 ± 50 rpm (in P or N position) |
| Target idle speed | 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

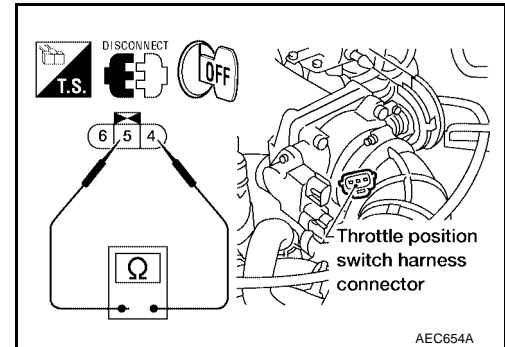
**Without CONSULT-II**

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-648, "Basic Inspection"](#).

| Items  | Specifications   |
|--|--|
| Ignitions timing   | 10° ± 2° BTDC  |
| Base idle speed  | 700 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.3 mm (0.012 in): ON<br>0.4 mm (0.016 in): OFF |
| Target idle speed  | 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 (a)     |
| Partially open            | Between (a) and (b) |
| Completely open           | 3.5 - 4.7 (b)       |

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

If NG, adjust closed throttle position switch. Refer to [EC-648, "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 (a)     |
| Partially open            | Between (a) and (b) |
| Completely open           | 3.5 - 4.7 (b)       |

If NG, adjust closed throttle position switch. Refer to [EC-648, "Basic Inspection"](#) .

**OK or NG**

OK >> GO TO 10.

NG >> Replace throttle position sensor.

**10. CHECK INTERMITTENT INCIDENT**

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**DTC P0600 A/T COMMUNICATION LINE**

PF0:23710

**System Description**

UBS007PU

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**

UBS007PV

| 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. | <ul style="list-style-type: none"> <li>Harness or connectors<br/>[The circuit between ECM and TCM (Transmission Control Module) is open or shorted.]</li> </ul> |

\*: This DTC can be detected only by "DATA MONITOR (AUTO TRIG)" with CONSULT-II.

**DTC Confirmation Procedure**

UBS007PW

**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-1006, "Diagnostic Procedure"](#).

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

**WITH GST**

Follow the procedure "With CONSULT-II".

# DTC P0600 A/T COMMUNICATION LINE

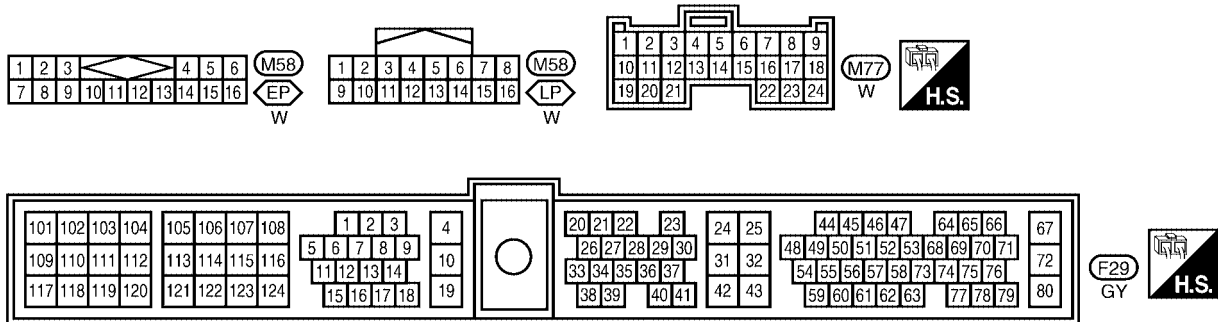
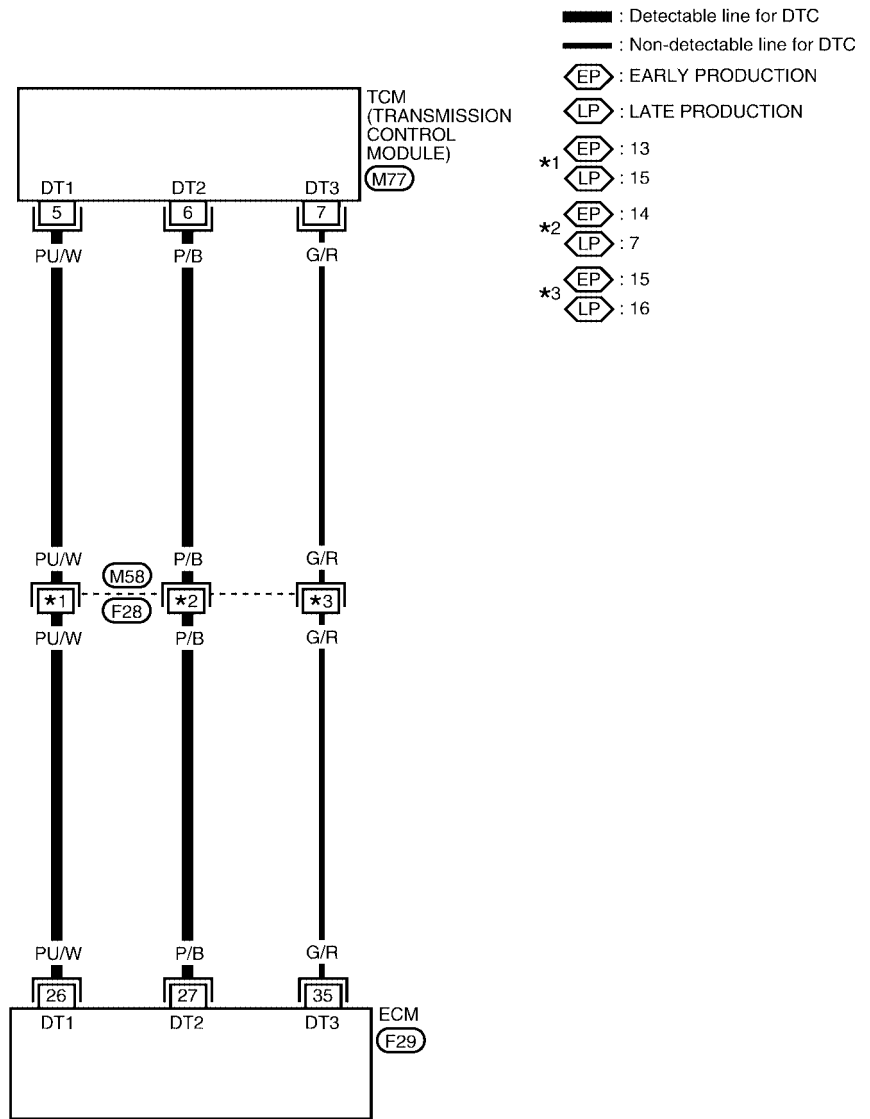
[VG33E]

UBS007PX

## Wiring Diagram WITHOUT VDC

EC-AT/C-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



WBWA0037E

## DTC P0600 A/T COMMUNICATION LINE

[VG33E]

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

**CAUTION:**

**Do not use 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)      |
|---------------|------------|------------------|---|------------------------|
| 26            | PU/W       | A/T signal No. 1 | <b>[Engine is running]</b> <ul style="list-style-type: none"><li>● Idle speed</li></ul> | Approximately 0 - 1.0V |
| 27            | P/B        | A/T signal No. 2 | <b>[Engine is running]</b> <ul style="list-style-type: none"><li>● Idle speed</li></ul> | Approximately 0 - 1.0V |
| 35            | G/R        | A/T signal No. 3 | <b>[Engine is running]</b> <ul style="list-style-type: none"><li>● Idle speed</li></ul> | Approximately 0 - 1.0V |




# DTC P0600 A/T COMMUNICATION LINE

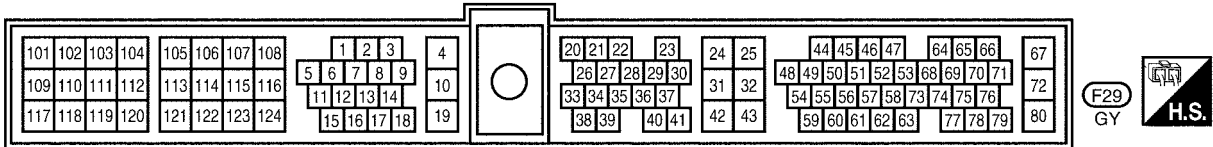
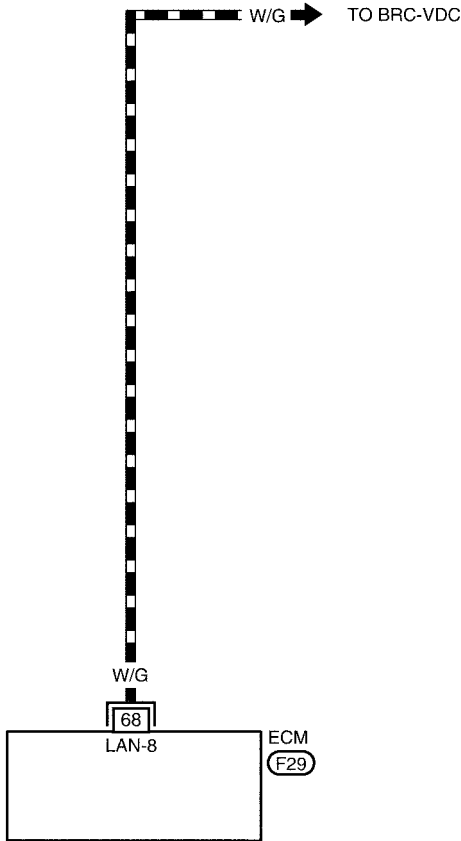
[VG33E]

WITH VDC

EC-CAN-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

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



BBWA0503E

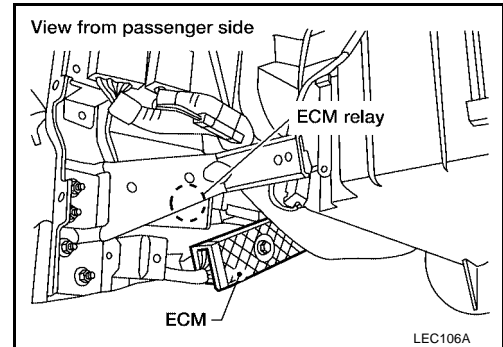
| TER-MINAL NO. | WIRE COLO R | ITEM       | CONDITION                                  | DATA (DC Voltage)      |
|---------------|-------------|------------|--|------------------------|
| 68            | W/G         | A/T signal | <b>[Engine is running]</b><br>● Idle speed | Approximately 0 - 5.0V |

## Diagnostic Procedure

UBS007PY

### 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.

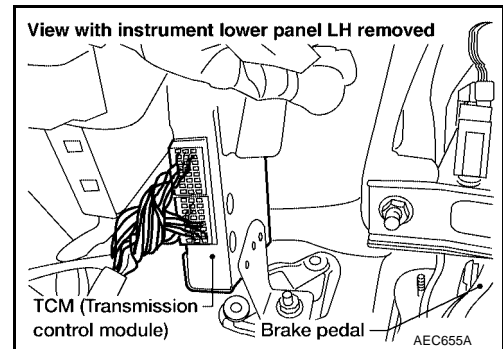


3. Check harness continuity between ECM terminal 26 and TCM terminal 5, ECM terminal 27 and TCM terminal 6, ECM terminal 35 and TCM terminal 7. Refer to Wiring Diagram.

**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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

A

EC

C

D

E

F

G

H

I

J

K

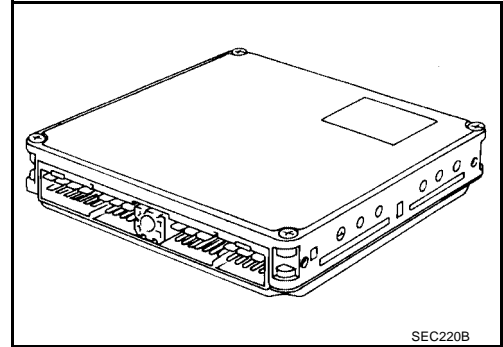
L

M

**DTC P0605 ECM**

**Component Description**

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine.



**On Board Diagnosis Logic**

| DTC No. | Trouble diagnosis name | DTC detecting condition                     | Possible cause |
|---------|------------------------|---|----------------|
| P0605   | Engine control module  | ECM calculation function is malfunctioning. | ● ECM          |

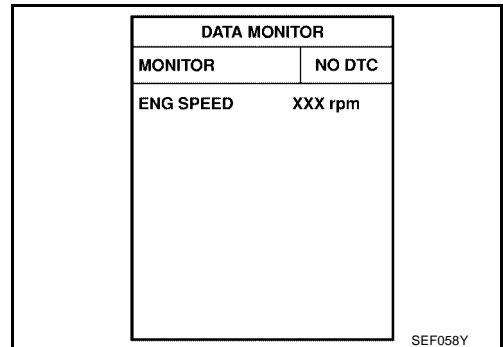
**DTC Confirmation Procedure**

**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-1009, "Diagnostic Procedure"](#).



**WITH GST**

Follow the procedure “With CONSULT-II”.



**Diagnostic Procedure****1. INSPECTION START****With CONSULT-II**

1. Turn ignition switch ON.
2. Select "SELF DIAG RESULTS" mode with CONSULT-II.
3. Touch "ERASE".
4. **Perform "DTC Confirmation Procedure".**  
See [EC-1008](#).
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-1008](#).
5. Is the 1st trip DTC P0605 displayed again?

Yes or No

- Yes >> Replace ECM.  
No >> **INSPECTION END.**

A

EC

C

D

E

F

G

H

I

J

K

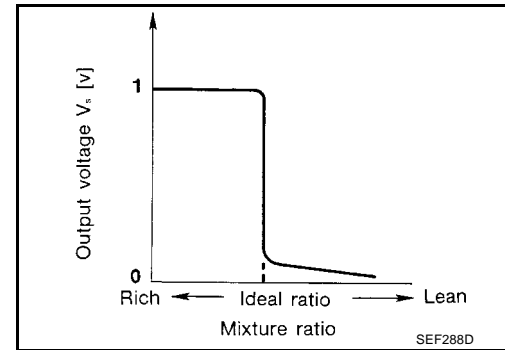
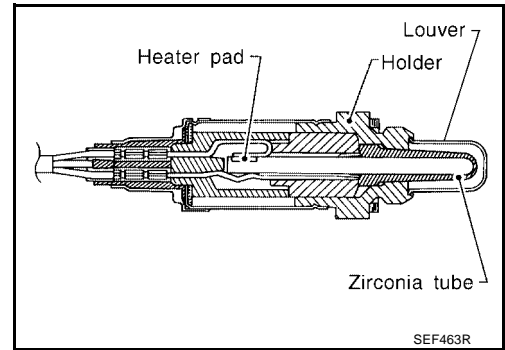
L

M

**DTC P1143, P1163 HO2S1**

**Component Description**

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.



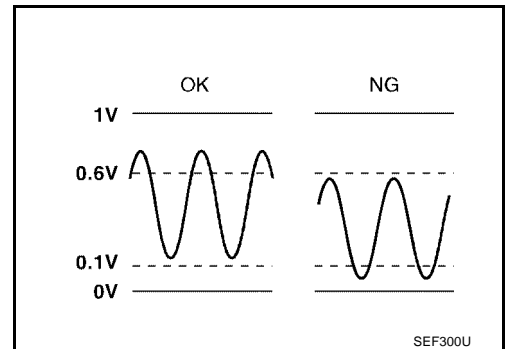
**CONSULT-II Reference Value in Data Monitor Mode**

Specification data are reference values.

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

**On Board Diagnosis Logic**

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<br>(Bank 1) | Heated oxygen sensor<br>1 lean shift monitoring | The maximum and minimum voltage from the sensor are not reached to the specified voltages. | <ul style="list-style-type: none"> <li>● Heated oxygen sensor 1</li> <li>● Heated oxygen sensor 1 heater</li> <li>● Fuel pressure</li> <li>● Injectors</li> <li>● Intake air leaks</li> </ul> |
| P1163<br>(Bank 2) |   |  |   |

## DTC Confirmation Procedure

UBS007Q6

**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".

|                  |          |
|------------------|----------|
| HO2S1 (B1) P1143 |          |
| TESTING          |          |
| MONITOR          |          |
| ENG SPEED        | XXX rpm  |
| B/FUEL SCHDL     | XXX msec |
| COOLAN TEMP/S    | XXX °C   |
| VHCL SPEED SEN   | XXX km/h |

LEC072A

5. Start engine and let it idle for at least 3.5 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.)

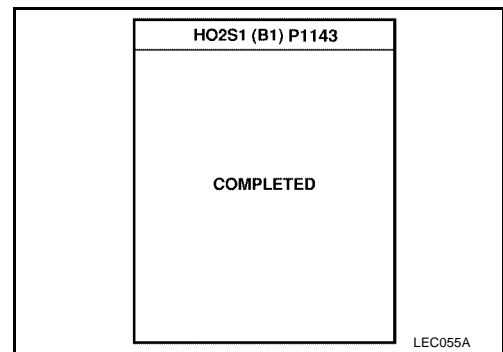
|                |                             |
|----------------|-----------------------------|
| EGN SPEED      | 1,200 - 2,700 rpm           |
| Vehicle speed  | Less than 100 km/h (62 MPH) |
| B/FUEL SCHDL   | 2.0 - 14.0 msec             |
| Selector lever | Suitable position           |

|                  |          |
|------------------|----------|
| HO2S1 (B1) P1143 |          |
| TESTING          |          |
| MONITOR          |          |
| ENG SPEED        | XXX rpm  |
| B/FUEL SCHDL     | XXX msec |
| COOLAN TEMP/S    | XXX °C   |
| VHCL SPEED SE    | XXX km/h |

LEC073A

**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-1012, "Diagnostic Procedure"](#).



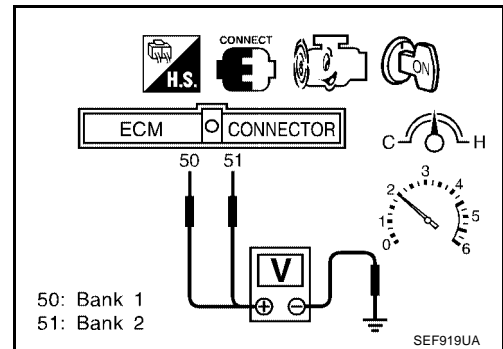
## Overall Function Check

UBS007Q7

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

### ⊗ 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 engine ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.
  - The maximum voltage is over 0.6V at least one time.
  - The minimum voltage is over 0.1V at least one time.
4. If NG, go to [EC-1012, "Diagnostic Procedure"](#).



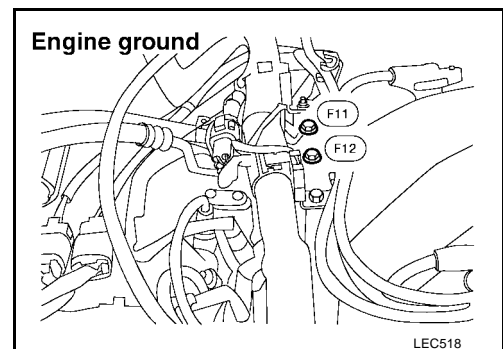
UBS007Q8

## Diagnostic Procedure

### 1. RETIGHTEN GROUND SCREWS

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

>> GO TO 2.



### 2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten corresponding heated oxygen sensor 1.

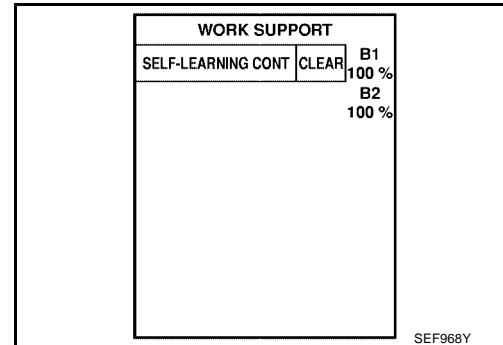
**Tightening torque : 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)**

>> 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

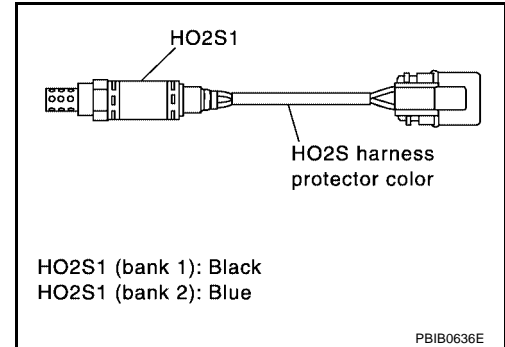
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to [EC-634, "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-823](#) .
- No >> GO TO 4.

#### 4. CHECK HEATED OXYGEN SENSOR 1 HEATER

1. Stop engine.
2. Check heated oxygen sensor 1 harness protector color.



3. Check resistance between HO2S1 terminals 3 and 1.

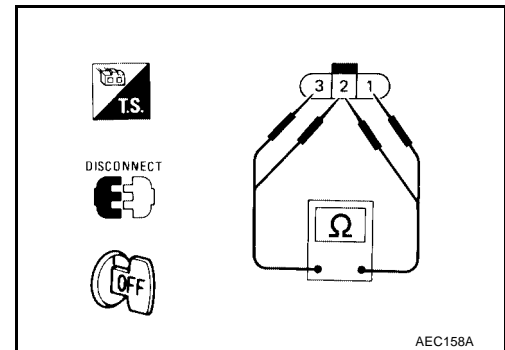
**Resistance** : 2.3 - 4.3Ω at 25°C (77°F)

4. 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.

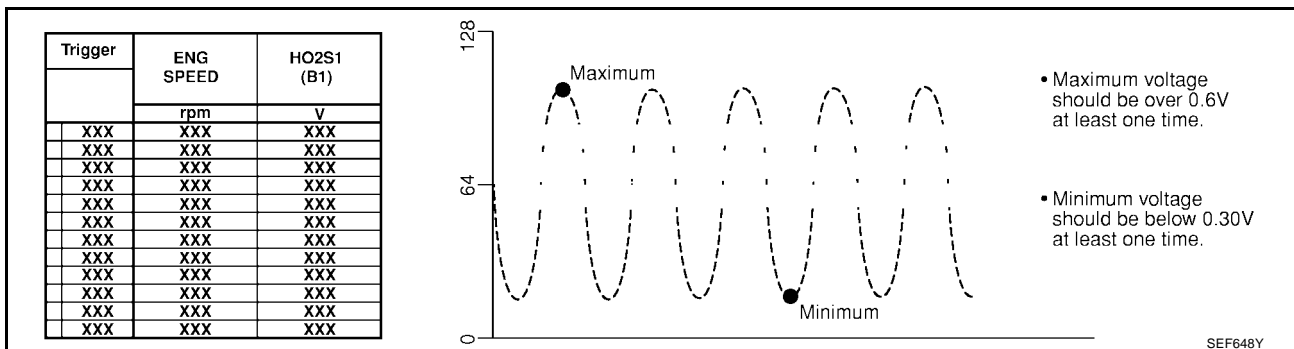
| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |
| HO2S1 (B1)    | XXX V   |
| HO2S2 (B2)    | XXX V   |

SEF967Y

5. Check the following.
  - "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown 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



**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 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

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

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

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

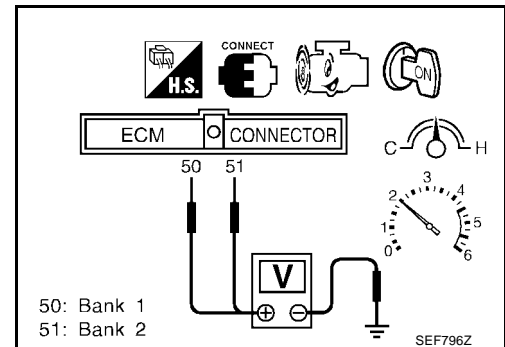
### CAUTION:

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

OK or NG

OK >> GO TO 7.

NG >> Replace malfunctioning heated oxygen sensor 1.



## 7. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

For circuit, refer to [EC-796](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 1

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

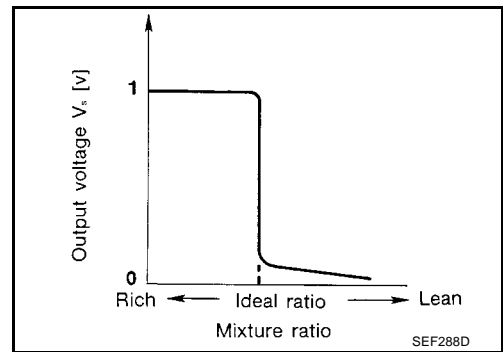
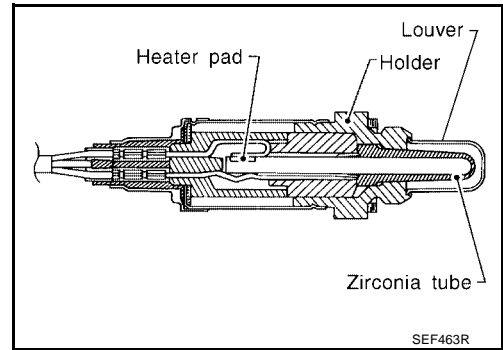
UBS007Q9



DTC P1144, P1164 HO2S1

Component Description

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.



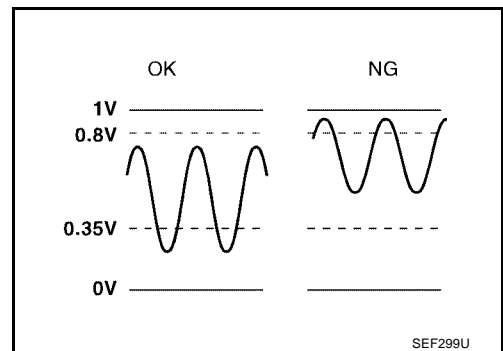
CONSULT-II Reference Value in Data Monitor Mode

Specification data are reference values.

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

On Board Diagnosis Logic

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)<br>P1164 (Bank 2) | Heated oxygen sensor 1 rich shift monitoring | The maximum and minimum voltages from the sensor are beyond the specified voltages. | <ul style="list-style-type: none"> <li>● Heated oxygen sensor 1</li> <li>● Heated oxygen sensor 1 heater</li> <li>● Fuel pressure</li> <li>● Injectors</li> </ul> |

**DTC Confirmation Procedure**

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

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

TESTING CONDITION:

- Always perform at a temperature above  $-10^{\circ}\text{C}$  ( $14^{\circ}\text{F}$ ).
- 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”.

|                  |          |
|------------------|----------|
| 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

5. Start engine and let it idle for at least 3.5 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.)

|                |                             |
|----------------|-----------------------------|
| 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-1019, "Diagnostic Procedure"](#).

|                  |  |
|------------------|--|
| HO2S1 (B1) P1144 |  |
| COMPLETED        |  |

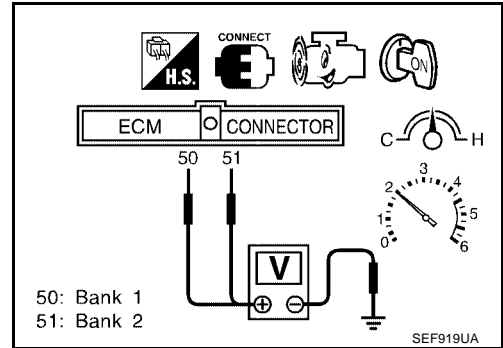
LEC058A

**Overall Function Check**

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

**WITH GST**

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and engine ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.
  - The maximum voltage is below 0.8V at least one time.
  - The minimum voltage is below 0.35V at least one time.
4. If NG, go to [EC-1019, "Diagnostic Procedure"](#) .

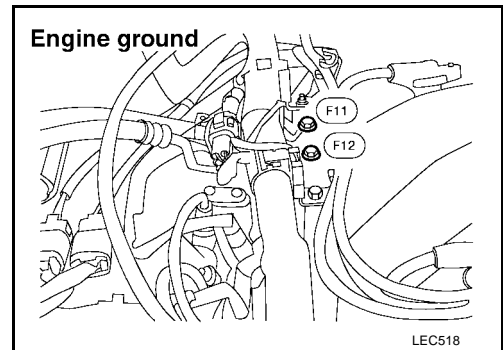


**Diagnostic Procedure**

**1. RETIGHTEN GROUND SCREWS**

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

>> GO TO 2.



**2. RETIGHTEN HEATED OXYGEN SENSOR 1**

Loosen and retighten corresponding heated oxygen sensor 1.

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

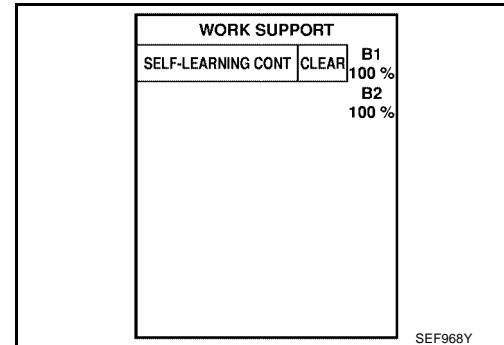
>> GO TO 3.

### 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-634, "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-831](#) .  
No >> GO TO 4.

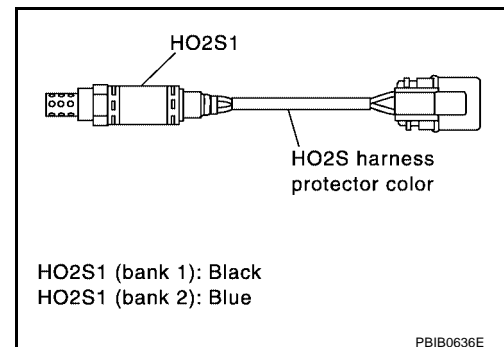
### 4. CHECK HO2S 1 CONNECTOR FOR WATER

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 harness protector color.
3. Disconnect heated oxygen sensor 1 harness connector.
4. 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 : 2.3 - 4.3Ω at 25°C (77°F)**

Check continuity between HO2S1 terminals 2 and 1, 3 and 2.

**Continuity should not exist.**

**CAUTION:**

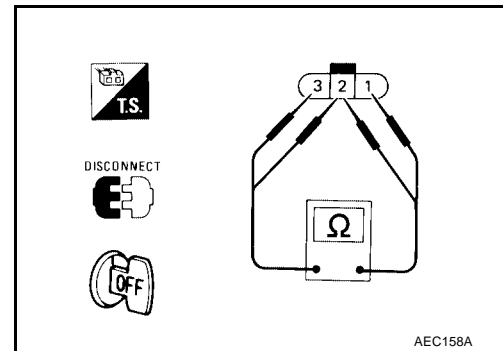
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved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



A

EC

C

D

E

F

G

H

I

J

K

L

M

**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 |
| COOLAN TEMP/S | XXX °C  |
| HO2S1 (B1)    | XXX V   |
| HO2S2 (B2)    | XXX V   |

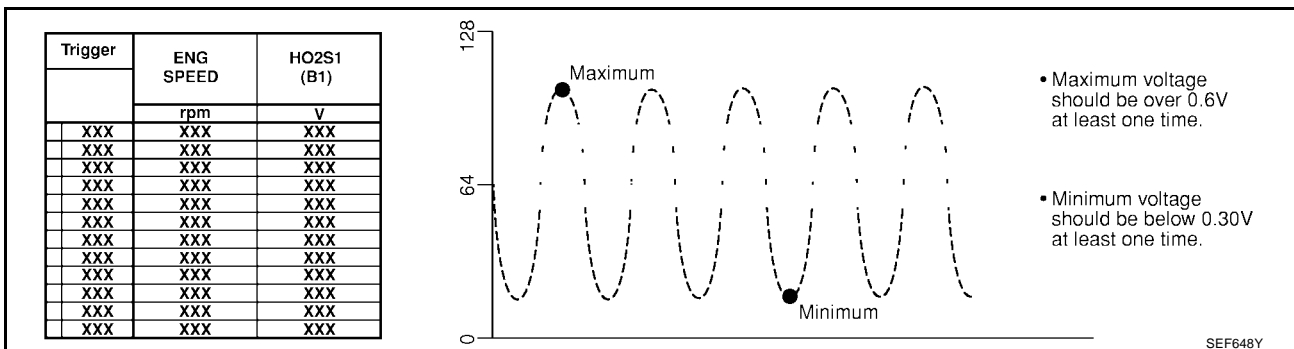
SEF967Y

5. Check the following.
  - “HO2S1 MNTR (B1)/(B2)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” 5 times in 10 seconds. 5 times (cycles) are counted as shown 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



**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 (bank 1 signal) or 51 (bank 2 signal) and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
  - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
  - The maximum voltage is over 0.6V at least one time.
  - The minimum voltage is below 0.3V at least one time.
  - The voltage never exceeds 1.0V.

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

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

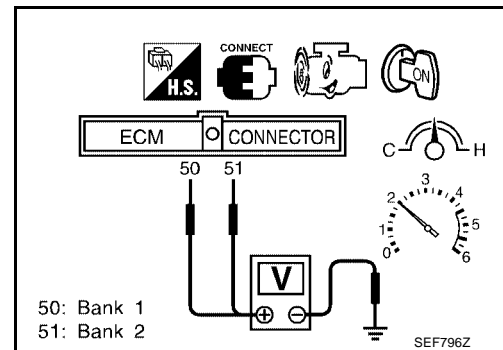
### CAUTION:

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

OK or NG

OK >> GO TO 8.

NG >> Replace malfunctioning heated oxygen sensor 1.



## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

For circuit, refer to [EC-796](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 1

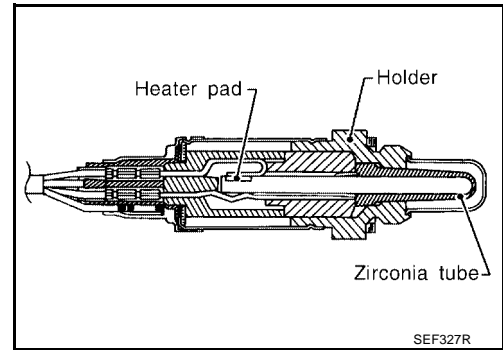
Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

**DTC P1146, P1166 HO2S2**

**Component Description**

UBS007QH

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.



SEF327R

**CONSULT-II Reference Value in Data Monitor Mode**

UBS007QI

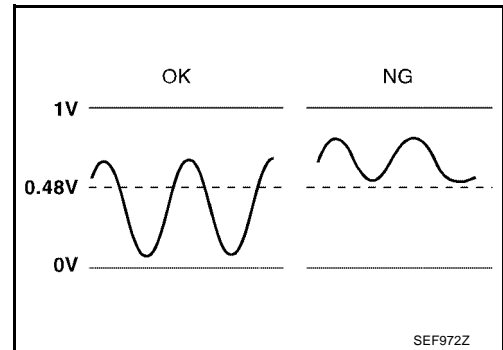
Specification data are reference values.

| MONITOR ITEM                       | CONDITION   | SPECIFICATION                 |
|------------------------------------|---|-------------------------------|
| HO2S2 (B1)<br>HO2S2 (B2)           | <ul style="list-style-type: none"> <li>Warm-up condition</li> <li>After keeping engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> Revving engine from idle up to 3,000 rpm quickly | 0 - 0.3V ↔ Approx. 0.6 - 1.0V |
| HO2S2 MNTR (B1)<br>HO2S2 MNTR (B2) |   | LEAN ↔ RICH                   |

**On Board Diagnosis Logic**

UBS007QJ

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.



SEF972Z

| DTC No.        | Trouble diagnosis name                            | DTC detecting condition  | Possible cause  |
|----------------|---|--|---|
| P1146 (Bank 1) | Heated oxygen sensor 2 minimum voltage monitoring | The minimum voltage from the sensor is not reached to the specified voltage. | <ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> <li>Fuel pressure</li> <li>Injectors</li> </ul> |
| P1166 (Bank 2) |   |  |   |

**DTC Confirmation Procedure**

UBS007QK

**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:**

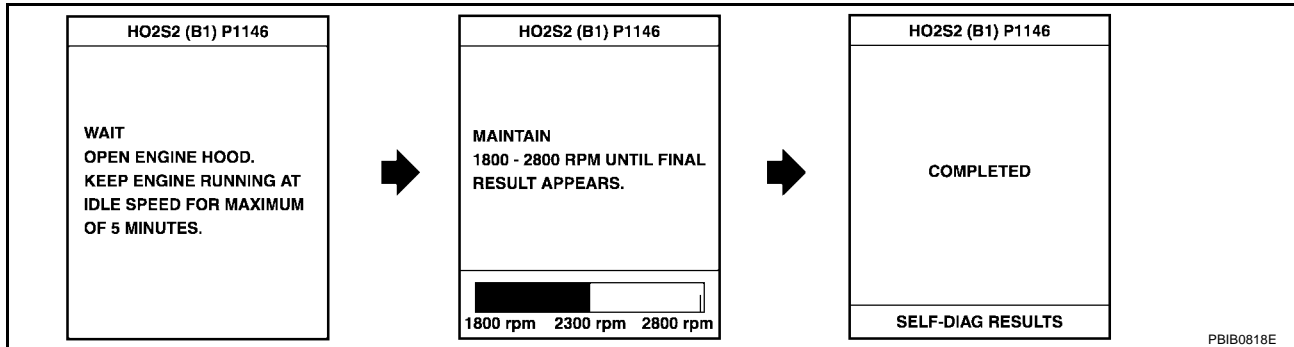
Open engine hood before conducting following procedure

**WITH CONSULT-II**

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



3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minutes.
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-1019, "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

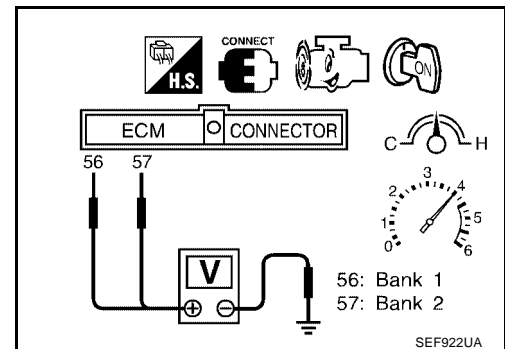
Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

### CAUTION:

Always drive vehicle at a safe speed.

### WITH GST

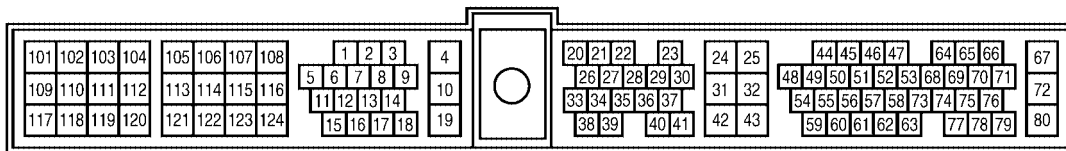
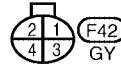
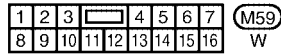
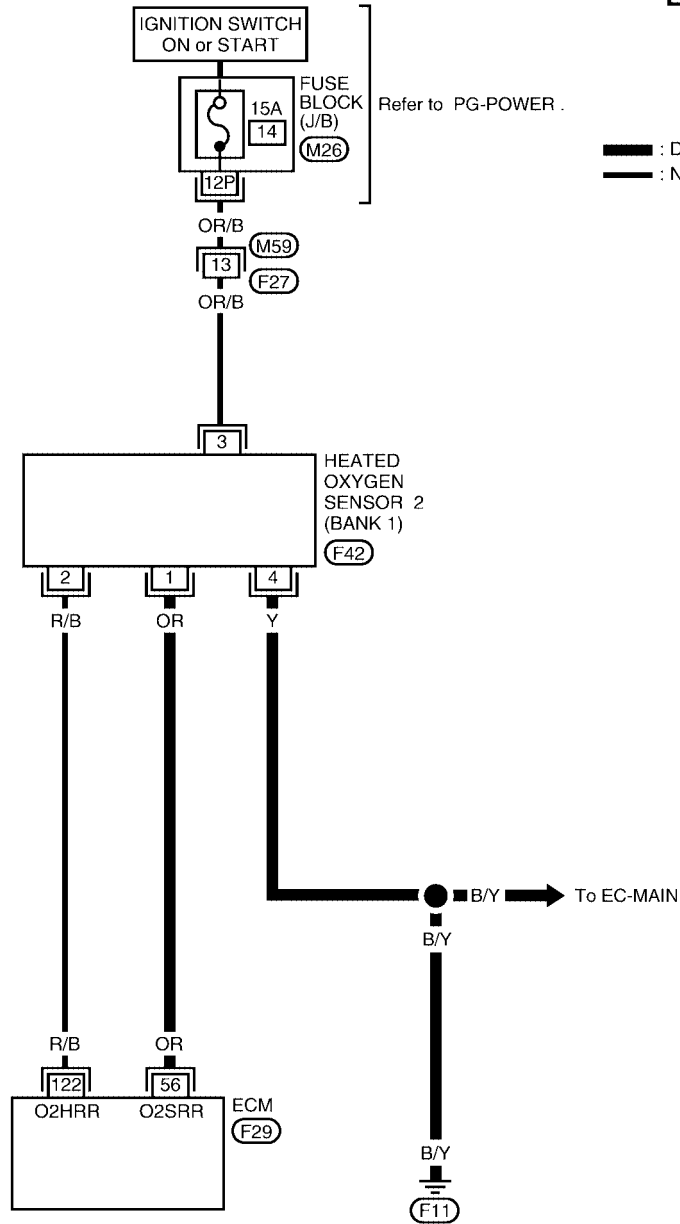
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minutes.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
(Depress and release accelerator pedal as soon as possible.)  
**The voltage should be below 0.48V 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-1019, "Diagnostic Procedure"](#) .



Wiring Diagram  
BANK 1

EC-O2S2B1-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



# DTC P1146, P1166 HO2S2

[VG33E]

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

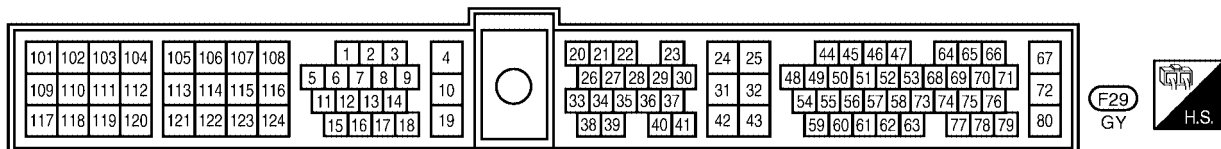
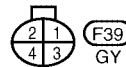
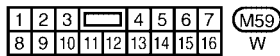
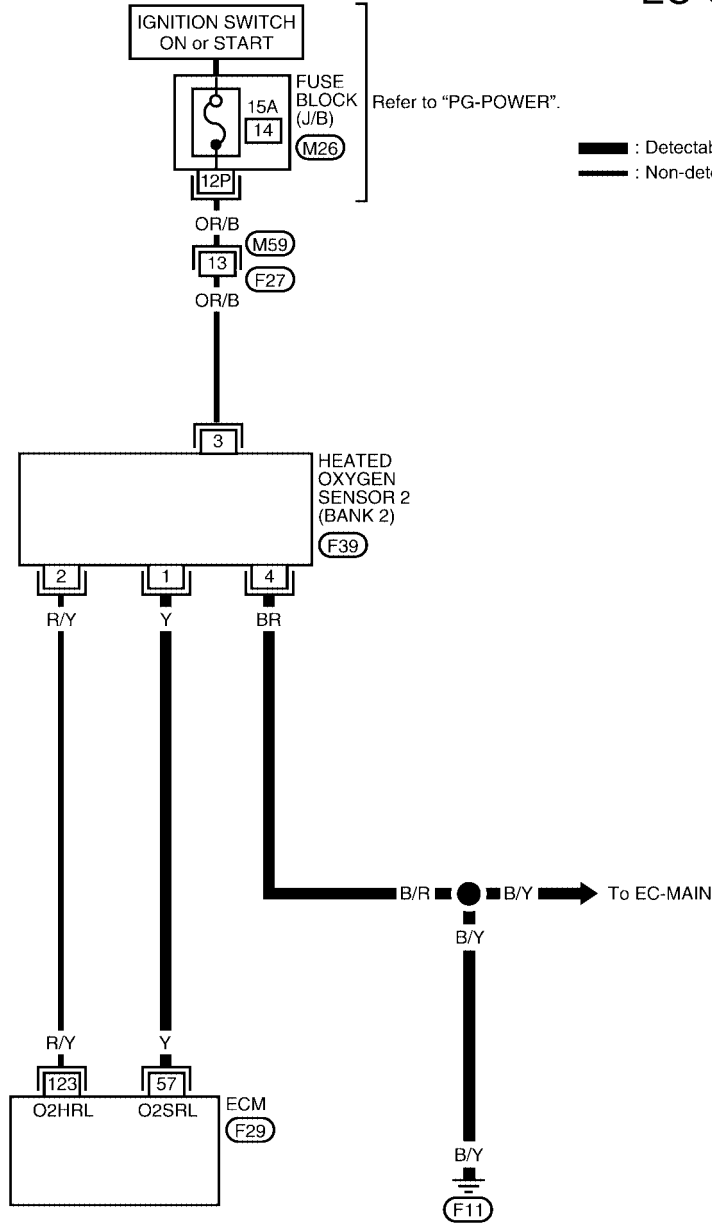
**CAUTION:**

**Do not use 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)      |
|---------------|------------|---------------------------------|--|------------------------|
| 56            | OR         | Heated oxygen sensor 2 (bank 1) | <b>[Engine is running]</b> <ul style="list-style-type: none"><li>● Engine after warming up.</li><li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li><li>● Revving engine from idle to 3,000 rpm quickly.</li></ul> | 0 - Approximately 1.0V |

BANK 2

EC-O2S2B2-01



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

**CAUTION:**

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

| TER-MINAL NO. | WIRE COLO R | ITEM                            | CONDITION   | DATA (DC Voltage)      |
|---------------|-------------|---------------------------------|---|------------------------|
| 57            | Y           | Heated oxygen sensor 2 (bank 2) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine after warming up.</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V |

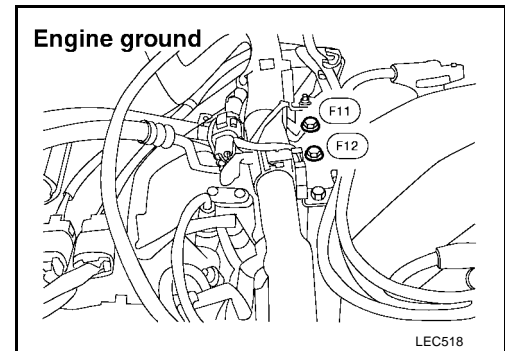
**Diagnostic Procedure**

UBS007QN

**1. RETIGHTEN GROUND SCREWS**

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

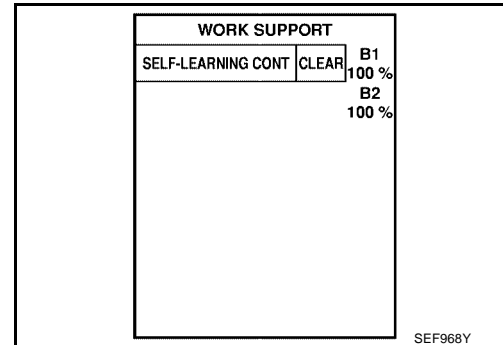
>> GO TO 2.



## 2. CLEAR THE SELF-LEARNING DATA

### With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC P0172 or P0175 detected?**  
**Is it difficult to start engine?**



### Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to [EC-634, "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-831](#) .  
No >> GO TO 3.

## 3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.  
Refer to Wiring Diagram.

**Continuity should exist.**

2. Also check harness for short to power.

#### OK or NG

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

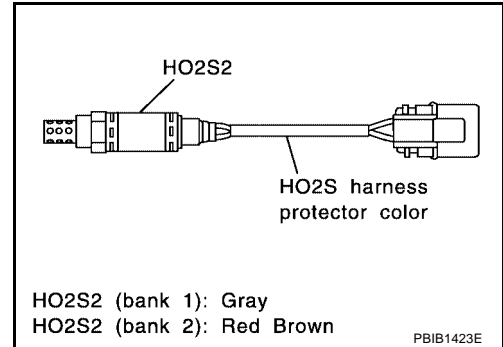
## 4. DETECT MALFUNCTIONING PART

Check harness for open between heated oxygen sensor 2 and engine ground.

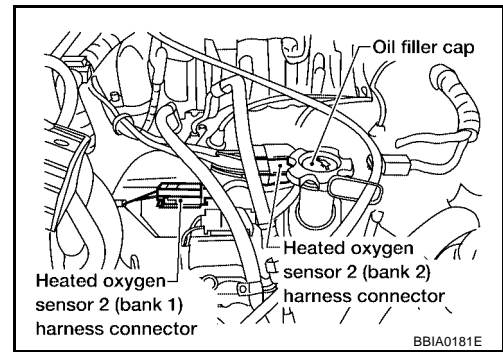
>> Repair open circuit or short to power in harness or connectors.

**5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 harness protector color.



3. Disconnect corresponding heated oxygen sensor 2 harness connector.
4. Disconnect ECM harness connector.
5. 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.**

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows. Refer to Wiring Diagram.

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P1146 | 56 or 1       | Ground | Bank 1 |
| P1166 | 57 or 1       | Ground | Bank 2 |

**Continuity should not exist.**

7. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 6.

OK (Without CONSULT-II)>>GO TO 7.

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



**6. CHECK HEATED OXYGEN SENSOR 2**

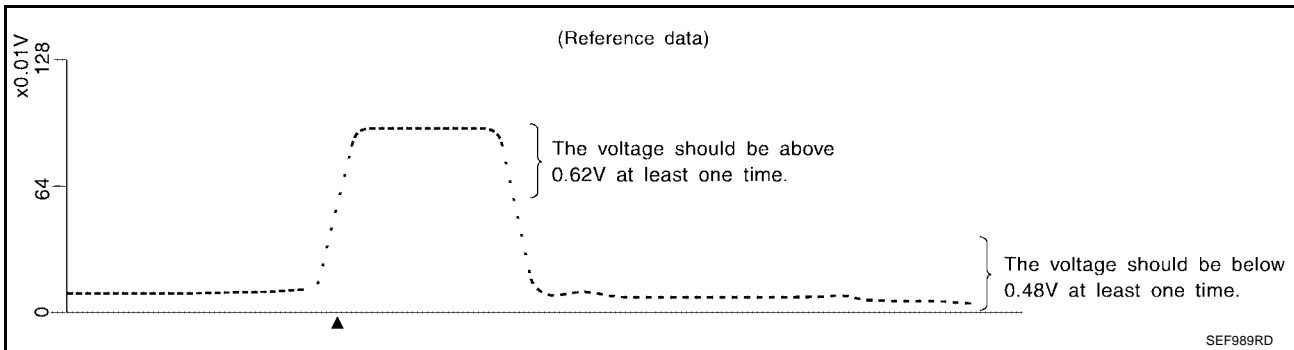
**With CONSULT-II**

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch "OFF" and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
5. Let engine idle for one minutes.
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  $\pm 25\%$ .



"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.

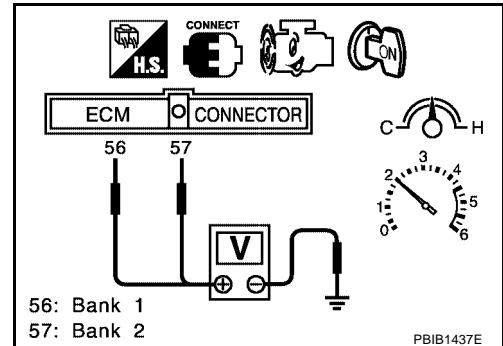
OK or NG

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

## 7. 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 one minute under no load.
4. Let engine idle for one minutes.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
(Depress and release accelerator pedal as soon as possible.)  
**The voltage should be above 0.62V 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 8.  
NG >> Replace malfunctioning heated oxygen sensor 2.

## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 2

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

UBS007QO

**DTC P1147, P1167 HO2S2**

PF2:226A0

**Component Description**

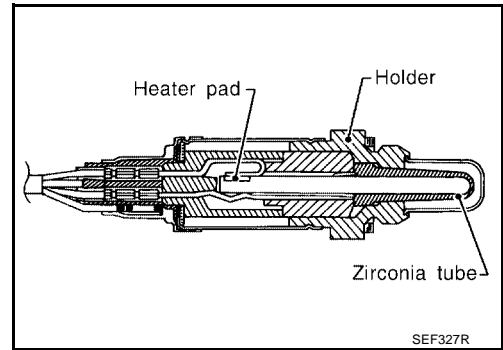
UBS007QP

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**

UBS007QQ

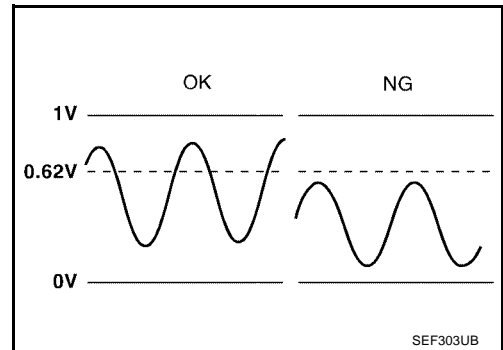
Specification data are reference values.

| MONITOR ITEM                       | CONDITION   | SPECIFICATION                 |
|------------------------------------|---|-------------------------------|
| HO2S2 (B1)<br>HO2S2 (B2)           | <ul style="list-style-type: none"> <li>Warm-up condition</li> </ul>   | 0 - 0.3V ↔ Approx. 0.6 - 1.0V |
| HO2S2 MNTR (B1)<br>HO2S2 MNTR (B2) | <ul style="list-style-type: none"> <li>After keeping engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> | LEAN ↔ RICH                   |
|                                    | Revving engine from idle up to 3,000 rpm quickly  |                               |

**On Board Diagnosis Logic**

UBS007QR

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) | Heated oxygen sensor 2 maximum voltage monitoring | The maximum voltage from the sensor is not reached to the specified voltage. | <ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> <li>Fuel pressure</li> <li>Injectors</li> <li>Intake air leaks</li> </ul> |
| P1167 (Bank 2) |   |  |   |

**DTC Confirmation Procedure**

UBS007QS

**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

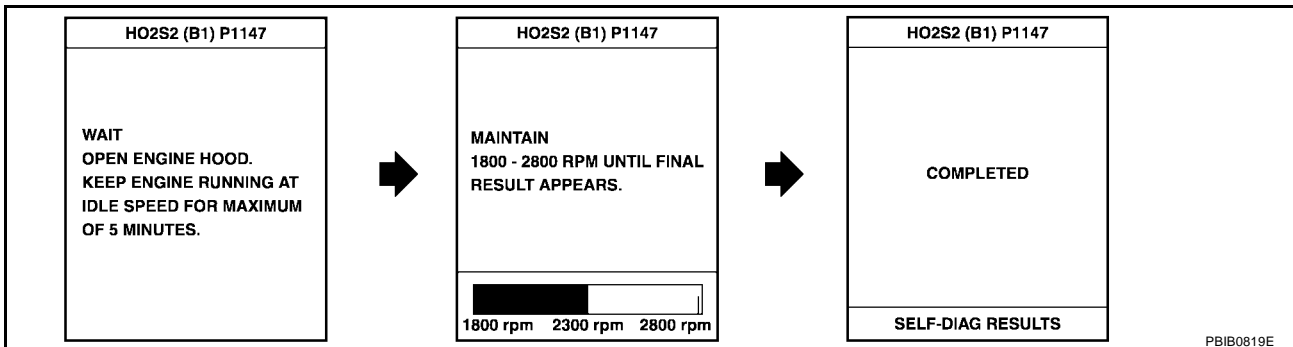
**WITH CONSULT-II**

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

## DTC P1147, P1167 HO2S2

[VG33E]

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. 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-1041, "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

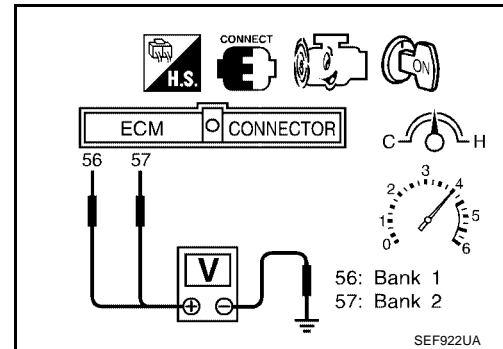
Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

### CAUTION:

Always drive vehicle at a safe speed.

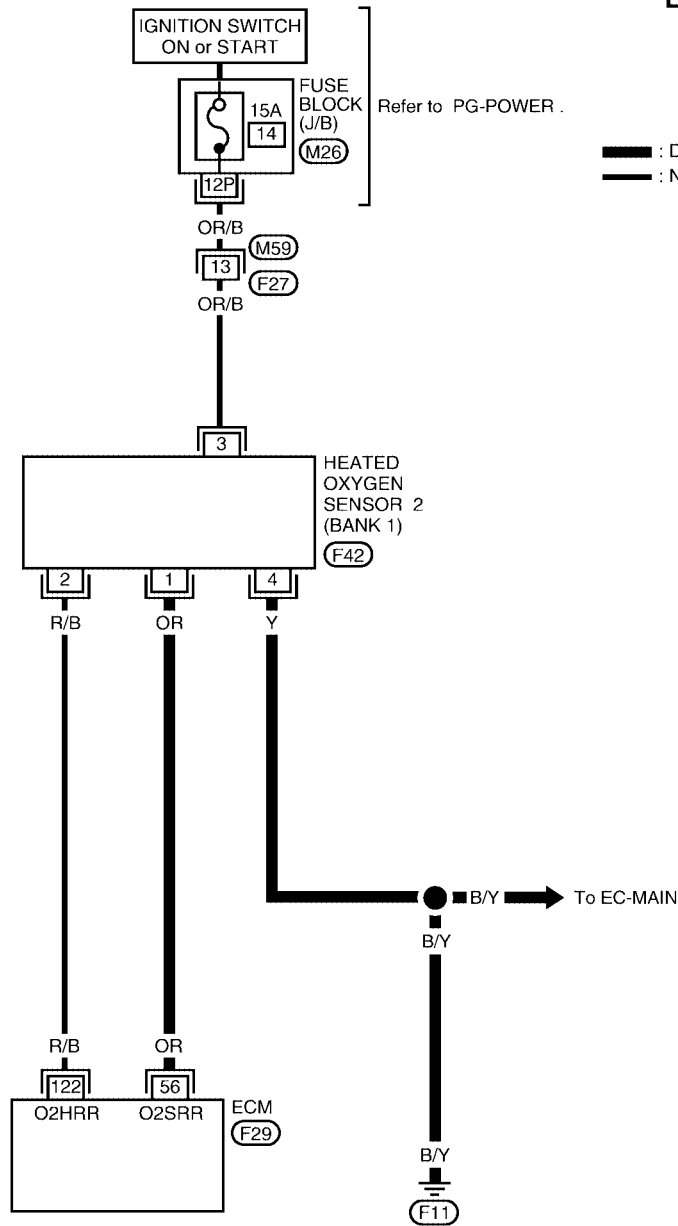
### WITH GST

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 one minute under no load.
4. Let engine idle for one minutes.
5. Set voltmeter probes between ECM terminal 88 [HO2S2 (B1) signal] or 90 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
(Depress and release accelerator pedal as soon as possible.)  
**The voltage should be above 0.62V 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-1041, "Diagnostic Procedure"](#) .

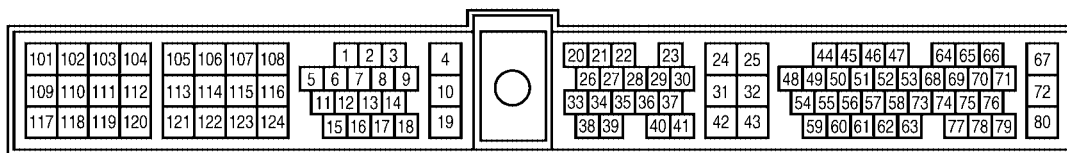
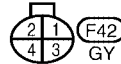
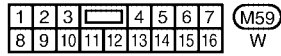


Wiring Diagram  
BANK 1

EC-O2S2B1-01



— : Detectable line for DTC  
— : Non-detectable line for DTC



# DTC P1147, P1167 HO2S2

[VG33E]

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

**CAUTION:**

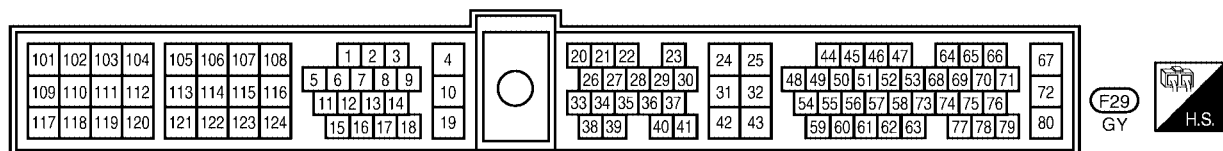
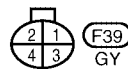
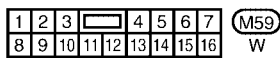
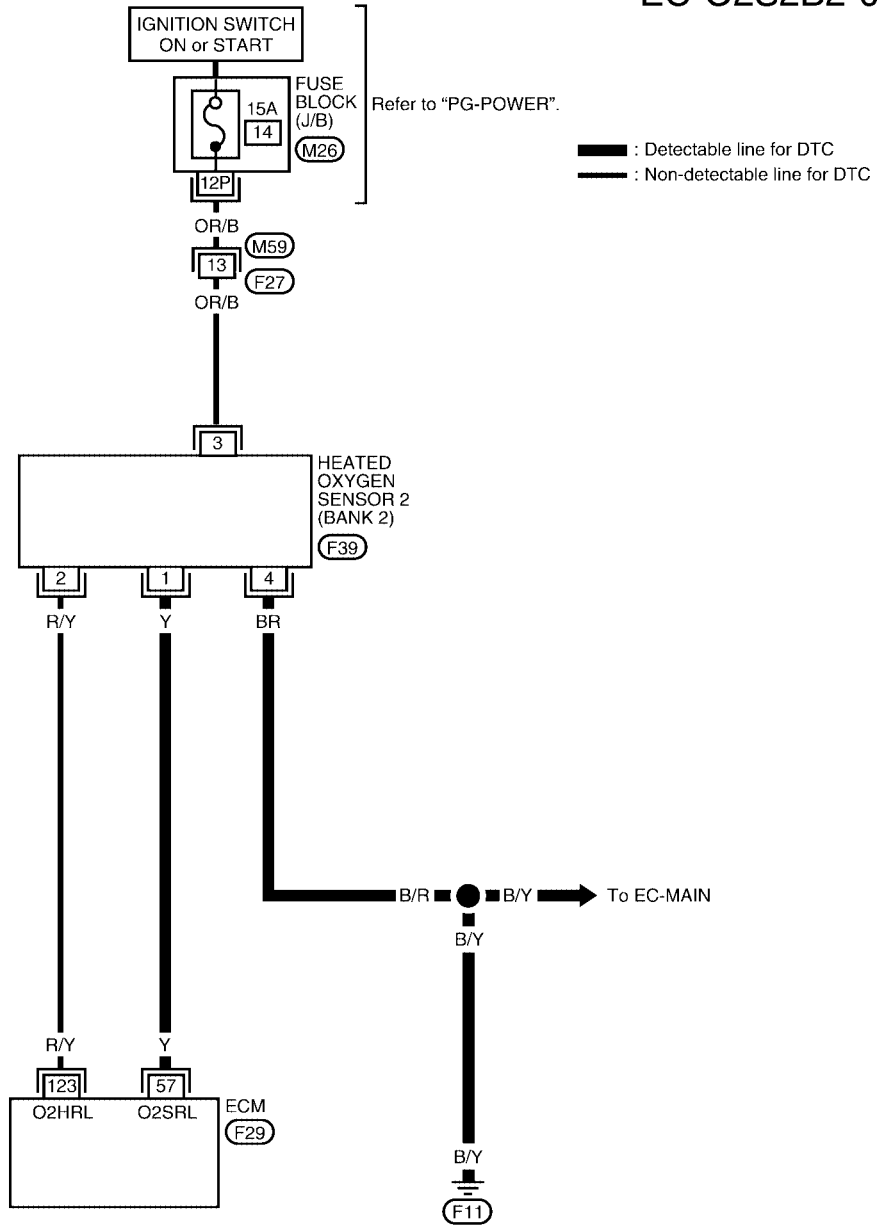
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

| TER-MINAL NO. | WIRE COLO R | ITEM                            | CONDITION   | DATA (DC Voltage)      |
|---------------|-------------|---------------------------------|---|------------------------|
| 56            | OR          | Heated oxygen sensor 2 (bank 1) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine after warming up.</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V |

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BANK 2

EC-O2S2B2-01





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

**CAUTION:**

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

| TER-MINAL NO. | WIRE COLO R | ITEM                            | CONDITION   | DATA (DC Voltage)      |
|---------------|-------------|---------------------------------|---|------------------------|
| 57            | Y           | Heated oxygen sensor 2 (bank 2) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine after warming up.</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V |

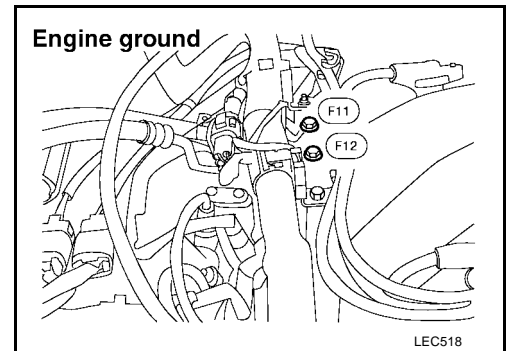
**Diagnostic Procedure**

UBS007QV

**1. RETIGHTEN GROUND SCREWS**

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

>> GO TO 2.



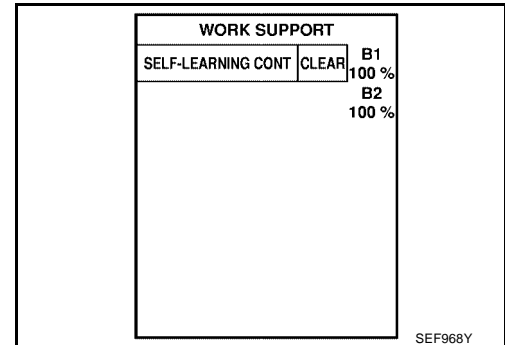
LEC518

## 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-634, "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-823](#) .  
No >> GO TO 3.

## 3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.  
Refer to Wiring Diagram.

**Continuity should exist.**

2. Also check harness for short to power.

OK or NG

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

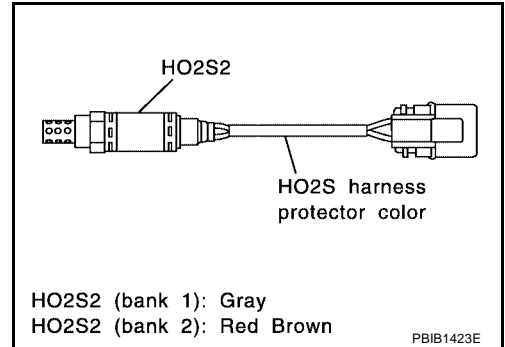
## 4. DETECT MALFUNCTIONING PART

Check Harness for open between heated oxygen sensor 2 and engine ground.

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

**5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 harness protector color.
3. Disconnect corresponding heated oxygen sensor 2 harness connector.
4. Disconnect ECM harness connector.
5. 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.**

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows.

Refer to Wiring Diagram.

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P1147 | 56 or 1       | Ground | Bank 1 |
| P1167 | 57 or 1       | Ground | Bank 2 |

**Continuity should not exist.**

7. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 6.

OK (Without CONSULT-II)>>GO TO 7.

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

**6. CHECK HEATED OXYGEN SENSOR 2**

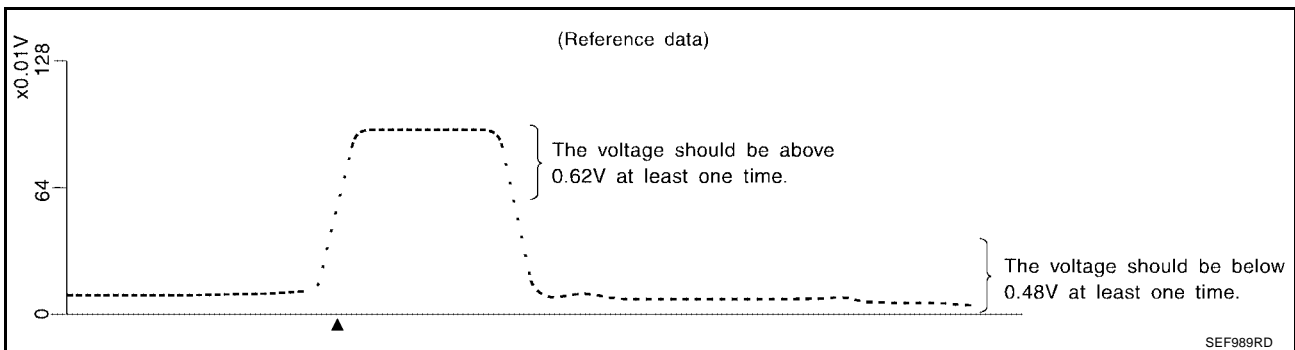
**With CONSULT-II**

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch "OFF" and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
5. Let engine idle for one minutes.
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  $\pm 25\%$ .



"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.

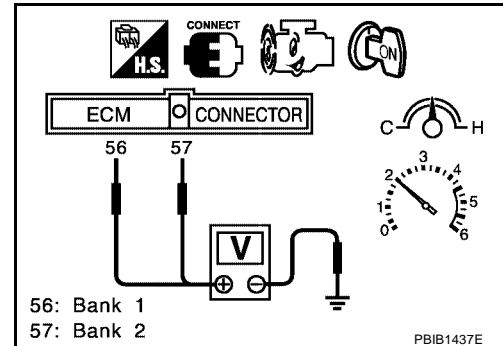
OK or NG

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

## 7. 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 one minute under no load.
4. Let engine idle for one minutes.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
(Depress and release accelerator pedal as soon as possible.)  
**The voltage should be above 0.62V 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 8.  
NG >> Replace malfunctioning heated oxygen sensor 2.

## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 2

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

UBS007QW

## DTC P1148, P1168 CLOSED LOOP CONTROL

PFP:22690

### On Board Diagnosis Logic

UBS0070X

These self-diagnoses have the one trip detection logic.

| DTC No.           | Trouble diagnosis name       | DTC detecting condition   | Possible cause  |
|-------------------|------------------------------|---|---|
| P1148<br>(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. | <ul style="list-style-type: none"> <li>● The heated oxygen sensor 1 circuit is open or shorted.</li> </ul>        |
| P1168<br>(Bank 2) |                              | The closed loop control function for bank 2 does not operate even when vehicle is driving in the specified condition. | <ul style="list-style-type: none"> <li>● Heated oxygen sensor 1</li> <li>● Heated oxygen sensor heater</li> </ul> |

### DTC Confirmation Procedure

UBS0070Y

**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-1047, "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.

| DATA MONITOR   |         |
|----------------|---------|
| MONITOR        | NO DTC  |
| ENG SPEED      | XXX rpm |
| COOLANT TEMP/S | XXX °C  |
| HO2S1 (B1)     | XXX V   |
| HO2S2 (B2)     | XXX V   |

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|                |                            |
|----------------|----------------------------|
| B/FUEL SCHDL   | 2.0 msec or more           |
| ENG SPEED      | 1,500 rpm or more          |
| Selector lever | Suitable position          |
| VHCL SPEED SE  | More than 71 km/h (44 MPH) |

During this test, P0134 and/or P0154 may be displayed on CONSULT-II screen.

6. If DTC is detected, go to [EC-1047, "Diagnostic Procedure"](#) .

### Overall Function Check

UBS0070Z

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

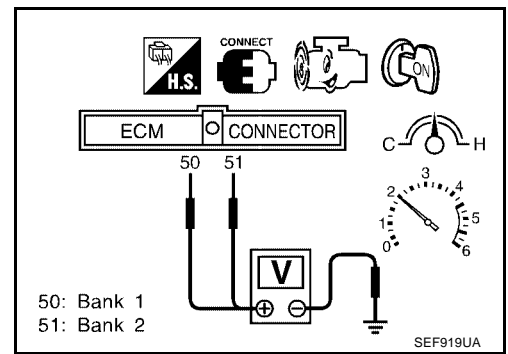
**Ⓟ WITH GST**

1. Start engine and warm it up to normal operating temperature.

## DTC P1148, P1168 CLOSED LOOP CONTROL

[VG33E]

2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no-load.
  - The voltage should go above 0.70V at least once.
  - The voltage should go below 0.21V at least once.
4. If NG, go to [EC-1047, "Diagnostic Procedure"](#) .



### Diagnostic Procedure

Perform trouble diagnosis for "DTC P0133, P0153", [EC-786](#) .

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## DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

PFP:00021

### On Board Diagnosis Logic

UBS007R1

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) | Engine coolant temperature reaches an abnormally high temperature. | <ul style="list-style-type: none"> <li>● Cooling fan (crankshaft driven)</li> <li>● Radiator hose</li> <li>● Radiator</li> <li>● Radiator cap</li> <li>● Water pump</li> <li>● Thermostat</li> </ul> <p>For more information, refer to <a href="#">EC-1050</a>, "<a href="#">Main 12 Causes of Overheating</a>".</p> |

**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](#), "[ANTI-FREEZE COOLANT MIXTURE RATIO](#)".
2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

### Overall Function Check

UBS007R2

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

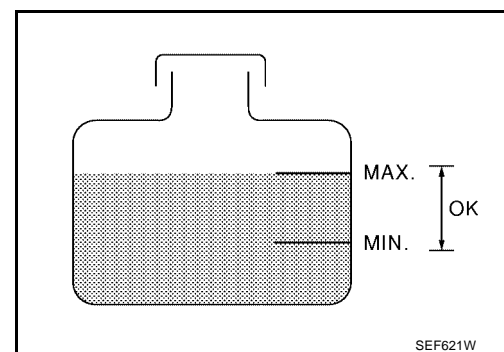
**WARNING:**

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-1049](#), "[Diagnostic Procedure](#)".
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-1049](#), "[Diagnostic Procedure](#)".
3. Start engine.
4. Make sure that cooling fan (crankshaft driven) operates.
5. If NG, go to [EC-1049](#), "[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-1049](#), "[Diagnostic Procedure](#)".
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-1049](#), "[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-1049](#), "[Diagnostic Procedure](#)".



**Diagnostic Procedure****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.

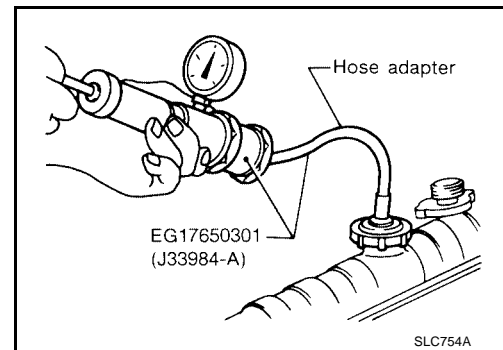
OK or NG

OK >> GO TO 3.

NG >> Check the following for leak

- Hose
- Radiator
- Water pump

Refer to [CO-25, "WATER PUMP"](#).

**3. CHECK RADIATOR CAP**

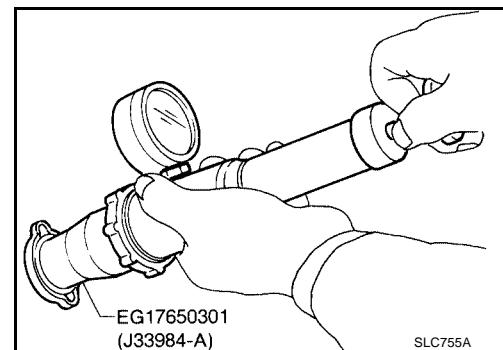
Apply pressure to cap with a tester and check radiator cap relief pressure.

**Radiator cap relief pressure** : 59 - 98 kPa (0.6 - 1.0 kg/cm<sup>2</sup>, 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)

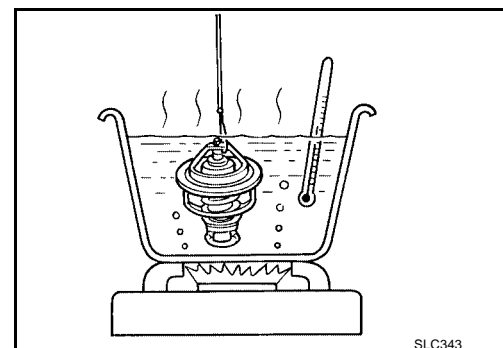
3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer to [CO-28, "THERMOSTAT"](#).

OK or NG

OK >> GO TO 5.

NG >> Replace thermostat



# DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

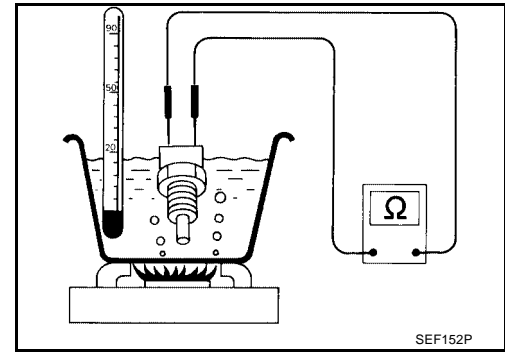
[VG33E]

## 5. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance 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 |

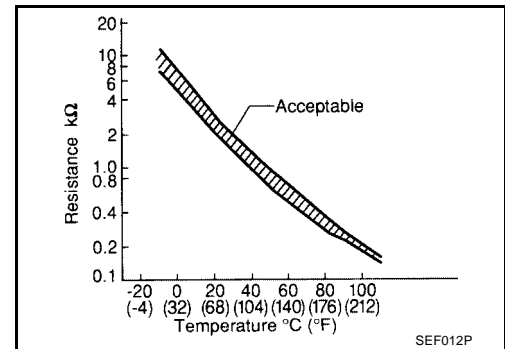


SEF152P

OK or NG

OK >> GO TO 6.

NG >> Replace engine coolant temperature sensor.



SEF012P

## 6. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to [EC-1050, "Main 12 Causes of Overheating"](#) .

>> INSPECTION END.

### Main 12 Causes of Overheating

UBS007R4

| Engine | Step | Inspection item  | Equipment  | Standard   | Reference page   |
|--------|------|--|--|--|--|
| OFF    | 1    | <ul style="list-style-type: none"> <li>Blocked radiator</li> <li>Blocked condenser</li> <li>Blocked radiator grille</li> <li>Blocked bumper</li> </ul> | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | No blocking  | —  |
|        | 2    | <ul style="list-style-type: none"> <li>Coolant mixture</li> </ul>  | <ul style="list-style-type: none"> <li>Coolant tester</li> </ul>                               | 50 - 50% coolant mixture   | See <a href="#">MA-12, "Recommended Fluids and Lubricants"</a> . |
|        | 3    | <ul style="list-style-type: none"> <li>Coolant level</li> </ul>  | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | Coolant up to MAX level in reservoir tank and radiator filler neck | See <a href="#">MA-26, "Changing Engine Coolant"</a> .           |
|        | 4    | <ul style="list-style-type: none"> <li>Radiator cap</li> </ul>   | <ul style="list-style-type: none"> <li>Pressure tester</li> </ul>                              | 59 - 98 kPa (0.6 - 1.0 kg/cm <sup>2</sup> , 9 - 14 psi) (Limit)    | See <a href="#">CO-23, "System Check"</a> .                      |
| ON*1   | 5    | <ul style="list-style-type: none"> <li>Coolant leaks</li> </ul>  | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | No leaks   | See <a href="#">CO-23, "System Check"</a> .                      |
| ON*1   | 6    | <ul style="list-style-type: none"> <li>Thermostat</li> </ul>   | <ul style="list-style-type: none"> <li>Touch the upper and lower radiator hoses</li> </ul>     | Both hoses should be hot   | See <a href="#">CO-28, "THERMOSTAT"</a> .                        |
| ON*1   | 7    | <ul style="list-style-type: none"> <li>Cooling fan (crankshaft driven)</li> </ul>  | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | Operating  | See <a href="#">CO-32, "COOLING FAN (CRANKSHAFT DRIVEN)"</a> .   |
| OFF    | 8    | <ul style="list-style-type: none"> <li>Combustion gas leak</li> </ul>  | <ul style="list-style-type: none"> <li>Color checker chemical tester 4 Gas analyzer</li> </ul> | Negative   | —  |

# DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

[VG33E]

| 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 <a href="#">MA-26, "Changing Engine Coolant"</a> .               |
| OFF*3  | 10   | ● Coolant return from reservoir tank to radiator | ● Visual                      | Should be initial level in reservoir tank      | See <a href="#">MA-24, "ENGINE MAINTENANCE (VG33E AND VG33ER)"</a> . |
| OFF    | 11   | ● Cylinder head                                  | ● Straight gauge feeler gauge | 0.1 mm (0.004 in) Maximum distortion (warping) | See <a href="#">EM-110, "Inspection"</a> .                           |
|        | 12   | ● Cylinder block and pistons                     | ● Visual                      | No scuffing on cylinder walls or piston        | See <a href="#">EM-133, "Inspection"</a> .                           |

\*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"](#) .

A

EC

C

D

E

F

G

H

I

J

K

L

M

## DTC P1336 CKP SENSOR (OBD)

### Component Description

UBS007R5

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.

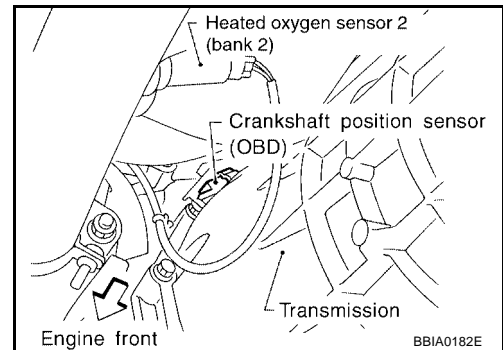
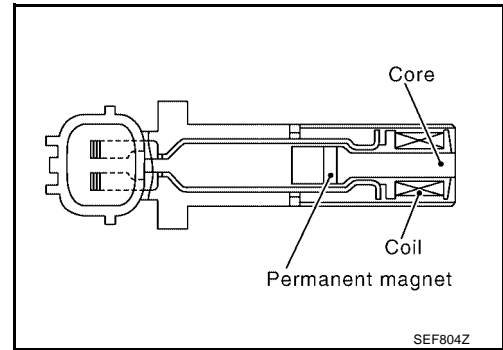
The changing gap causes the magnetic field near the sensor to change.

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

UBS007R6

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors<br/>(The sensor circuit is open or shorted.)</li> <li>● Crankshaft position sensor (OBD)</li> <li>● Drive plate/Flywheel</li> </ul> |

### DTC Confirmation Procedure

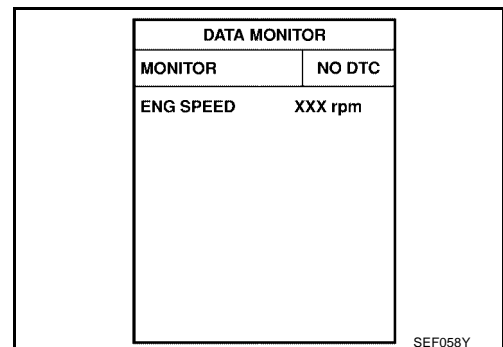
UBS007R7

**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-1054, "Diagnostic Procedure"](#).



**WITH GST**

Follow the procedure "With CONSULT-II".

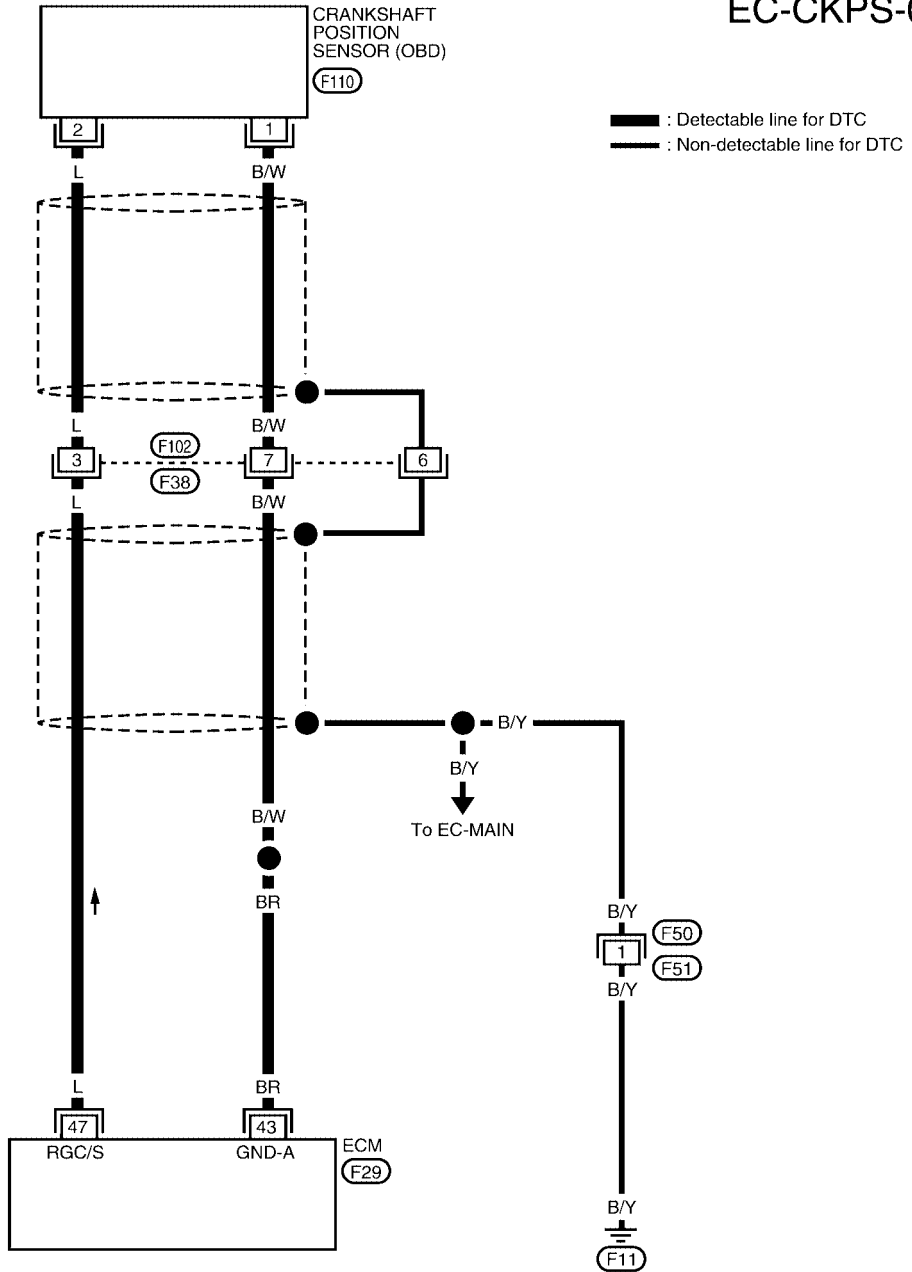
# DTC P1336 CKP SENSOR (OBD)

[VG33E]

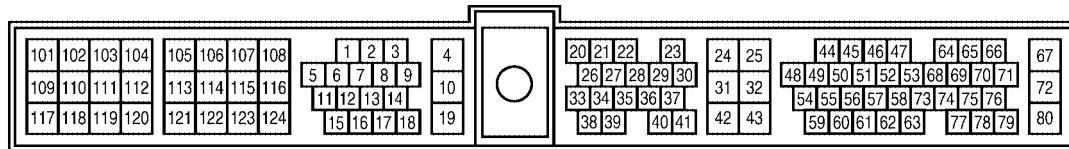
UBS007R8

## Wiring Diagram

EC-CKPS-01



A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



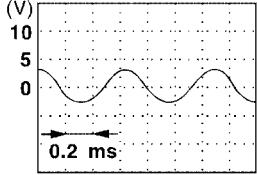
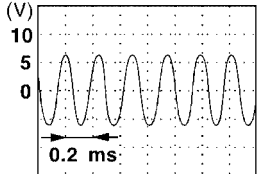
# DTC P1336 CKP SENSOR (OBD)

[VG33E]

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

**CAUTION:**

**Do not use 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 (AC Voltage)  |
|---------------|------------|----------------------------------|--|--|
| 47            | L          | Crankshaft position sensor (OBD) | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul> | <p>1 - 2V★<br/>(AC range)</p>  <p>SEF690W</p> |
|               |            |                                  | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>               | <p>3 - 4V★<br/>(AC range)</p>  <p>SEF691W</p> |

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

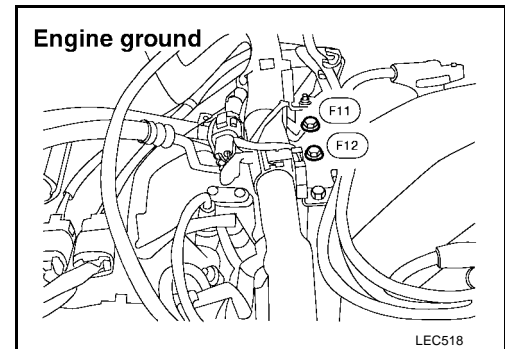
## Diagnostic Procedure

UBS007R9

### 1. RETIGHTEN GROUND SCREWS

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

>> GO TO 2.



### 2. CHECK CKP SENSOR (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

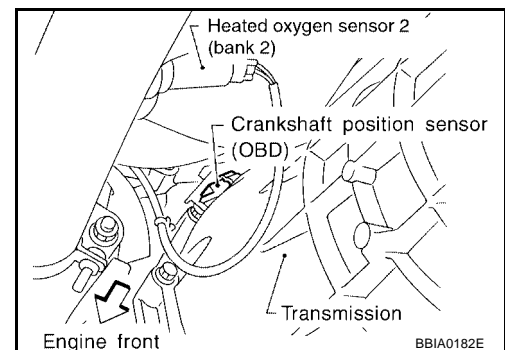
1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.
2. Check continuity between ECM terminal 47 and CKP sensor (OBD) terminal 2.

**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. Reconnect ECM harness connectors.
2. Check harness continuity between CKP sensor (OBD) terminal 1 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

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

**5. DETECT MALFUNCTIONING PART**

Check the following.

- Harness connectors 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 IMPROPER INSTALLATION**

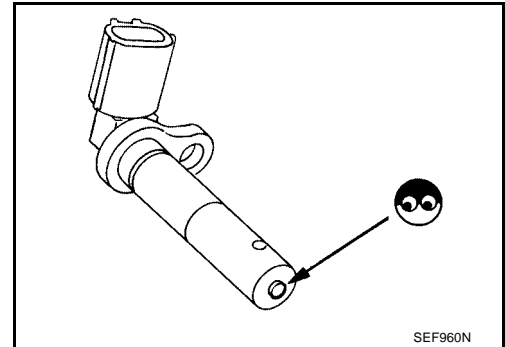
1. Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD).
2. Perform [EC-1052, "DTC Confirmation Procedure"](#) .

Is a 1st trip DTC P1336 detected?

- Yes >> GO TO 7.
- No >> **INSPECTION END.**

## 7. 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.

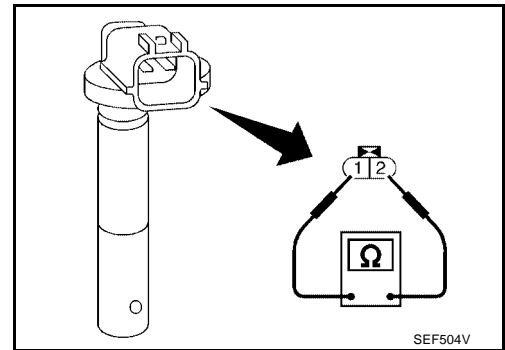


5. Check resistance as shown in the figure.

**Resistance** : Approximately 512 - 632Ω [at 20°C (68°F)]

OK or NG

- OK >> GO TO 8.  
 NG >> Replace crankshaft position sensor (OBD).



## 8. CHECK GEAR TOOTH

Visually check for chipping flywheel or drive plate gear tooth (cog).

OK or NG

- OK >> GO TO 9.  
 NG >> Replace the flywheel or drive plate.

## 9. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.



## DTC P1400 EGRC-SOLENOID VALVE

PFP:14956

### Component Description

UBS0060Z

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

UBS006P0

Specification data are reference values.

| MONITOR ITEM | CONDITION   | SPECIFICATION |
|--------------|---|---------------|
| EGRC SOL/V   | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: "OFF"</li> <li>● Shift lever: "N" (A/T models)</li> <li>● No-load</li> </ul> | Idle<br>OFF   |
|              | Rev engine up from idle to 3,000 rpm quickly.   | ON            |

### On Board Diagnosis Logic

UBS006P2

| DTC No. | Trouble diagnosis name | DTC detecting condition   | Possible Cause   |
|---------|------------------------|---|--|
| P1400   | EGRC-solenoid valve    | <ul style="list-style-type: none"> <li>● The improper voltage signal is sent to ECM through EGRC-solenoid valve.</li> </ul> | <ul style="list-style-type: none"> <li>● Harness or connectors (The EGRC-solenoid valve circuit is open or shorted.)</li> <li>● EGRC-solenoid valve</li> </ul> |

### DTC Confirmation Procedure

UBS006P3

#### 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-1060, "Diagnostic Procedure"](#).

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| COOLAN TEMP/S | XXX °C   |
| VHCL SPEED SE | XXX km/h |
| THRTL POS SEN | XXX V    |
| B/FUEL SCHDL  | XXX msec |

SEF201Y

#### WITH GST

- Follow the procedure with "CONSULT-II".

### Overall Function Check

UBS006P4

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

#### WITHOUT CONSULT-II

1. Start engine and warm it up to normal operating temperature.

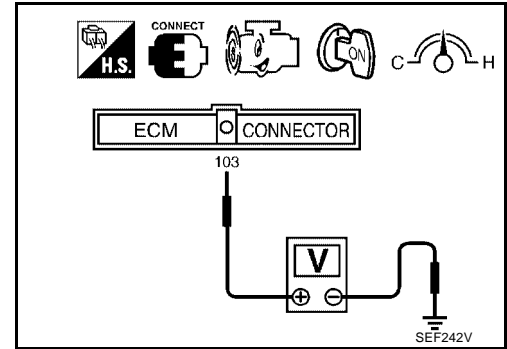
## DTC P1400 EGRC-SOLENOID VALVE

[VG33E]

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-1060, "Diagnostic Procedure"](#) .



# DTC P1400 EGRC-SOLENOID VALVE

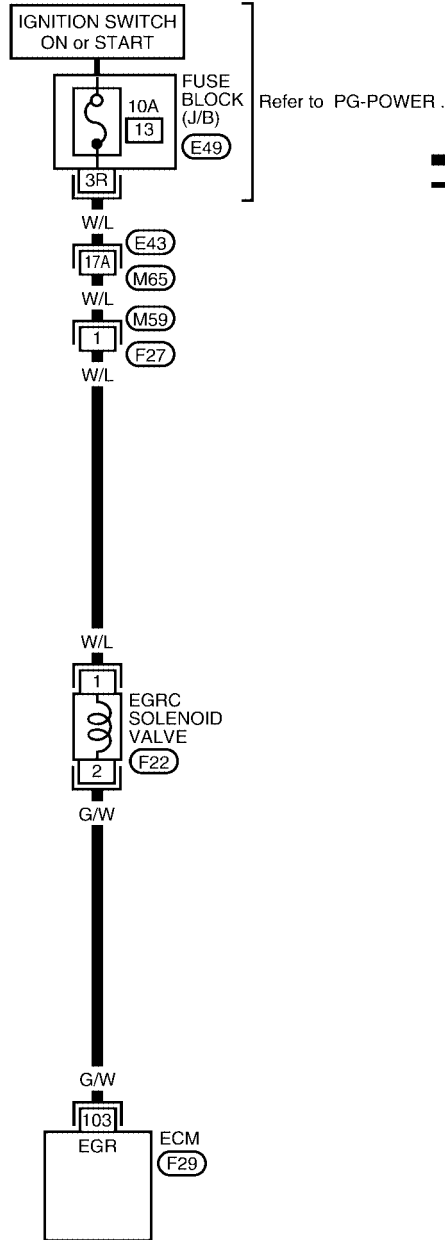
[VG33E]

UBS006P5

## Wiring Diagram

EC-EGRC/V-01

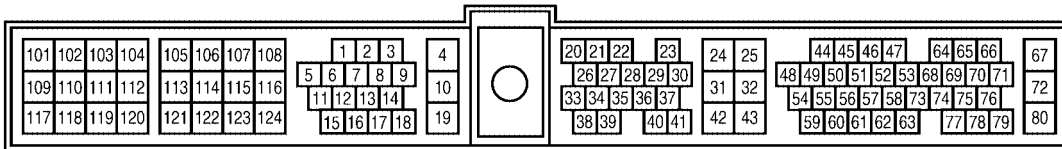
A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



Refer to PG-POWER.  
**—** : Detectable line for DTC  
**—** : Non-detectable line for DTC



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



BBWA0505E

# DTC P1400 EGRC-SOLENOID VALVE

[VG33E]

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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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 COLO R | ITEM                | CONDITION  | DATA (DC Voltage)          |
|---------------|-------------|---------------------|--|----------------------------|
| 103           | G/W         | EGRC-solenoid valve | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>  | BATTERY VOLTAGE (11 - 14V) |
|               |             |                     | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● M/T models: Lift up drive wheels and shift to 1st gear position.</li> <li>● Revving engine from idle up to 3,000 rpm quickly.</li> </ul> | 0 - 1V                     |

## Diagnostic Procedure

UBS006P6

### 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

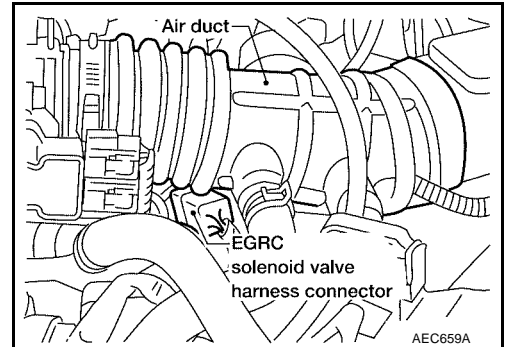
- OK (With CONSULT-II)>>GO TO 6.
- OK (Without CONSULT-II)>>GO TO 7.
- NG >> GO TO 2

| ACTIVE TEST |         |
|-------------|---------|
| EGRC SOL/V  | ON      |
| MONITOR     |         |
| ENG SPEED   | XXX rpm |
|             |         |
|             |         |
|             |         |
|             |         |
|             |         |
|             |         |

SEF722Z

## 2. CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EGRC-solenoid valve harness connector.

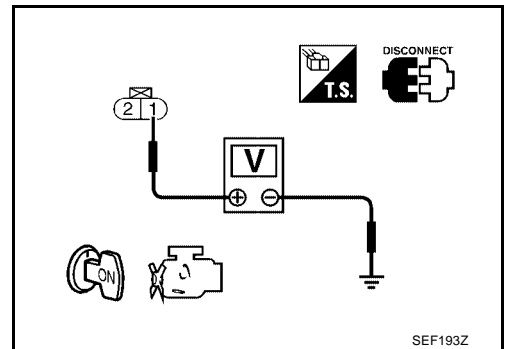


3. Turn ignition switch ON.
4. Check voltage between terminal 1 and ground with CONSULT-II or tester.

**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 10A 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.

**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.

CONNECT

| ACTIVE TEST         |         |
|---------------------|---------|
| EGRC SOLENOID VALVE | OFF     |
| MONITOR             |         |
| ENG SPEED           | XXX rpm |
|                     |         |
|                     |         |
|                     |         |
|                     |         |
|                     |         |
|                     |         |
| ON                  | ON/OFF  |

SEF129Y

### 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.

FUSE

BAT  
BATTERY

AEC919

### 8. CHECK INTERMITTENT INCIDENT

Perform [EC-699. "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

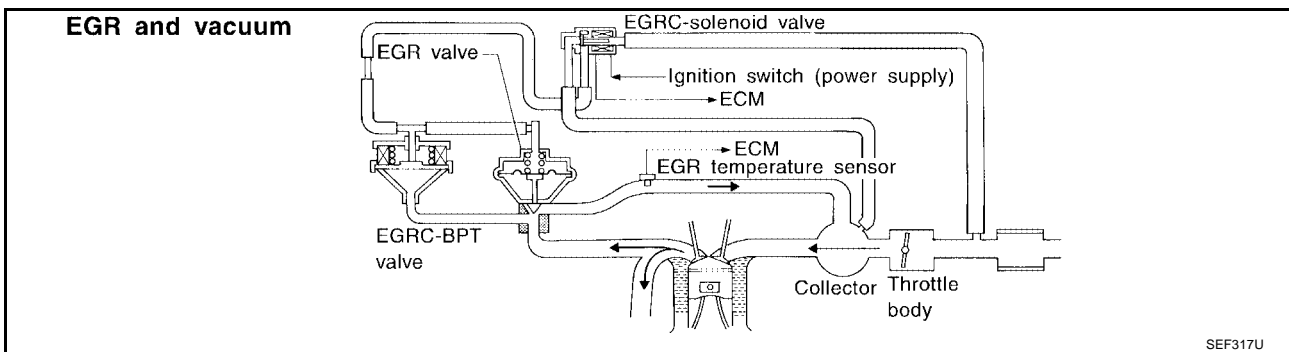
**DTC P1402 EGR FUNCTION**

**Description  
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.

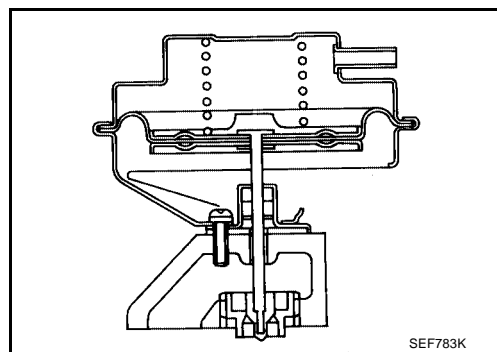
- Low engine coolant temperature
- Engine starting
- High-speed engine operation
- Engine idling
- Excessively high engine coolant temperature
- Mass air flow sensor malfunction



**COMPONENT DESCRIPTION**

**Exhaust Gas Recirculation (EGR) Valve**

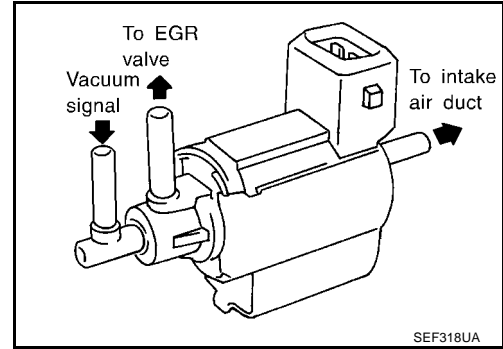
The EGR valve controls the amount of exhaust gas routed to the intake manifold. Vacuum is applied to the EGR valve in response to throttle valve opening and EGRC-BPT valve operation. The vacuum controls the movement of a taper valve connected to the vacuum diaphragm in the EGR valve.



## 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.

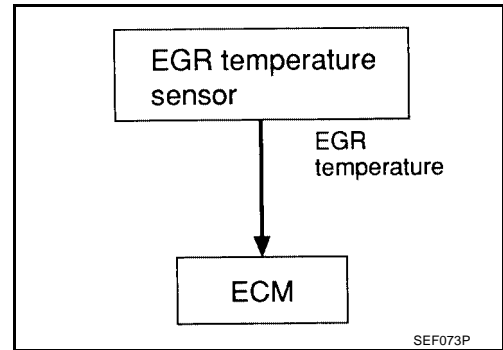


## On Board Diagnosis Logic

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 | <ul style="list-style-type: none"> <li>EGR flow is detected under conditions that do not call for EGR.</li> </ul> | <ul style="list-style-type: none"> <li>EGRC-solenoid valve</li> <li>EGR valve leaking or stuck open</li> <li>EGR temperature sensor</li> <li>EGRC-BPT valve</li> </ul> |

## DTC Confirmation Procedure

### 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:

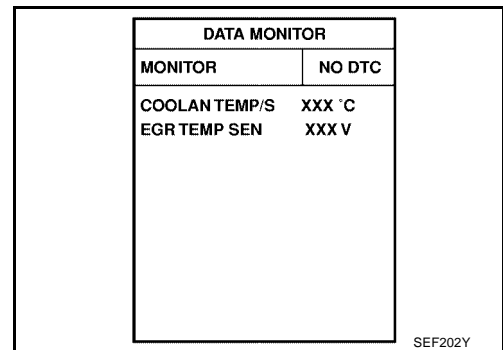
- Engine coolant temperature and EGR temperature must be verified in "DATA MONITOR" mode with CONSULT-II before starting DTC WORK SUPPORT test. If it is out of range below, the test cannot be conducted.

**COOLANT 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

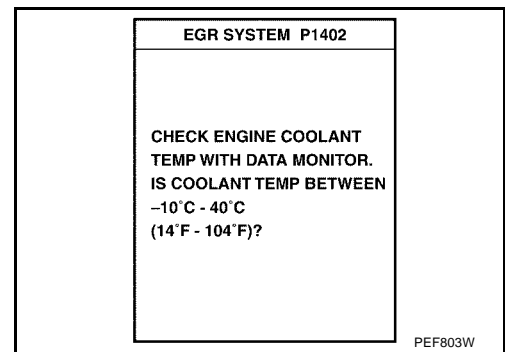
- Turn ignition switch "OFF" and wait at least 5 seconds, then turn ignition switch "ON".



# DTC P1402 EGR FUNCTION

[VG33E]

- Select "EGR SYSTEM P1402" of "EGR SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.



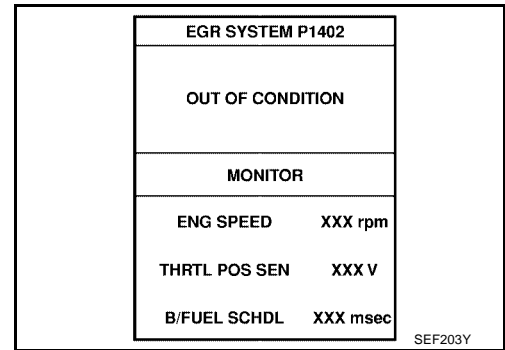
A

EC

C

D

- Touch "START". Follow instruction of CONSULT-II.



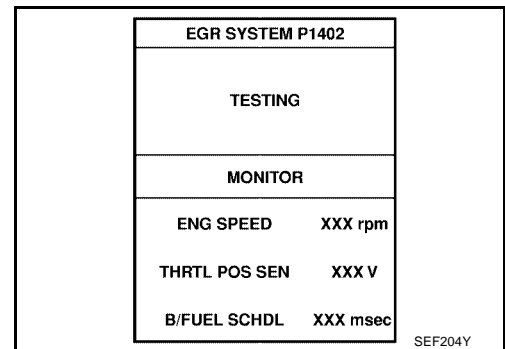
E

F

G

- 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.**

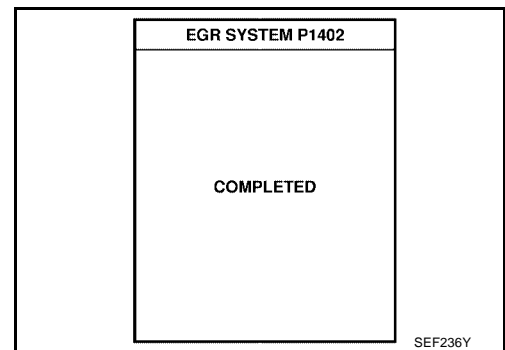


H

I

J

K



L

M

- Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to [EC-1068, "Diagnostic Procedure"](#).

## WITH GST

- Turn ignition switch ON and select "MODE 1" with GST.
- Check that engine coolant temperature is within the range of -10 to 40°C (14 to 104°F).
- Check that voltage between ECM terminal 63 (EGR temperature sensor signal) and ground is less than 4.8V.
- Start engine and let it idle for at least 60 seconds.
- Stop engine.
- Perform from step 1 to 4.

7. Select "MODE 3" with GST.
8. If 1st trip DTC is detected, go to [EC-1068, "Diagnostic Procedure"](#) .

# DTC P1402 EGR FUNCTION

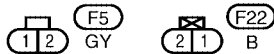
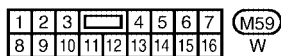
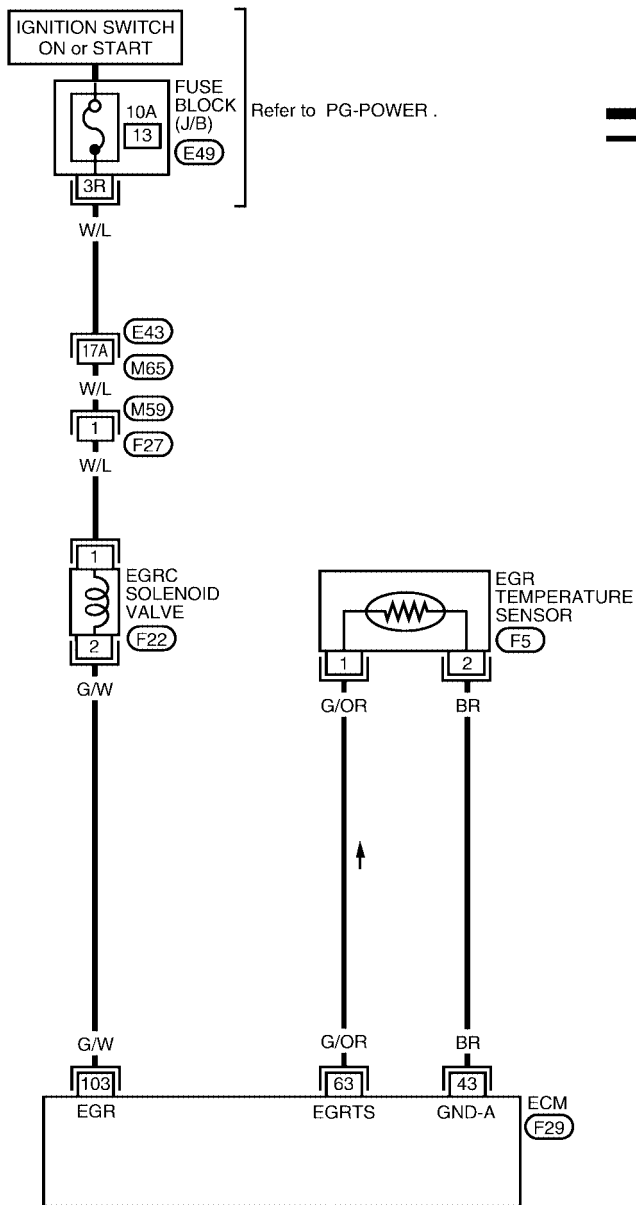
[VG33E]

## Wiring Diagram

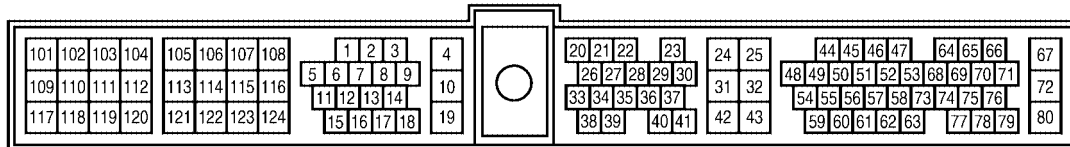
UBS006PA

EC-EGRC1-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



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



BBWA0504E

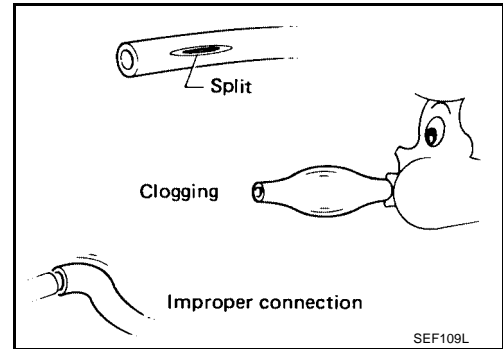
## Diagnostic Procedure

### 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.

| ACTIVE TEST |         |
|-------------|---------|
| EGRC SOL/V  | ON      |
| (EGR)       | CUT     |
| MONITOR     |         |
| ENG SPEED   | XXX rpm |
|             |         |
|             |         |
|             |         |
|             |         |
|             |         |
|             |         |

SEF716Z

### 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**

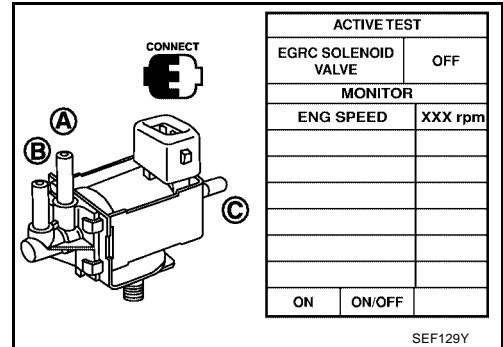
**Ⓜ With CONSULT-II**

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**

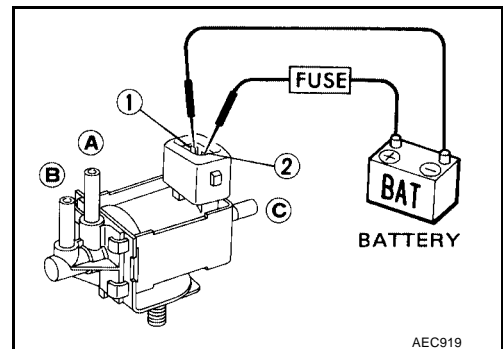
**⊗ Without CONSULT-II**

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-1070, "Component Inspection"](#) .

**OK or NG**

- OK >> GO TO 8.
- NG >> Replace EGR valve.

**8. CHECK EGRC-BPT VALVE**

Refer to [EC-1070, "Component Inspection"](#) .

**OK or NG**

- OK >> GO TO 9.
- NG >> Replace EGRC-BPT valve.

**9. CHECK EGR TEMPERATURE SENSOR**

Refer to [EC-898, "Component Inspection"](#) .

**OK or NG**

- OK >> GO TO 10.
- NG >> Replace EGR temperature sensor.

10. CHECK INTERMITTENT INCIDENT

Perform [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

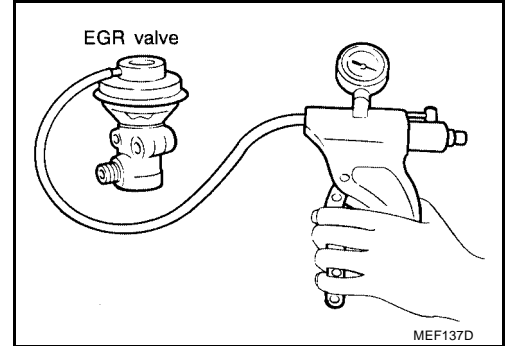
**Component Inspection**  
**EGR VALVE**

UBS006ZM

1. Apply vacuum to EGR vacuum port with a hand vacuum pump.

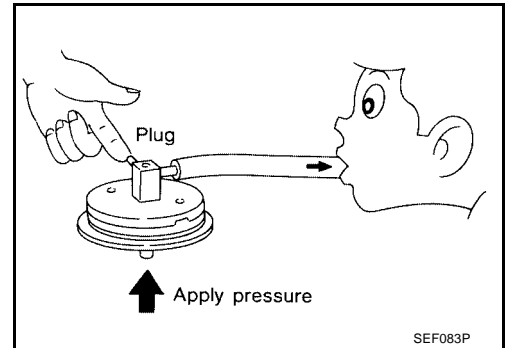
**EGR valve spring should lift.**

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<sub>2</sub> O, 3.94 inH<sub>2</sub> O) from under EGRC-BPT valve.
3. If a leakage is noted, replace the valve.



DTC P1442 EVAP CONTROL SYSTEM

PF14950

On Board Diagnosis Logic

UBS007RB

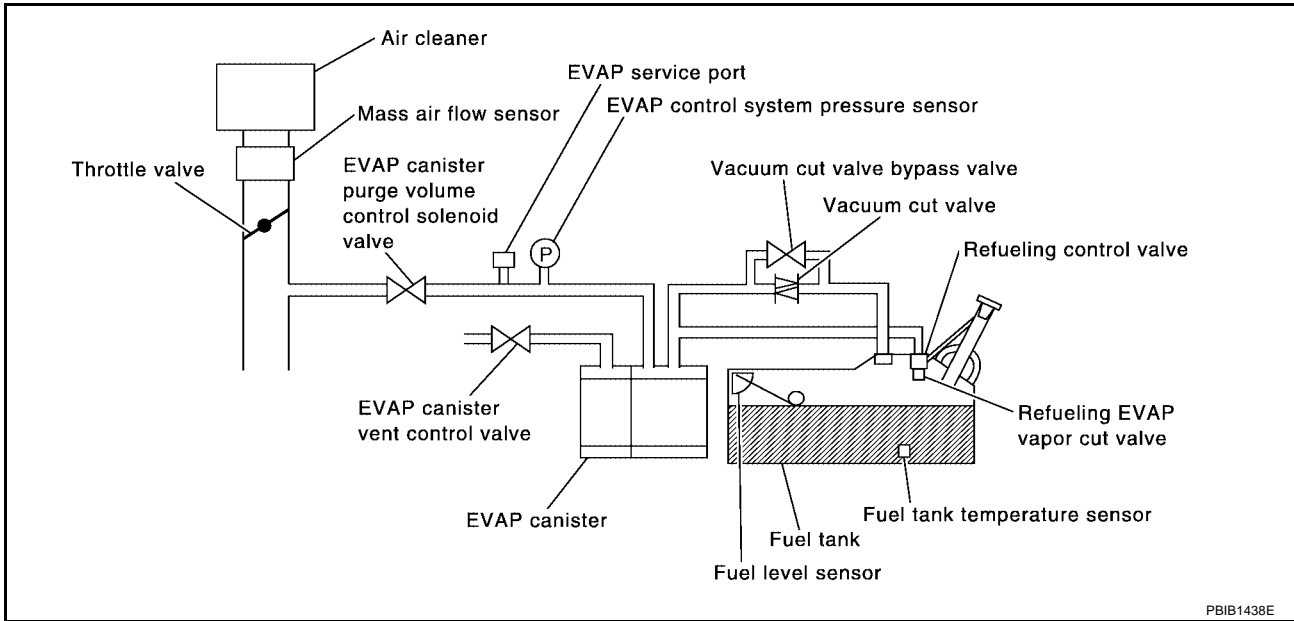
NOTE:

If DTC P1442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See EC-1088.)

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.



PBIB1438E

# DTC P1442 EVAP CONTROL SYSTEM

[VG33E]

| 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. | <ul style="list-style-type: none"> <li>● Incorrect fuel tank vacuum relief valve</li> <li>● Incorrect fuel filler cap used</li> <li>● Fuel filler cap remains open or fails to close.</li> <li>● Foreign matter caught in fuel filler cap.</li> <li>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>● Foreign matter caught in EVAP canister vent control valve.</li> <li>● EVAP canister</li> <li>● EVAP purge line (pipe and rubber tube) leaks</li> <li>● EVAP purge line rubber tube bent</li> <li>● Blocked or bent rubber tube to EVAP control system pressure sensor</li> <li>● Loose or disconnected rubber tube</li> <li>● EVAP canister vent control valve and the circuit</li> <li>● EVAP canister purge volume control solenoid valve</li> <li>● Fuel tank temperature sensor</li> <li>● O-ring of EVAP canister vent control valve is missing or damaged.</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water</li> <li>● Fuel level sensor and the circuit</li> <li>● EVAP control system pressure sensor</li> <li>● Refueling control valve</li> <li>● ORVR system leaks</li> <li>● Foreign matter caught in EVAP canister purge volume control solenoid valve</li> </ul> |

**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

*UBS007RC*

Refer to "P0456 or P1456 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", [EC-962](#) or [EC-1082](#).

## Diagnostic Procedure

*UBS007RD*

Refer to "P0456 or P1456 EVAP CONTROL SYSTEM (VERY SMALL LEAK) (NEGATIVE PRESSURE)", [EC-962](#) or [EC-1082](#).



# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VG33E]

## DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

### Description SYSTEM DESCRIPTION

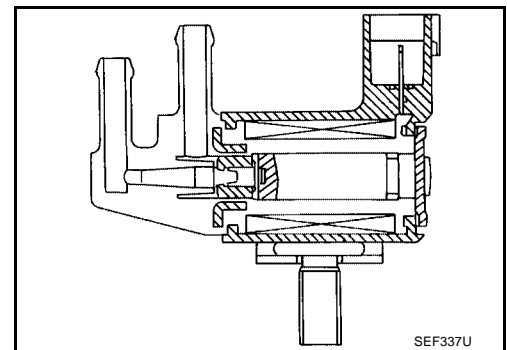
UBS007RE

| 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 sensors 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

UBS007RF

Specification data are reference values.

| MONITOR ITEM | CONDITION   | SPECIFICATION          |
|--------------|---|------------------------|
| PURG VOL C/V | ● Engine: After warming up<br>● Air conditioner switch OFF<br>● Shift lever: "N"<br>● No-load | Idle (Vehicle stopped) |
|              | 2,000 rpm   | 0%                     |

# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VG33E]

UBS007RG

## On Board Diagnosis Logic

| 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. | <ul style="list-style-type: none"> <li>● EVAP control system pressure sensor</li> <li>● EVAP canister purge volume control solenoid valve<br/>(The valve is stuck open.)</li> <li>● EVAP canister vent control valve</li> <li>● EVAP canister</li> <li>● Hoses<br/>(Hoses are connected incorrectly or clogged.)</li> </ul> |

## DTC Confirmation Procedure

UBS007RH

### NOTE:

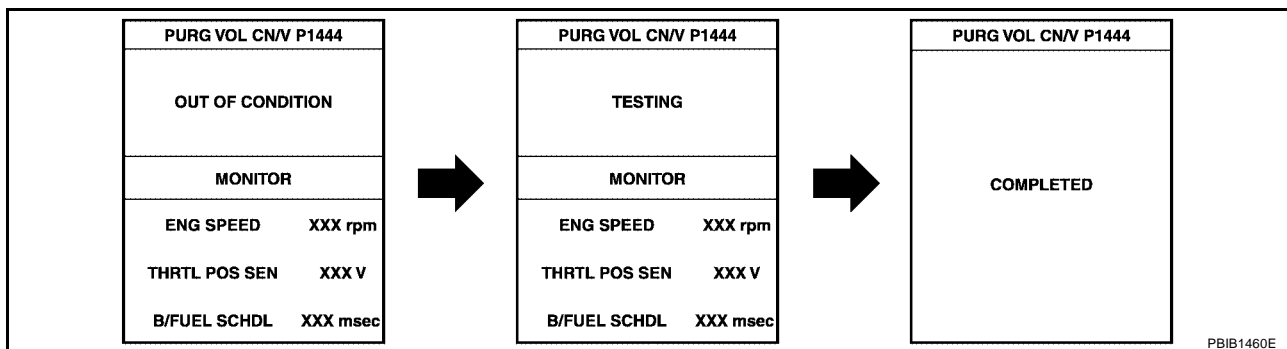
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

### 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-1077, "Diagnostic Procedure"](#).

### WITH GST

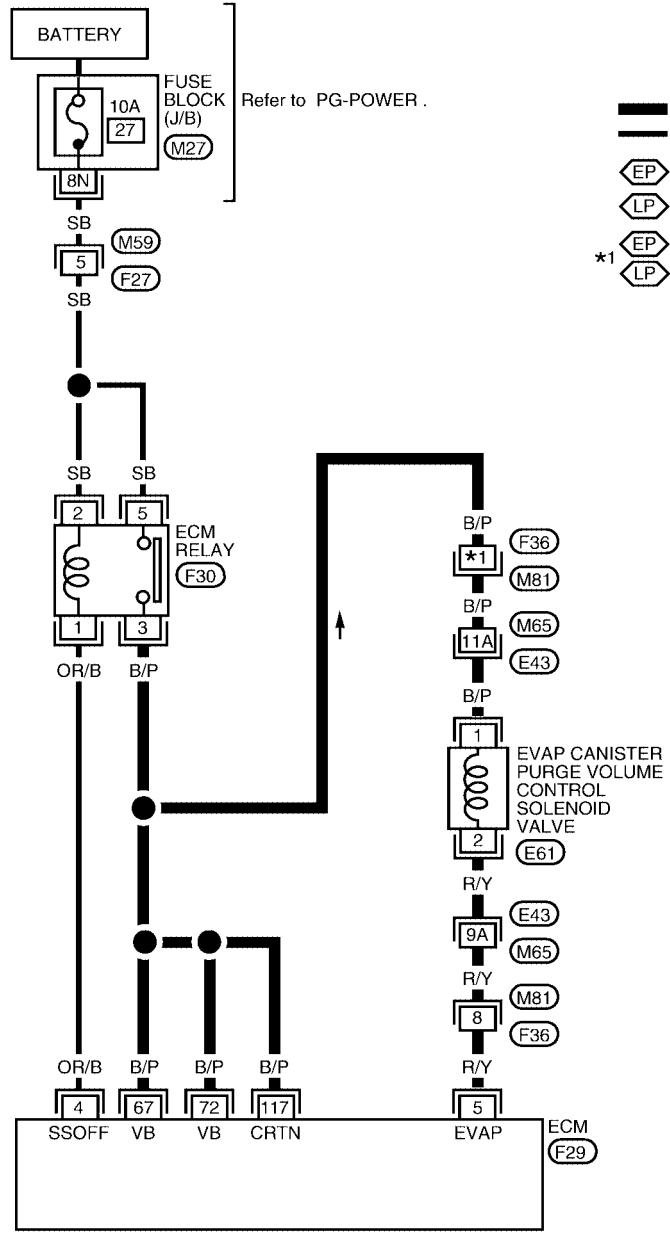
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Start engine and let it idle for at least 20 seconds.
4. Select “MODE 7” with GST.
5. If 1st trip DTC is detected, go to [EC-1077, "Diagnostic Procedure"](#).

# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VG33E]

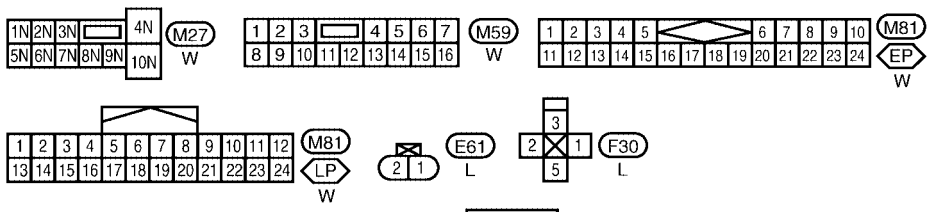
UBS007R1

## Wiring Diagram

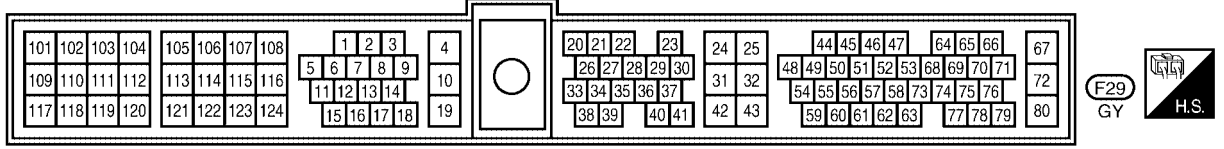
EC-PGC/V-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- \*1 EP : 13
- LP : 15



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



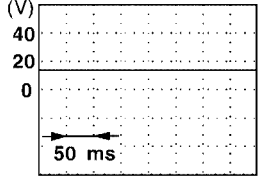
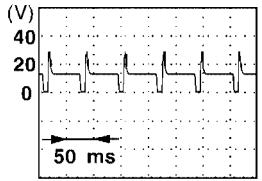
# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

**[VG33E]**

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

**CAUTION:**

**Do not use 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)   |
|---------------|------------|---|---|---|
| 4             | OR/B       | ECM relay (Self shut-off)                         | <b>[Engine is running]</b><br><b>[Ignition switch OFF]</b><br>● For a few seconds after turning ignition switch OFF | 0 - 1.5V  |
|               |            |   | <b>[Ignition switch OFF]</b><br>● A few seconds passed after turning ignition switch OFF                            | BATTERY VOLTAGE<br>(11 - 14V)   |
| 5             | R/Y        | EVAP canister purge volume control solenoid valve | <b>[Engine is running]</b><br>● Idle speed  | BATTERY VOLTAGE<br>(11 - 14V)★<br><br>SEF994U  |
|               |            |   | <b>[Engine is running]</b><br>● Engine speed is 2,000 rpm   | BATTERY VOLTAGE<br>(11 - 14V)★<br><br>SEF995U |
| 67            | B/P        | Power supply for ECM                              | <b>[Ignition switch ON]</b>   | BATTERY VOLTAGE<br>(11 - 14V)   |
| 72            | B/P        |   |   |   |
| 117           | B/P        | Current return                                    | <b>[Engine is running]</b><br>● Idle speed  | BATTERY VOLTAGE<br>(11 - 14V)   |

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

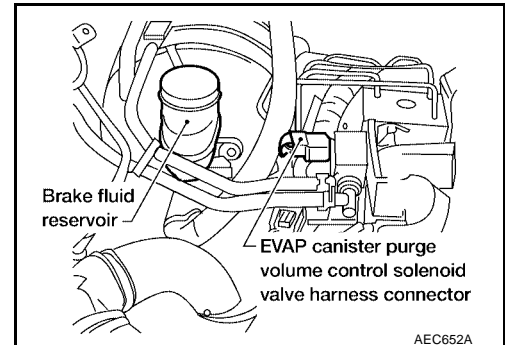
# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VG33E]

UBS007RJ

## Diagnostic Procedure

### 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.

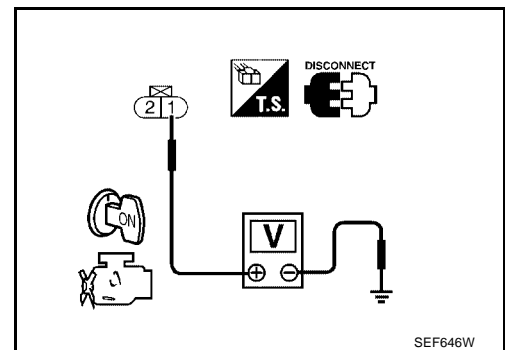


4. Check voltage between terminal 1 and engine ground with CONSULT-II or tester.

**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.

# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VG33E]

## 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

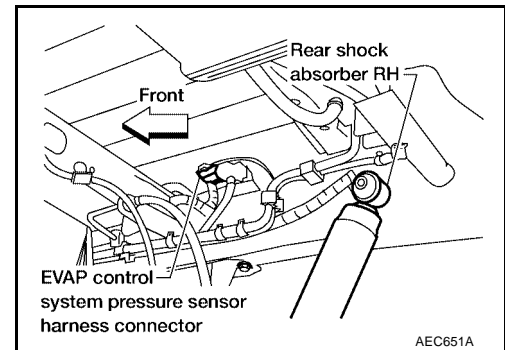
- OK >> GO TO 6.
- NG >> Repair it.

## 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.

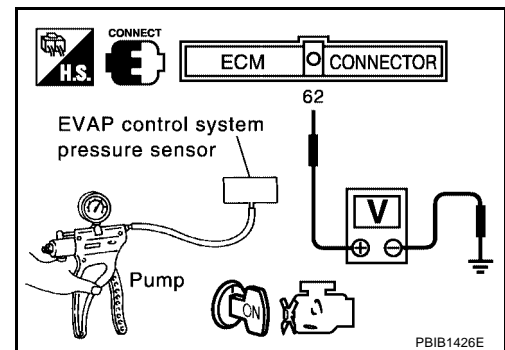
| Applied vacuum                    | Voltage V                          |
|-----------------------------------|------------------------------------|
| Not applied                       | 1.4 - 4.8                          |
| -26.7 kPa (-200 mmHg, -7.87 inHg) | 2.1 to 2.5V lower than above value |

**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.



# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VG33E]

## 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

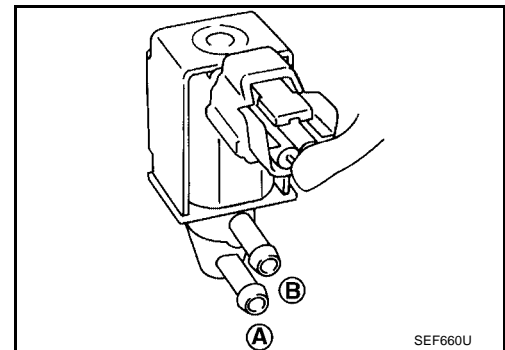
3. Check air passage continuity.

| Condition<br>PURG VOL CONT/V value | Air passage continuity<br>between A and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |

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

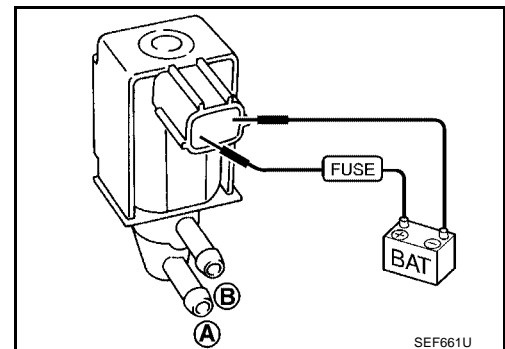
Check air passage continuity.

| Condition  | Air passage continuity<br>between A and B |
|--|---|
| 12V direct current supply between<br>terminals 1 and 2 | Yes                                       |
| No supply  | No  |

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.



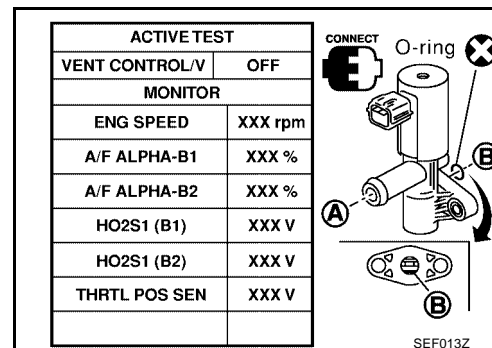
### 10. CHECK EVAP CANISTER VENT CONTROL VALVE

#### 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.

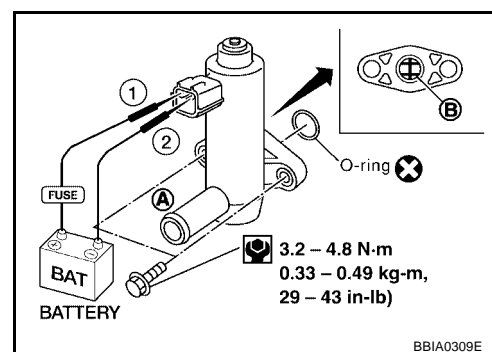
If portion **B** is rusted, replace control valve.

**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.

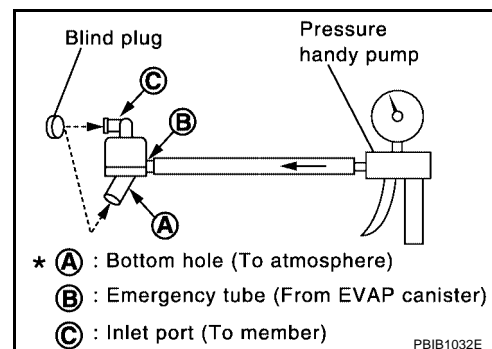
**NOTE:**

- Do not disassemble water separator.

OK or NG

OK >> GO TO 13.

NG >> Replace water separator.





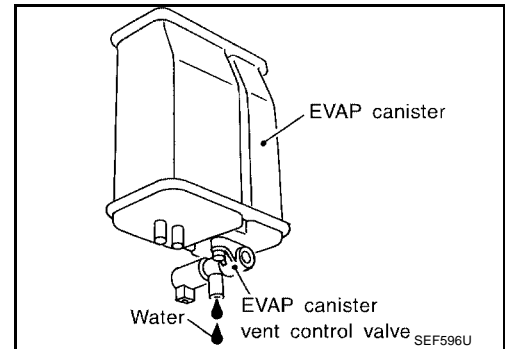
# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VG33E]

## 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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

## DTC P1446 EVAP CANISTER VENT CONTROL VALVE

PFP:14935

### Component Description

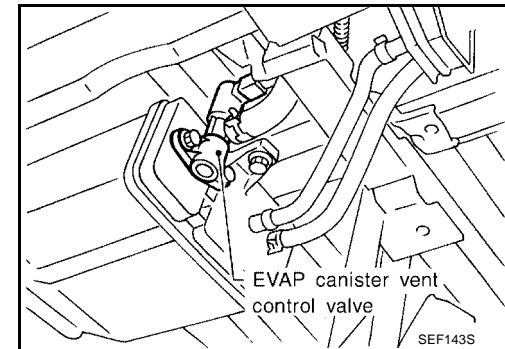
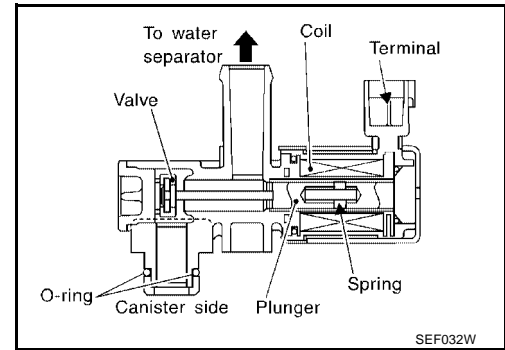
UBS007RL

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

UBS007RM

Specification data are reference values.

| MONITOR ITEM | CONDITION             | SPECIFICATION |
|--------------|-----------------------|---------------|
| VENT CONT/V  | ● Ignition switch: ON | OFF           |

### On Board Diagnosis Logic

UBS007RN

| 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. | <ul style="list-style-type: none"> <li>● EVAP canister vent control valve</li> <li>● EVAP control system pressure sensor and the circuit</li> <li>● Blocked rubber tube to EVAP canister vent control valve</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water</li> </ul> |

### DTC Confirmation Procedure

UBS007RO

**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.

# DTC P1446 EVAP CANISTER VENT CONTROL VALVE

[VG33E]

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-1085, "Diagnostic Procedure"](#).

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| COOLAN TEMP/S | XXX °C   |
| VHCL SPEED SE | XXX km/h |
| THRTL POS SEN | XXX V    |
| B/FUEL SCHDL  | XXX msec |

SEF201Y

 **WITH GST**

Follow the procedure "With CONSULT-II".

A

EC

C

D

E

F

G

H

I

J

K

L

M

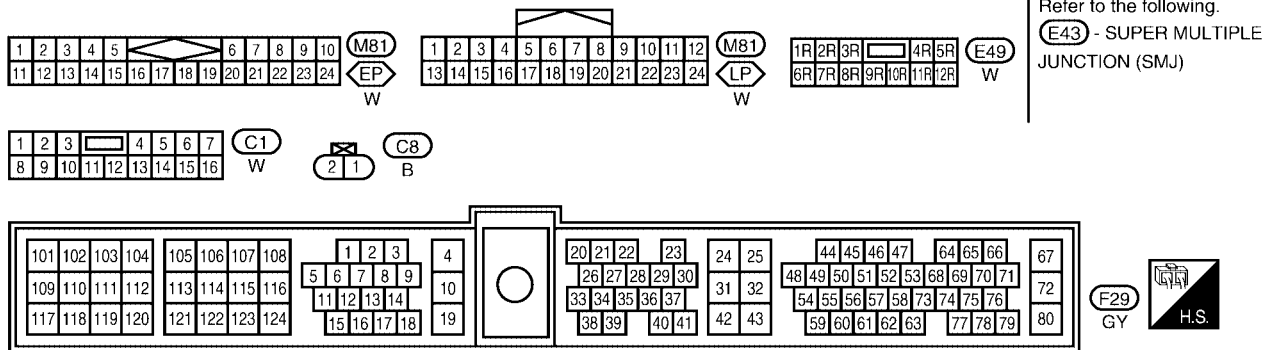
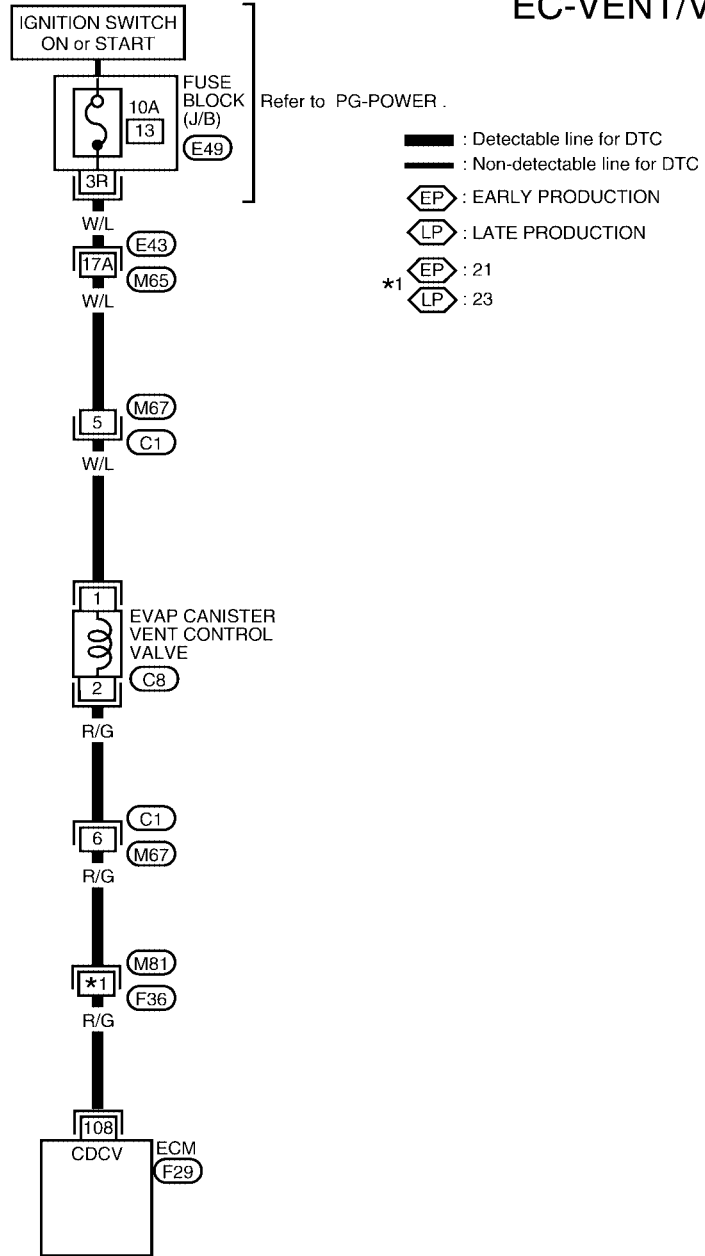
# DTC P1446 EVAP CANISTER VENT CONTROL VALVE

[VG33E]

UBS007RP

## Wiring Diagram

EC-VENT/V-01



WBWA0060E

# DTC P1446 EVAP CANISTER VENT CONTROL VALVE

[VG33E]

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

**CAUTION:**

Do not use 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.

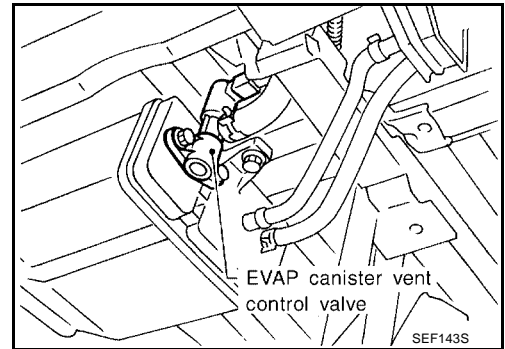
| TER-MINAL NO. | WIRE COLO R | ITEM                             | CONDITION            | DATA (DC Voltage)          |
|---------------|-------------|----------------------------------|----------------------|----------------------------|
| 108           | R/G         | EVAP canister vent control valve | [Ignition switch ON] | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

UBS007RQ

### 1. CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Check obstructed rubber tube connected to EVAP canister vent control valve.



OK or NG

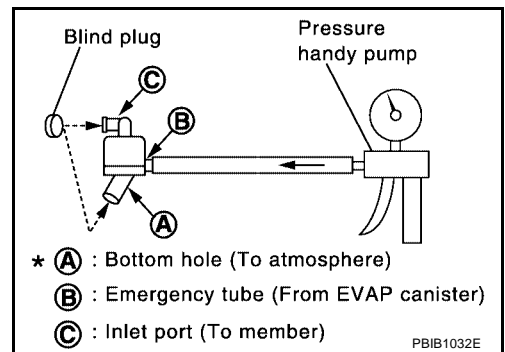
- OK >> GO TO 2.
- NG >> Clean, repair or replace rubber tube.

### 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.

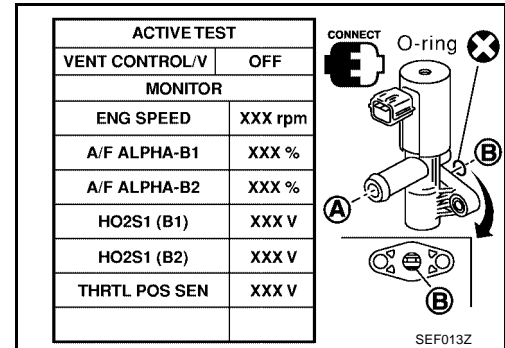
## 3. CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

### 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.

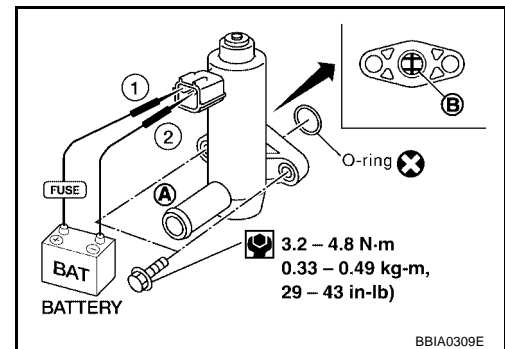
If portion **B** is rusted, replace control valve.

**Make sure new O-ring is installed properly.**

OK or NG

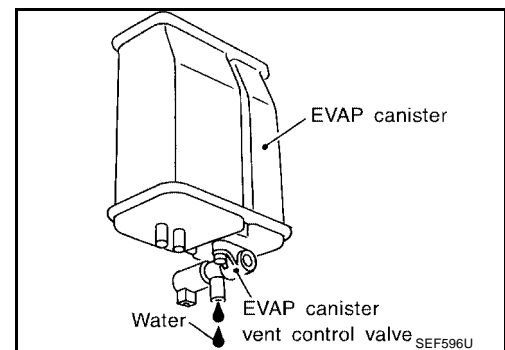
OK >> GO TO 4.

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

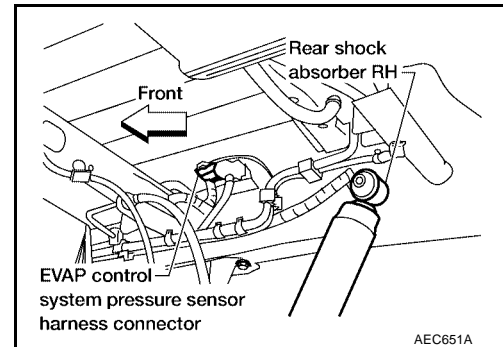
- OK >> GO TO 8.
- NG >> Repair it.

## 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 "DTC Confirmation Procedure" for DTC P0452 or P0453, [EC-937](#) or [EC-943](#).

OK or NG

- OK >> GO TO 10.
- NG >> Replace EVAP control system pressure sensor.

## 10. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END.

## DTC P1448 EVAP CANISTER VENT CONTROL VALVE

PFP:14935

### Component Description

UBS007RR

**NOTE:**

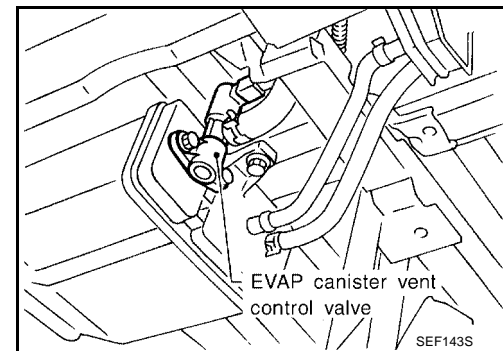
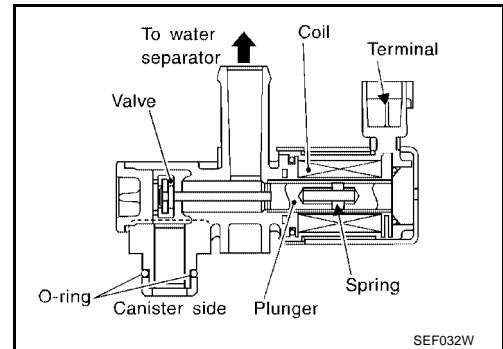
**If DTC P1448 is displayed with P0442, perform trouble diagnosis for DTC P1448 first.**

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

UBS007RS

Specification data are reference values.

| MONITOR ITEM | CONDITION             | SPECIFICATION |
|--------------|-----------------------|---------------|
| VENT CONT/V  | ● Ignition switch: ON | OFF           |

### On Board Diagnosis Logic

UBS007RT

| 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. | <ul style="list-style-type: none"> <li>● EVAP canister vent control valve</li> <li>● EVAP control system pressure sensor and the circuit</li> <li>● Blocked rubber tube to EVAP canister vent control valve</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water</li> <li>● Vacuum cut valve</li> </ul> |

### DTC Confirmation Procedure

UBS007RU

**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.



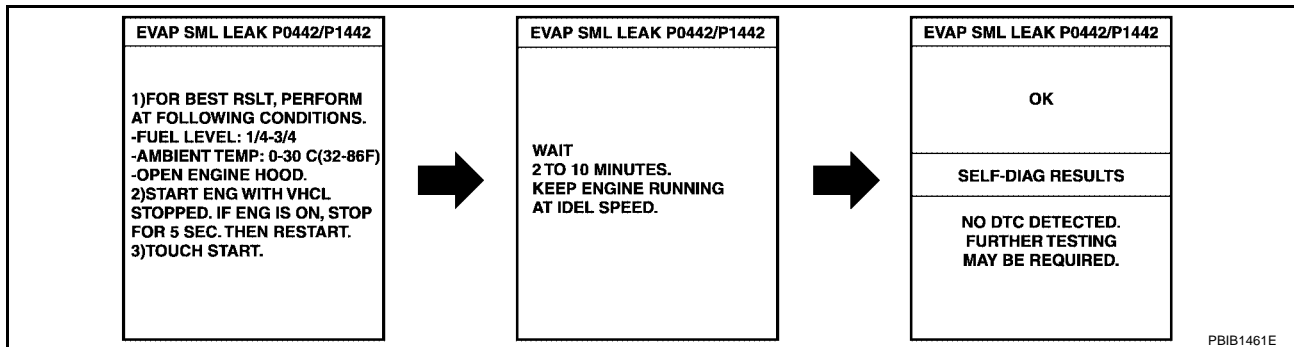
# DTC P1448 EVAP CANISTER VENT CONTROL VALVE

[VG33E]

- 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” 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-648, "Basic Inspection"](#).

6. Make sure that “OK” is displayed.  
If “NG” is displayed, go to the following step.

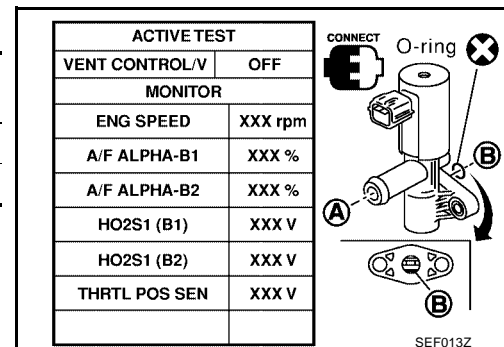
**NOTE:**

**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<br>VENT CONTROL/V | Air passage continuity between A and B |
|-----------------------------|--|
| ON                          | No                                     |
| OFF                         | Yes                                    |

If the result is NG, go to [EC-1092, "Diagnostic Procedure"](#).  
If the result is OK, go to [EC-915, "Diagnostic Procedure"](#).



## Overall Function Check

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.

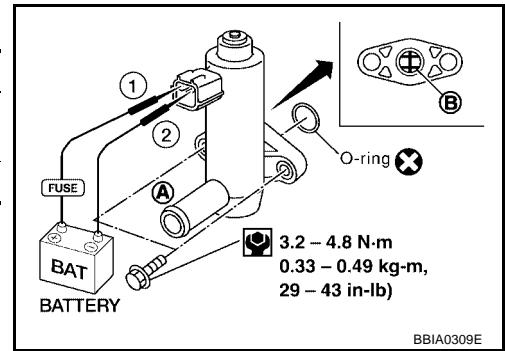
# DTC P1448 EVAP CANISTER VENT CONTROL VALVE

[VG33E]

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-1092. "Diagnostic Procedure"](#) .  
If the result is OK, go to [EC-915. "Diagnostic Procedure"](#) .



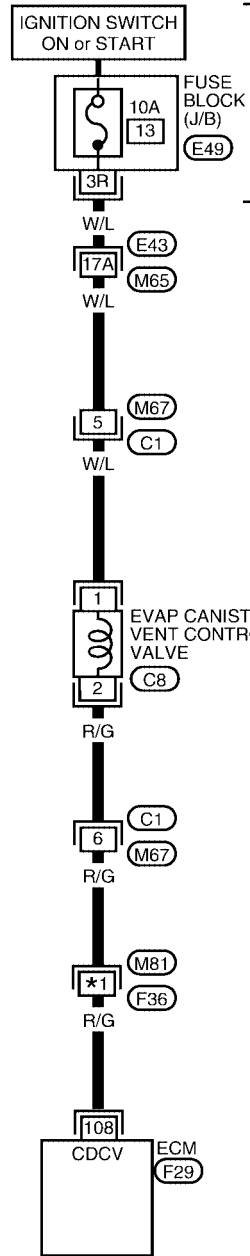
# DTC P1448 EVAP CANISTER VENT CONTROL VALVE

[VG33E]

UBS007RW

## Wiring Diagram

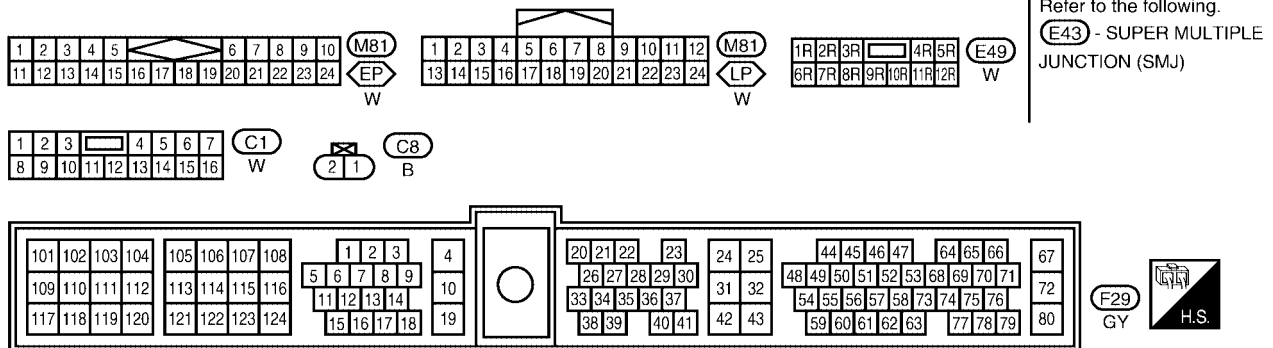
EC-VENT/V-01



Refer to PG-POWER .

- : Detectable line for DTC
- : Non-detectable line for DTC
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 21
- \*1 : 23

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



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

# DTC P1448 EVAP CANISTER VENT CONTROL VALVE

[VG33E]

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

**CAUTION:**

Do not use 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 COLO R | ITEM                             | CONDITION            | DATA (DC Voltage)          |
|---------------|-------------|----------------------------------|----------------------|----------------------------|
| 108           | R/G         | EVAP canister vent control valve | [Ignition switch ON] | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

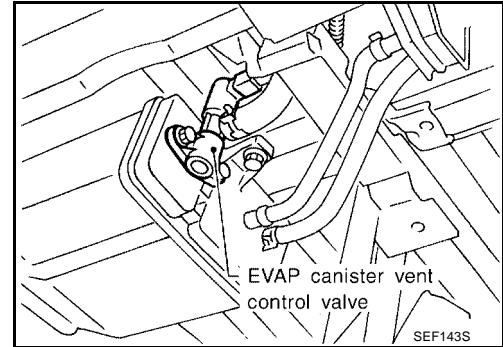
UBS007RX

### 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

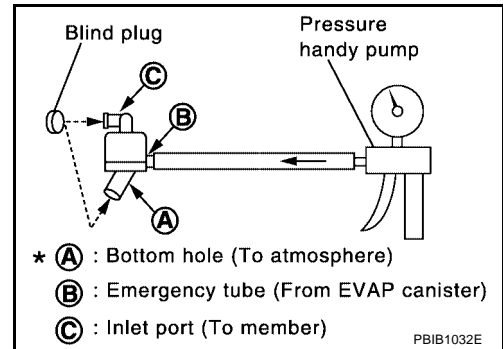
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

**NOTE:**

- Do not disassemble water separator.

OK or NG

- OK >> GO TO 3.
- NG >> Replace water separator.



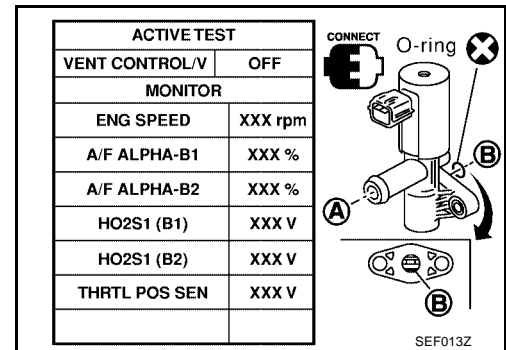
## 3. CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

### 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.

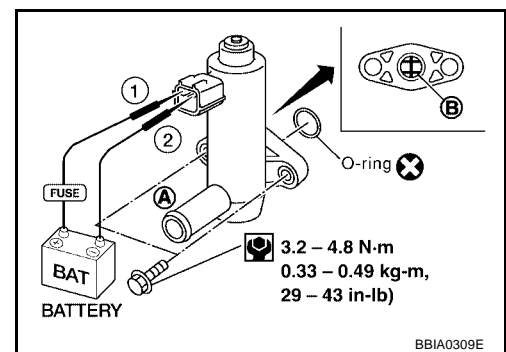
If portion B is rusted, replace control valve.

**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

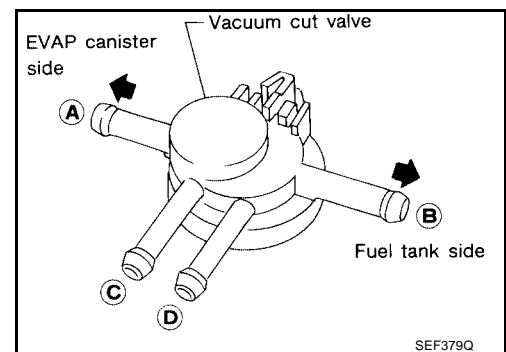
Check vacuum cut valve as follows:

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.

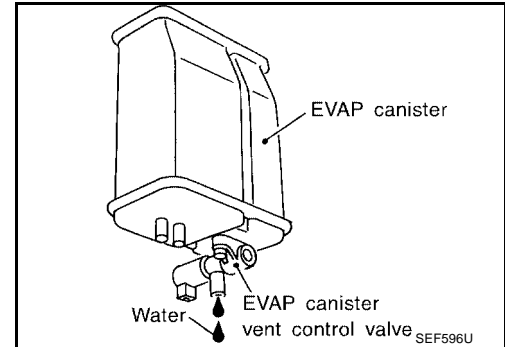


## 5. CHECK IF EVAP CANISTER SATURATED WITH WATER

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

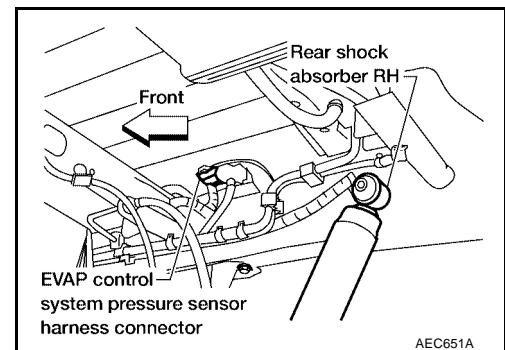
- OK >> GO TO 9.
- NG >> Repair it.

## 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 "DTC Confirmation Procedure" for DTC P0452 [EC-937](#) or DTC P0453 [EC-943](#) .

OK or NG

- OK >> GO TO 11.
- NG >> Replace EVAP control system pressure sensor.

# DTC P1448 EVAP CANISTER VENT CONTROL VALVE

[VG33E]

---

## 11. CHECK INTERMITTENT INCIDENT

---

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

A

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DTC P1456 EVAP CONTROL SYSTEM

PFP:14710

On Board Diagnosis Logic

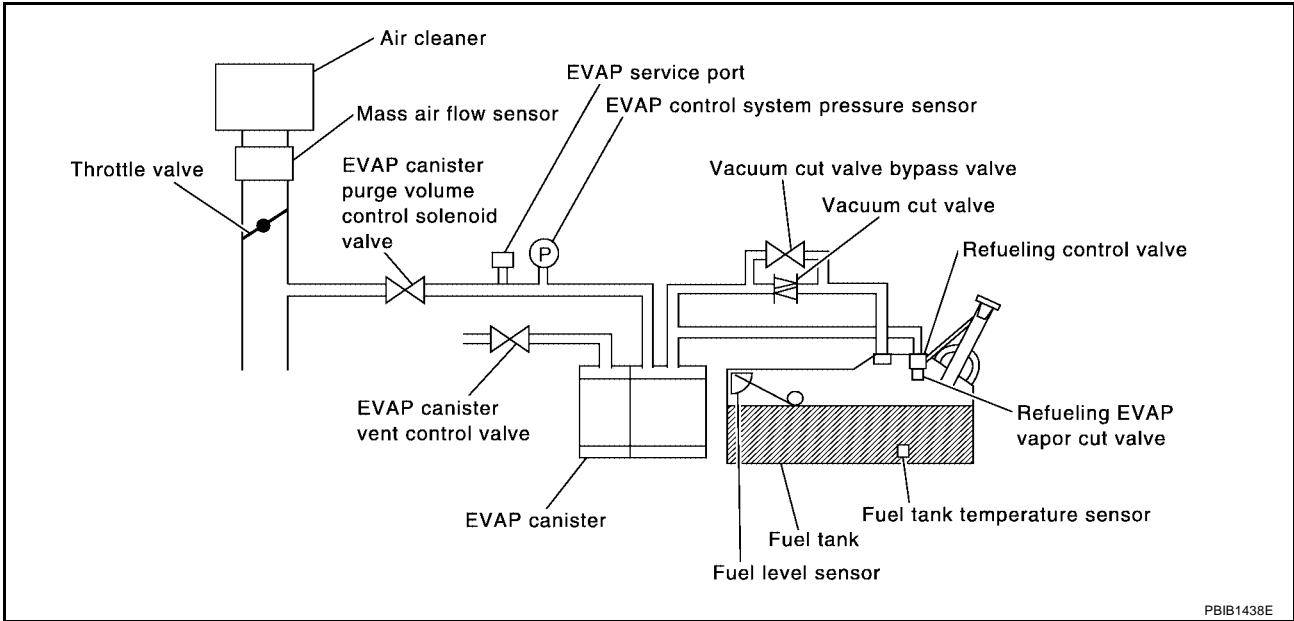
UBS007RY

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.



PBIB1438E

| DTC No. | Trouble diagnosis name  | DTC detecting condition  | Possible cause  |
|---------|---|--|---|
| P1456   | Evaporative emission control system very small leak (positive pressure check) | <ul style="list-style-type: none"> <li>● EVAP system has a very small leak.</li> <li>● EVAP system does not operate properly.</li> </ul> | <ul style="list-style-type: none"> <li>● Incorrect fuel tank vacuum relief valve</li> <li>● Incorrect fuel filler cap used</li> <li>● Fuel filler cap remains open or fails to close.</li> <li>● Foreign matter caught in fuel filler cap.</li> <li>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>● Foreign matter caught in EVAP canister vent control valve.</li> <li>● EVAP canister or fuel tank leaks</li> <li>● EVAP purge line (pipe and rubber tube) leaks</li> <li>● EVAP purge line rubber tube bent</li> <li>● Blocked or bent rubber tube to EVAP control system pressure sensor</li> <li>● Loose or disconnected rubber tube</li> <li>● EVAP canister vent control valve and the circuit</li> <li>● EVAP canister purge volume control solenoid valve</li> <li>● Fuel tank temperature sensor</li> <li>● O-ring of EVAP canister vent control valve is missing or damaged</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water</li> <li>● Fuel level sensor and the circuit</li> <li>● EVAP control system pressure sensor</li> <li>● Refueling control valve</li> <li>● ORVR system leaks</li> </ul> |



**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

UBS007RZ

**CAUTION:**

Never remove fuel filler cap during the DTC confirmation procedure.

**NOTE:**

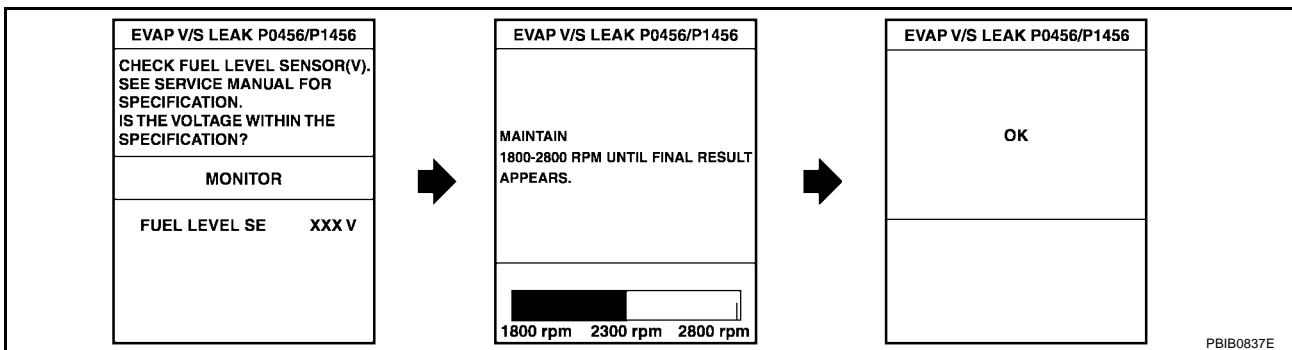
- If DTC P0456 or P1456 is displayed with P0442 or P1442, perform TROUBLE DIAGNOSIS FOR DTC P0456 or P1456 first.
- After repair, make sure that the hoses and clips are installed properly.
- If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 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-1098, "Diagnostic Procedure"](#) .

**NOTE:**

- If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to [EC-648, "Basic Inspection"](#) .

- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

## Overall Function Check

UBS007S0

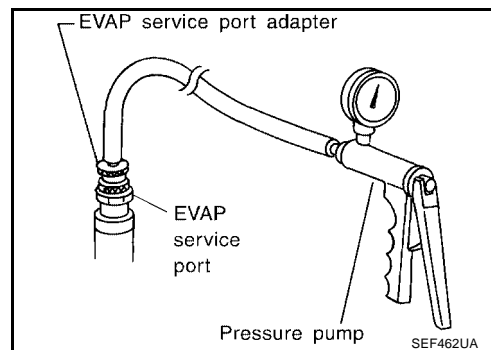
### WITH GST

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<sup>2</sup>, 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-1098, "Diagnostic Procedure"](#).

#### NOTE:

For more information, refer to GST instruction manual.

## Diagnostic Procedure

UBS007S1

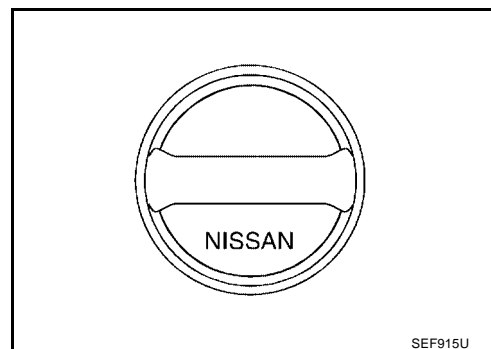
### 1. CHECK FUEL FILLER CAP DESIGN

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

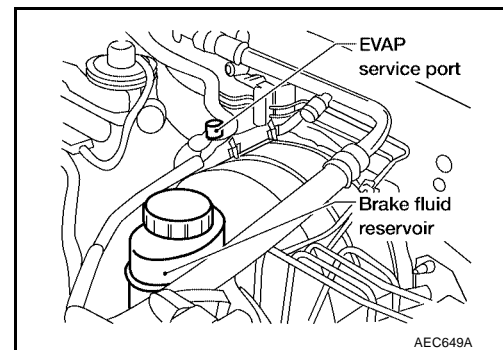
Refer to [EC-1172, "FUEL TANK VACUUM RELIEF VALVE \(BUILT INTO FUEL FULLER CAP\)"](#).

OK or NG

- OK >> GO TO 5.
- NG >> Replace fuel filler cap with a genuine one.

### 5. INSTALL THE PRESSURE PUMP

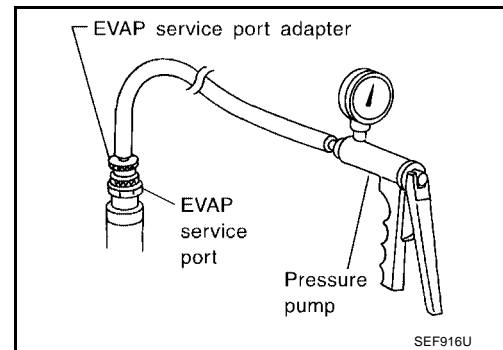
To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



**NOTE:**

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

- Models with CONSULT-II >> GO TO 6.
- Models without CONSULT-II >> GO TO 7.



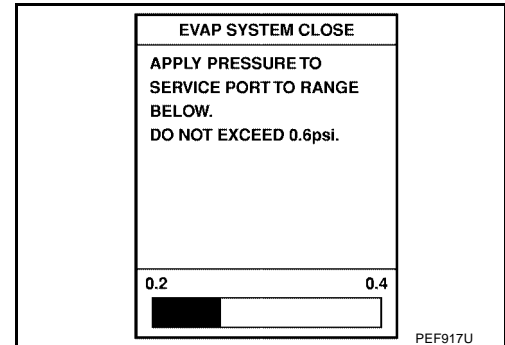
## 6. CHECK FOR EVAP LEAK

### With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

**NOTE:**

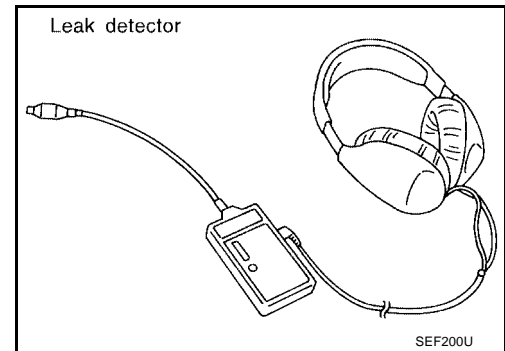
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-1170, "EVAPORATIVE EMISSION LINE DRAWING"](#).

**OK or NG**

- OK    >> GO TO 8.  
 NG    >> Repair or replace.



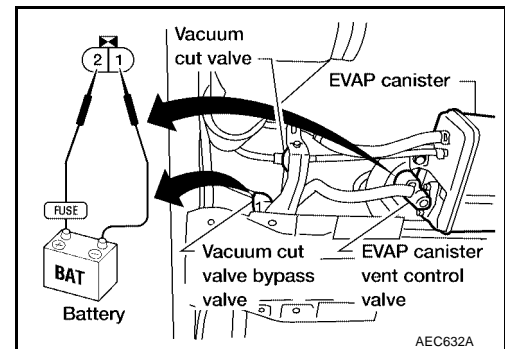
## 7. CHECK FOR EVAP LEAK

### 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:**

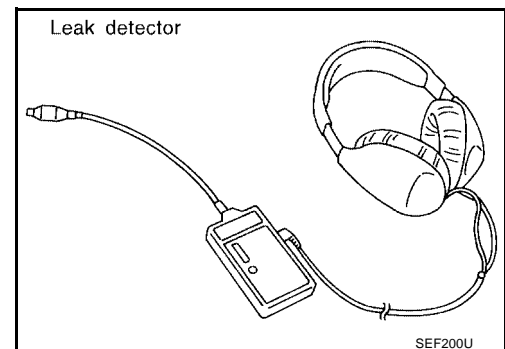
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-1170, "EVAPORATIVE EMISSION LINE DRAWING"](#).

**OK or NG**

- OK    >> GO TO 8.  
 NG    >> Repair or replace.



## 8. CHECK WATER SEPARATOR

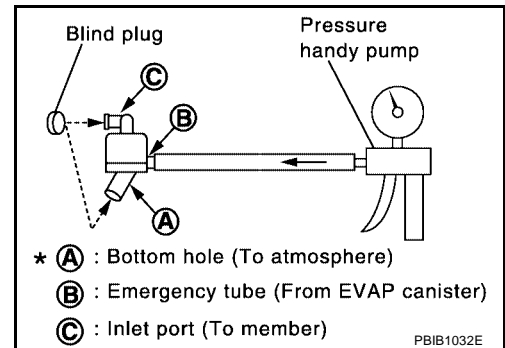
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG 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-1088, "DTC Confirmation Procedure"](#) .

**OK or NG**

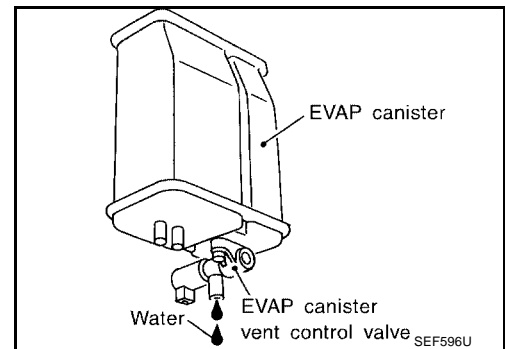
- OK >> GO TO 10.
- NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

## 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 100.0%.
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.

| 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

**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-601, "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.

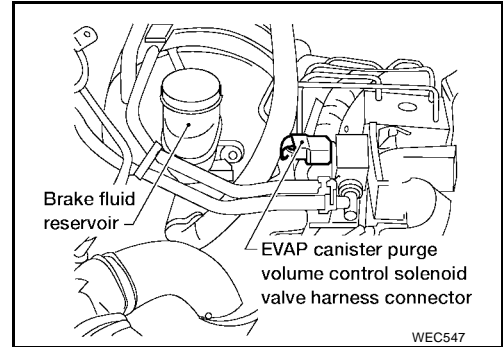
| ACTIVE TEST     |         |
|-----------------|---------|
| PURG VOL CONT/V | 0.0%    |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| A/F ALPHA-B2    | XXX %   |
| HO2S1 MNTR (B1) | RICH    |
| HO2S1 MNTR (B2) | RICH    |
| THRTL POS SEN   | XXX V   |
|                 |         |

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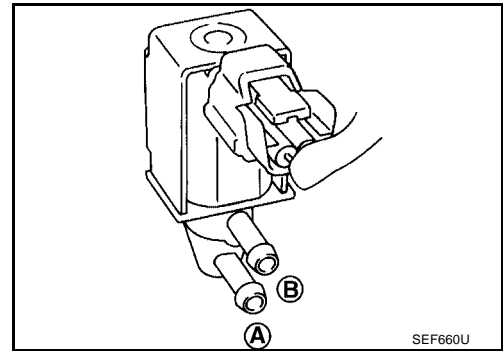
17. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

 With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

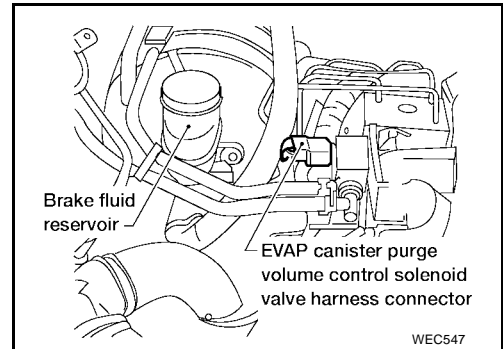


| Condition<br>PURG VOL CONT/V value | Air passage continuity between<br>A and B |
|------------------------------------|---|
| 100.0 %                            | Yes                                       |
| 0.0%                               | No  |

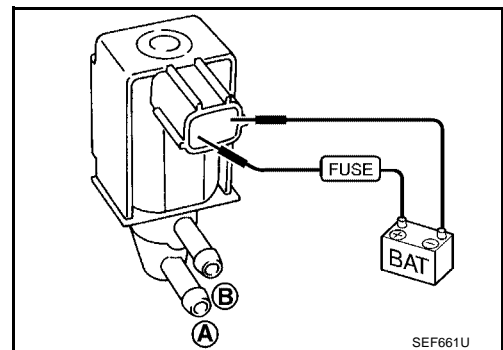


 Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



| Condition  | Air passage continuity between<br>A and B |
|--|---|
| 12V direct current supply between terminals<br>1 and 2 | Yes                                       |
| No supply  | No  |



OK or NG

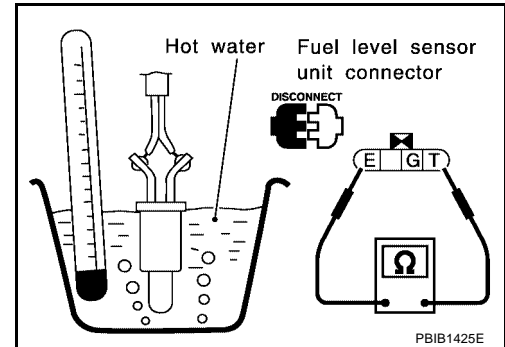
OK >> GO TO 18.

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.

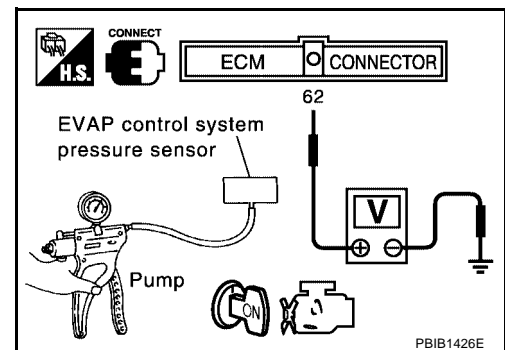
| Applied vacuum                    | Voltage V                          |
|-----------------------------------|------------------------------------|
| Not applied                       | 1.8 - 4.8                          |
| -26.7 kpa (-200 mmHg, -7.87 inHg) | 2.1 to 2.5V lower than above value |

**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-1170, "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 FUEL LEVEL SENSOR**

---

Refer to [DI-18, "FUEL LEVEL SENSOR UNIT CHECK"](#) .

OK or NG

OK >> GO TO 23.

NG >> Replace fuel level sensor unit.

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**23. CHECK INTERMITTENT INCIDENT**

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Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

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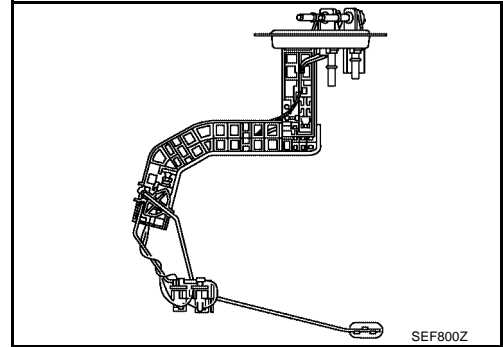
## DTC P1464 FUEL LEVEL SENSOR

### Component Description

UBS007S2

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



### On Board Diagnosis Logic

UBS007S3

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. | <ul style="list-style-type: none"> <li>● Harness or connectors<br/>(The sensor circuit is open or shorted)</li> </ul> |

### DTC Confirmation Procedure

UBS007S4

#### 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-1108, "Diagnostic Procedure"](#).

| DATA MONITOR  |        |
|---------------|--------|
| MONITOR       | NO DTC |
| FUEL T/TMP SE | XXX °C |
| FUEL LEVEL SE | XXX V  |

SEF195Y

#### WITH GST

Follow the procedure "WITH CONSULT-II" above.

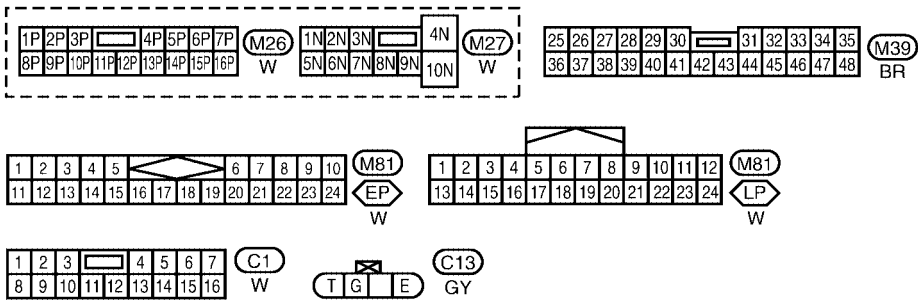
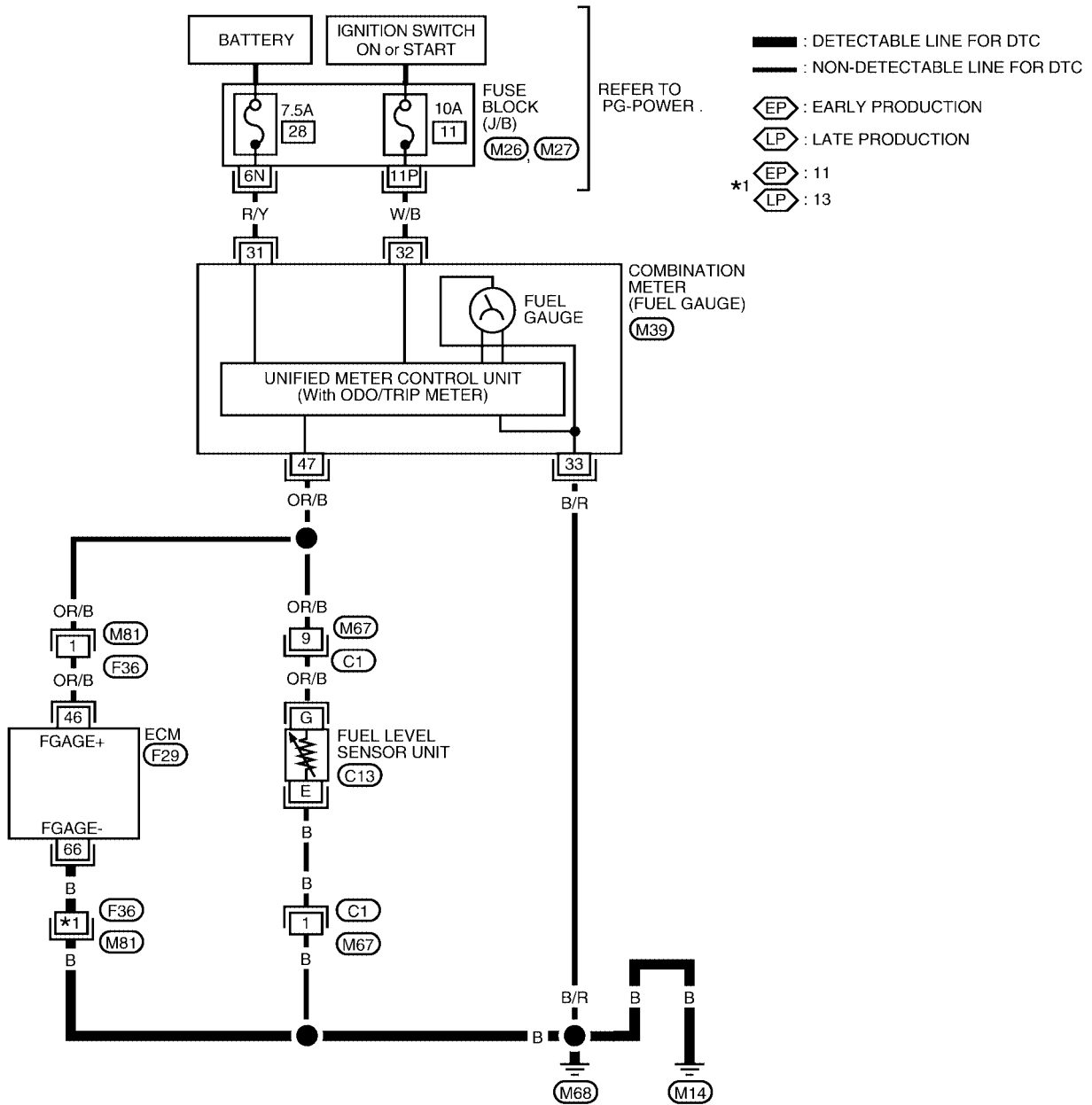
# DTC P1464 FUEL LEVEL SENSOR

[VG33E]

UBS007S5

## Wiring Diagram

EC-FLS3-01



Refer to the following.  
**F29** - ELECTRICAL UNITS

WBWA0064E

# DTC P1464 FUEL LEVEL SENSOR

[VG33E]

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

## CAUTION:

**Do not use ECM ground terminals when measuring input/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)  |
|---------------|------------|--------------------------|-------------------------------------|--|
| 46            | G          | Fuel level sensor        | [Ignition switch ON]                | Approximately 0 - 4.8V<br>Output voltage varies with fuel level. |
| 66            | B          | Fuel level sensor ground | [Engine is running]<br>● Idle speed | Approximately 0V   |

## Diagnostic Procedure

UBS007S6

### 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 body 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 body 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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## Removal and Installation FUEL LEVEL SENSOR

UBS007S7

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

DTC P1490 VACUUM CUT VALVE BYPASS VALVE

PF17372

UBS007S8

Description

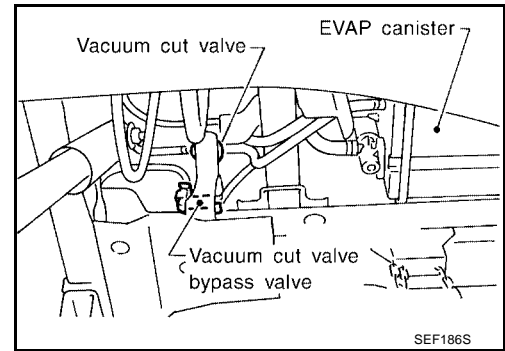
COMPONENT DESCRIPTION

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.

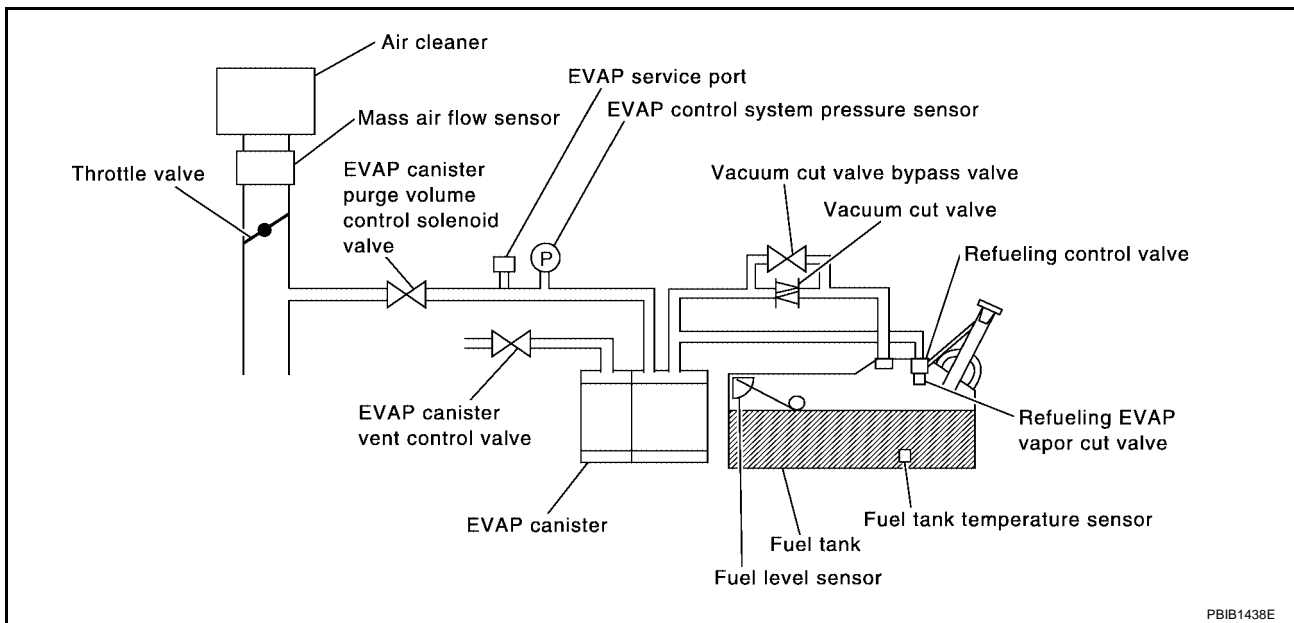
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

UBS007S9

Specification data are reference values.

| MONITOR ITEM  | CONDITION             | SPECIFICATION |
|---------------|-----------------------|---------------|
| VC/V BYPASS/V | ● Ignition switch: ON | OFF           |

On Board Diagnosis Logic

UBS007SA

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted)</li> <li>● Vacuum cut valve bypass valve</li> </ul> |

DTC Confirmation Procedure

UBS007SB

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-1112, "Diagnostic Procedure"](#).

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

**WITH GST**

Follow the procedure "With CONSULT-II".

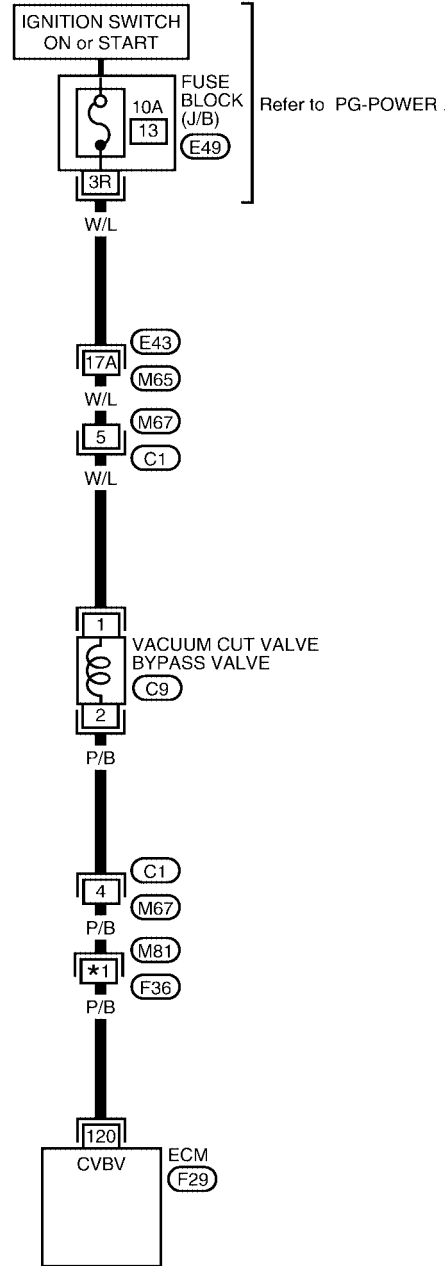
# DTC P1490 VACUUM CUT VALVE BYPASS VALVE

[VG33E]

UBS007SC

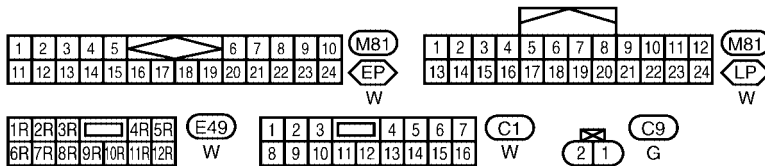
## Wiring Diagram

### EC-BYPS/V-01

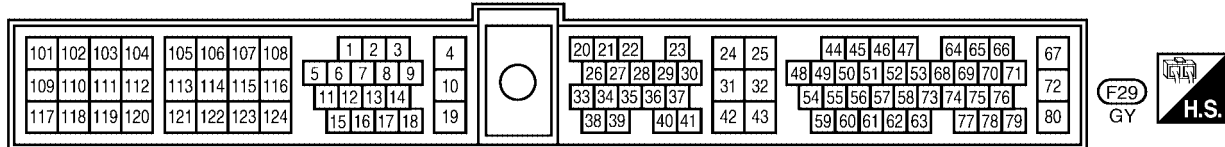


- : Detectable line for DTC
- : Non-detectable line for DTC
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 15
- : 17

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



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



WBWA0065E

# DTC P1490 VACUUM CUT VALVE BYPASS VALVE

[VG33E]

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

## CAUTION:

Do not use 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 COLO R | ITEM                          | CONDITION            | DATA (DC Voltage)          |
|---------------|-------------|-------------------------------|----------------------|----------------------------|
| 120           | P/B         | Vacuum cut valve bypass valve | [Ignition switch ON] | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

UBS007SD

### 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   |
|                 |         |

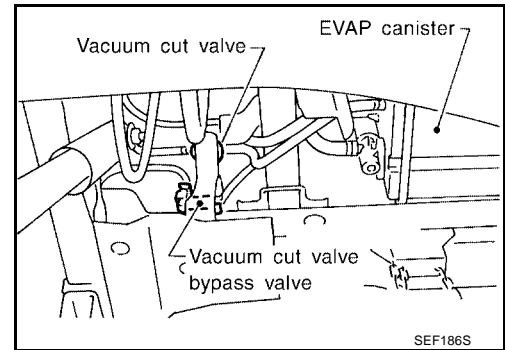
SEF014Z



## 3. CHECK VACUUM CUT VALVE BYPASS VALVE 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".

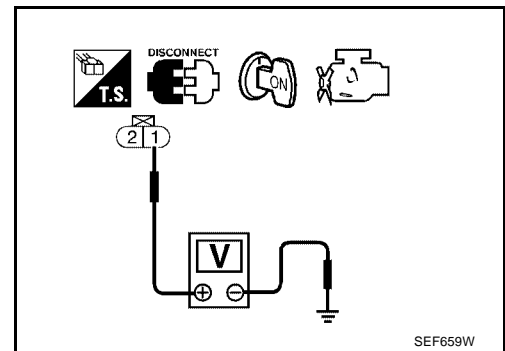


4. Check voltage between terminal 1 and ground with CONSULT-II or tester.

**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.

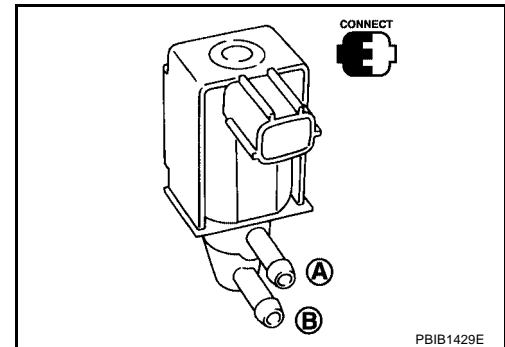
| ACTIVE TEST     |         |
|-----------------|---------|
| VC/V BYPASS/V   | OFF     |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| A/F ALPHA-B2    | XXX %   |
| HO2S1 MNTR (B1) | LEAN    |
| HO2S1 MNTR (B2) | LEAN    |
| THRTL POS SEN   | XXX V   |

SEF014Z

2. Check air passage continuity and operation delay time under the following conditions.

| Condition<br>VC/V BYPASS/V | Air passage continuity between A and B |
|----------------------------|--|
| ON                         | Yes                                    |
| OFF                        | No                                     |

**Operation takes less than 1 second.**



### ⊗ Without CONSULT-II

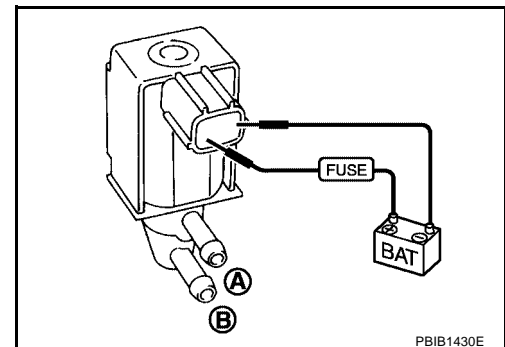
Check air passage continuity and operation delay time under the following conditions.

| 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.**

OK or NG

- OK >> GO TO 8.
- NG >> Replace vacuum cut valve bypass valve.



## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

DTC P1491 VACUUM CUT VALVE BYPASS VALVE

Description

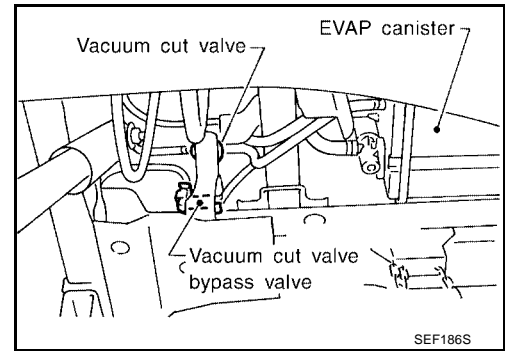
COMPONENT DESCRIPTION

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.

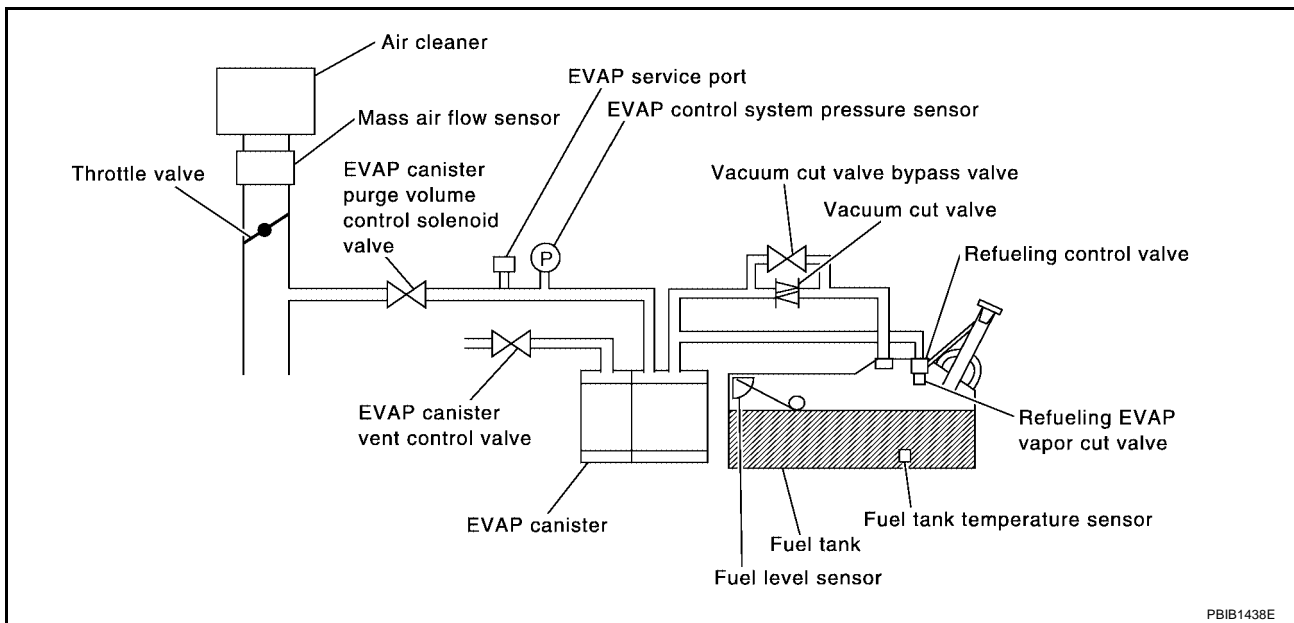
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

Specification data are reference values.

| MONITOR ITEM  | CONDITION             | SPECIFICATION |
|---------------|-----------------------|---------------|
| VC/V BYPASS/V | ● Ignition switch: ON | OFF           |

## On Board Diagnosis Logic

| 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. | <ul style="list-style-type: none"> <li>● Vacuum cut valve bypass valve</li> <li>● Vacuum cut valve</li> <li>● Bypass hoses for clogging</li> <li>● EVAP control system pressure sensor and circuit</li> <li>● EVAP canister vent control valve</li> <li>● Hose between fuel tank and vacuum cut valve clogged</li> <li>● Hose between vacuum cut valve and EVAP canister clogged</li> <li>● EVAP canister</li> <li>● EVAP purge port of fuel tank for clogging</li> <li>● Refueling control valve</li> <li>● Refueling EVAP vapor cut valve</li> </ul> |

## DTC Confirmation Procedure

**CAUTION:**

**Always drive vehicle at a safe speed.**

**NOTE:**

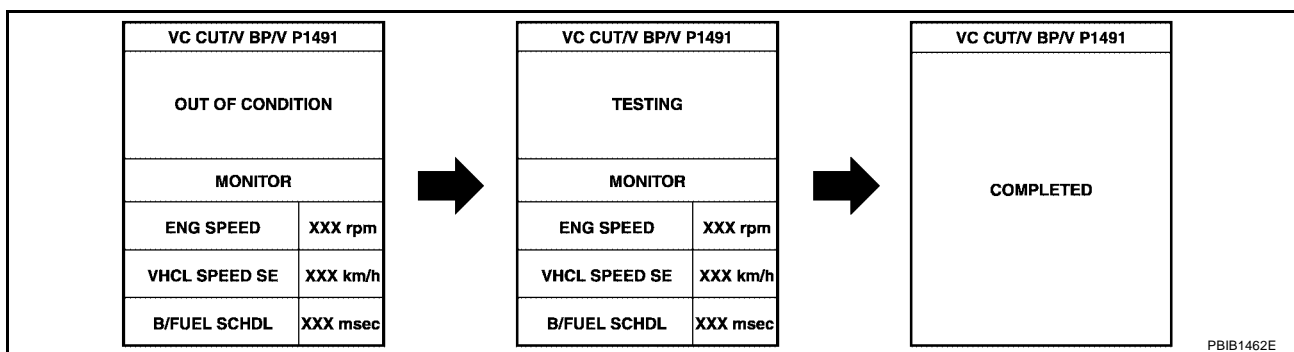
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

**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 37 km/h (23 MPH) |
| B/FUEL SCHDL   | 1.0 - 11.0 msec            |

**If "TESTING" is not displayed after 5 minutes, retry from step 3.**

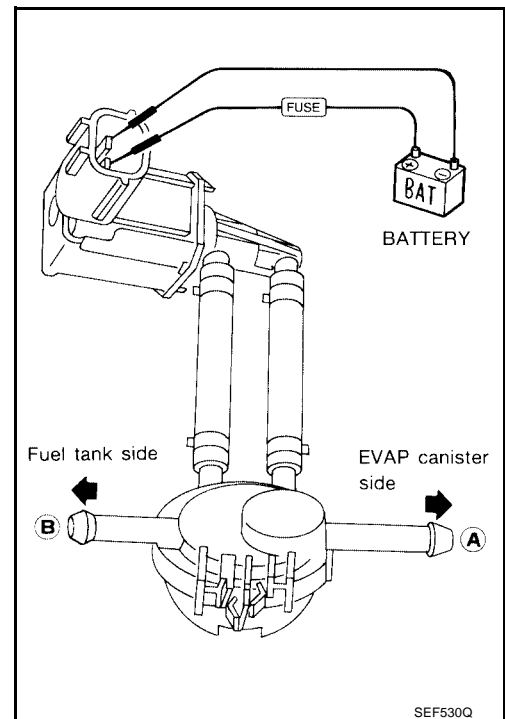
8. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to [EC-1119, "Diagnostic Procedure"](#).

## Overall Function Check

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-1119, "Diagnostic Procedure"](#).



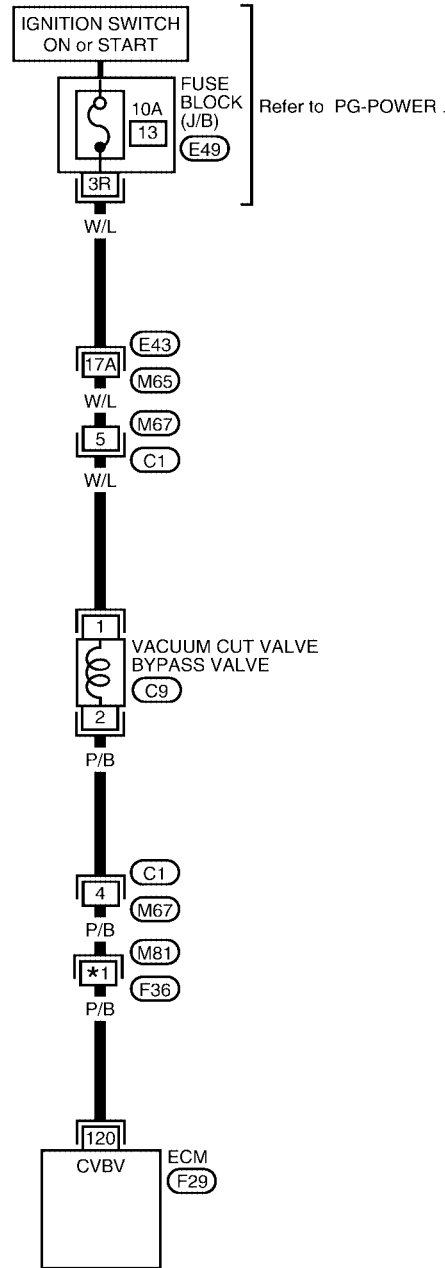
# DTC P1491 VACUUM CUT VALVE BYPASS VALVE

[VG33E]

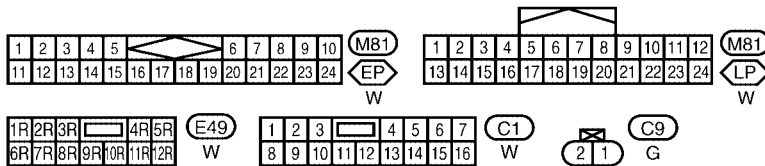
UBS007SJ

## Wiring Diagram

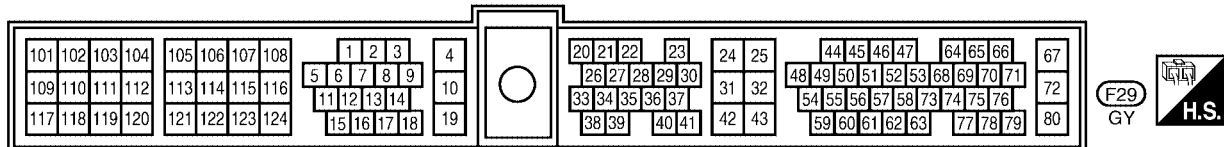
### EC-BYPS/V-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 15
- : 17



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



WBWA0065E

# DTC P1491 VACUUM CUT VALVE BYPASS VALVE

[VG33E]

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

**CAUTION:**

Do not use 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 COLO R | ITEM                          | CONDITION            | DATA (DC Voltage)          |
|---------------|-------------|-------------------------------|----------------------|----------------------------|
| 120           | P/B         | Vacuum cut valve bypass valve | [Ignition switch ON] | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

UBS007SK

### 1. INSPECTION START

Do you have CONSULT-II?

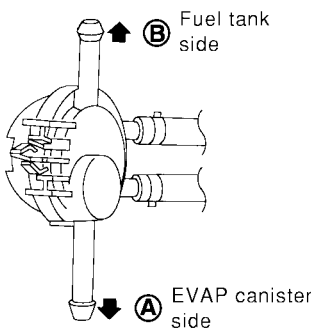
Yes or No

- 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

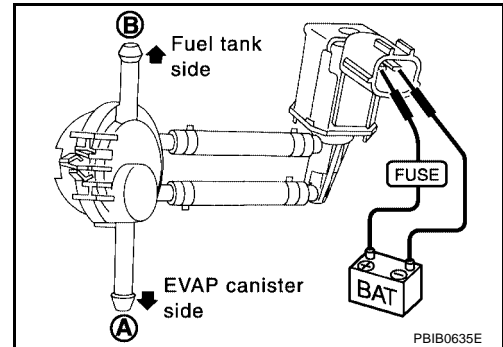
OK or NG

- 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-1172](#).

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   |

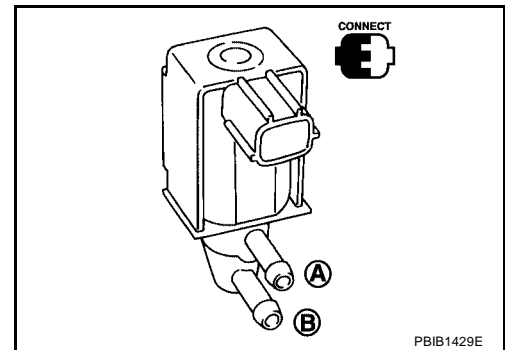
SEF014Z

2. Check air passage continuity and operation delay time under the following conditions.

| Condition<br>VC/V BYPASS/V | Air passage continuity between A and B |
|----------------------------|--|
| ON                         | Yes                                    |
| OFF                        | No                                     |

Operation takes less than 1 second.

3. Check air passage continuity and operation delay time under the following conditions.



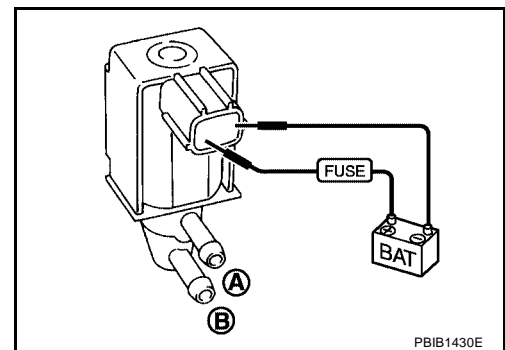
### Without CONSULT-II

| 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.

OK or NG

- OK >> GO TO 7.
- NG >> Replace vacuum cut valve bypass valve.



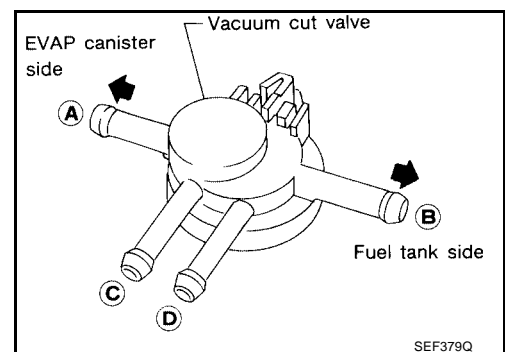
## 7. CHECK VACUUM CUT VALVE

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

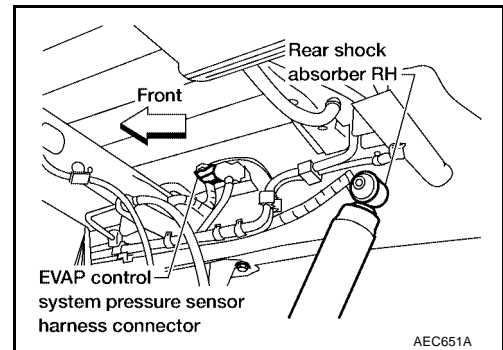
- OK >> GO TO 9.
- NG >> Repair or replace.

## 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 Confirmation Procedure" for DTC P0452 [EC-937](#) or DTC P0453 [EC-943](#) .

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.

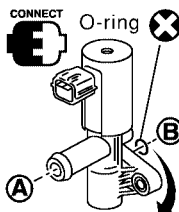
 **With CONSULT-II**

1. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
2. Check air passage continuity and operation delay time.

| Condition<br>VENT CONTROL/V | Air passage continuity between A and B |
|-----------------------------|--|
| ON                          | Yes                                    |
| OFF                         | No                                     |

**Operation takes less than 1 second.**

| 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   |



SEF013Z

 **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.**

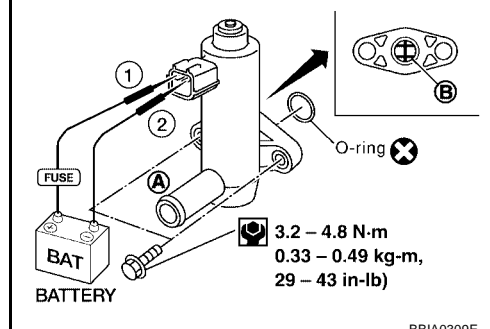
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

If portion **B** is rusted, replace control valve.

**Make sure new O-ring is installed properly.**

OK or NG

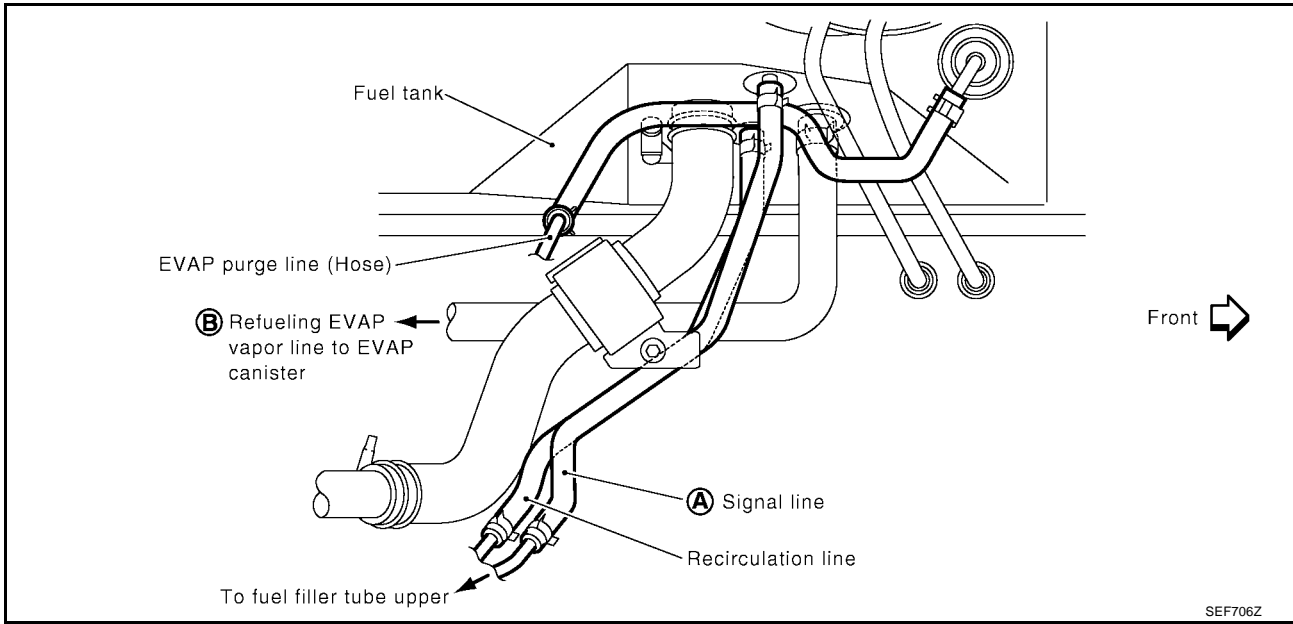
- OK    >> GO TO 12.
- NG    >> Replace EVAP canister vent control valve.



BBI A0309E

## 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.



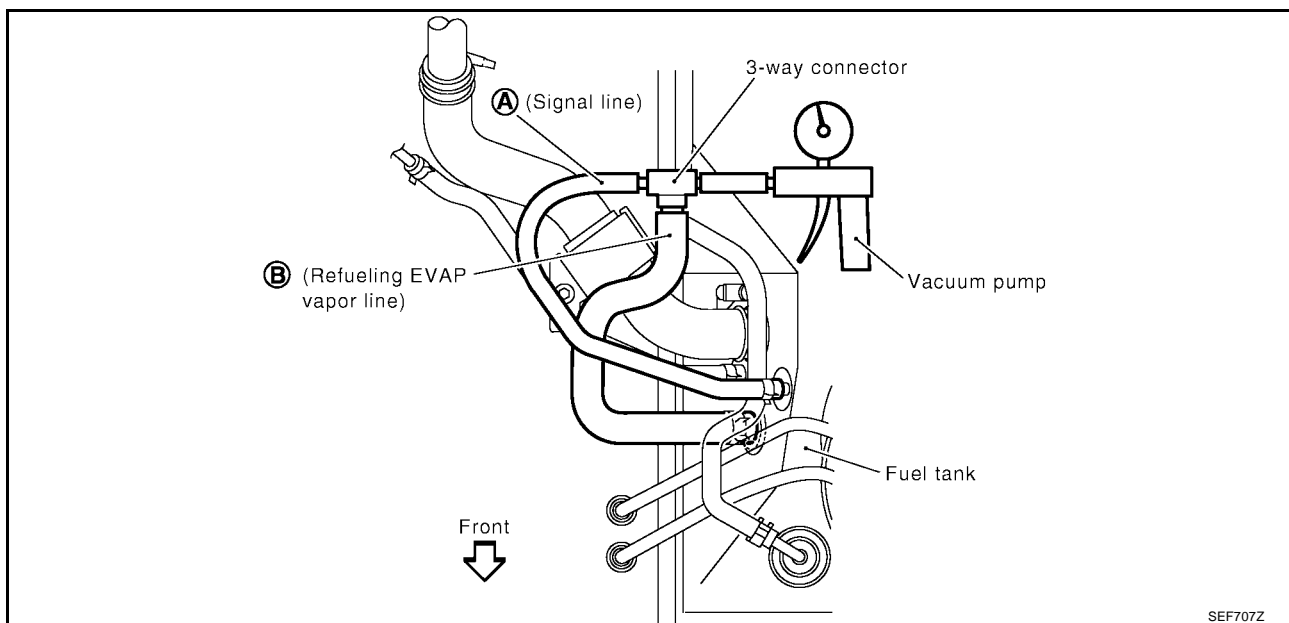
### OK or NG

- 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.



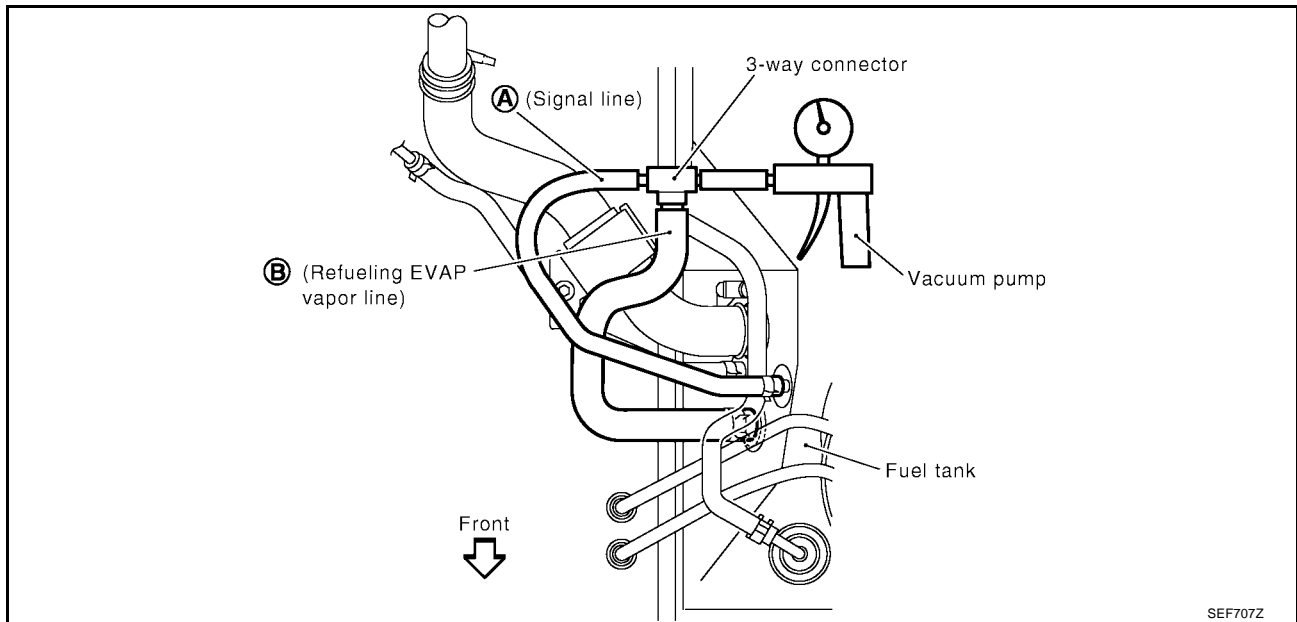
### Without CONSULT-II

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

# DTC P1491 VACUUM CUT VALVE BYPASS VALVE

[VG33E]

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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## DTC P1605 A/T DIAGNOSIS COMMUNICATION LINE

PFP:23710

### Component Description

UBS007SL

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

UBS007SM

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors<br/>[The communication line circuit between ECM and TCM (Transmission Control Module) is open or shorted.]</li> <li>● Dead (Weak) battery</li> <li>● TCM (Transmission Control Module)</li> </ul> |

### DTC Confirmation Procedure

UBS007SN

**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-1131, "Diagnostic Procedure"](#).

| 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

**WITH GST**

Follow the procedure "With CONSULT-II".

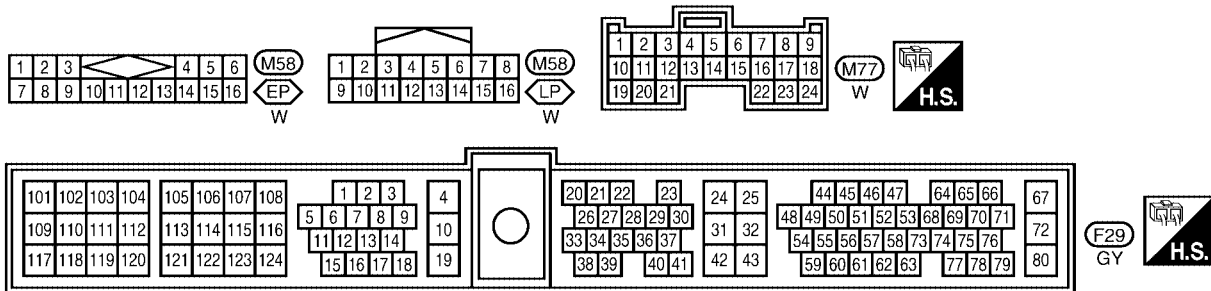
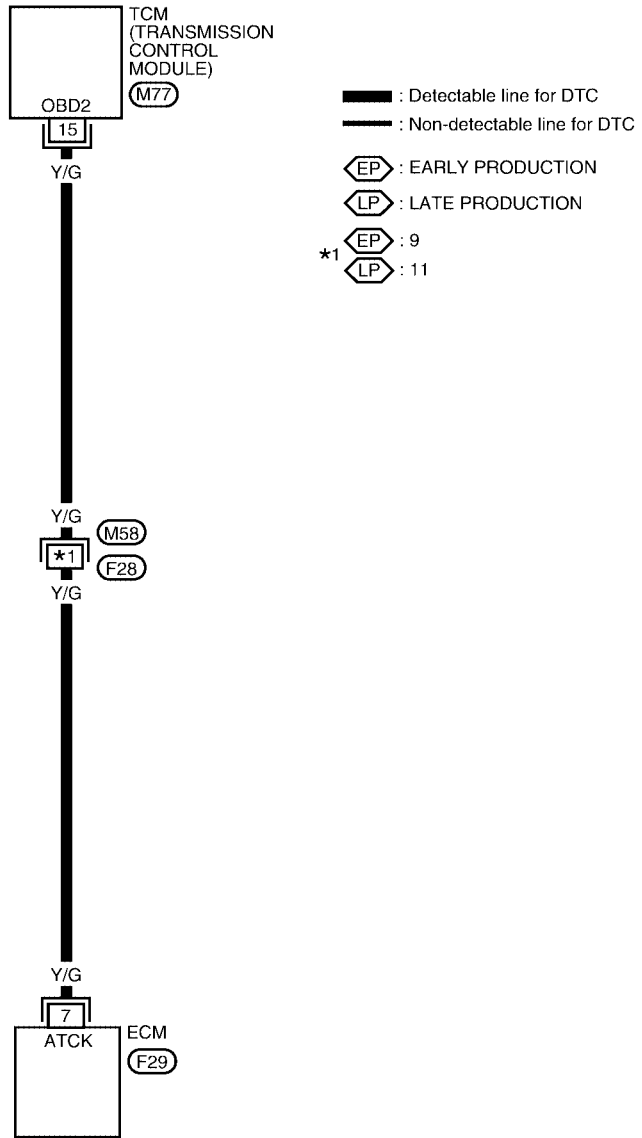
# DTC P1605 A/T DIAGNOSIS COMMUNICATION LINE

[VG33E]

UBS007SO

## Wiring Diagram WITHOUT VDC

EC-ATDIAG-01



WBWA0040E



# DTC P1605 A/T DIAGNOSIS COMMUNICATION LINE

[VG33E]

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

**CAUTION:**

**Do not use 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 COLO R | ITEM             | CONDITION   | DATA (DC Voltage) |
|---------------|-------------|------------------|---|-------------------|
| 7             | Y/G         | A/T check signal | <b>[Ignition switch ON]<br/>[Engine is running]</b> | 0 - 3.0V          |

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J

K

L




M

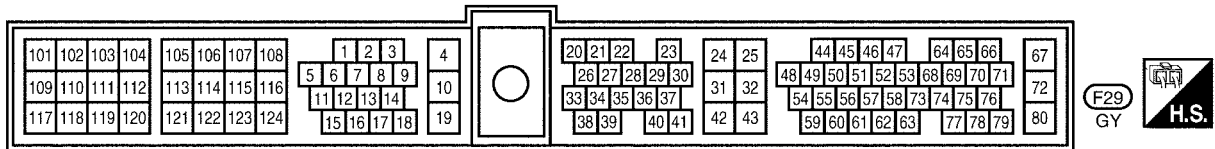
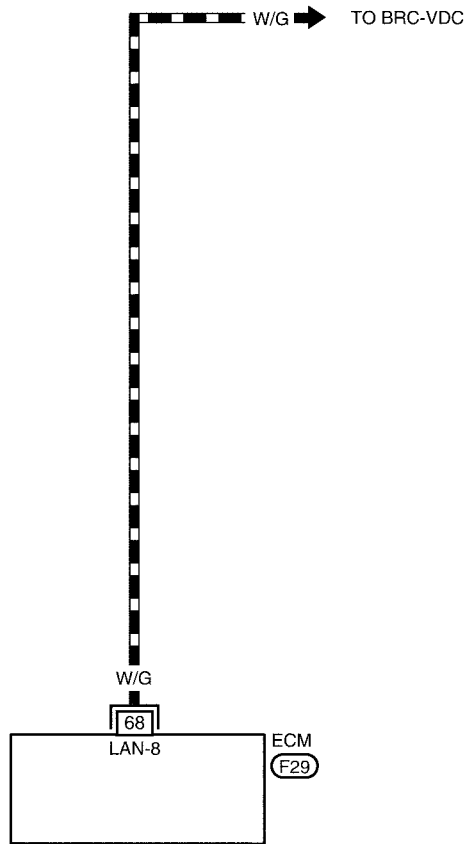
# DTC P1605 A/T DIAGNOSIS COMMUNICATION LINE

[VG33E]

WITH VDC

EC-CAN-01

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



BBWA0503E

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

# DTC P1605 A/T DIAGNOSIS COMMUNICATION LINE

[VG33E]

**CAUTION:**

Do not use 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.

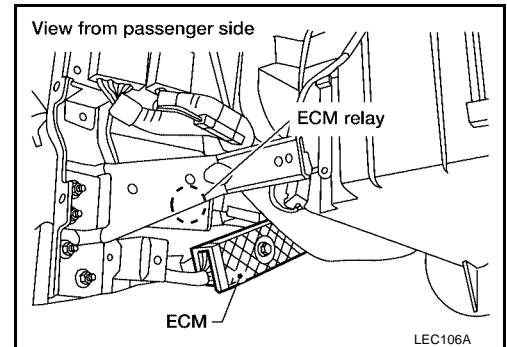
| TER-MINAL NO. | WIRE COLO-R | ITEM       | CONDITION                            | DATA (DC Voltage) |
|---------------|-------------|------------|--------------------------------------|-------------------|
| 68            | W/G         | A/T signal | [Ignition switch ON]<br>● Idle speed | 0 - 5.0V          |

## Diagnostic Procedure

UBS007SP

### 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.



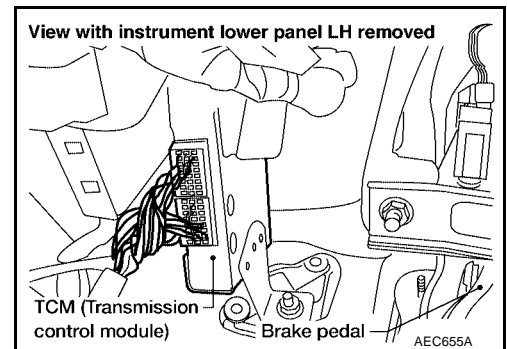
3. Check harness continuity between ECM terminal 7 and TCM terminal 15. Refer to Wiring Diagram.

**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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

## DTC P1706 PNP SWITCH

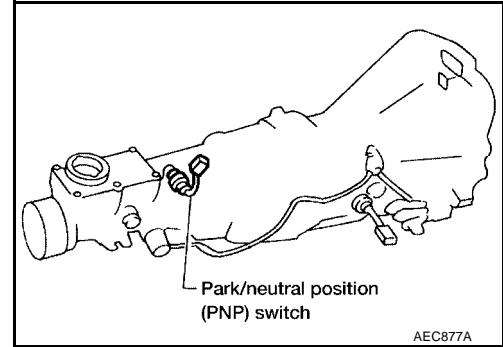
### Component Description

UBS007SQ

When the gear position is “P” (A/T models only) or “N”, park/neutral position (PNP) switch is “ON”.

ECM detects the position because the continuity of the line (the “ON” signal) exists.

For A/T models, the park/neutral position (PNP) switch assembly also includes a transmission range switch to detect selector lever position.



### CONSULT-II Reference Value in Data Monitor Mode

UBS007SR

Specification data are reference values.

| MONITOR ITEM | CONDITION             |                         | SPECIFICATION |
|--------------|-----------------------|-------------------------|---------------|
| P/N POSI SW  | ● Ignition switch: ON | Shift lever: “P” or “N” | ON            |
|              |                       | Except above            | OFF           |

### On Board Diagnosis Logic

UBS007SS

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.]</li> <li>● Park/neutral position (PNP) switch</li> </ul> |

### DTC Confirmation Procedure

UBS007ST

**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” and “P” position      | ON                |
| Except the above position | OFF               |

If NG, go to [EC-1135, "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.

| DATA MONITOR |        |
|--------------|--------|
| MONITOR      | NO DTC |
| P/N POSI SW  | ON     |

SEF212Y

# DTC P1706 PNP SWITCH

[VG33E]

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          |

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| COOLAN TEMP/S | XXX °C   |
| VHCL SPEED SE | XXX km/h |
| P/N POSI SW   | OFF      |
| B/FUEL SCHDL  | XXX msec |

SEF213Y

6. If 1st trip DTC is detected, go to [EC-1135, "Diagnostic Procedure"](#).

## Overall Function Check

UBS007SU

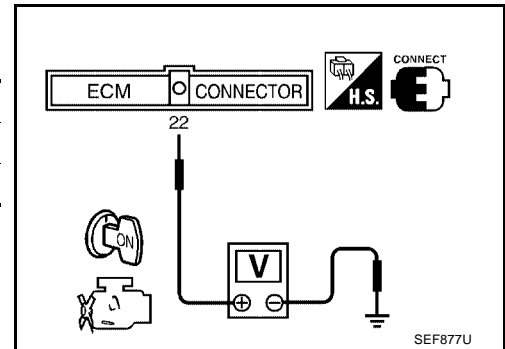
Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

### WITH GST

- Turn ignition switch ON.
- Check voltage between ECM terminal 22 and body ground under the following conditions.

| Condition (Gear position) | Voltage (V) (Known good data) |
|---------------------------|-------------------------------|
| "P" and "N" position      | Approx. 0                     |
| Except the above position | Approx. 5                     |

3. If NG, go to [EC-1135, "Diagnostic Procedure"](#).



# DTC P1706 PNP SWITCH

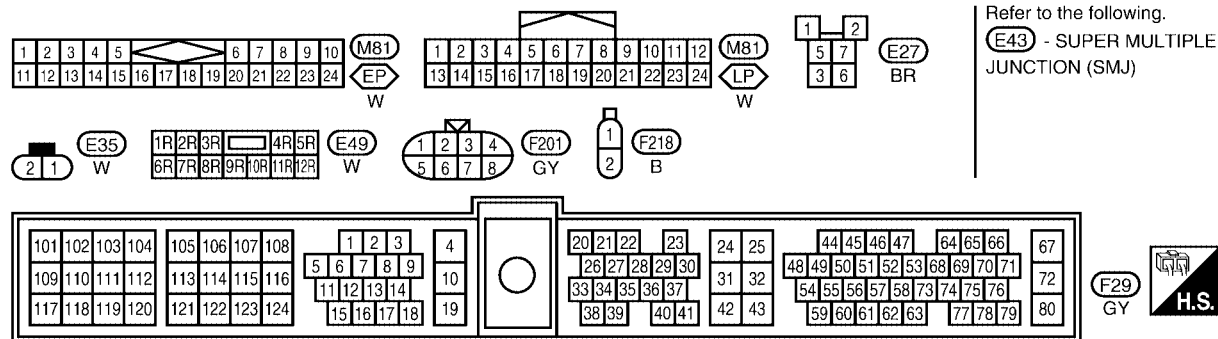
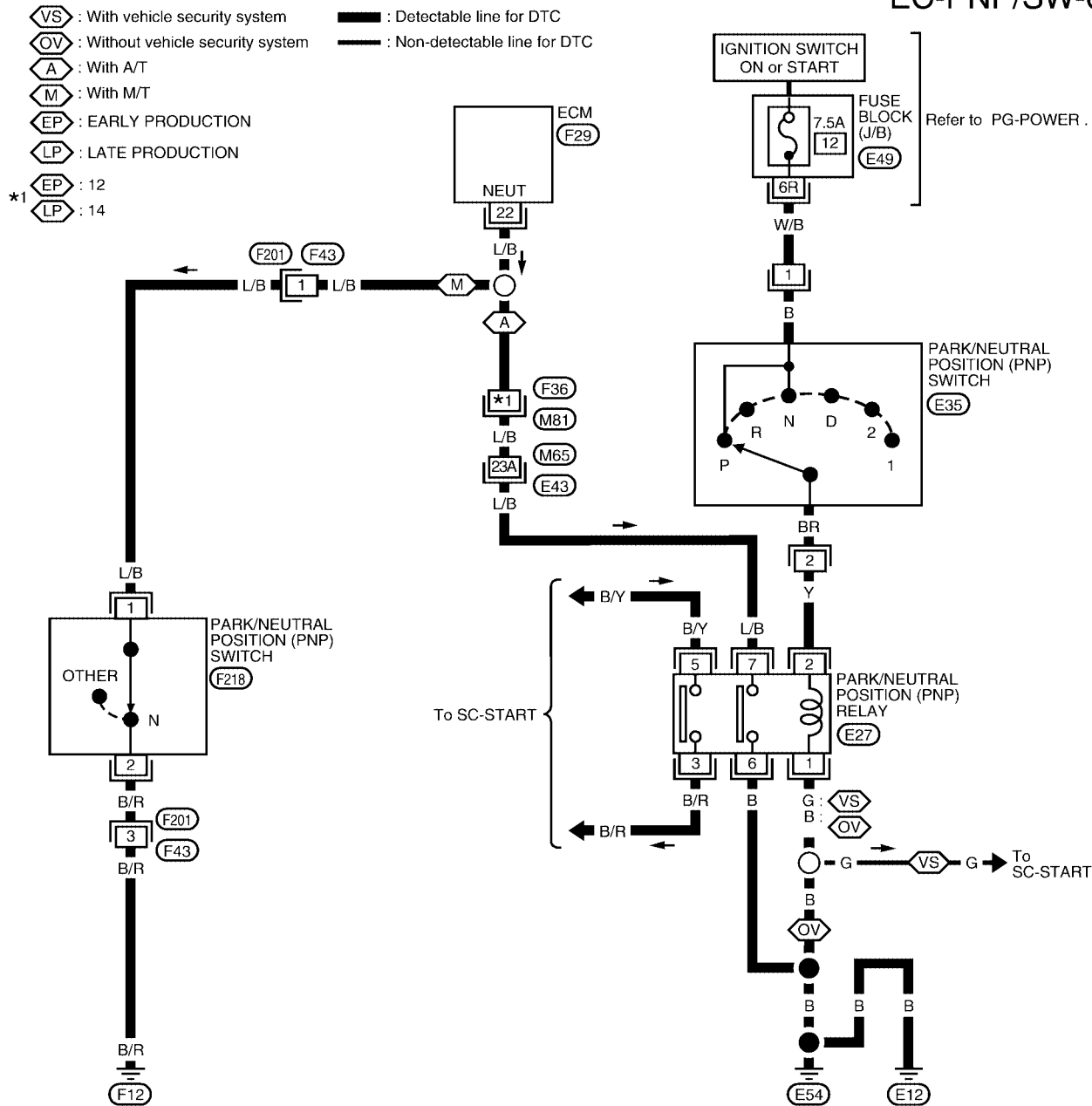
[VG33E]

UBS007SV

## Wiring Diagram

EC-PNP/SW-01

- : With vehicle security system
- : Without vehicle security system
- : With A/T
- : With M/T
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 12
- : 14



WBWA0041E

# DTC P1706 PNP SWITCH

[VG33E]

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

## CAUTION:

Do not use 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 COLO R | ITEM                               | CONDITION  | DATA (DC Voltage) |
|---------------|-------------|------------------------------------|--|-------------------|
| 22            | L/B         | Park/neutral position (PNP) switch | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"><li>• Gear position is "N" or "P"</li></ul>    | Approximately 0V  |
|               |             |                                    | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"><li>• Except the above gear position</li></ul> | Approximately 5V  |

## Diagnostic Procedure FOR M/T MODELS

UBS007SW

### 1. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

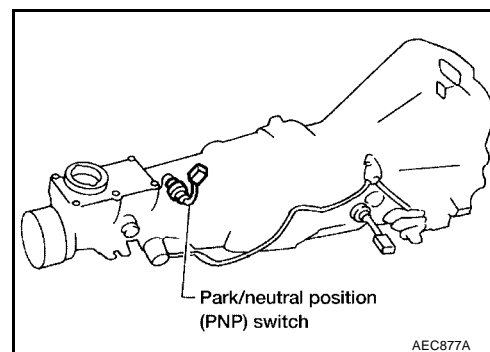
1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and engine ground. Refer to Wiring Diagram.

**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 engine 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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### FOR A/T MODELS

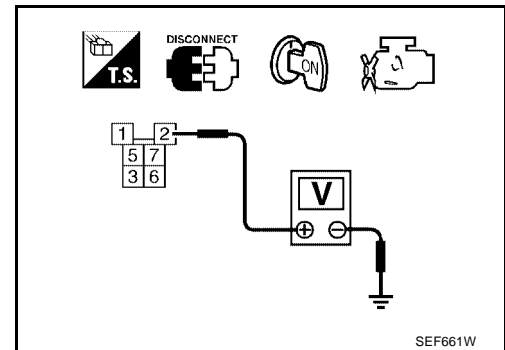
#### 1. CHECK PNP SWITCH POWER SUPPLY CIRCUIT-I

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

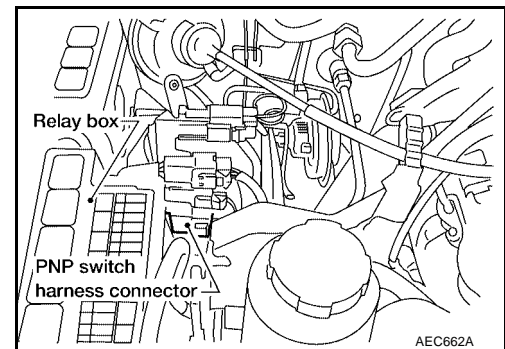
1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and PNP relay terminal 2. Refer to Wiring Diagram.

**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, "Component Inspection"](#) .

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 body 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 body 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**

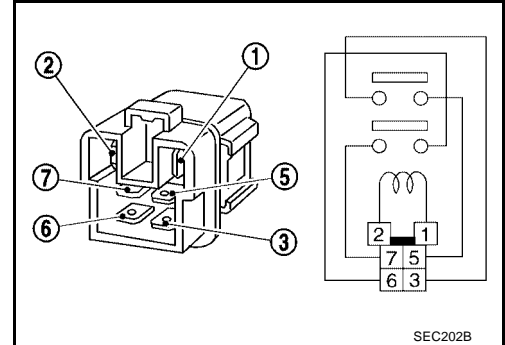
1. Apply 12V direct current between park/neutral position (PNP) relay terminals 1 and 2.
2. Check continuity between park/neutral position (PNP) relay terminals 3 and 5, 6 and 7.

**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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

## IGNITION SIGNAL

### Component Description

#### IGNITION COIL & POWER TRANSISTOR

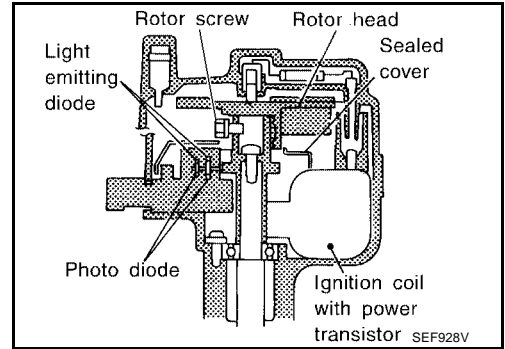
The power transistor switches on and off the ignition coil primary circuit according to the ECM signal. As the primary circuit is turned on and off, the proper high voltage is induced in the secondary circuit. The distributor is not repairable except for the distributor cap and rotor head.

**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)**



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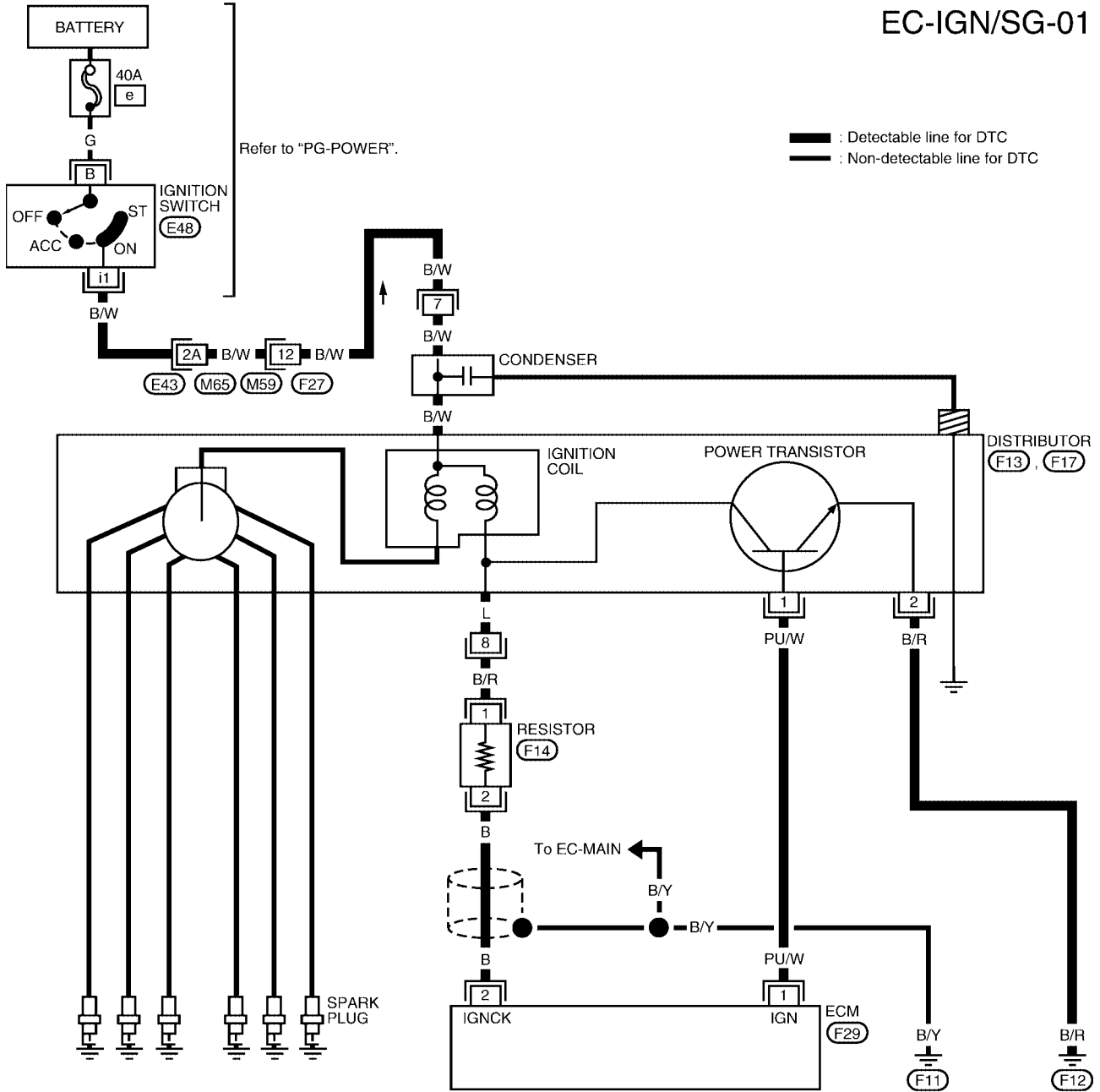
# IGNITION SIGNAL

[VG33E]

UBS007SY

## Wiring Diagram

EC-IGN/SG-01



|   |   |    |    |    |    |    |    |    |
|---|---|----|----|----|----|----|----|----|
| 1 | 2 | 3  | 4  | 5  | 6  | 7  |    |    |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |

(M59)  
W

|   |    |    |
|---|----|----|
| B | i1 | ST |
| R | AC | 12 |

(F13)  
GY

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|

(E48)  
W

|   |   |
|---|---|
| 7 | 8 |
|---|---|

(F17)  
GY

|   |   |
|---|---|
| 1 | 2 |
|---|---|

(F14)  
GY

Refer to the following.

(E43) - SUPER MULTIPLE JUNCTION (SMJ)

|     |     |     |     |     |     |     |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 1  | 2  | 3  | 4  | 20 | 21 | 22 | 23 | 24 | 25 | 44 | 45 | 46 | 47 | 64 | 65 | 66 | 67 |    |    |    |    |    |    |    |    |    |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 5  | 6  | 7  | 8  | 9  | 10 | 26 | 27 | 28 | 29 | 30 | 48 | 49 | 50 | 51 | 52 | 53 | 58 | 59 | 60 | 61 | 62 | 63 | 77 | 78 | 79 | 72 |
| 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 11 | 12 | 13 | 14 | 10 | 33 | 34 | 35 | 36 | 37 | 31 | 32 | 54 | 55 | 56 | 57 | 58 | 73 | 74 | 75 | 76 | 80 |    |    |    |    |    |
|     |     |     |     |     |     |     |     | 15 | 16 | 17 | 18 | 19 | 38 | 39 | 40 | 41 | 42 | 43 | 59 | 60 | 61 | 62 | 63 | 77 | 78 | 79 |    |    |    |    |    |    |    |    |

(F29)  
GY



BBWA0496E

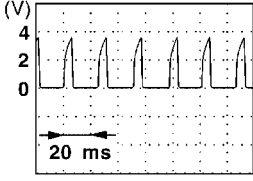
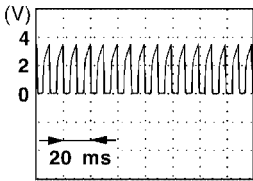
# IGNITION SIGNAL

[VG33E]

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

**CAUTION:**

Do not use 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]<br>● Idle speed                | Approximately 0.7V★<br> |
|               |            |                 | [Engine is running]<br>● Engine speed is 2,000 rpm | 1.1 - 1.5V★<br>         |

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

## Diagnostic Procedure

UBS007SZ

### 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.

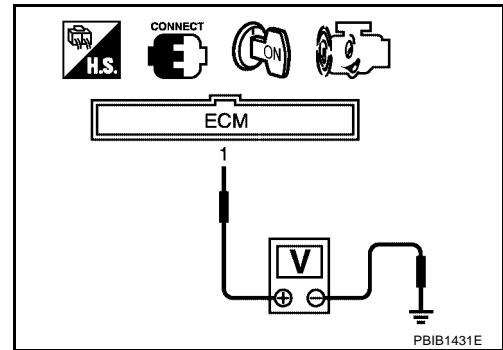
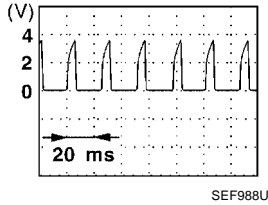
| ACTIVE TEST   |          |
|---------------|----------|
| POWER BALANCE |          |
| MONITOR       |          |
| ENG SPEED     | XXX rpm  |
| MAS AIF SE-B1 | XXX V    |
| IACV-AAC/V    | XXX step |
|               |          |
|               |          |
|               |          |

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.

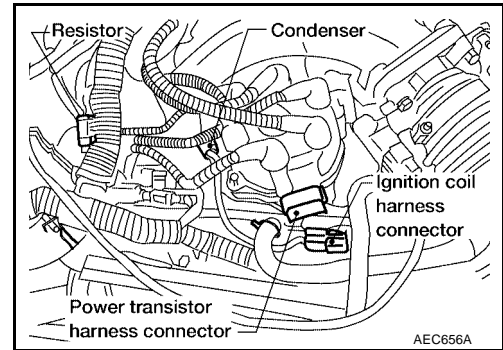


OK or NG

- 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.

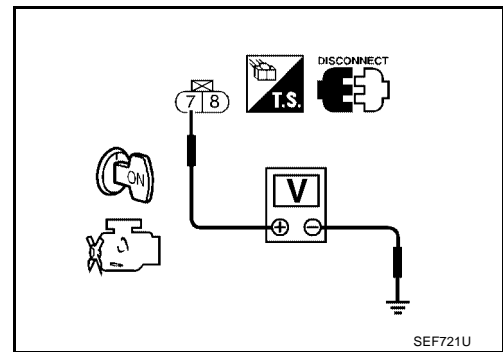


4. Check voltage between terminal 7 and ground with CONSULT-II or tester.

**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 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 engine 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. 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.**

4. 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**

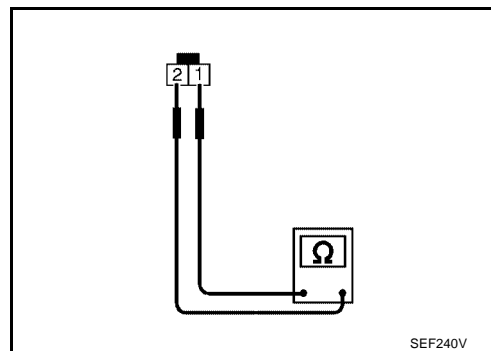
Check resistance between resistor terminals 1 and 2.

**Resistance : Approximately 2.2 k $\Omega$  [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. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 1 and power transistor terminal 1. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

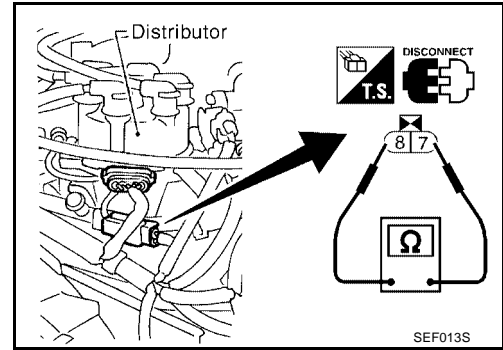
OK >> GO TO 10.

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.

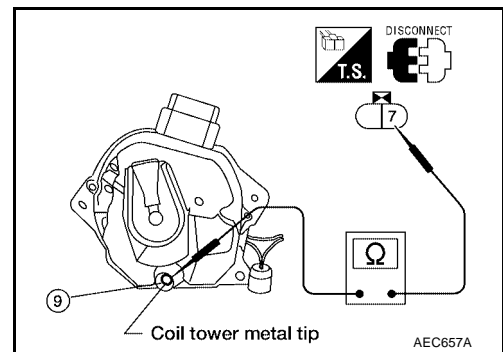
| Terminal               | Resistance [at 20°C (68°F)] |
|------------------------|-----------------------------|
| 7 - 8 (Primary coil)   | Approx. 1.0Ω                |
| 7 - 9 (secondary coil) | Approx. 10 kΩ               |



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.



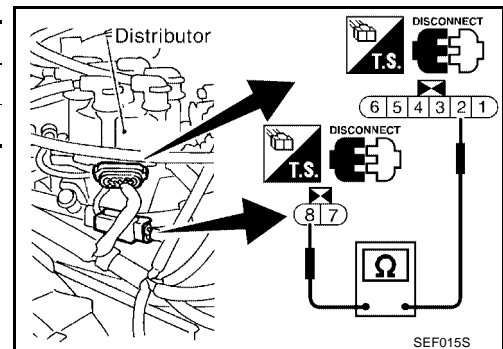
## 11. CHECK POWER TRANSISTOR

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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation DISTRIBUTOR

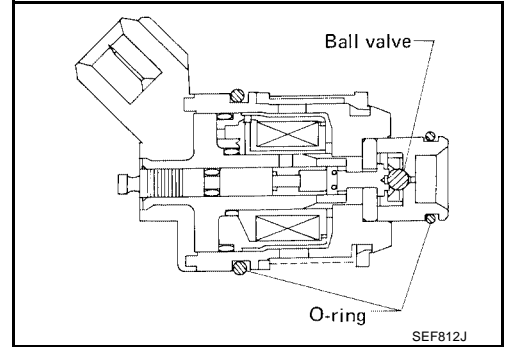
Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .



## INJECTOR CIRCUIT

### Component Description

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

Specification data are reference values.

| MONITOR ITEM                 | CONDITION  |           | SPECIFICATION  |
|------------------------------|--|-----------|----------------|
| INJ PULSE-B1<br>INJ PULSE-B2 | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: "OFF"</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 2.4 - 3.7 msec |
|                              |  | 2,000 rpm | 1.9 - 3.3 msec |
| B/FUEL SCHDL                 | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: "OFF"</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 1.0 - 1.6 msec |
|                              |  | 2,000 rpm | 0.7 - 1.4 msec |

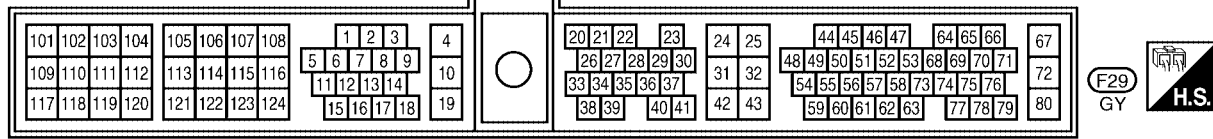
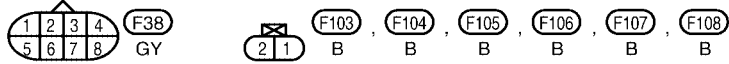
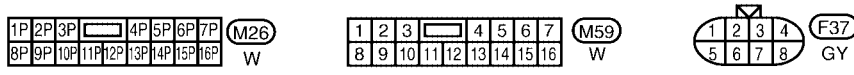
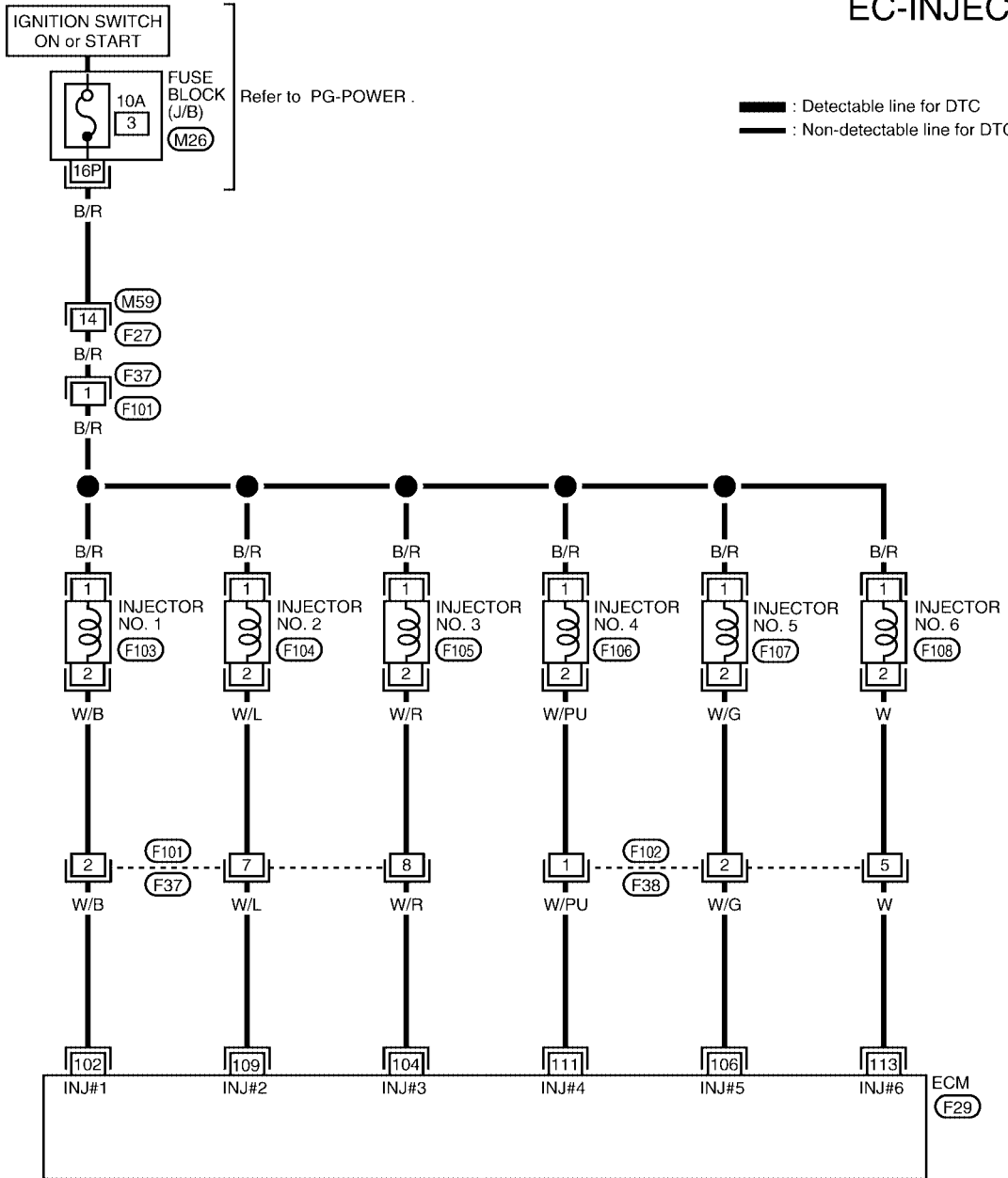
# INJECTOR CIRCUIT

[VG33E]

UBS007T3

## Wiring Diagram

### EC-INJECT-01



BBWA0497E

# INJECTOR CIRCUIT

[VG33E]

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

**CAUTION:**

Do not use 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)                      |
|--|---------------------------------------|--|---|--|
| 102<br>104<br>106<br>109<br>111<br>113 | W/B<br>W/R<br>W/G<br>W/L<br>W/PU<br>W | Injector No. 1<br>Injector No. 3<br>Injector No. 5<br>Injector No. 2<br>Injector No. 4<br>Injector No. 6 | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>                | <p>BATTERY VOLTAGE<br/>(11 - 14V)★</p> |
|  |                                       |  | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>BATTERY VOLTAGE<br/>(11 - 14V)★</p> |

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

## Diagnostic Procedure

UBS00774

### 1. INSPECTION START

Turn ignition switch to START.

**Is any cylinder ignited?**

Yes or No

- Yes >> GO TO 2.
- No >> GO TO 3.

## 2. CHECK OVERALL FUNCTION

### With CONSULT-II

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

| ACTIVE TEST   |          |
|---------------|----------|
| POWER BALANCE |          |
| MONITOR       |          |
| ENG SPEED     | XXX rpm  |
| MAS AIF SE-B1 | XXX V    |
| IACV-AAC/V    | XXX step |
|               |          |
|               |          |
|               |          |
|               |          |

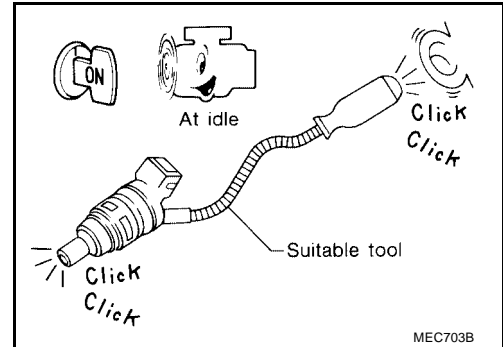
SEF070Y

### Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.  
**Clicking noise should be heard.**

#### OK or NG

- OK    >> **INSPECTION END.**  
 NG    >> GO TO 3.



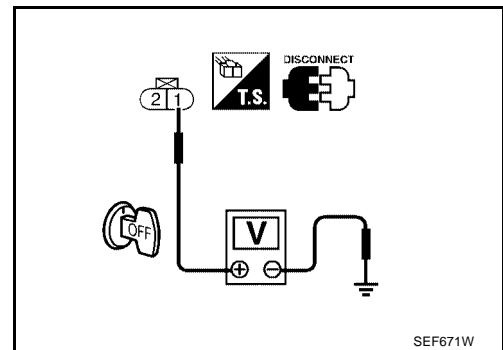
## 3. CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect injector harness connector.
3. 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. Disconnect ECM harness connector.
2. Check harness continuity between injector terminal 2 and ECM terminals 102, 104, 106, 109, 111, 113. 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 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.

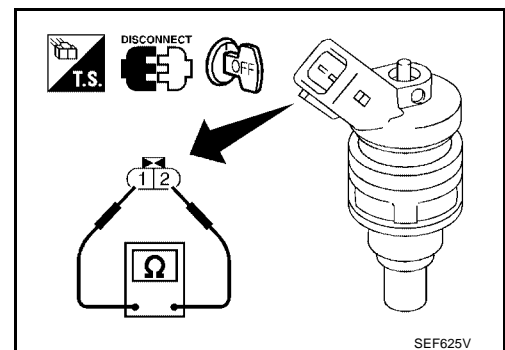
## 7. CHECK INJECTOR

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

**Resistance : 10 - 14Ω [at 25°C (77°F)]**

OK or NG

- OK >> GO TO 8.
- NG >> Replace injector.



## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## Removal and Installation INJECTOR

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

# START SIGNAL

[VG33E]

## START SIGNAL

PF:48750

### CONSULT-II Reference Value in Data Monitor Mode

UBS00776

Specification data are reference values.

| MONITOR ITEM | CONDITION                          | SPECIFICATION  |
|--------------|------------------------------------|----------------|
| START SIGNAL | ● Ignition switch: ON → START → ON | OFF → ON → OFF |

# START SIGNAL

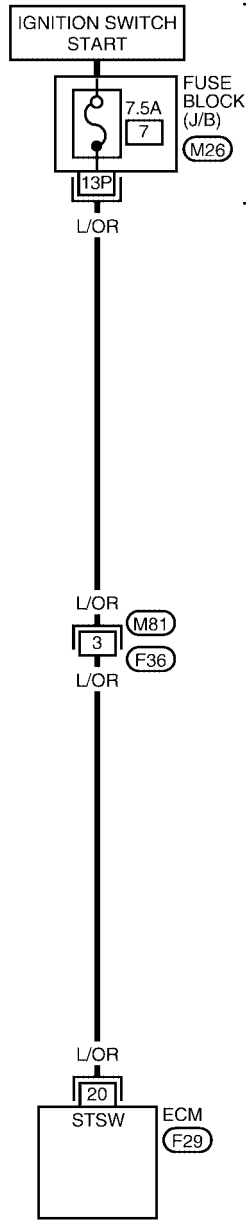
[VG33E]

UBS00777

## Wiring Diagram

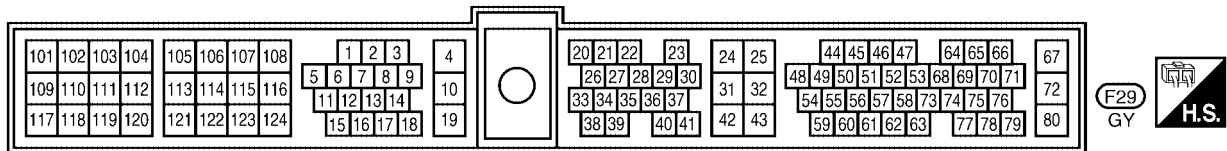
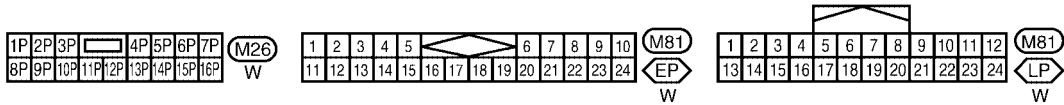
EC-S/SIG-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



Refer to PG-POWER.

- : Detectable line for DTC
- : Non-detectable line for DTC
- : EARLY PRODUCTION
- : LATE PRODUCTION



WBWA0042E

# START SIGNAL

[VG33E]

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

**CAUTION:**

**Do not use 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 COLO R | ITEM         | CONDITION               | DATA (DC Voltage) |
|---------------|-------------|--------------|-------------------------|-------------------|
| 20            | L/OR        | Start signal | [Ignition switch ON]    | Approximately 0V  |
|               |             |              | [Ignition switch START] | 9 - 12V           |

## Diagnostic Procedure

UBS00778

### 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**

- Turn ignition switch ON.
- 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             |

| DATA MONITOR |        |
|--------------|--------|
| MONITOR      | NO DTC |
| START SIGNAL | OFF    |
| CLSD THL POS | ON     |
| AIR COND SIG | OFF    |
| P/N POSI SW  | ON     |

PBIB0182E

OK or NG

- OK >> **INSPECTION END.**
- NG >> GO TO 4.

### 3. CHECK OVERALL FUNCTION

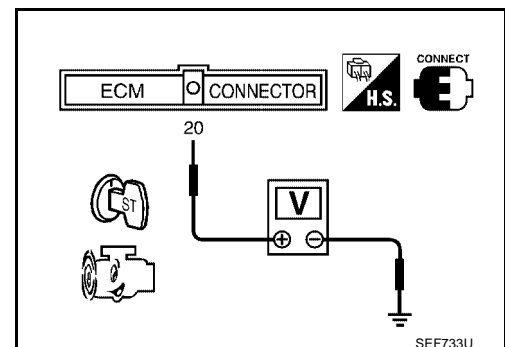
 **Without CONSULT-II**

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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

A

EC

C

D

E

F

G

H

I

J

K

L

M

# FUEL PUMP CIRCUIT

[VG33E]

PF1:17042

UBS007T9

## FUEL PUMP CIRCUIT

### Description SYSTEM DESCRIPTION

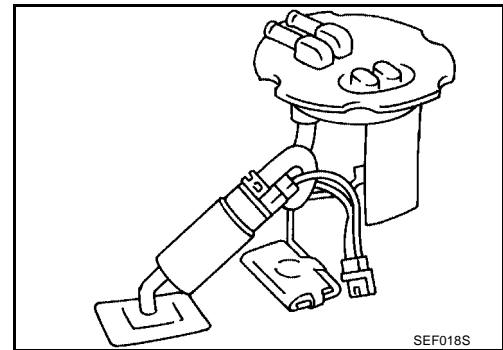
| Sensor                   | Input Signal to ECM | ECM function      | Actuator        |
|--------------------------|---------------------|-------------------|-----------------|
| Camshaft position sensor | Engine speed        | Fuel pump control | Fuel pump relay |
| Ignition switch          | Start 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

UBS007TA

Specification data are reference values.

| MONITOR ITEM  | CONDITION   | SPECIFICATION |
|---------------|---|---------------|
| FUEL PUMP RLY | <ul style="list-style-type: none"> <li>● Ignition switch is turned to ON. (Operates for 5 seconds.)</li> <li>● Engine running and cranking</li> </ul> | ON            |
|               | Except as shown above   | OFF           |

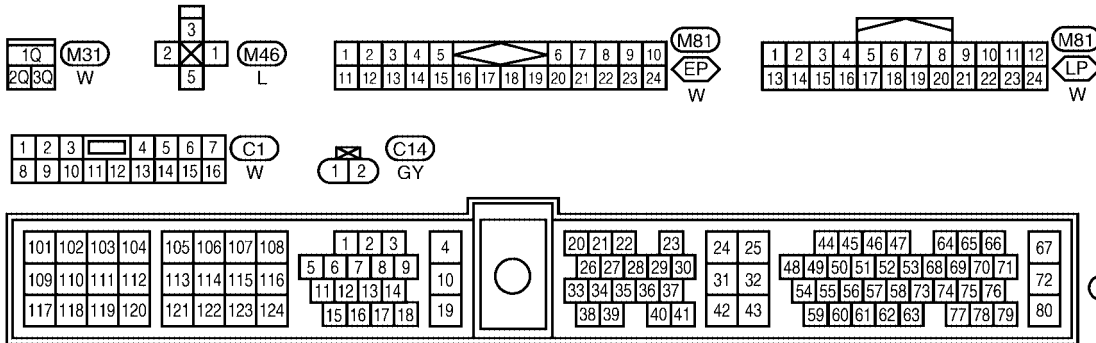
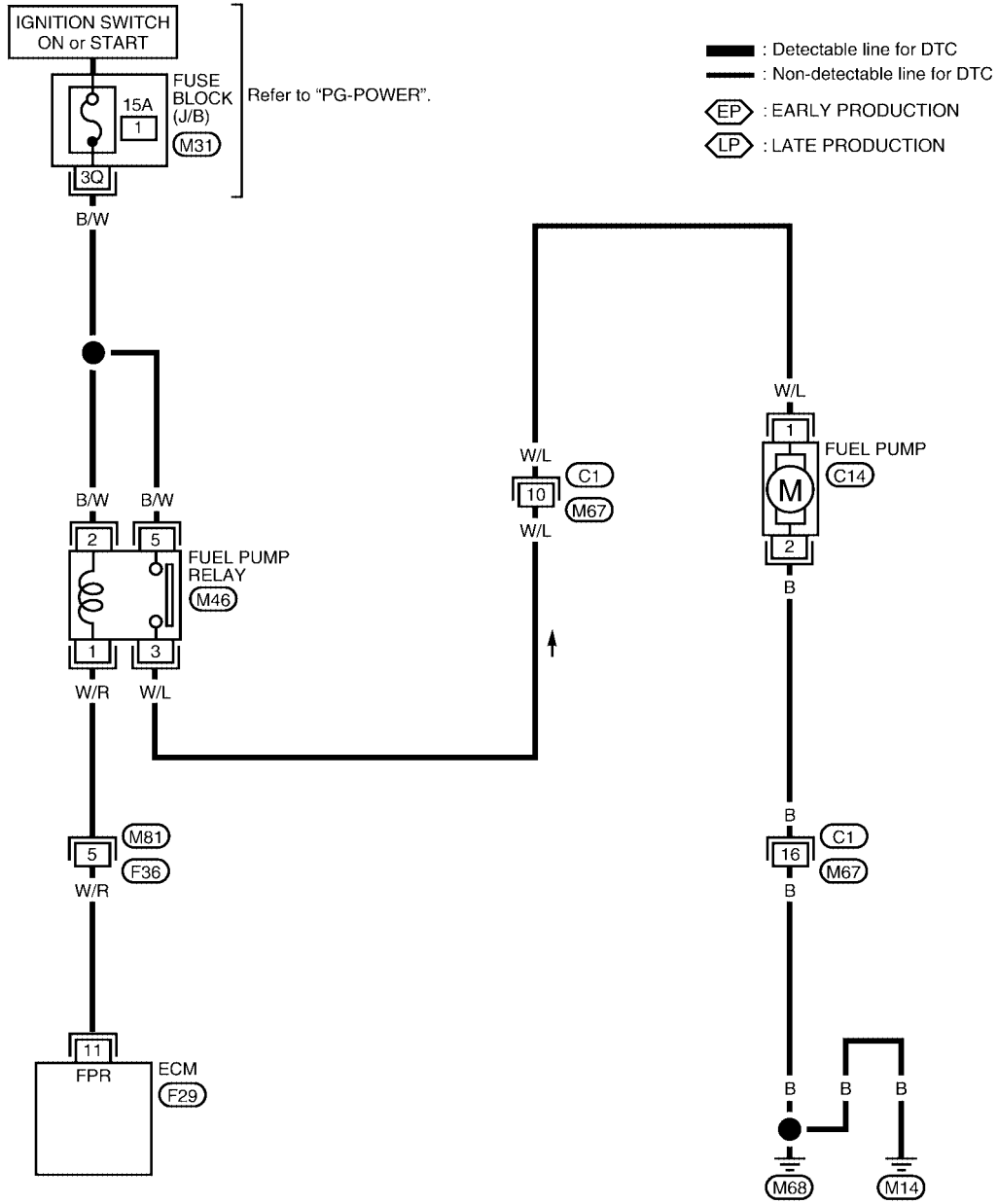
# FUEL PUMP CIRCUIT

[VG33E]

UBS007TB

## Wiring Diagram

### EC-F/PUMP-01



WBWA0066E

# FUEL PUMP CIRCUIT

[VG33E]

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

**CAUTION:**

Do not use 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 COLO R | ITEM            | CONDITION   | DATA (DC Voltage)             |
|---------------|-------------|-----------------|---|-------------------------------|
| 11            | W/R         | Fuel pump relay | [Ignition switch ON]<br>● For 5 seconds after turning ignition switch ON                              | 0 - 1V                        |
|               |             |                 | [Engine is running]<br>[Ignition switch ON]<br>● More than 5 seconds after turning ignition switch ON | BATTERY VOLTAGE<br>(11 - 14V) |

## Diagnostic Procedure

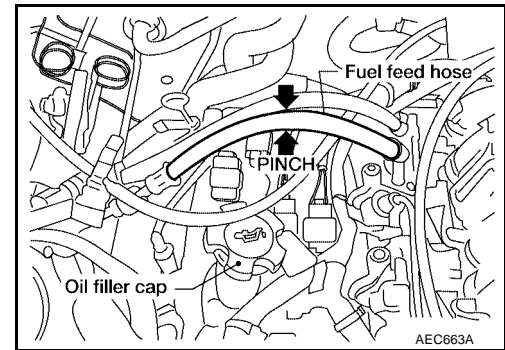
UBS007TC

### 1. CHECK OVERALL FUNCTION

- Turn ignition switch "ON".
- 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".**

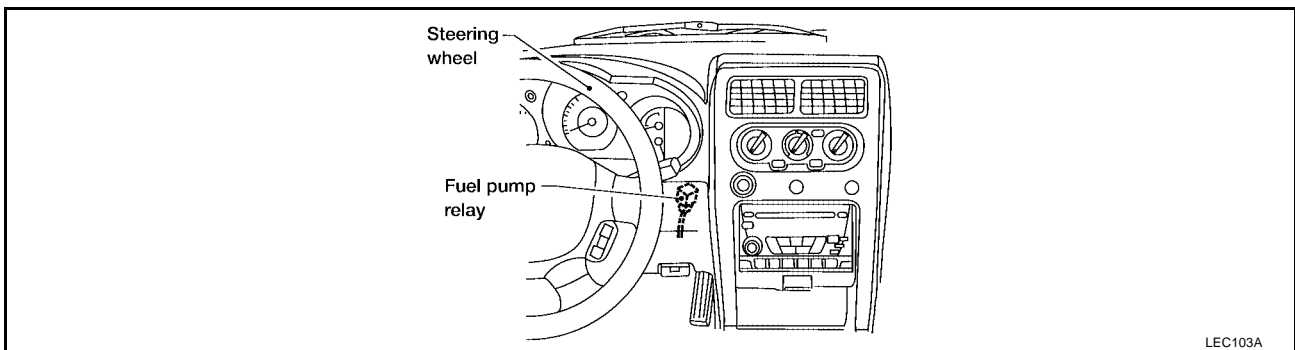
OK or NG

- OK >> **INSPECTION END.**  
 NG >> GO TO 2.



### 2. CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

- Turn ignition switch "OFF".
- Disconnect fuel pump relay.

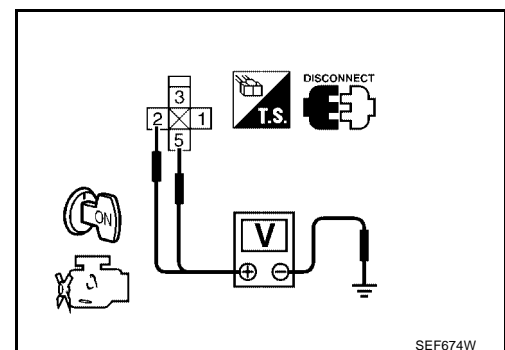


- Turn ignition switch "ON".
- Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.

**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 harness or connectors.

## 4. CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

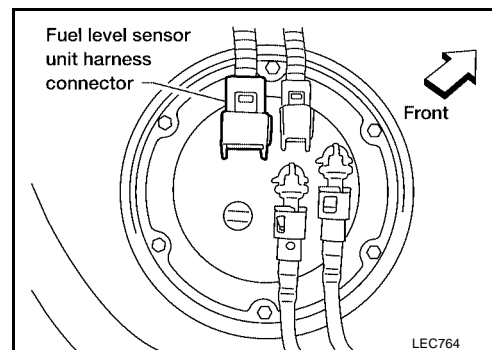
1. Turn ignition switch "OFF".
2. Disconnect fuel pump harness connector.
3. Check harness continuity between fuel pump terminal 2 and body ground, fuel pump terminal 1 and fuel pump relay terminal 3. Refer to Wiring Diagram.

**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 body 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.

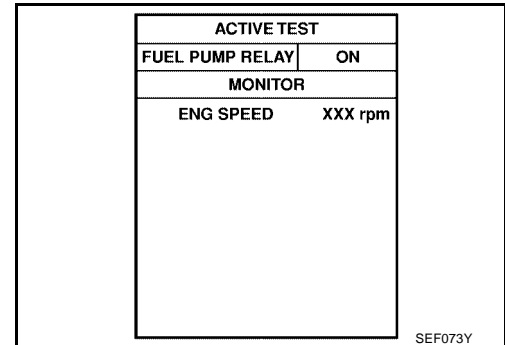
- Harness connectors M81, F36
- Harness for open or short between ECM and fuel pump relay

>> 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.



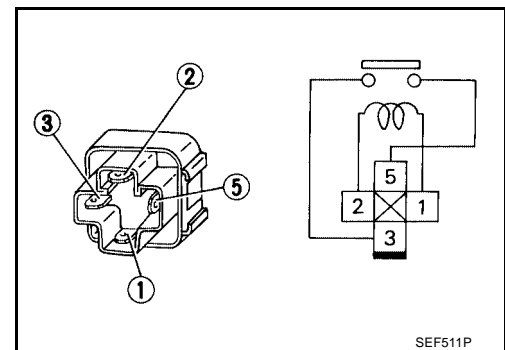
### Without CONSULT-II

Check continuity between 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.



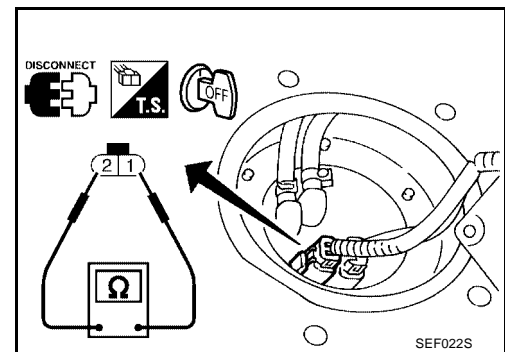
## 9. CHECK FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between 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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation FUEL PUMP

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

# POWER STEERING OIL PRESSURE SWITCH

[VG33E]

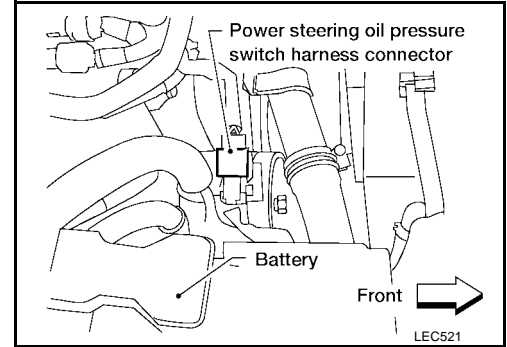
PF:49761

UBS007TE

## POWER STEERING OIL PRESSURE SWITCH

### Component Description

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

UBS007TF

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)<br>OFF |
|              |   | The steering wheel is fully turned.<br>ON                     |

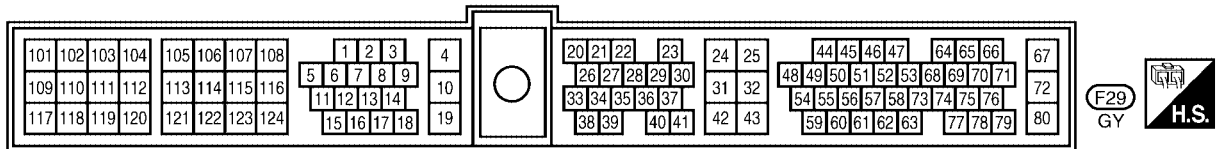
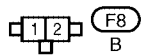
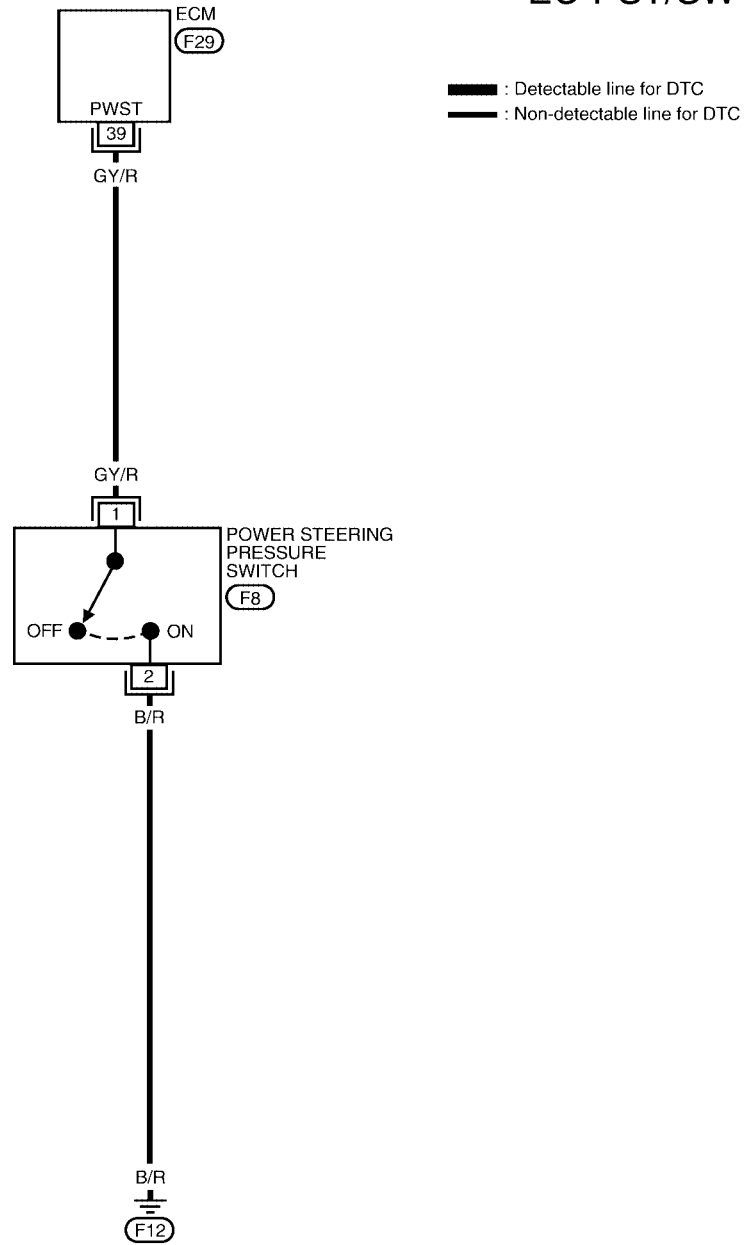
# POWER STEERING OIL PRESSURE SWITCH

[VG33E]

UBS007TG

## Wiring Diagram

EC-PST/SW-01



BBWA0500E



# POWER STEERING OIL PRESSURE SWITCH

[VG33E]

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

**CAUTION:**

Do not use 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 COLO R | ITEM                               | CONDITION   | DATA (DC Voltage) |
|---------------|-------------|------------------------------------|---|-------------------|
| 39            | GY/R        | Power steering oil pressure switch | [Engine is running]<br>● Steering wheel is being turned     | Approximately 0V  |
|               |             |                                    | [Engine is running]<br>● Steering wheel is not being turned | Approximately 5V  |

## Diagnostic Procedure

UBS007TH

### 1. INSPECTION START

Do you have CONSULT-II?

Yes or No

- Yes >> GO TO 2.
- No >> GO TO 3.

### 2. CHECK OVERALL FUNCTION

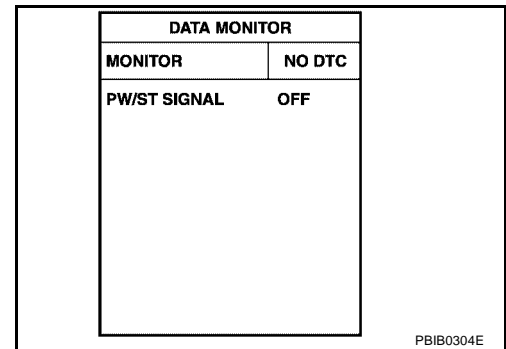
**With CONSULT-II**

- Start engine.
- 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

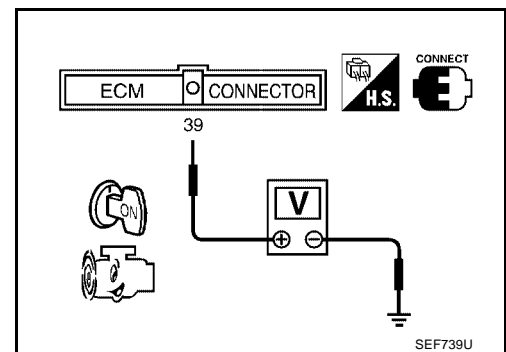
**Without CONSULT-II**

- Start engine.
- 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**

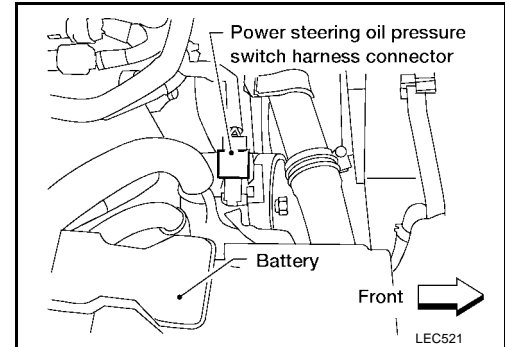
1. Turn ignition switch OFF.
2. Disconnect power steering oil pressure switch harness connector.
3. Check harness continuity between power steering oil pressure switch terminal 2 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

4. Also check harness for short to power.

OK or NG

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

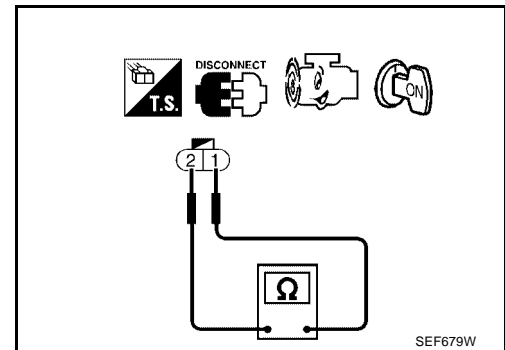
**6. CHECK POWER STEERING OIL PRESSURE SWITCH**

1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between 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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

**>> INSPECTION END.**

# IACV-FICD SOLENOID VALVE

[VG33E]

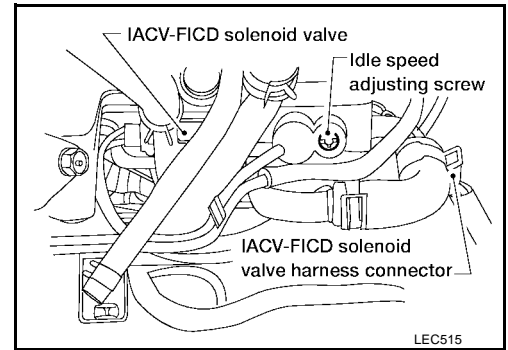
PF2:23781

UBS007T1

## IACV-FICD SOLENOID VALVE

### Component Description

When the air conditioner is on, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load.



A

EC

C

D

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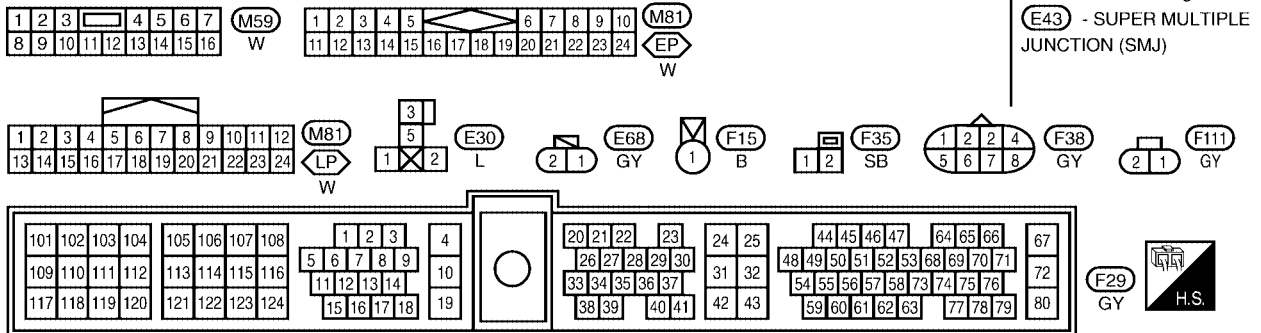
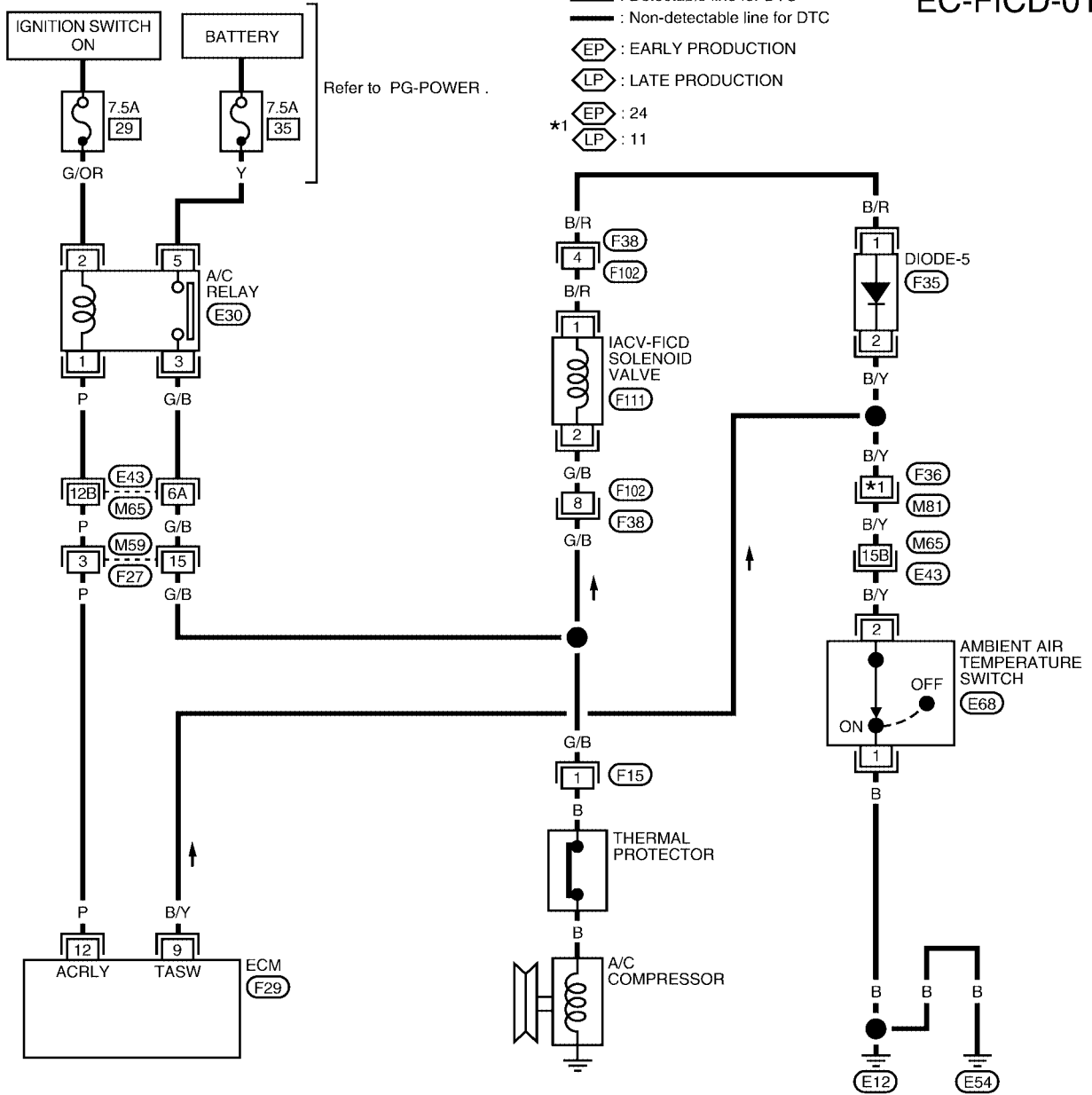
# IACV-FICD SOLENOID VALVE

[VG33E]

UBS0077J

## Wiring Diagram

EC-FICD-01



WBWA0044E

# IACV-FICD SOLENOID VALVE

[VG33E]

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

**CAUTION:**

Do not use 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 COLO R | ITEM                           | CONDITION   | DATA (DC Voltage)          |
|---------------|-------------|--------------------------------|---|----------------------------|
| 9             | B/Y         | Ambient air temperature switch | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> <li>● Ambient air temperature is above 25°C (77°F)</li> <li>● Air conditioner is operating</li> </ul>     | 0V                         |
|               |             |                                | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> <li>● Ambient air temperature is below 19°C (66°F)</li> <li>● Air conditioner is operating</li> </ul>     | BATTERY VOLTAGE (11 - 14V) |
|               |             |                                | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> <li>● Ambient air temperature is below 19°C (66°F)</li> <li>● Air conditioner is not operating</li> </ul> | Approximately 5V           |
| 12            | P           | Air conditioner relay          | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Both A/C switch and blower switch are ON*</li> </ul>  | 0 - 1V                     |
|               |             |                                | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● A/C switch is OFF</li> </ul>  | BATTERY VOLTAGE (11 - 14V) |

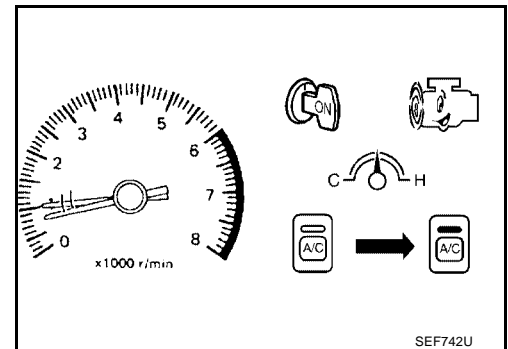
\*: Any mode except "OFF", ambient air temperature is above 25°C (77°F).

## Diagnostic Procedure

UBS007TK

### 1. CHECK OVERALL FUNCTION

- Start engine and warm it up to normal operating temperature.
- Check idle speed.
  - 750±50 rpm (in "P" or "N" position)**
  - If NG, adjust idle speed.
- Turn air conditioner switch and blower fan switch ON.
- Recheck idle speed.
  - 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

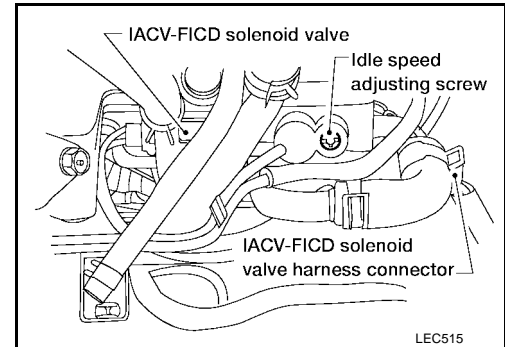
Check if air conditioner compressor functions normally.

OK or NG

- OK >> GO TO 3.
- NG >> Refer to [MTC-24, "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.

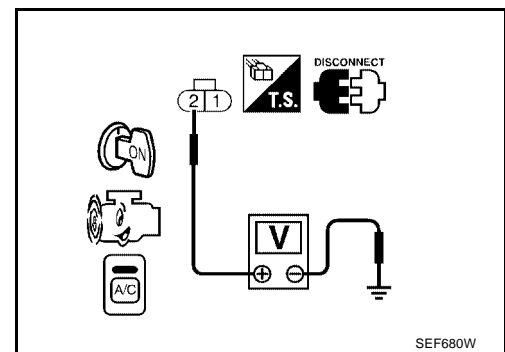


5. Check voltage between terminal 2 and ground with CONSULT-II or tester.

**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 for open or short between IACV-FICD solenoid valve and harness connector F27

>> 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 body 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

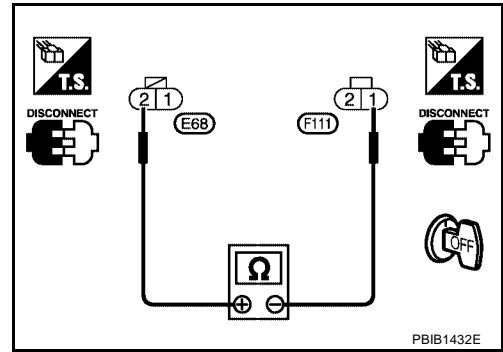
1. Check harness continuity between ambient air temperature switch terminal 2 and IACV-FICD solenoid valve terminal 1.

**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

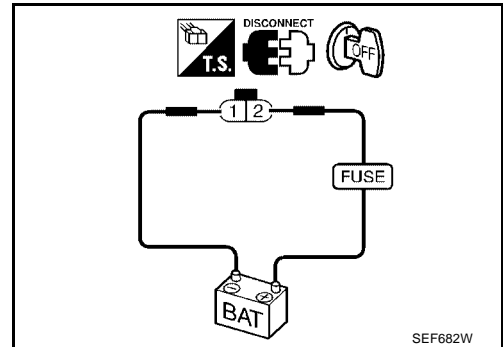
Check the following.

- 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

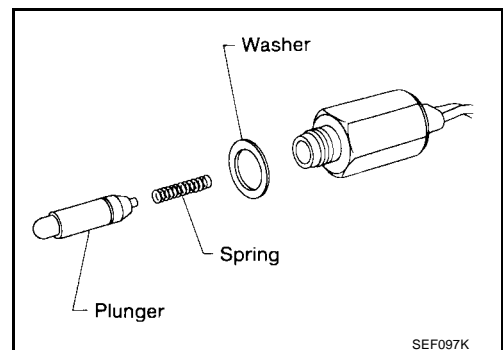
1. Disconnect IACV-FICD solenoid valve harness connector.
2. Check for clicking sound when applying 12V direct current to terminals.
3. Check plunger for seizing or sticking.



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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

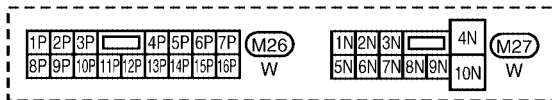
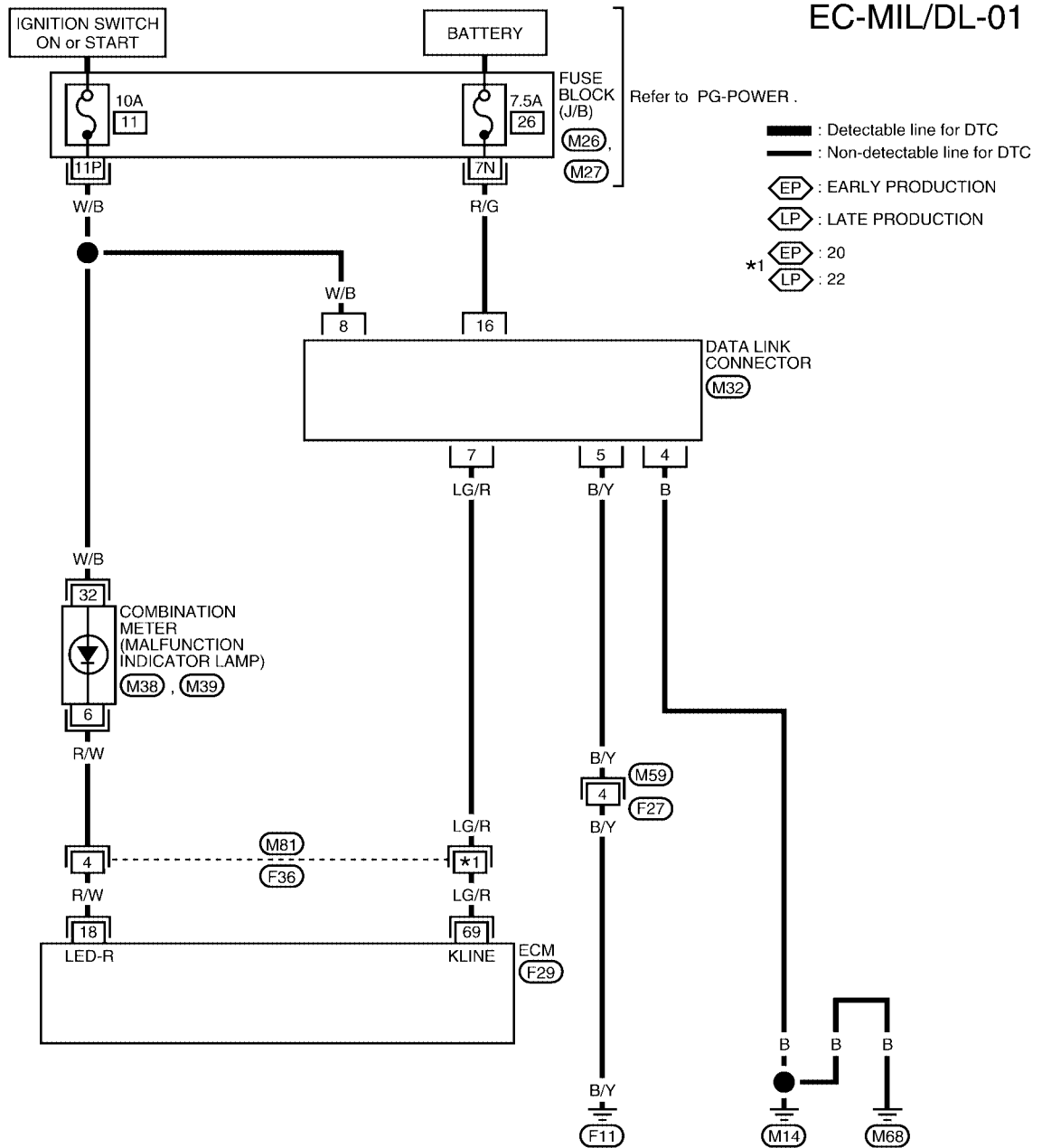
>> INSPECTION END.

MIL AND DATA LINK CONNECTOR

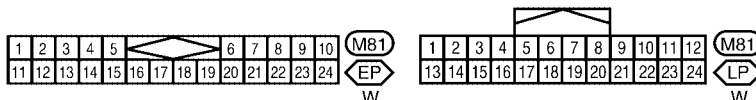
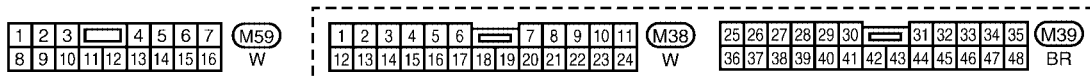
PF2:24814

Wiring Diagram

UBS007TM



Refer to the following.  
**F29** - ELECTRICAL UNITS



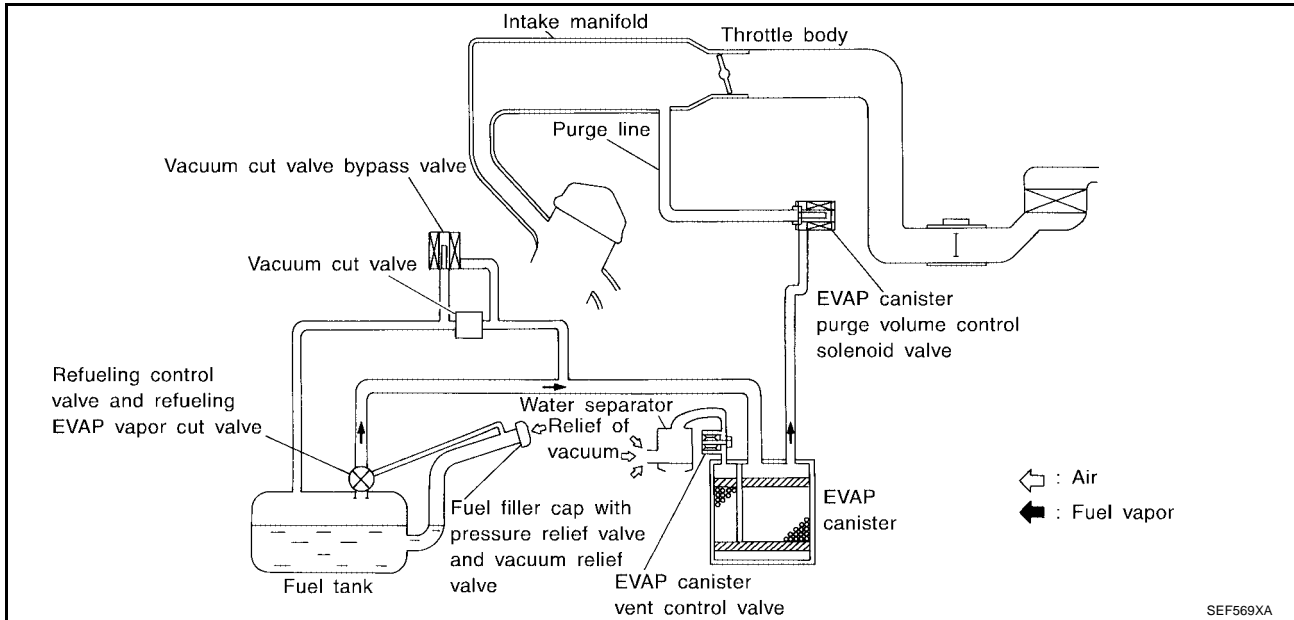


## EVAPORATIVE EMISSION SYSTEM

PFP:14950

### Description SYSTEM DESCRIPTION

UBS007TN



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

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

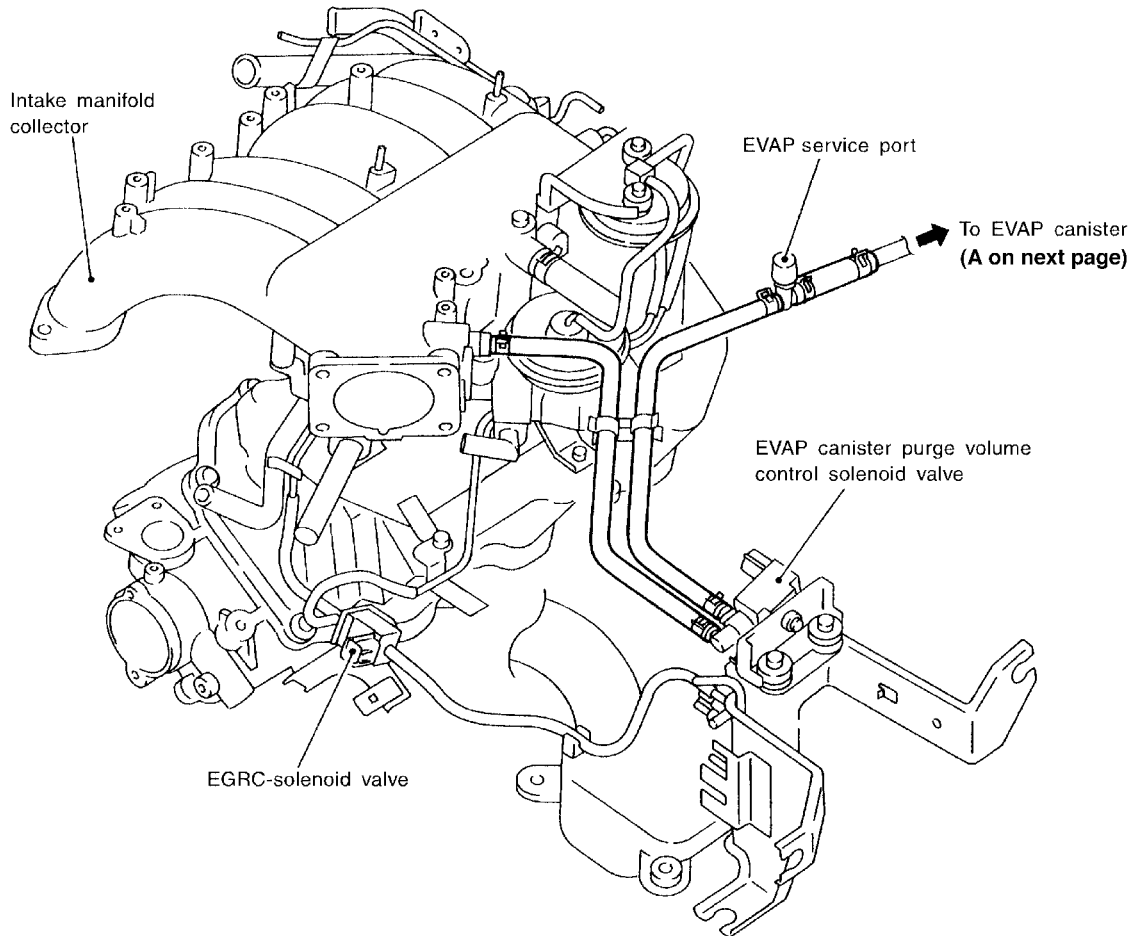
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid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

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

# EVAPORATIVE EMISSION SYSTEM

[VG33E]

## EVAPORATIVE EMISSION LINE DRAWING

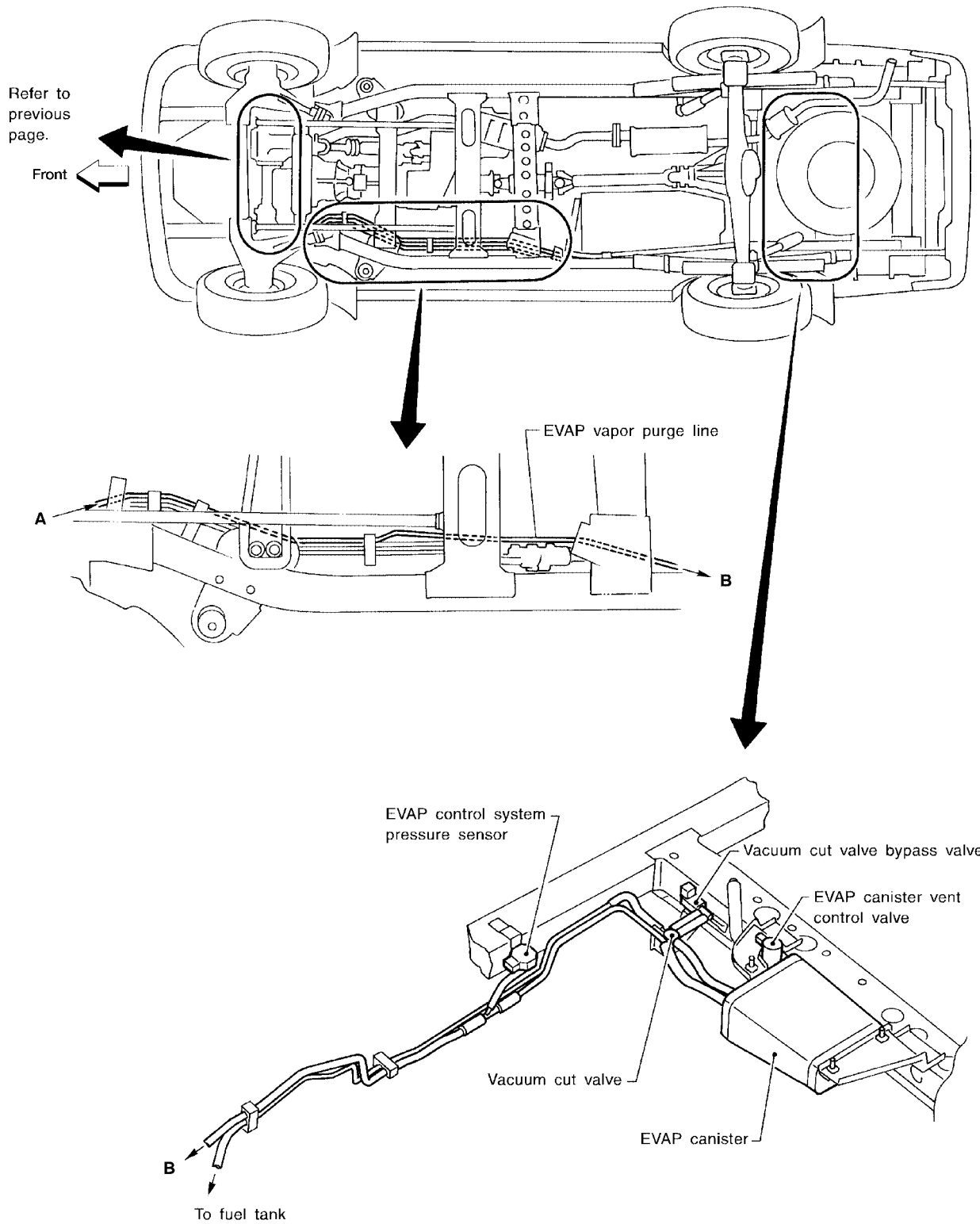


**NOTE:**  
Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

BBA0184E

# EVAPORATIVE EMISSION SYSTEM

[VG33E]



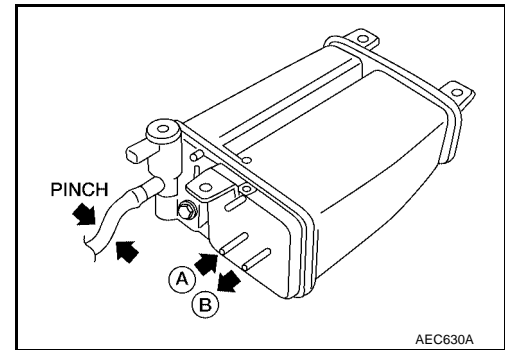
A  
EC  
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F  
G  
H  
I  
J  
K  
L  
M

AEC886A

## Component Inspection 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**.

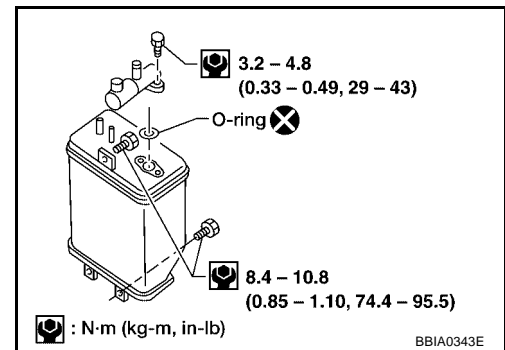


AEC630A

## Tightening Torque

Tighten EVAP canister as shown in the figure.

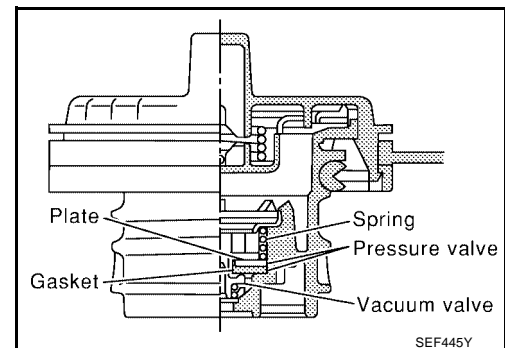
**Make sure new O-ring is installed properly between EVAP canister and EVAP canister vent control valve.**



B8IA0343E

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

1. Wipe clean valve housing.



SEF445Y

2. Check valve opening pressure and vacuum.

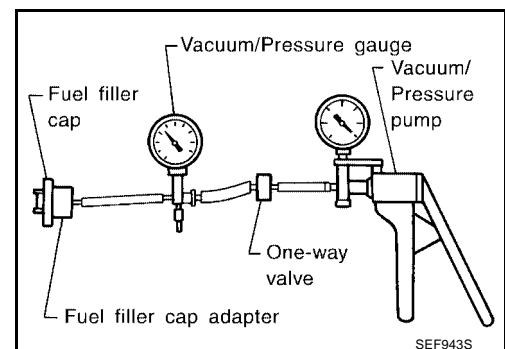
**Pressure:** 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm<sup>2</sup>, 2.22 - 2.90 psi)

**Vacuum:** -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm<sup>2</sup>, -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**



SEF943S

## VACUUM CUT VALVE AND VACUUM CUT VALVE BYPASS VALVE

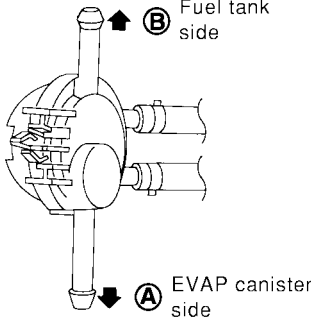
**With CONSULT-II**

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.

# EVAPORATIVE EMISSION SYSTEM

[VG33E]

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.

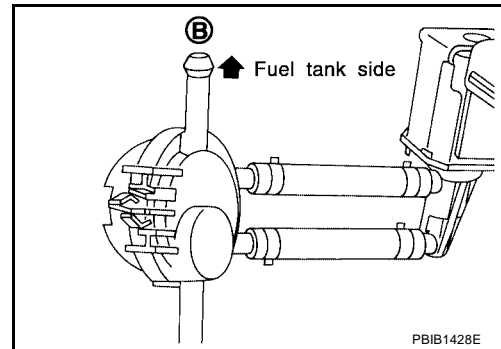


| ACTIVE TEST     |         |
|-----------------|---------|
| VC/V BYPASS/V   | OFF     |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| A/F ALPHA-B2    | XXX %   |
| HO2S1 MNTR (B1) | LEAN    |
| HO2S1 MNTR (B2) | LEAN    |
| THRTL POS SEN   | XXX V   |

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.



## 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

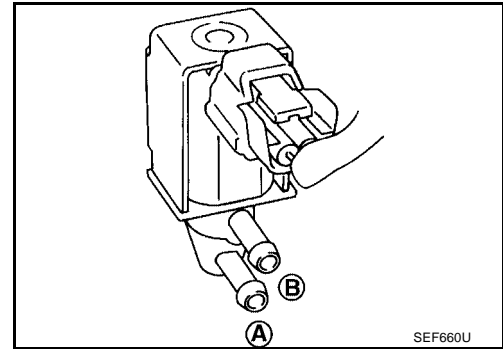
3. Check air passage continuity.

# EVAPORATIVE EMISSION SYSTEM

[VG33E]

| Condition<br>PURG VOL CONT/V value | Air passage continuity<br>between A and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |

If NG, replace the EVAP canister purge volume control solenoid valve.

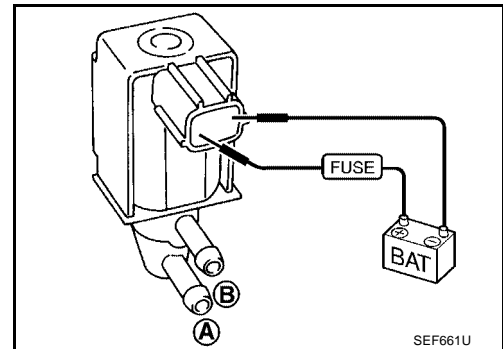


## ⊗ Without CONSULT-II

1. Check air passage continuity.

| Condition  | Air passage continuity<br>between A and B |
|--|---|
| 12V direct current supply between<br>terminals 1 and 2 | Yes                                       |
| No supply  | No  |

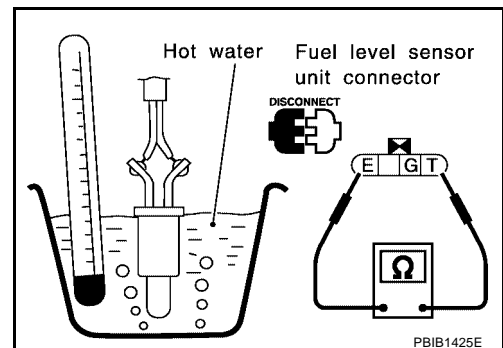
2. If NG, replace the EVAP canister purge volume control solenoid valve.



## FUEL TANK TEMPERATURE SENSOR

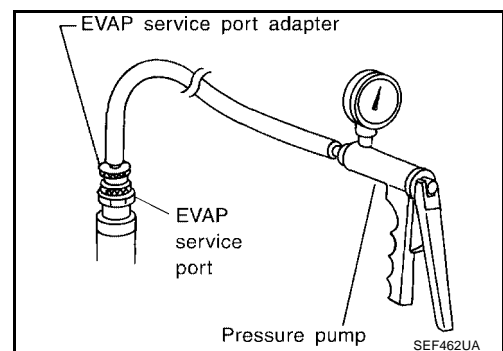
1. Remove fuel level sensor unit.
2. Check resistance fuel level sensor unit terminals T and E by heating with hot water or heat gun as shown in the figure.

| 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

UBS0077P

### CAUTION:

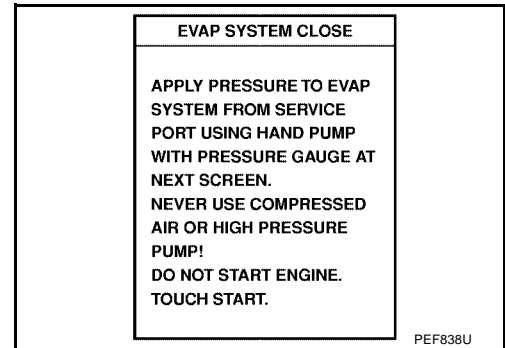
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in EVAP system.

**NOTE:**

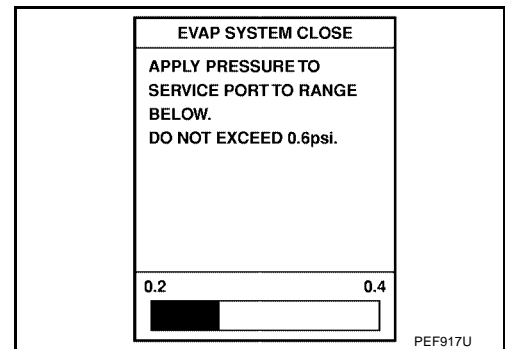
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

**WITH CONSULT-II**

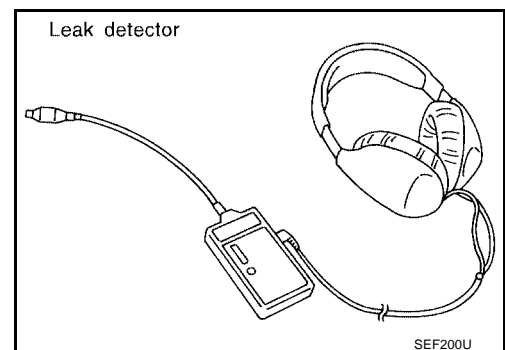
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose to the EVAP service port adapter.
3. Turn ignition switch "ON".
4. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
5. Touch "START". A bar graph (Pressure indicating 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.

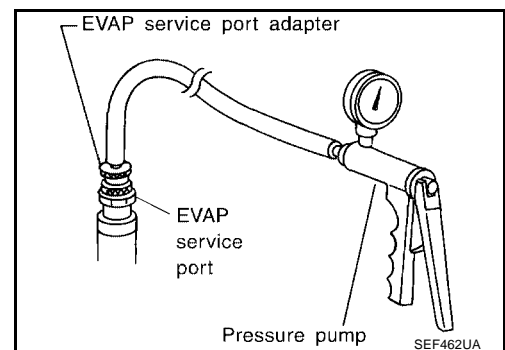


8. Locate the leak using a leak detector. Refer to [EC-1170, "EVAPORATIVE EMISSION LINE DRAWING"](#).



**WITHOUT CONSULT-II**

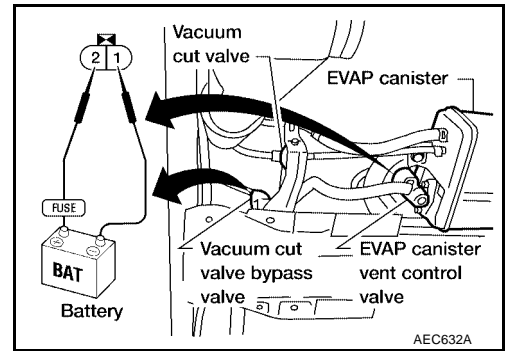
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump with pressure gauge to the EVAP service port adapter.



# EVAPORATIVE EMISSION SYSTEM

[VG33E]

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<sup>2</sup>, 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-1170. "EVAPORATIVE EMISSION LINE DRAWING"](#).



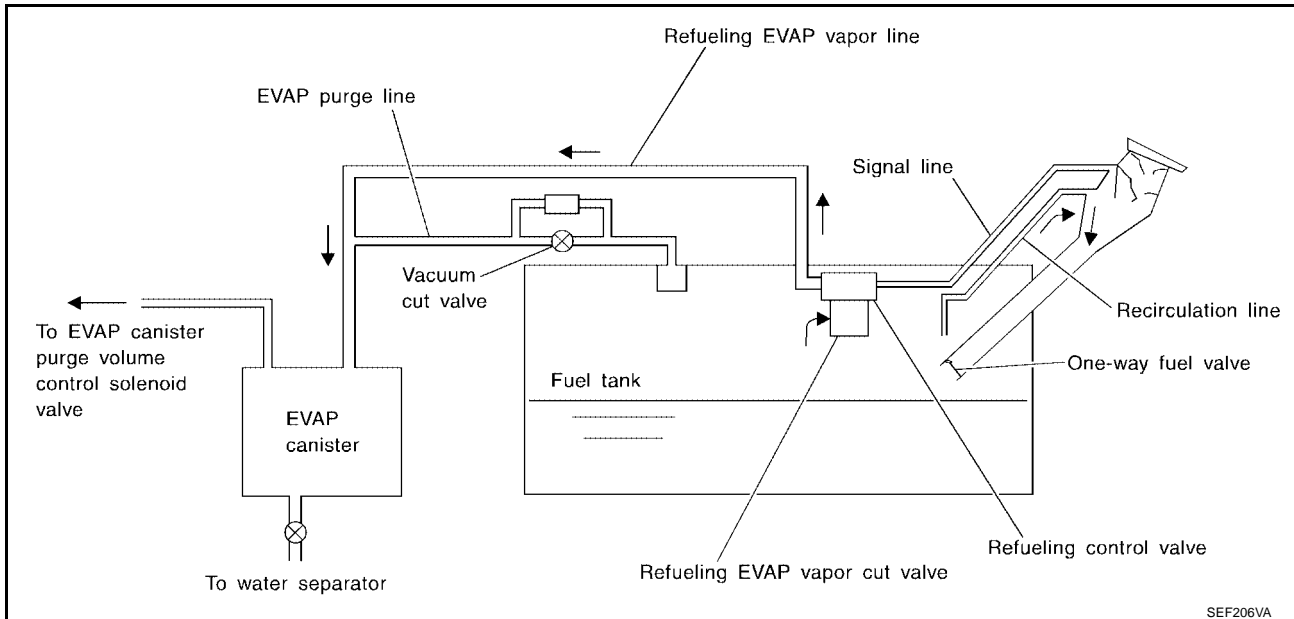


## ON BOARD REFUELING VAPOR RECOVERY (ORVR)

PFP:00032

### System Description

UBS007TQ



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<sub>2</sub> 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-619. "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

**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

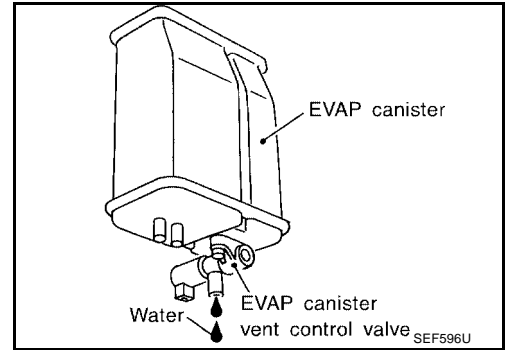
- OK >> GO TO 2.
- NG >> GO TO 3.

### 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

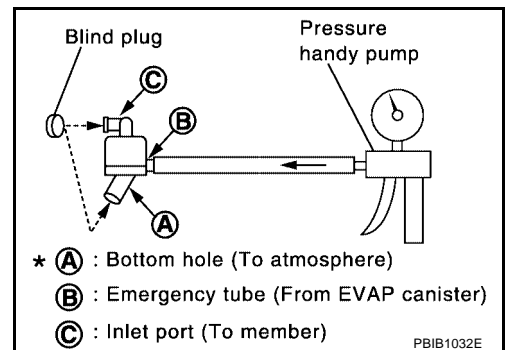
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG 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.

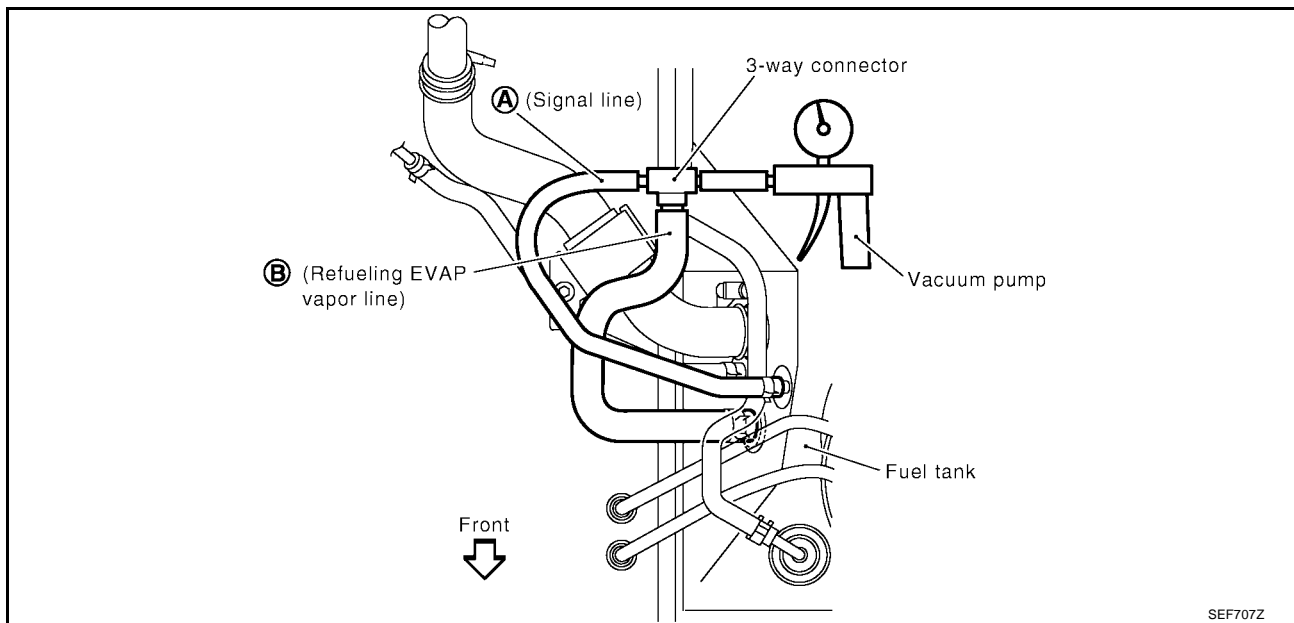
>> Repair or replace EVAP hose.

## 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.



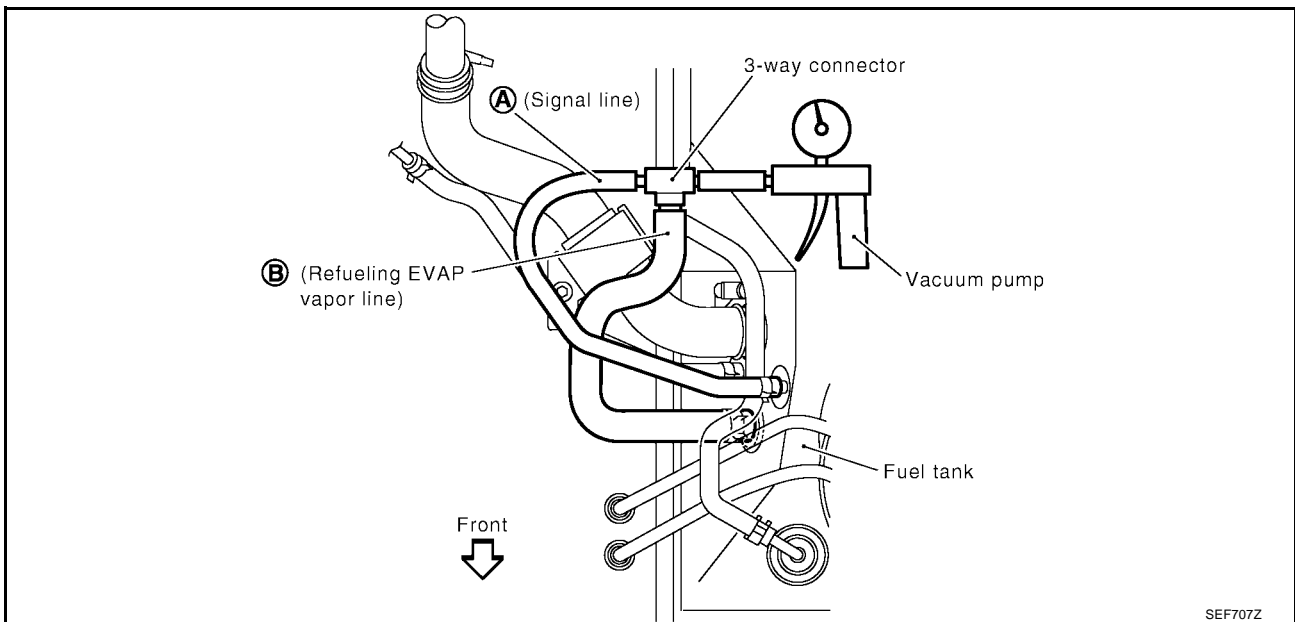
OK or NG

- 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.

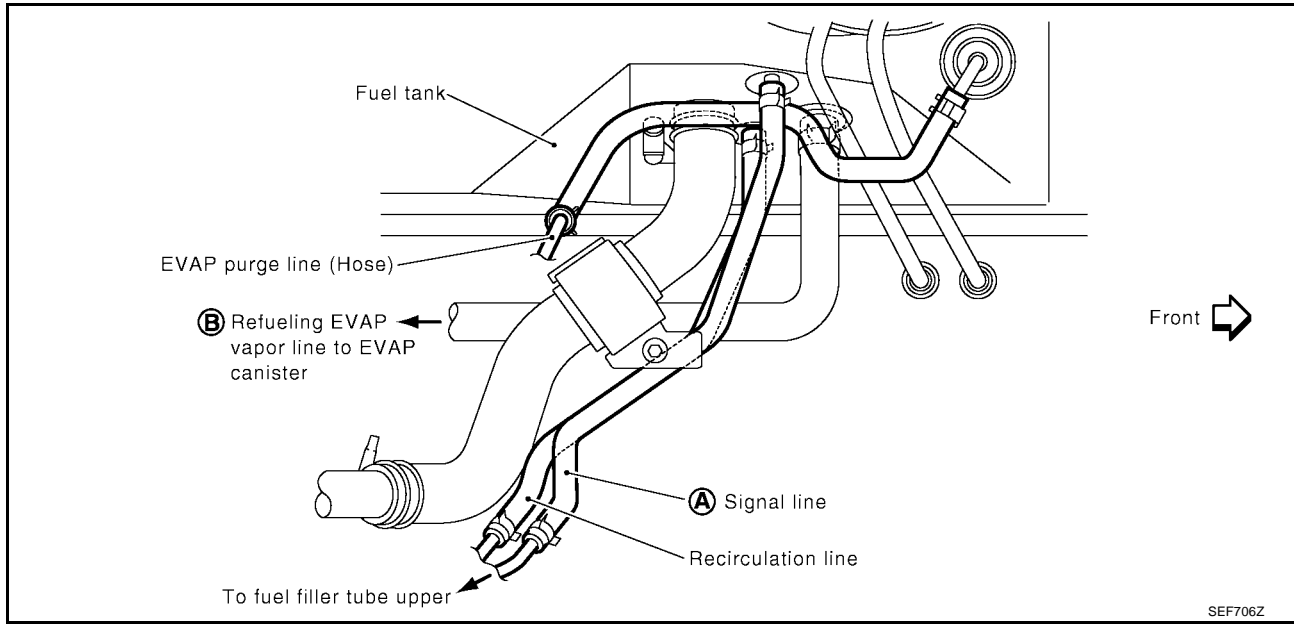


OK or NG

- 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.

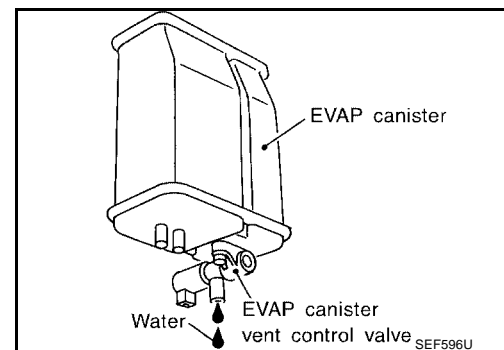
## 2. CHECK IF EVAP CANISTER SATURATED WITH WATER

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.

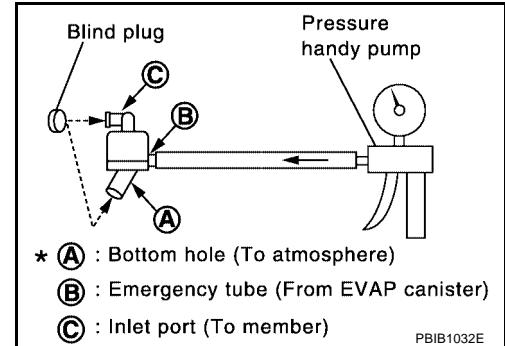
**NOTE:**

- 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.

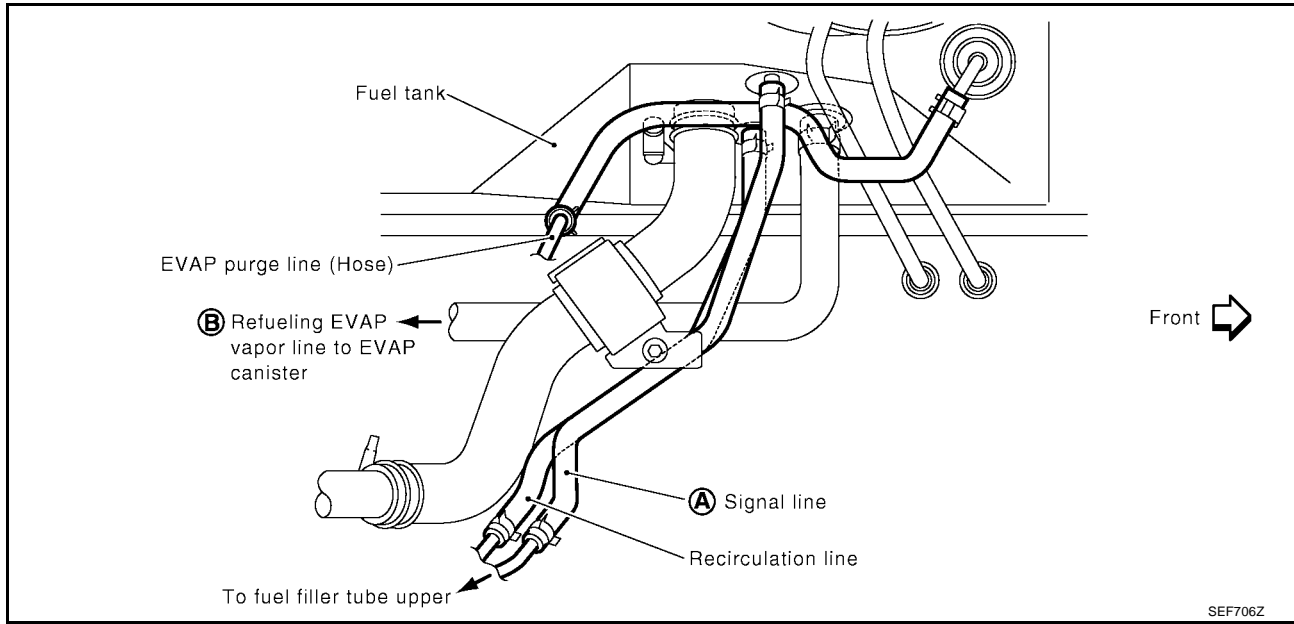
OK or NG

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.

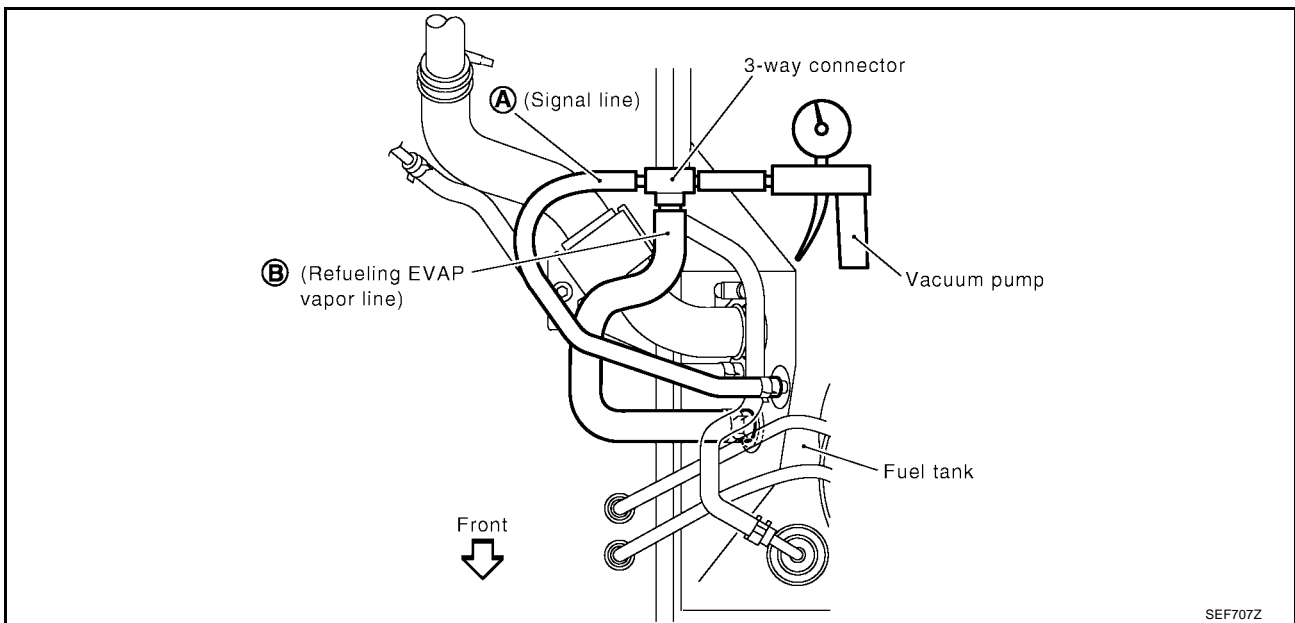
NG >> Replace refueling control valve with fuel tank.

## 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

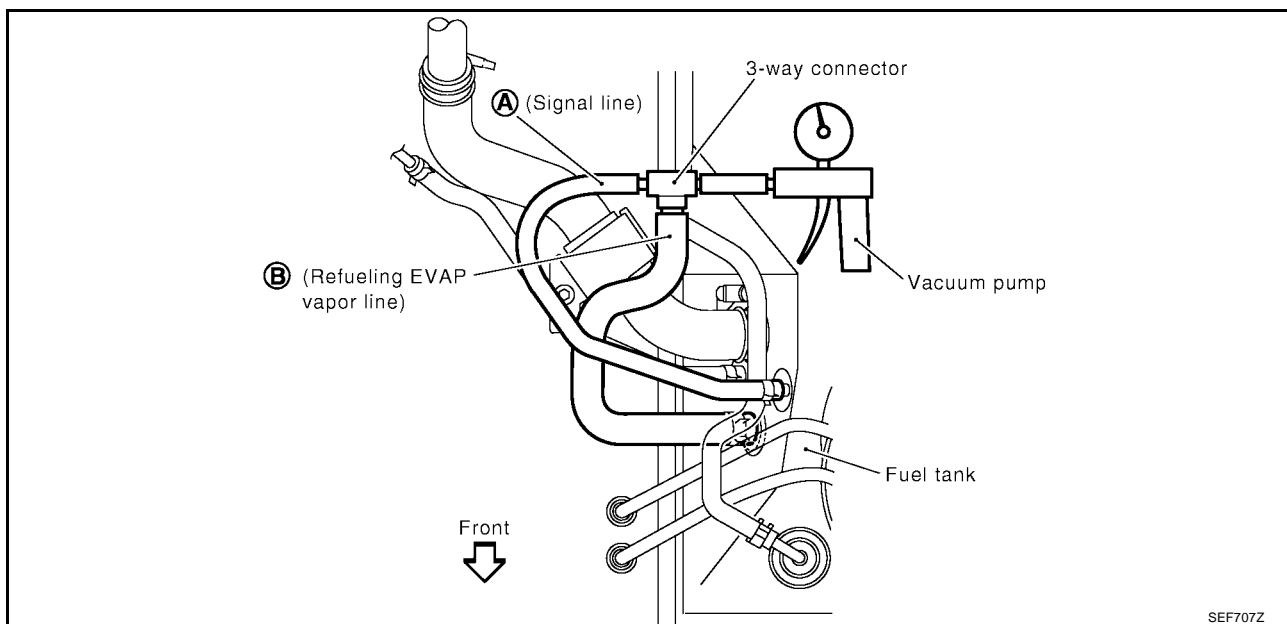
- OK >> GO TO 11.
- NG >> Replace refueling EVAP vapor cut valve with fuel tank.



## 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

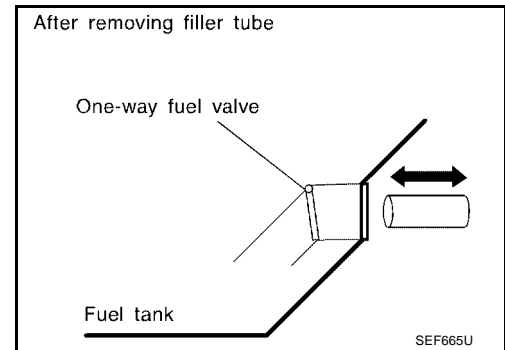
1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.  
When a stick is inserted, the valve should open, when removing stick it should close.

**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**

**Description**

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.

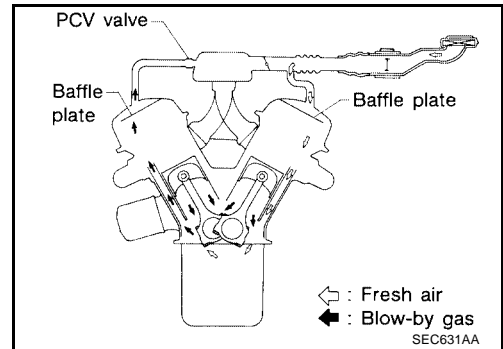
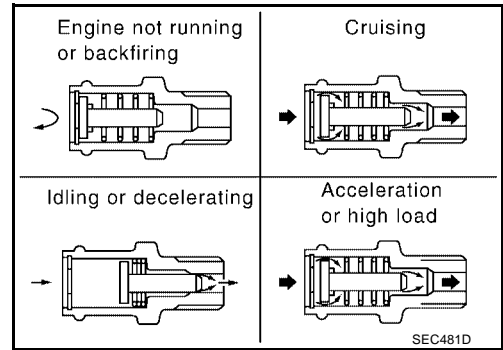
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.

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.

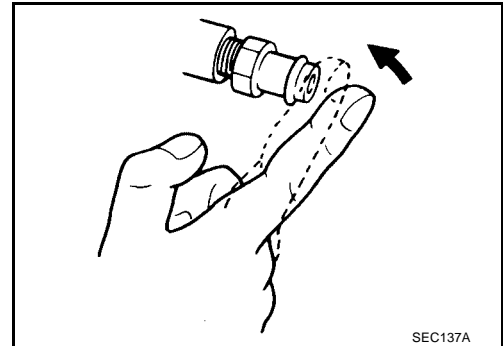
This system returns blow-by gas to the intake manifold.



**Component Inspection**

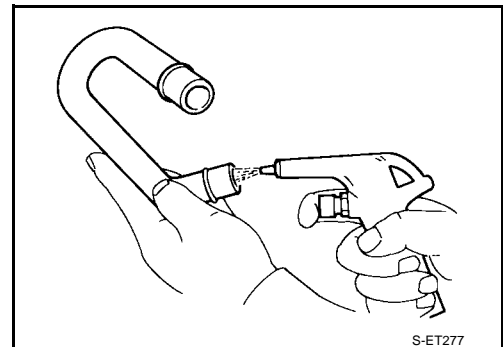
**PCV (POSITIVE CRANKCASE VENTILATION) VALVE**

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)

[VG33E]

## SERVICE DATA AND SPECIFICATIONS (SDS)

PF0:00030

### Fuel Pressure Regulator

UBS007TU

|  |                             |
|--|-----------------------------|
| Fuel pressure at idling kPa (kg/cm <sup>2</sup> , psi) |                             |
| Vacuum hose is connected                               | Approximately 235 (2.4, 34) |
| Vacuum hose is disconnected                            | Approximately 294 (3.0, 43) |

### Idle Speed and Ignition Timing

UBS007TV

|  |                                    |                 |
|--|------------------------------------|-----------------|
| Base idle speed*1                      | No-load*4 (in "P" or "N" position) | 700±50 rpm      |
| Target idle speed*2                    | No-load*4 (in "P" or "N" position) | 750±50 rpm      |
| Air conditioner: ON                    | In "P" or "N" position             | 850 rpm or more |
| Ignition timing*3                      | In "P" or "N" position             | 10°±2° BTDC     |
| 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

UBS007TW

|                                       |                     |
|---------------------------------------|---------------------|
| 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

UBS007TX

|   |   |
|---|---|
| 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*<br>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

UBS007TY

| 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

UBS007TZ

|                             |            |
|-----------------------------|------------|
| Resistance [at 25°C (77°F)] | 2.3 - 4.3Ω |
|-----------------------------|------------|

### Fuel Pump

UBS007U0

|                             |            |
|-----------------------------|------------|
| Resistance [at 25°C (77°F)] | 0.2 - 5.0Ω |
|-----------------------------|------------|

### IACV-AAC Valve

UBS007U1

|                             |                     |
|-----------------------------|---------------------|
| Resistance [at 20°C (68°F)] | Approximately 10.0Ω |
|-----------------------------|---------------------|

### Injector

UBS007U2

|                             |          |
|-----------------------------|----------|
| Resistance [at 25°C (77°F)] | 10 - 14Ω |
|-----------------------------|----------|

# SERVICE DATA AND SPECIFICATIONS (SDS)

[VG33E]

## Throttle Position Sensor

UBS007U3

| Throttle valve conditions | Voltage (at normal operating temperature, engine off, ignition switch ON) |
|---------------------------|---|
| Completely closed (a)     | 0.15 - 0.85V  |
| Partially open            | Between (a) and (b)   |
| Completely open (b)       | 3.5 - 4.7V  |

## Calculated Load Value

UBS007U4

|              | 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

UBS007U5

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

## Heated Oxygen Sensor 2 Heater

UBS007U6

|                             |            |
|-----------------------------|------------|
| Resistance [at 25°C (77°F)] | 2.3 - 4.3Ω |
|-----------------------------|------------|

## Crankshaft Position Sensor (OBD)

UBS007U7

|                             |            |
|-----------------------------|------------|
| Resistance [at 20°C (68°F)] | 512 - 632Ω |
|-----------------------------|------------|

## Fuel Tank Temperature Sensor

UBS007U8

| Temperature °C (°F) | Resistance kΩ |
|---------------------|---------------|
| 20 (68)             | 2.3 - 2.7     |
| 50 (122)            | 0.79 - 0.90   |

# INDEX FOR DTC

[VG33ER]

PFP:00024

UBS005W6

## INDEX FOR DTC Alphabetical Index

x: Applicable —: Not applicable

| Item<br>(CONSULT-II screen terms) | DTC*1*2           | Trip | MIL<br>Lighting<br>up | Reference page          |
|-----------------------------------|-------------------|------|-----------------------|-------------------------|
|                                   | CONSULT-II<br>GST |      |                       |                         |
| Unable to access ECM              | —                 | —    | —                     | <a href="#">EC-1251</a> |
| A/T 1ST GR FNCTN                  | P0731             | 2    | x                     | <a href="#">AT-270</a>  |
| A/T 2ND GR FNCTN                  | P0732             | 2    | x                     | <a href="#">AT-276</a>  |
| A/T 3RD GR FNCTN                  | P0733             | 2    | x                     | <a href="#">AT-281</a>  |
| A/T 4TH GR FNCTN                  | P0734             | 2    | x                     | <a href="#">AT-286</a>  |
| A/T COMM LINE                     | P0600*4           | 2    | —                     | <a href="#">EC-1591</a> |
| A/T DIAG COMM LINE                | P1605             | 2    | x                     | <a href="#">EC-1702</a> |
| A/T TCC S/V FNCTN                 | P0744             | 2    | x                     | <a href="#">AT-298</a>  |
| ATF TEMP SEN/CIRC                 | P0710             | 2    | x                     | <a href="#">AT-255</a>  |
| CKP SEN/CIRCUIT                   | P0335             | 2    | x                     | <a href="#">EC-1476</a> |
| CKP SENSOR (COG)                  | P1336             | 2    | x                     | <a href="#">EC-1641</a> |
| CLOSED LOOP-B1                    | P1148             | 1    | x                     | <a href="#">EC-1635</a> |
| CLOSED LOOP-B2                    | P1168             | 1    | x                     | <a href="#">EC-1635</a> |
| CLOSED TP SW/CIRC                 | P0510             | 2    | x                     | <a href="#">EC-1584</a> |
| CMP SEN/CIRCUIT                   | P0340             | 2    | x                     | <a href="#">EC-1482</a> |
| CYL1 MISFIRE                      | P0301             | 2    | x                     | <a href="#">EC-1464</a> |
| CYL2 MISFIRE                      | P0302             | 2    | x                     | <a href="#">EC-1464</a> |
| CYL3 MISFIRE                      | P0303             | 2    | x                     | <a href="#">EC-1464</a> |
| CYL4 MISFIRE                      | P0304             | 2    | x                     | <a href="#">EC-1464</a> |
| CYL5 MISFIRE                      | P0305             | 2    | x                     | <a href="#">EC-1464</a> |
| CYL6 MISFIRE                      | P0306             | 2    | x                     | <a href="#">EC-1464</a> |
| ECM                               | P0605             | 2    | x                     | <a href="#">EC-1597</a> |
| ECT SEN/CIRCUIT                   | P0117*3           | 1    | x                     | <a href="#">EC-1349</a> |
| ECT SEN/CIRCUIT                   | P0118*3           | 1    | x                     | <a href="#">EC-1349</a> |
| ECT SENSOR                        | P0125             | 2    | x                     | <a href="#">EC-1371</a> |
| ENG OVER TEMP                     | P0217             | 1    | x                     | <a href="#">EC-1456</a> |
| ENG OVER TEMP                     | P1217             | 1    | x                     | <a href="#">EC-1637</a> |
| ENG SPEED SIG                     | P0725             | 2    | x                     | <a href="#">AT-266</a>  |
| EVAP GROSS LEAK                   | P0455             | 2    | x                     | <a href="#">EC-1542</a> |
| EVAP PURG FLOW/MON                | P0441             | 2    | x                     | <a href="#">EC-1495</a> |
| EVAP SMALL LEAK                   | P0442             | 2    | x                     | <a href="#">EC-1503</a> |
| EVAP SMALL LEAK                   | P1442             | 2    | x                     | <a href="#">EC-1646</a> |
| EVAP SYS PRES SEN                 | P0452             | 2    | x                     | <a href="#">EC-1528</a> |
| EVAP SYS PRES SEN                 | P0453             | 2    | x                     | <a href="#">EC-1534</a> |
| EVAP VERY SML LEAK                | P0456             | 2    | x                     | <a href="#">EC-1551</a> |
| EVAP VERY SML LEAK                | P1456             | 2    | x                     | <a href="#">EC-1671</a> |
| FTT SEN/CIRCUIT                   | P0182             | 2    | x                     | <a href="#">EC-1452</a> |
| FTT SEN/CIRCUIT                   | P0183             | 2    | x                     | <a href="#">EC-1452</a> |
| FTT SENSOR                        | P0181             | 2    | x                     | <a href="#">EC-1447</a> |
| FUEL LEV SEN SLOSH                | P0460             | 2    | x                     | <a href="#">EC-1562</a> |

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| Item<br>(CONSULT-II screen terms) | DTC*1*2           | Trip | MIL<br>Lighting<br>up | Reference page          |
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|                                   | CONSULT-II<br>GST |      |                       |                         |
| FUEL LEVEL SEN/CIRC               | P1464             | 2    | ×                     | <a href="#">EC-1681</a> |
| FUEL LEVEL SENSOR                 | P0461             | 2    | ×                     | <a href="#">EC-1566</a> |
| FUEL LEVL SEN/CIRC                | P0462             | 2    | ×                     | <a href="#">EC-1568</a> |
| FUEL LEVL SEN/CIRC                | P0463             | 2    | ×                     | <a href="#">EC-1568</a> |
| FUEL SYS-LEAN-B1                  | P0171             | 2    | ×                     | <a href="#">EC-1431</a> |
| FUEL SYS-LEAN-B2                  | P0174             | 2    | ×                     | <a href="#">EC-1431</a> |
| FUEL SYS-RICH-B1                  | P0172             | 2    | ×                     | <a href="#">EC-1439</a> |
| FUEL SYS-RICH-B2                  | P0175             | 2    | ×                     | <a href="#">EC-1439</a> |
| HO2S1 (B1)                        | P0132             | 2    | ×                     | <a href="#">EC-1379</a> |
| HO2S1 (B1)                        | P0133             | 2    | ×                     | <a href="#">EC-1388</a> |
| HO2S1 (B1)                        | P0134             | 2    | ×                     | <a href="#">EC-1401</a> |
| HO2S1 (B1)                        | P1143             | 2    | ×                     | <a href="#">EC-1599</a> |
| HO2S1 (B1)                        | P1144             | 2    | ×                     | <a href="#">EC-1606</a> |
| HO2S1 (B2)                        | P0152             | 2    | ×                     | <a href="#">EC-1379</a> |
| HO2S1 (B2)                        | P0153             | 2    | ×                     | <a href="#">EC-1388</a> |
| HO2S1 (B2)                        | P0154             | 2    | ×                     | <a href="#">EC-1401</a> |
| HO2S1 (B2)                        | P1163             | 2    | ×                     | <a href="#">EC-1599</a> |
| HO2S1 (B2)                        | P1164             | 2    | ×                     | <a href="#">EC-1606</a> |
| HO2S1 HTR (B1)                    | P0031             | 2    | ×                     | <a href="#">EC-1308</a> |
| HO2S1 HTR (B1)                    | P0032             | 2    | ×                     | <a href="#">EC-1308</a> |
| HO2S1 HTR (B2)                    | P0051             | 2    | ×                     | <a href="#">EC-1308</a> |
| HO2S1 HTR (B2)                    | P0052             | 2    | ×                     | <a href="#">EC-1308</a> |
| HO2S2 HTR (B1)                    | P0037             | 2    | ×                     | <a href="#">EC-1322</a> |
| HO2S2 HTR (B1)                    | P0038             | 2    | ×                     | <a href="#">EC-1322</a> |
| HO2S2 HTR (B2)                    | P0057             | 2    | ×                     | <a href="#">EC-1322</a> |
| HO2S2 HTR (B2)                    | P0058             | 2    | ×                     | <a href="#">EC-1322</a> |
| HO2S2 (B1)                        | P0138             | 2    | ×                     | <a href="#">EC-1412</a> |
| HO2S2 (B1)                        | P0139             | 2    | ×                     | <a href="#">EC-1421</a> |
| HO2S2 (B1)                        | P1146             | 2    | ×                     | <a href="#">EC-1613</a> |
| HO2S2 (B1)                        | P1147             | 2    | ×                     | <a href="#">EC-1624</a> |
| HO2S2 (B2)                        | P0158             | 2    | ×                     | <a href="#">EC-1412</a> |
| HO2S2 (B2)                        | P0159             | 2    | ×                     | <a href="#">EC-1421</a> |
| HO2S2 (B2)                        | P1166             | 2    | ×                     | <a href="#">EC-1613</a> |
| HO2S2 (B2)                        | P1167             | 2    | ×                     | <a href="#">EC-1624</a> |
| IAT SEN/CIRCUIT                   | P0112             | 2    | ×                     | <a href="#">EC-1344</a> |
| IAT SEN/CIRCUIT                   | P0113             | 2    | ×                     | <a href="#">EC-1344</a> |
| IAT SENSOR                        | P0127             | 2    | ×                     | <a href="#">EC-1374</a> |
| ISC SYSTEM/CIRC                   | P0505             | 2    | ×                     | <a href="#">EC-1577</a> |
| KNOCK SEN/CIRC-B1                 | P0327             | 2    | —                     | <a href="#">EC-1472</a> |
| KNOCK SEN/CIRC-B1                 | P0328             | 2    | —                     | <a href="#">EC-1472</a> |
| L/PRESS SOL/CIRC                  | P0745             | 2    | ×                     | <a href="#">AT-306</a>  |
| MAF SEN/CIRCUIT                   | P0101             | 2    | ×                     | <a href="#">EC-1331</a> |
| MAF SEN/CIRCUIT                   | P0102*3           | 1    | ×                     | <a href="#">EC-1338</a> |

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| Item<br>(CONSULT-II screen terms)                               | DTC*1*2           | Trip | MIL<br>Lighting<br>up | Reference page          |
|---|-------------------|------|-----------------------|-------------------------|
|   | CONSULT-II<br>GST |      |                       |                         |
| MAF SEN/CIRCUIT   | P0103*3           | 2    | ×                     | <a href="#">EC-1338</a> |
| MULTI CYL MISFIRE   | P0300             | 2    | ×                     | <a href="#">EC-1464</a> |
| <b>NO DTC IS DETECTED.<br/>FURTHER TESTING MAY BE REQUIRED.</b> | <b>P0000</b>      | —    | —                     | —                       |
| P-N POS SW/CIRCUIT  | P1706             | 2    | ×                     | <a href="#">EC-1707</a> |
| PNP SW/CIRC   | P0705             | 2    | ×                     | <a href="#">AT-249</a>  |
| PURG VOLUME CONT/V  | P0444             | 2    | ×                     | <a href="#">EC-1515</a> |
| PURG VOLUME CONT/V  | P0445             | 2    | ×                     | <a href="#">EC-1515</a> |
| PURG VOLUME CONT/V  | P1444             | 2    | ×                     | <a href="#">EC-1648</a> |
| SC FUNCTION   | P0299             | 2    | ×                     | <a href="#">EC-1461</a> |
| SCB/V CONT SOL/V  | P0034             | 2    | ×                     | <a href="#">EC-1316</a> |
| SFT SOL A/CIRC  | P0750*3           | 1    | ×                     | <a href="#">AT-311</a>  |
| SFT SOL B/CIRC  | P0755*3           | 1    | ×                     | <a href="#">AT-316</a>  |
| TCC SOLENOID/CIRC   | P0740             | 2    | ×                     | <a href="#">AT-293</a>  |
| THERMSTAT FNCTN   | P0128             | 2    | ×                     | <a href="#">EC-1377</a> |
| TP SEN/CIRC A/T   | P1705*5           | 1    | ×                     | <a href="#">AT-249</a>  |
| TP SEN/CIRCUIT  | P0121             | 2    | ×                     | <a href="#">EC-1354</a> |
| TP SEN/CIRCUIT  | P0122*3           | 1    | ×                     | <a href="#">EC-1363</a> |
| TP SEN/CIRCUIT  | P0123*3           | 1    | ×                     | <a href="#">EC-1363</a> |
| TW CATALYST SYS-B1  | P0420             | 2    | ×                     | <a href="#">EC-1489</a> |
| TW CATALYST SYS-B2  | P0430             | 2    | ×                     | <a href="#">EC-1489</a> |
| VC CUT/V BYPASS/V   | P1491             | 2    | ×                     | <a href="#">EC-1690</a> |
| VC/V BYPASS/V   | P1490             | 2    | ×                     | <a href="#">EC-1684</a> |
| VEH SPEED SEN/CIRC AT   | P0720             | 2    | ×                     | <a href="#">AT-261</a>  |
| VEH SPEED SEN/CIRC  | P0500*5           | 2    | ×                     | <a href="#">EC-1572</a> |
| VENT CONTROL VALVE  | P0447             | 2    | ×                     | <a href="#">EC-1522</a> |
| VENT CONTROL VALVE  | P1446             | 2    | ×                     | <a href="#">EC-1657</a> |
| VENT CONTROL VALVE  | P1448             | 2    | ×                     | <a href="#">EC-1663</a> |

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

\*2: These numbers are prescribed by SAE J2012.

\*3: When the fail-safe operation occurs, the MIL illuminates.

\*4: This DTC is displayed with CONSULT-II only.

\*5: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

**NOTE:**

Regarding D22 models, "B1" indicates bank 1, "B2" indicates bank 2.

## DTC No. Index

UBS006VS

×: Applicable —: Not applicable

| DTC*1*2           | Items<br>(CONSULT-II screen terms)                              | Trip | MIL<br>Lighting<br>up | Reference page          |
|-------------------|---|------|-----------------------|-------------------------|
| CONSULT-II<br>GST |   |      |                       |                         |
| —                 | Unable to access ECM  | 2    | ×                     | <a href="#">EC-1251</a> |
| <b>P0000</b>      | <b>NO DTC IS DETECTED.<br/>FURTHER TESTING MAY BE REQUIRED.</b> | —    | —                     | —                       |
| P0031             | HO2S1 HTR (B1)  | 2    | ×                     | <a href="#">EC-1308</a> |



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| DTC*1*2           | Items<br>(CONSULT-II screen terms) | Trip | MIL<br>Lighting<br>up | Reference page          |
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| CONSULT-II<br>GST |                                    |      |                       |                         |
| P0032             | HO2S1 HTR (B1)                     | 2    | ×                     | <a href="#">EC-1308</a> |
| P0034             | SCB/V CONT SOL/V                   | 2    | ×                     | <a href="#">EC-1316</a> |
| P0037             | HO2S2 HTR (B1)                     | 2    | ×                     | <a href="#">EC-1322</a> |
| P0038             | HO2S2 HTR (B1)                     | 2    | ×                     | <a href="#">EC-1322</a> |
| P0051             | HO2S1 HTR (B2)                     | 2    | ×                     | <a href="#">EC-1308</a> |
| P0052             | HO2S1 HTR (B2)                     | 2    | ×                     | <a href="#">EC-1308</a> |
| P0057             | HO2S2 HTR (B2)                     | 2    | ×                     | <a href="#">EC-1322</a> |
| P0058             | HO2S2 HTR (B2)                     | 2    | ×                     | <a href="#">EC-1322</a> |
| P0101             | MAF SEN/CIRCUIT                    | 2    | ×                     | <a href="#">EC-1331</a> |
| P0102*3           | MAF SEN/CIRCUIT                    | 1    | ×                     | <a href="#">EC-1338</a> |
| P0103*3           | MAF SEN/CIRCUIT                    | 2    | ×                     | <a href="#">EC-1338</a> |
| P0112             | IAT SEN/CIRCUIT                    | 2    | ×                     | <a href="#">EC-1344</a> |
| P0113             | IAT SEN/CIRCUIT                    | 2    | ×                     | <a href="#">EC-1344</a> |
| P0117*3           | ECT SEN/CIRCUIT                    | 1    | ×                     | <a href="#">EC-1349</a> |
| P0118*3           | ECT SEN/CIRCUIT                    | 1    | ×                     | <a href="#">EC-1349</a> |
| P0121             | TP SEN/CIRCUIT                     | 2    | ×                     | <a href="#">EC-1354</a> |
| P0122*3           | TP SEN/CIRCUIT                     | 1    | ×                     | <a href="#">EC-1363</a> |
| P0123*3           | TP SEN/CIRCUIT                     | 1    | ×                     | <a href="#">EC-1363</a> |
| P0125             | ECT SENSOR                         | 2    | ×                     | <a href="#">EC-1371</a> |
| P0127             | IAT SENSOR                         | 2    | ×                     | <a href="#">EC-1374</a> |
| P0128             | THERMSTAT FNCTN                    | 2    | ×                     | <a href="#">EC-1377</a> |
| P0132             | HO2S1 (B1)                         | 2    | ×                     | <a href="#">EC-1379</a> |
| P0133             | HO2S1 (B1)                         | 2    | ×                     | <a href="#">EC-1388</a> |
| P0134             | HO2S1 (B1)                         | 2    | ×                     | <a href="#">EC-1401</a> |
| P0138             | HO2S2 (B1)                         | 2    | ×                     | <a href="#">EC-1412</a> |
| P0139             | HO2S2 (B1)                         | 2    | ×                     | <a href="#">EC-1421</a> |
| P0152             | HO2S1 (B2)                         | 2    | ×                     | <a href="#">EC-1379</a> |
| P0153             | HO2S1 (B2)                         | 2    | ×                     | <a href="#">EC-1388</a> |
| P0154             | HO2S1 (B2)                         | 2    | ×                     | <a href="#">EC-1401</a> |
| P0158             | HO2S2 (B2)                         | 2    | ×                     | <a href="#">EC-1412</a> |
| P0159             | HO2S2 (B2)                         | 2    | ×                     | <a href="#">EC-1421</a> |
| P0171             | FUEL SYS-LEAN-B1                   | 2    | ×                     | <a href="#">EC-1431</a> |
| P0172             | FUEL SYS-RICH-B1                   | 2    | ×                     | <a href="#">EC-1439</a> |
| P0174             | FUEL SYS-LEAN-B2                   | 2    | ×                     | <a href="#">EC-1431</a> |
| P0175             | FUEL SYS-RICH-B2                   | 2    | ×                     | <a href="#">EC-1439</a> |
| P0181             | FTT SENSOR                         | 2    | ×                     | <a href="#">EC-1447</a> |
| P0182             | FTT SEN/CIRCUIT                    | 2    | ×                     | <a href="#">EC-1452</a> |
| P0183             | FTT SEN/CIRCUIT                    | 2    | ×                     | <a href="#">EC-1452</a> |
| P0217             | ENG OVER TEMP                      | 1    | ×                     | <a href="#">EC-1456</a> |
| P0299             | SC FUNCTION                        | 2    | ×                     | <a href="#">EC-1461</a> |
| P0300             | MULTI CYL MISFIRE                  | 2    | ×                     | <a href="#">EC-1464</a> |
| P0301             | CYL1 MISFIRE                       | 2    | ×                     | <a href="#">EC-1464</a> |
| P0302             | CYL2 MISFIRE                       | 2    | ×                     | <a href="#">EC-1464</a> |

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| CONSULT-II<br>GST |                                    |      |                       |                         |
| P0303             | CYL3 MISFIRE                       | 2    | ×                     | <a href="#">EC-1464</a> |
| P0304             | CYL4 MISFIRE                       | 2    | ×                     | <a href="#">EC-1464</a> |
| P0305             | CYL5 MISFIRE                       | 2    | ×                     | <a href="#">EC-1464</a> |
| P0306             | CYL6 MISFIRE                       | 2    | ×                     | <a href="#">EC-1464</a> |
| P0327             | KNOCK SEN/CIRC-B1                  | 1    | —                     | <a href="#">EC-1472</a> |
| P0328             | KNOCK SEN/CIRC-B1                  | 1    | —                     | <a href="#">EC-1472</a> |
| P0335             | CKP SEN/CIRCUIT                    | 2    | ×                     | <a href="#">EC-1476</a> |
| P0340             | CMP SEN/CIRCUIT                    | 2    | ×                     | <a href="#">EC-1482</a> |
| P0420             | TW CATALYST SYS-B1                 | 2    | ×                     | <a href="#">EC-1489</a> |
| P0430             | TW CATALYST SYS-B2                 | 2    | ×                     | <a href="#">EC-1489</a> |
| P0441             | EVAP PURG FLOW/MON                 | 2    | ×                     | <a href="#">EC-1495</a> |
| P0442             | EVAP SMALL LEAK                    | 2    | ×                     | <a href="#">EC-1503</a> |
| P0444             | PURG VOLUME CONT/V                 | 2    | ×                     | <a href="#">EC-1515</a> |
| P0445             | PURG VOLUME CONT/V                 | 2    | ×                     | <a href="#">EC-1515</a> |
| P0447             | VENT CONTROL VALVE                 | 2    | ×                     | <a href="#">EC-1522</a> |
| P0452             | EVAP SYS PRES SEN                  | 2    | ×                     | <a href="#">EC-1528</a> |
| P0453             | EVAP SYS PRES SEN                  | 2    | ×                     | <a href="#">EC-1534</a> |
| P0455             | EVAP GROSS LEAK                    | 2    | ×                     | <a href="#">EC-1542</a> |
| P0456             | EVAP VERY SML LEAK                 | 2    | ×                     | <a href="#">EC-1551</a> |
| P0460             | FUEL LEV SEN SLOSH                 | 2    | ×                     | <a href="#">EC-1562</a> |
| P0461             | FUEL LEVEL SENSOR                  | 2    | ×                     | <a href="#">EC-1566</a> |
| P0462             | FUEL LEVL SEN/CIRC                 | 2    | ×                     | <a href="#">EC-1568</a> |
| P0463             | FUEL LEVL SEN/CIRC                 | 2    | ×                     | <a href="#">EC-1568</a> |
| P0500*5           | VEH SPEED SEN/CIRC                 | 2    | ×                     | <a href="#">EC-1572</a> |
| P0505             | ISC SYSTEM/CIRC                    | 2    | ×                     | <a href="#">EC-1577</a> |
| P0510             | CLOSED TP SW/CIRC                  | 2    | ×                     | <a href="#">EC-1584</a> |
| P0600*4           | A/T COMM LINE                      | 2    | —                     | <a href="#">EC-1591</a> |
| P0605             | ECM                                | 2    | ×                     | <a href="#">EC-1597</a> |
| P0705             | PNP SW/CIRC                        | 2    | ×                     | <a href="#">AT-249</a>  |
| P0710             | ATF TEMP SEN/CIRC                  | 2    | ×                     | <a href="#">AT-255</a>  |
| P0720             | VEH SPD SEN/CIR AT                 | 2    | ×                     | <a href="#">AT-261</a>  |
| P0725             | ENGINE SPEED SIG                   | 2    | ×                     | <a href="#">AT-266</a>  |
| P0731             | A/T 1ST GR FNCTN                   | 2    | ×                     | <a href="#">AT-270</a>  |
| P0732             | A/T 2ND GR FNCTN                   | 2    | ×                     | <a href="#">AT-276</a>  |
| P0733             | A/T 3RD GR FNCTN                   | 2    | ×                     | <a href="#">AT-281</a>  |
| P0734             | A/T 4TH GR FNCTN                   | 2    | ×                     | <a href="#">AT-286</a>  |
| P0740             | TCC SOLENOID/CIRC                  | 2    | ×                     | <a href="#">AT-293</a>  |
| P0744             | A/T TCC S/V FNCTN                  | 2    | ×                     | <a href="#">AT-298</a>  |
| P0745             | L/PRESS SOL/CIRC                   | 2    | ×                     | <a href="#">AT-306</a>  |
| P0750*3           | SFT SOL A/CIRC                     | 1    | ×                     | <a href="#">AT-311</a>  |
| P0755*3           | SFT SOL B/CIRC                     | 1    | ×                     | <a href="#">AT-316</a>  |
| P1143             | HO2S1 (B1)                         | 2    | ×                     | <a href="#">EC-1599</a> |
| P1144             | HO2S1 (B1)                         | 2    | ×                     | <a href="#">EC-1606</a> |

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| CONSULT-II<br>GST |                                    |      |                       |                         |
| P1146             | HO2S2 (B1)                         | 2    | ×                     | <a href="#">EC-1613</a> |
| P1147             | HO2S2 (B1)                         | 2    | ×                     | <a href="#">EC-1624</a> |
| P1148             | CLOSED LOOP-B1                     | 1    | ×                     | <a href="#">EC-1635</a> |
| P1163             | HO2S1 (B2)                         | 2    | ×                     | <a href="#">EC-1599</a> |
| P1164             | HO2S1 (B2)                         | 2    | ×                     | <a href="#">EC-1606</a> |
| P1166             | HO2S2 (B2)                         | 2    | ×                     | <a href="#">EC-1613</a> |
| P1167             | HO2S2 (B2)                         | 2    | ×                     | <a href="#">EC-1624</a> |
| P1168             | CLOSED LOOP-B2                     | 1    | ×                     | <a href="#">EC-1635</a> |
| P1217             | ENG OVER TEMP                      | 1    | ×                     | <a href="#">EC-1637</a> |
| P1336             | CKP SENSOR (COG)                   | 2    | ×                     | <a href="#">EC-1641</a> |
| P1442             | EVAP SMALL LEAK                    | 2    | ×                     | <a href="#">EC-1646</a> |
| P1444             | PURG VOLUME CONT/V                 | 2    | ×                     | <a href="#">EC-1648</a> |
| P1446             | VENT CONTROL VALVE                 | 2    | ×                     | <a href="#">EC-1657</a> |
| P1448             | VENT CONTROL VALVE                 | 2    | ×                     | <a href="#">EC-1663</a> |
| P1456             | EVAP VERY SML LEAK                 | 2    | ×                     | <a href="#">EC-1671</a> |
| P1464             | FUEL LEVL SEN/CIRC                 | 2    | ×                     | <a href="#">EC-1681</a> |
| P1490             | VC/V BYPASS/V                      | 2    | ×                     | <a href="#">EC-1684</a> |
| P1491             | VC CUT/V BYPASS/V                  | 2    | ×                     | <a href="#">EC-1690</a> |
| P1605             | A/T DIAG COMM LINE                 | 2    | ×                     | <a href="#">EC-1702</a> |
| P1705*5           | TP SEN/CIRC A/T                    | 1    | ×                     | <a href="#">AT-249</a>  |
| P1706             | P-N POS SW/CIRCUIT                 | 2    | ×                     | <a href="#">EC-1707</a> |
| P1760             | O/R CLTCH SOL/CIRC                 | 2    | ×                     | <a href="#">AT-329</a>  |

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

\*2: These numbers are prescribed by SAE J2012.

\*3: When the fail-safe operation occurs, the MIL illuminates.

\*4: This DTC is displayed with CONSULT-II only.

\*5: The MIL illuminates when both the "Revolution sensor signal" and the "Vehicle speed sensor signal" meet the fail-safe condition at the same time.

**NOTE:**

Regarding D22 models, "B1" indicates bank 1, "B2" indicates bank 2.

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**PRECAUTIONS**

PFP:00001

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

UBS006VT

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

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**

UBS005W8

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, "HARNES 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

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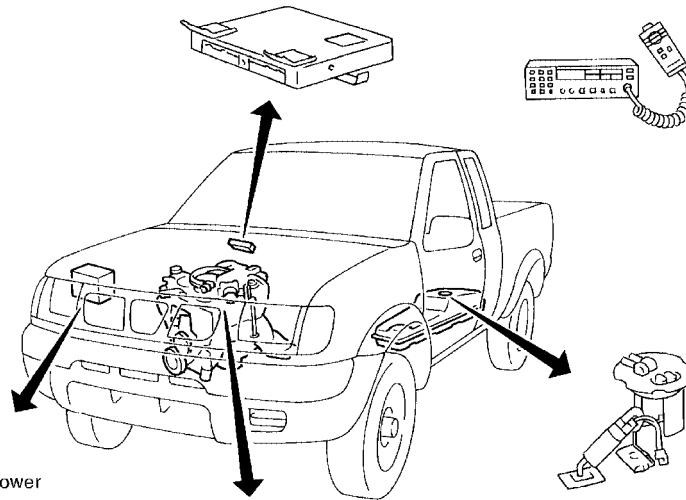
#### ECM

- 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.)

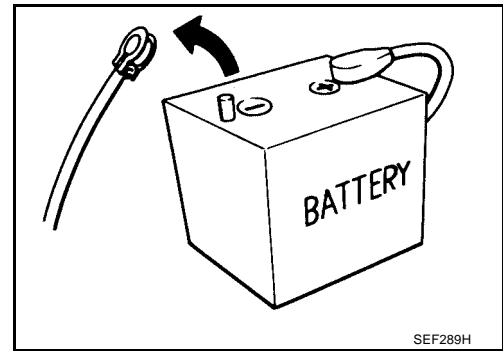
#### ECM HARNESS HANDLING

- 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 receiving 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.

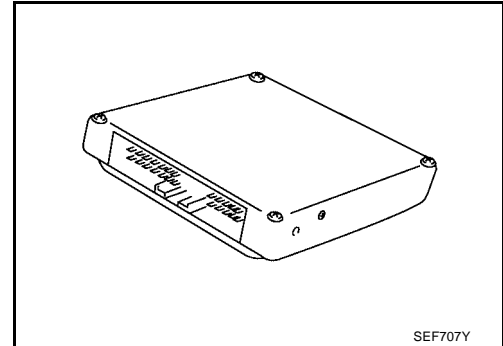
# PRECAUTIONS

[VG33ER]


- 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.

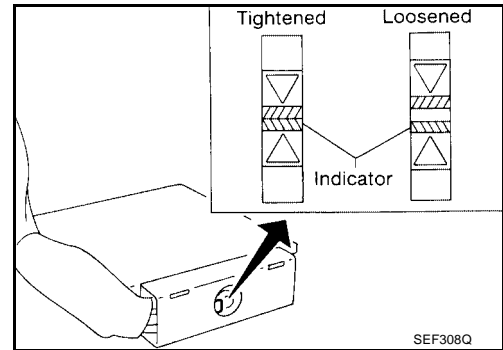


- Do not disassemble ECM.
- If a battery terminal is disconnected, the memory will return to the ECM value. The ECM will not start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace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

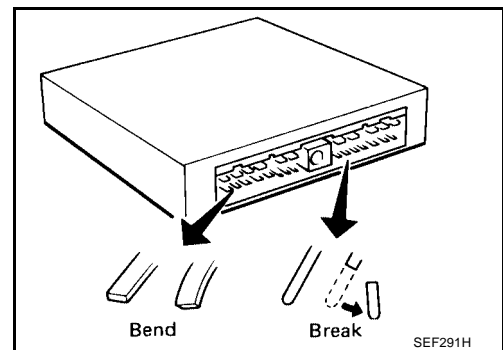


- When connecting ECM harness connector, tighten securing bolt until the gap between orange indicators disappears.

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



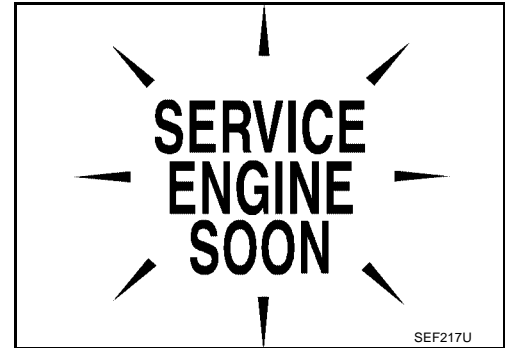
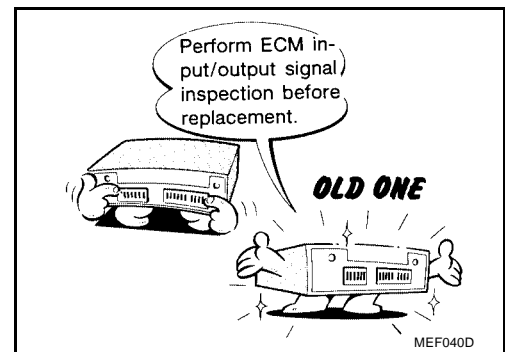
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break). Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors. A poor connection can cause an extremely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



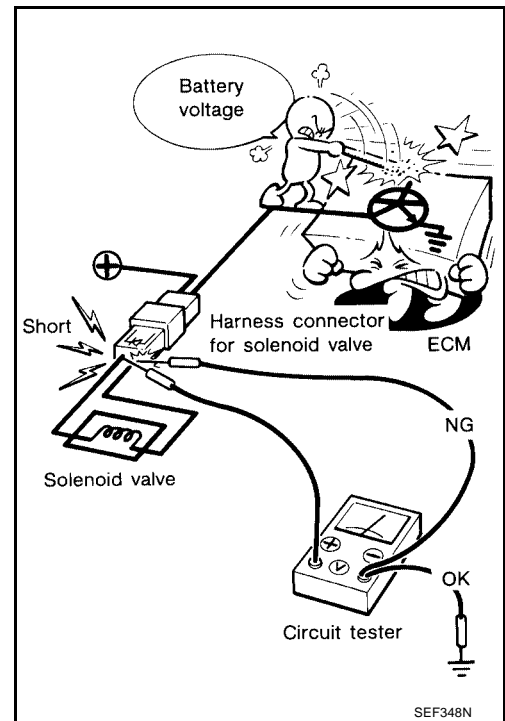
# PRECAUTIONS

[VG33ER]

- Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to [EC-1272, "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.

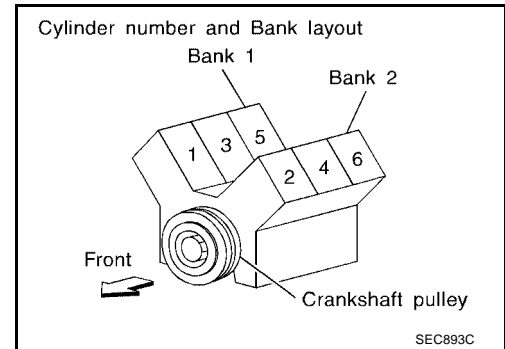


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# PRECAUTIONS

[VG33ER]

- Regarding model D22, “B1” indicates the bank 1, “B2” indicates the bank 1 as shown in the figure.



## Wiring Diagrams and Trouble Diagnosis

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"](#)

UBS005WB



# PREPARATION

[VG33ER]

PFP:00002

UBS005WC

## PREPARATION

### Special Service Tools

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

| Tool number<br>(Kent-Moore No.)<br>Tool name            | Description   |
|---|---|
| KV10117100<br>(J36471-A)<br>Heated oxygen sensor wrench | Loosening or tightening heated oxygen sensor 1 with 22 mm (0.87 in) hexagon nut |
| KV10114400<br>(J-38365)<br>Heated oxygen sensor wrench  | Loosening or tightening heated oxygen sensor 2<br><b>a: 22 mm (0.87 in)</b>     |
| J-44321<br>Fuel pressure gauge kit                      | Checking fuel pressure  |
| (J-45178)<br>TPS test connector                         | Used to test the throttle position sensor                                       |

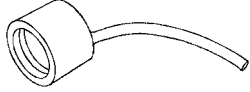
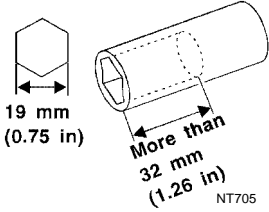
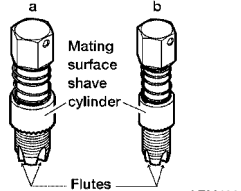
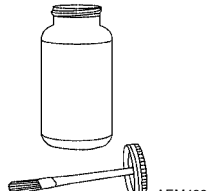
### Commercial Service Tools

UBS005WD

| Tool name (Kent-Moore No.)                       | Description  |
|--|--|
| Leak detector<br>i.e: (J41416)                   | Locating the EVAP leak                               |
| EVAP service port adapter<br>i.e.: (J41413-OBDD) | Applying positive pressure through EVAP service port |

# PREPARATION

[VG33ER]

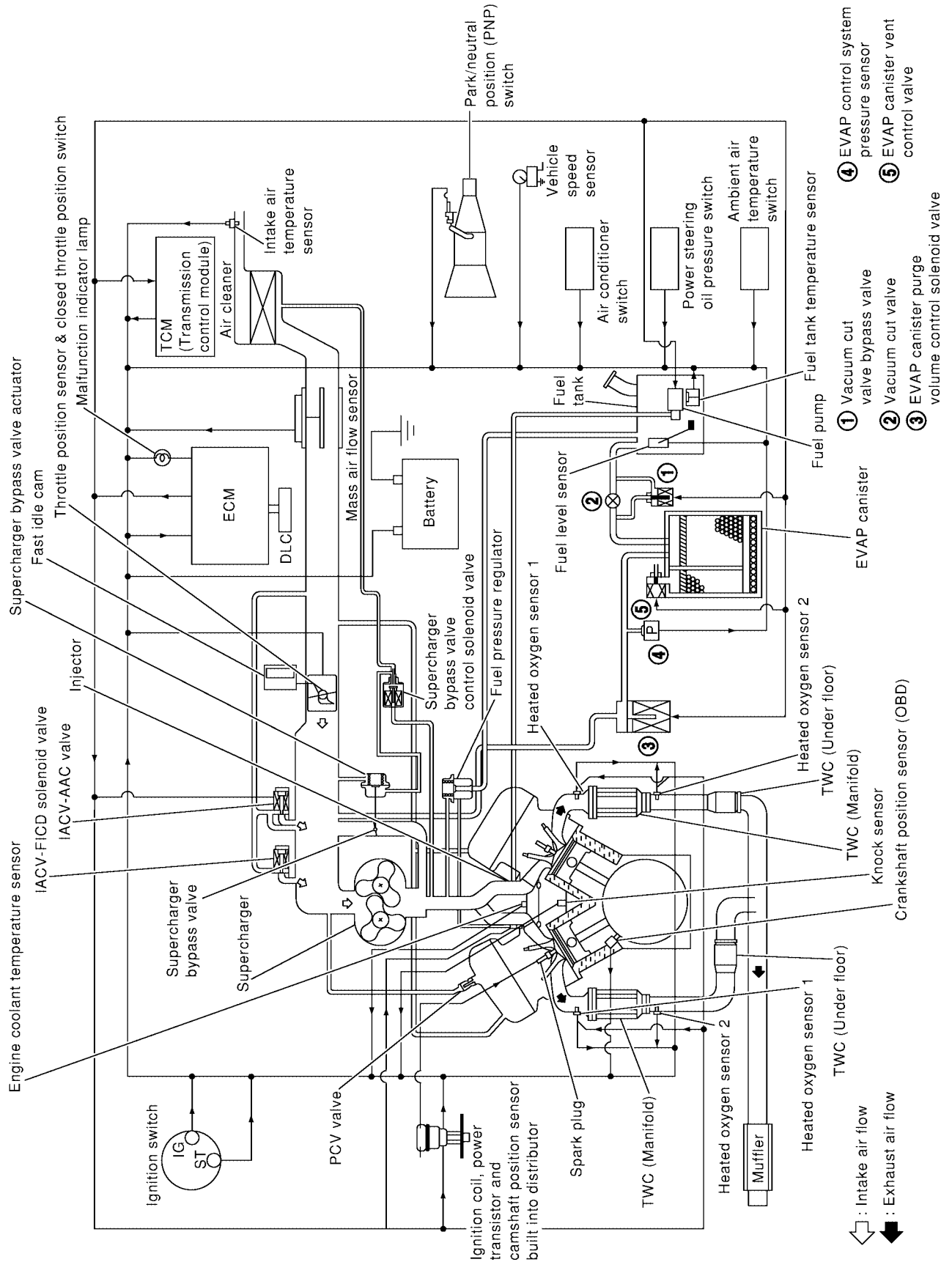
| Tool name (Kent-Moore No.)   | Description  |
|--|--|
| <p>Fuel filler cap adapter</p>  <p style="text-align: right;">NT653</p>   | <p>Checking fuel tank vacuum relief valve opening pressure</p>   |
| <p>Socket wrench</p>  <p style="text-align: right;">NT705</p>   | <p>Removing and installing engine coolant temperature sensor</p>   |
| <p>Oxygen sensor thread cleaner<br/>i.e.:(J-43897-18)<br/>(J-43897-12)</p>  <p style="text-align: right;">AEM488</p>                                | <p>Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown in "Commercial Service Tools".<br/>a: J-43897-18 (18 mm diameter with pitch 1.5 mm) for Zirconia Oxygen Sensor<br/>b: J-43897-12 (12 mm diameter with pitch 1.25 mm) for Titania Oxygen Sensor</p> |
| <p>Anti-seize lubricant<br/>i.e.:(Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)</p>  <p style="text-align: right;">AEM489</p> | <p>Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.</p>  |

## ENGINE CONTROL SYSTEM

### System Diagram

PFP:23710

UBS005WE

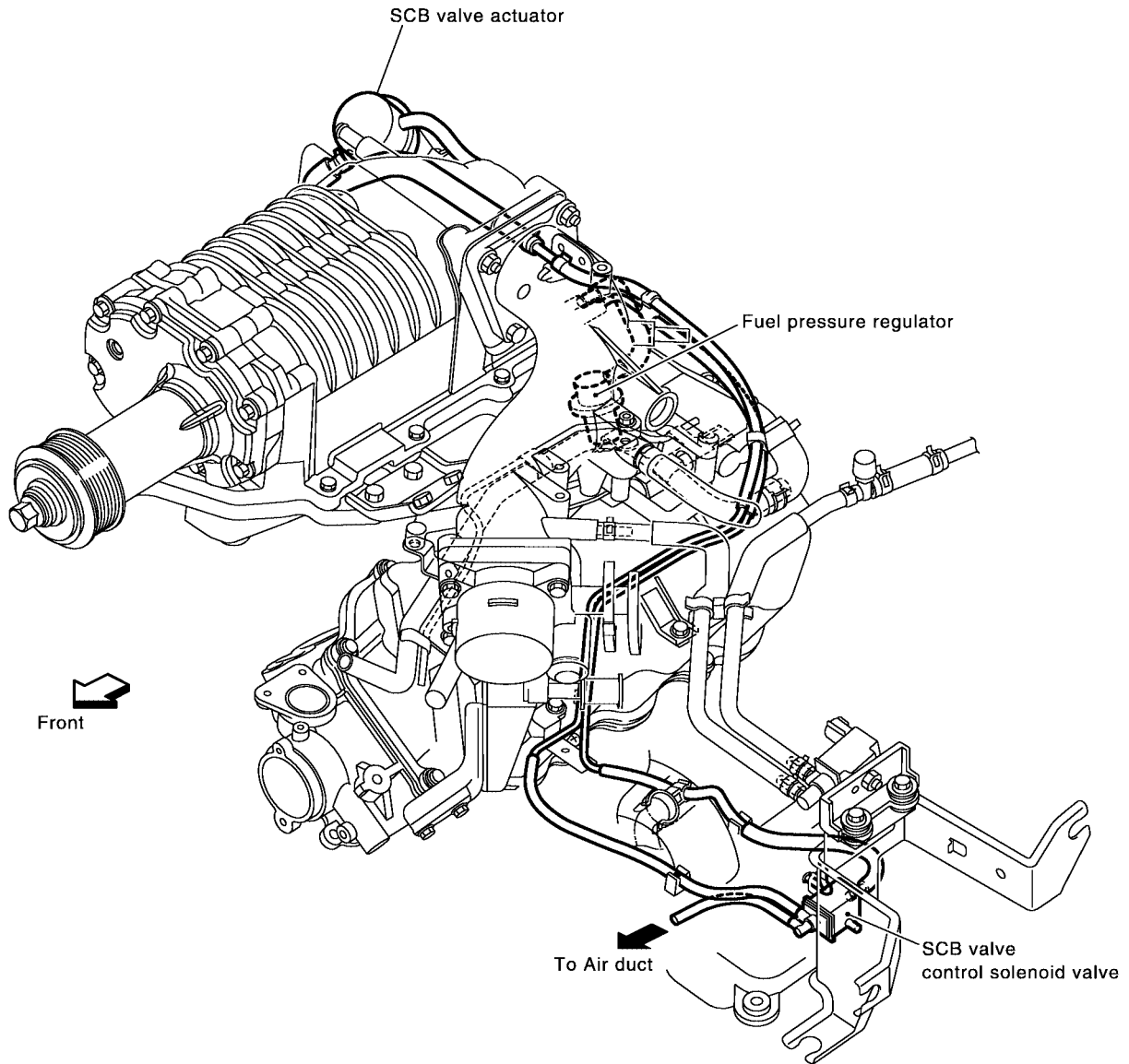


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### Vacuum Hose Drawing

UBS005WF



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

## System Chart

| Input (Sensor)  | ECM Function                           | Output (Actuator)                                 |   |
|---|--|---|---|
| <ul style="list-style-type: none"> <li>● Camshaft position sensor</li> <li>● Mass air flow sensor</li> <li>● Engine coolant temperature sensor</li> <li>● Heated oxygen sensor 1</li> <li>● Ignition switch</li> <li>● Throttle position sensor</li> <li>● Closed throttle position switch *4</li> <li>● Park/neutral position (PNP) switch</li> <li>● Air conditioner switch</li> <li>● Knock sensor</li> <li>● Intake air temperature sensor</li> <li>● EVAP control system pressure sensor *1</li> <li>● Battery voltage</li> <li>● Power steering oil pressure switch</li> <li>● Vehicle speed sensor</li> <li>● Fuel tank temperature sensor *1</li> <li>● Crankshaft position sensor (OBD) *1</li> <li>● Heated oxygen sensor 2 *3</li> <li>● TCM (Transmission control module) *2</li> <li>● Ambient air temperature switch</li> </ul> | Fuel injection & mixture ratio control | Injectors   |   |
|   | 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                | <ul style="list-style-type: none"> <li>● EVAP canister vent control valve</li> <li>● Vacuum cut valve bypass valve</li> </ul> |

\*1: These sensors are not used to control the engine system. They are 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 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 | Injectors |
| 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<br>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                  |  |           |

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

### 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.

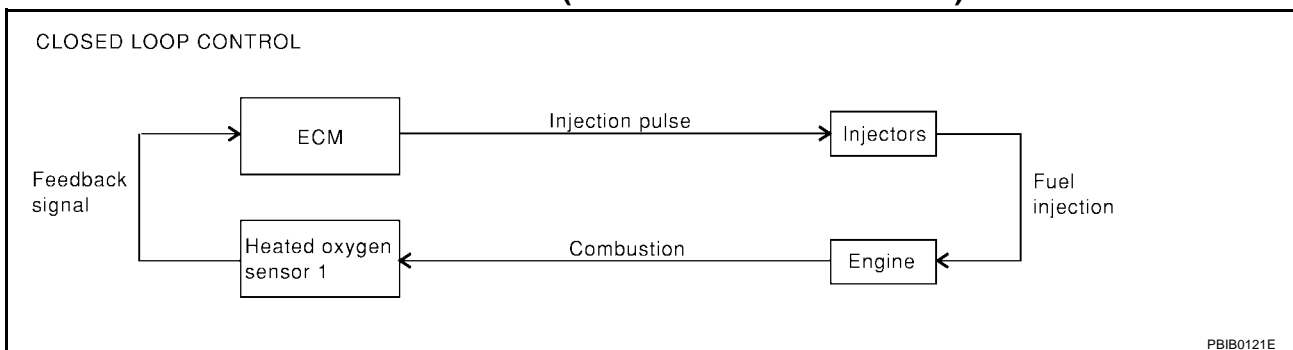
<Fuel increase>

- 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 if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about the heated oxygen sensor 1, refer to [EC-1379](#). 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.

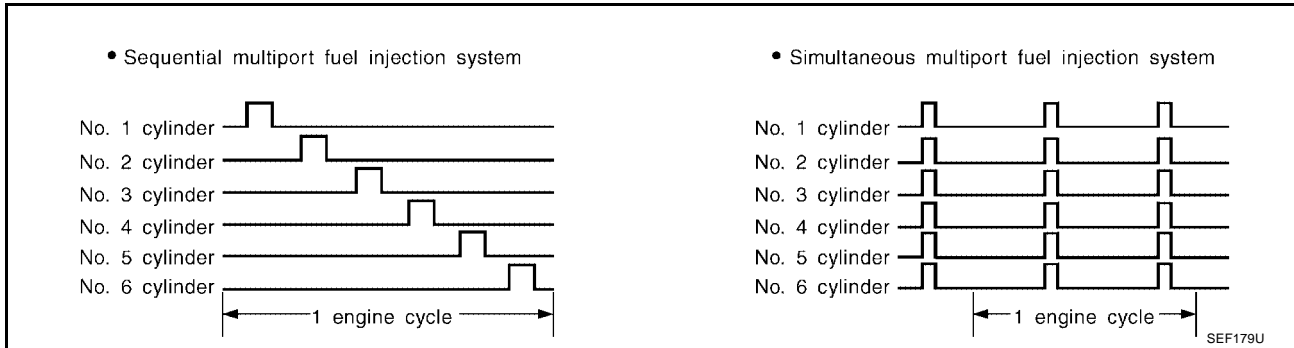
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of "injection pulse duration" to automatically compensate for the difference between the two ratios.

"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

UBS005WI

| 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<br>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                                   |                         |                  |

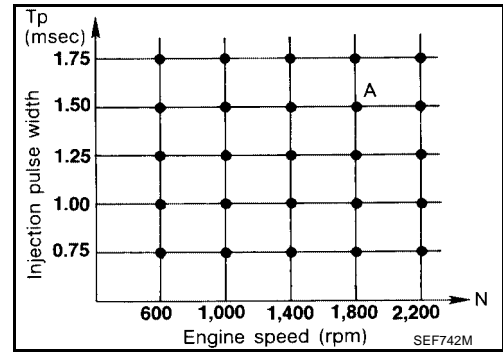
## SYSTEM DESCRIPTION

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 INPUT/OUTPUT SIGNAL CHART

UBS005WJ

| 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) INPUT/OUTPUT SIGNAL CHART

UBS005WK

| Sensor                             | Input Signal to ECM        | ECM function     | Actuator  |
|------------------------------------|----------------------------|------------------|-----------|
| Vehicle speed sensor               | Vehicle speed              | Fuel cut control | Injectors |
| 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 with no load (for example, in neutral and engine speed 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 operate until the engine speed reaches 2,000 rpm, then fuel cut is cancelled.

### NOTE:

This function is different from deceleration control listed under "Multiport Fuel Injection (MFI) System", [EC-1205](#).

A

EC

C

D

E

F

G

H

I

J

K

L

M

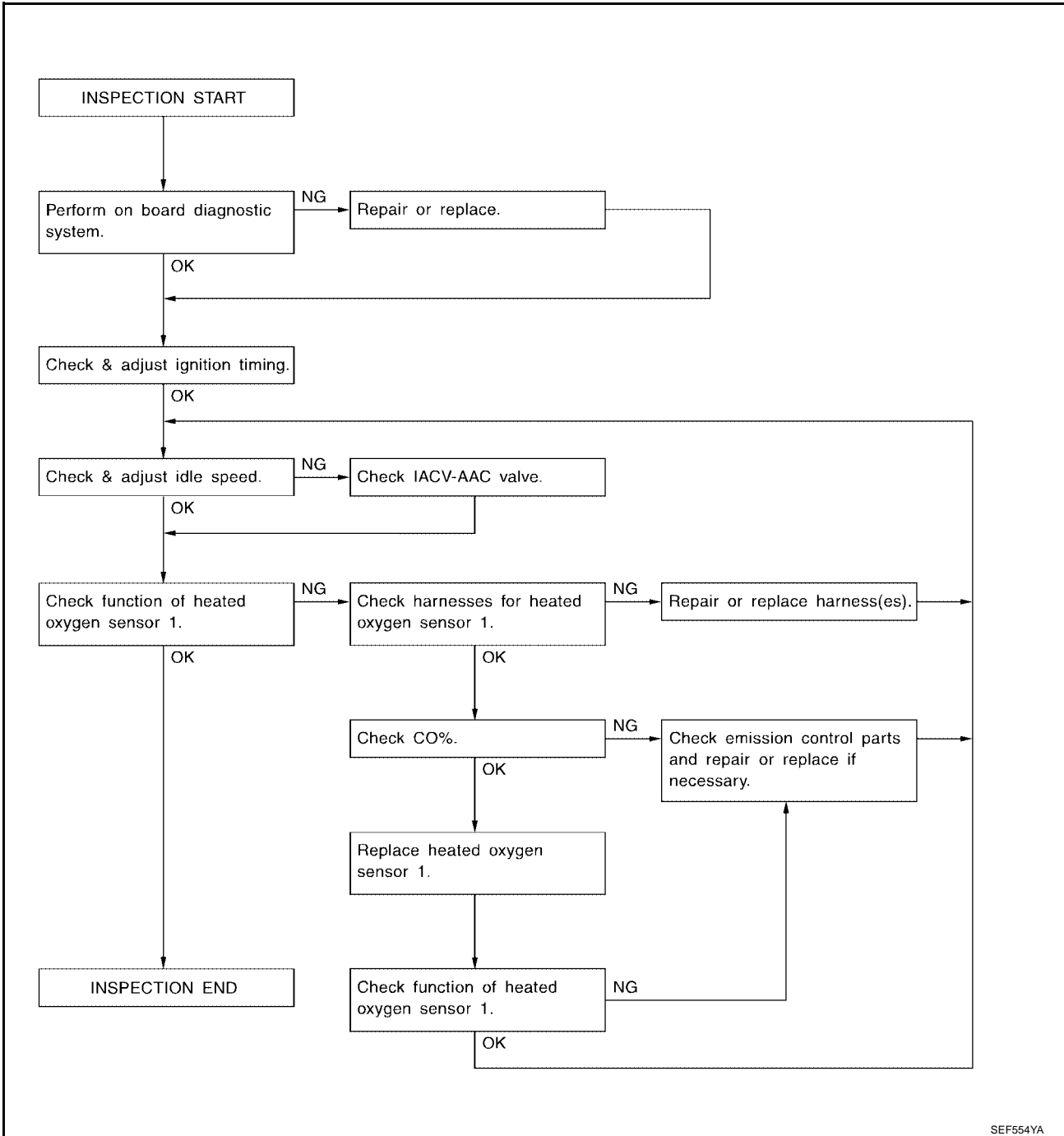
---

## BASIC SERVICE PROCEDURE

### Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment 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



SEF554YA

**NOTE:**

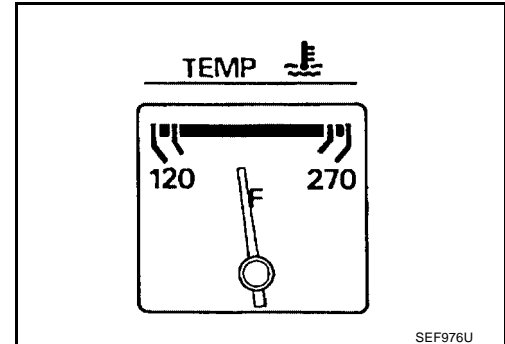
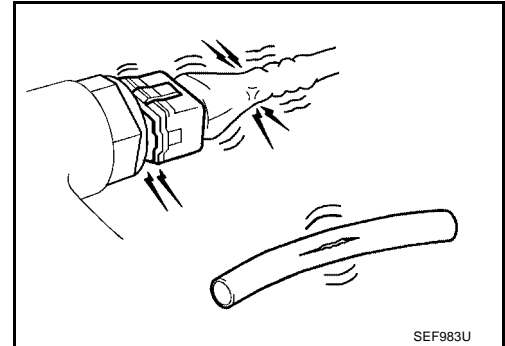
If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be expected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

A  
EC  
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M

## INSPECTION PROCEDURE

### 1. INSPECTION START

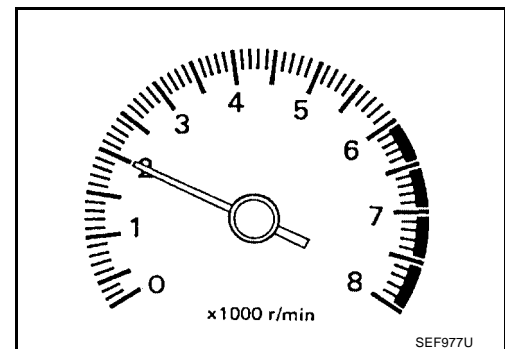
1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
  - Harness connectors for improper connections
  - Wiring harness for improper connections, pinches and cut
  - Vacuum hoses 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.

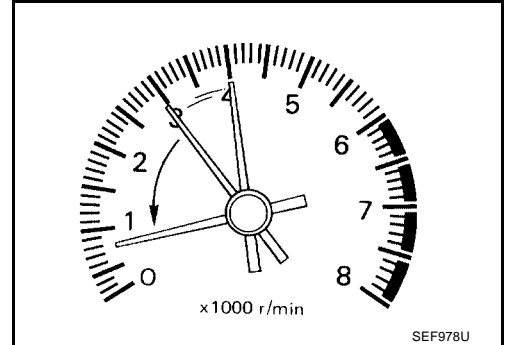
OK or NG

- OK    >> GO TO 2.  
 NG    >> 1. Repair or replace components as necessary.  
       2. GO TO 2.

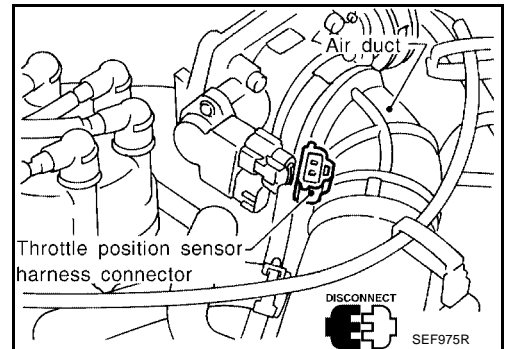


## 2. CHECK IGNITION TIMING

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. Turn off 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.

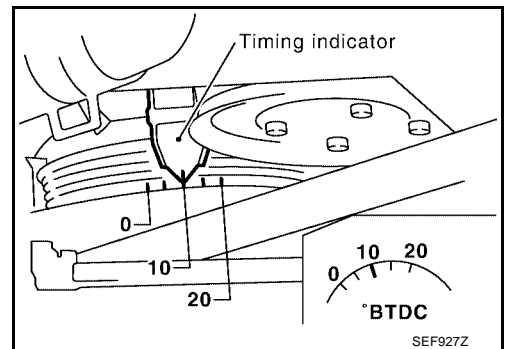


5. Check ignition timing with a timing light.

**M/T** :  $10^{\circ} \pm 2^{\circ}$  BTDC  
**A/T** :  $10^{\circ} \pm 2^{\circ}$  BTDC (in "P" or "N" position)

OK or NG

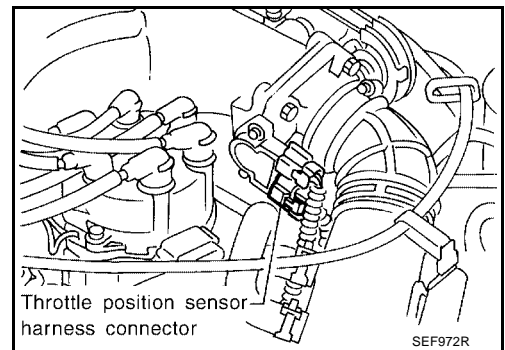
- OK >> GO TO 4.  
 NG >> GO TO 3.



## 3. ADJUST IGNITION TIMING

1. Adjust ignition timing by turning distributor after loosening securing bolts.
2. Turn off engine and connect throttle position sensor harness connector to throttle position sensor.

>> GO TO 2.



## 4. CHECK BASE IDLE SPEED

**With CONSULT-II**

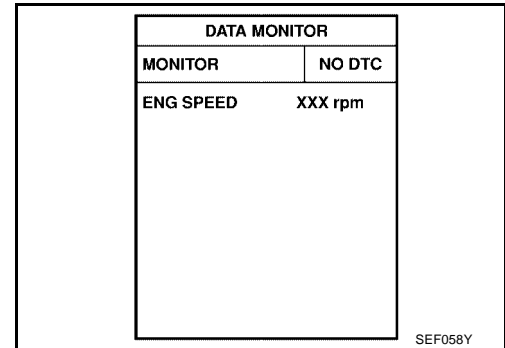
1. Read idle speed in "DATA MONITOR" mode with CONSULT-II.

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

**Without CONSULT-II**

1. Check idle speed.

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



OK or NG

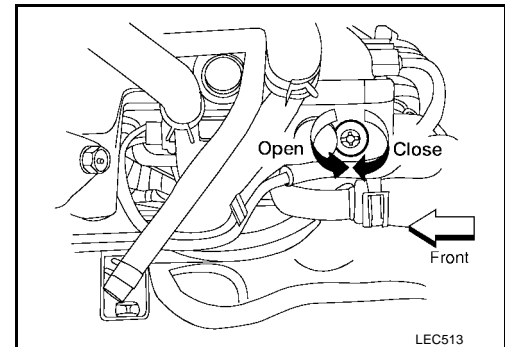
- OK >> GO TO 6.  
 NG >> GO TO 5.

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

>> GO TO 6.



**6. CHECK TARGET IDLE SPEED**

**With CONSULT-II**

1. Turn off 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**  
**A/T : 750±50 rpm (in "P" or "N" position)**

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

**Without CONSULT-II**

1. Turn off 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**  
**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-1577](#) .
2. Check IACV-AAC valve harness and repair if necessary. Refer to [EC-1577](#) .
3. Check ECM function by substituting another known-good ECM. (ECM may be the cause of an incident, but this is rarely the 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**

| DATA MONITOR    |         |
|-----------------|---------|
| MONITOR         | NO DTC  |
| ENG SPEED       | XXX rpm |
| HO2S1 MNTR (B1) | LEAN    |
| HO2S1 MNTR (B2) | RICH    |

PBIB0120E

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 62 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 62 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-1223](#).
2. Check mass air flow sensor and its circuit. Refer to [EC-1331](#).
3. Check injector and its circuit. Refer to [EC-1720](#).  
Clean or replace if necessary.
4. Check engine coolant temperature sensor and its circuit. Refer to [EC-1349](#).
5. Check ECM function by substituting another known good ECM.  
(ECM may be the cause of an incident, but this is rarely the case.)

>> GO TO 2.



**12. CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL**

**With CONSULT-II**

- See "HO2S1 (B1)" in "DATA MONITOR" mode.
- 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.

| DATA MONITOR    |         |
|-----------------|---------|
| MONITOR         | NO DTC  |
| ENG SPEED       | XXX rpm |
| HO2S1 MNTR (B1) | LEAN    |
| HO2S1 MNTR (B2) | RICH    |

PBIB0120E

**13. CHECK HEATED OXYGEN SENSOR 1 (BANK 1) SIGNAL**

**Without CONSULT-II**

- Set voltmeter probe between ECM terminal 63 and ground.
- 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**

- Stop engine.
- Replace heated oxygen sensor 1 (bank 1).
- Start engine and warm it up to normal operating temperature.
- Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
- See "HO2S1 MNTR (B1)" in "DATA MONITOR" mode.
- 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**

- Stop engine.
- Replace heated oxygen sensor 1 (bank 1).
- Start engine and warm it up to normal operating temperature.
- Run engine at approx. 2,000 rpm for approx. 2 minutes under no-load.
- Set voltmeter probe between ECM terminal 63 and ground.
- 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-1223](#) .
2. Check mass air flow sensor and its circuit. Refer to [EC-1331](#) .
3. Check injector and its circuit. Refer to [EC-1720](#) .  
Clean or replace if necessary.
4. Check engine coolant temperature sensor and its circuit. Refer to [EC-1349](#) .
5. Check ECM function by substituting another known good ECM.  
(ECM may be the cause of an incident, but this is rarely the case.)

>> GO TO 2.

## 16. CHECK HEATED OXYGEN SENSOR 1 (BANK 1) HARNESS

---

1. Turn off 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. Turn off 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".

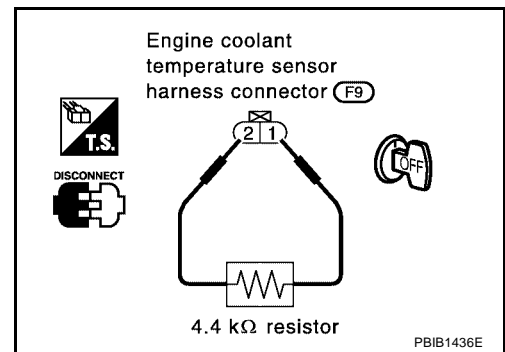
| ACTIVE TEST      |          |
|------------------|----------|
| ENG COOLANT TEMP | XXX °C   |
| MONITOR          |          |
| ENG SPEED        | XXX rpm  |
| INJ PULSE-B1     | XXX msec |
| IGN TIMING       | XXX BTDC |
|                  |          |
|                  |          |
|                  |          |
|                  |          |

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.

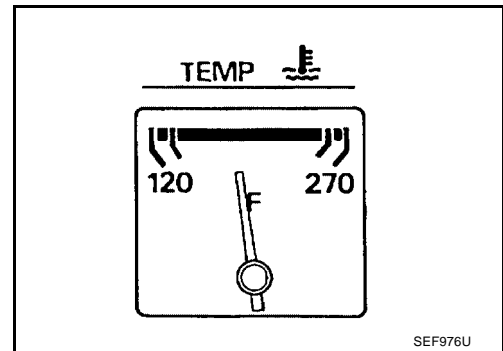
>> GO TO 19.



A  
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## 19. CHECK "CO" %

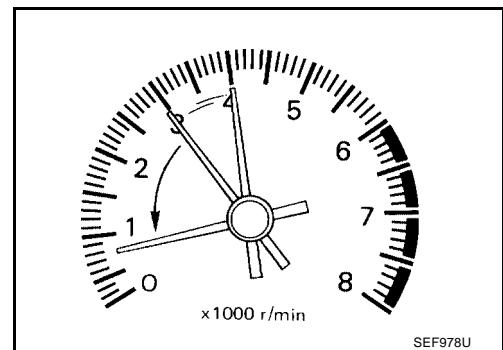
1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.



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-1223](#).
3. Check mass air flow sensor and its circuit. Refer to [EC-1331](#).
4. Check injector and its circuit. Refer to [EC-1720](#).  
Clean or replace if necessary.
5. Check engine coolant temperature sensor and its circuit. Refer to [EC-1349](#).
6. Check ECM function by substituting another known good ECM.  
(ECM may be the cause of an incident, but this is rarely the case.)

>> GO TO 2.

### Fast Idle Cam (FIC) Inspection and Adjustment OPERATION PROCEDURE

UBS005WM

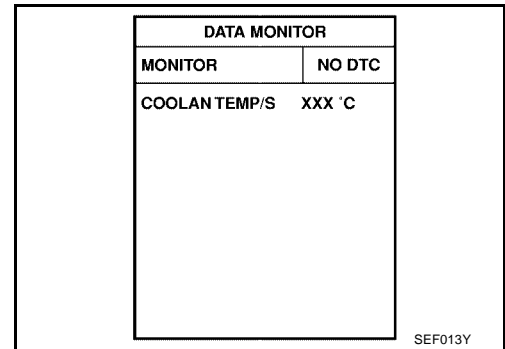
**With CONSULT-II**

1. Turn ignition switch ON.

# BASIC SERVICE PROCEDURE

[VG33ER]

- See "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.



- 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.

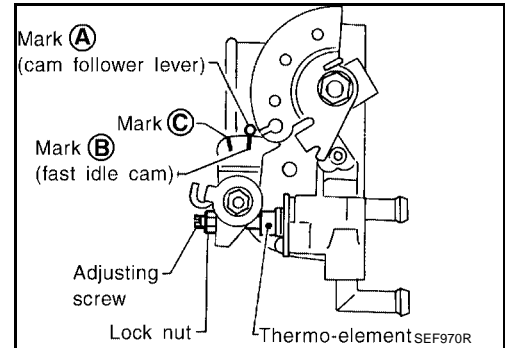
- If NG, adjust by turning adjusting screw.

### Lock nut



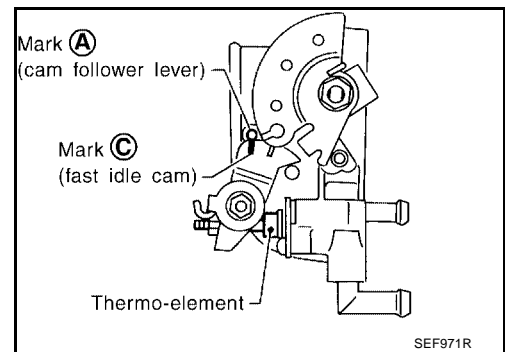
: 0.98 - 1.96 N·m (10 - 20 kg·cm, 8.7 - 17.4 in·lb)

- Start engine and warm it up.



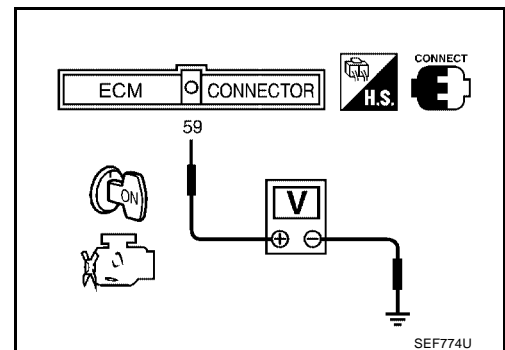
- When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.

- 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

- Turn ignition switch ON.
- Check voltage between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.



# BASIC SERVICE PROCEDURE

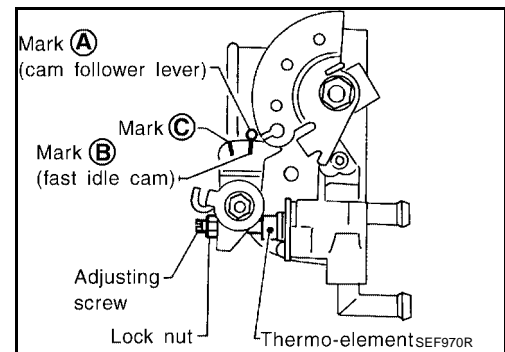
[VG33ER]

- 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.

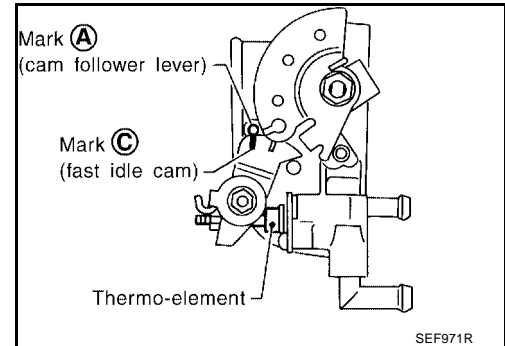
## Lock nut

 : 0.98 - 1.96 N·m (10 - 20 kg-cm, 8.7 - 17.4 in-lb)

- Start engine and warm it up.



- 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.



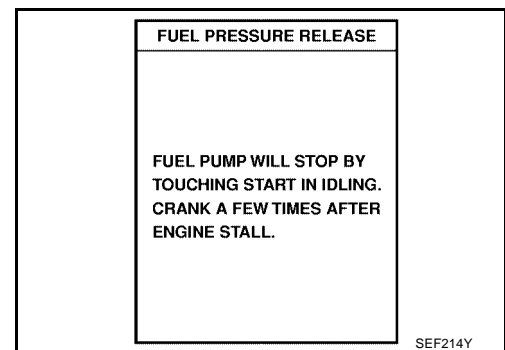
## Fuel Pressure Check FUEL PRESSURE RELEASE

UBS006Z0

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

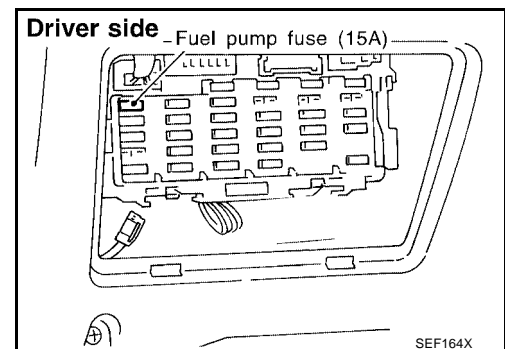
### With CONSULT-II

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



### Without CONSULT-II

- Remove fuel pump fuse located in fuse box.
- Start engine.
- After engine stalls, crank it two or three times to release all fuel pressure.
- Turn ignition switch OFF.
- Reinstall fuel pump fuse after servicing fuel system.



## FUEL PRESSURE CHECK

- Use Fuel Pressure Gauge Kit J-44321 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. Refer to [EC-1222](#).
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<sup>2</sup> , 34 psi)**

**With vacuum hose disconnected**

**Approximately 294 kPa  
(3.0 kg/cm<sup>2</sup> , 43 psi)**

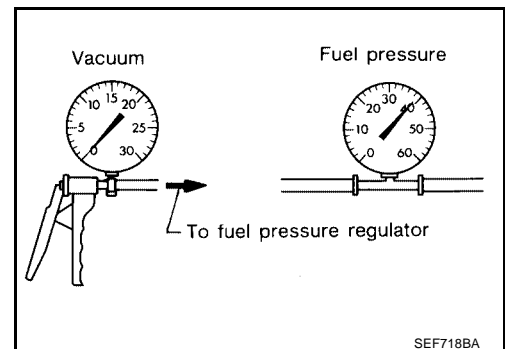
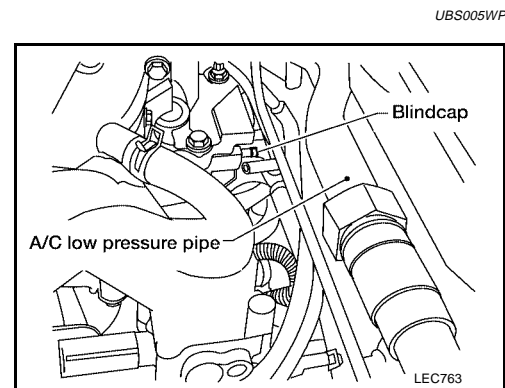
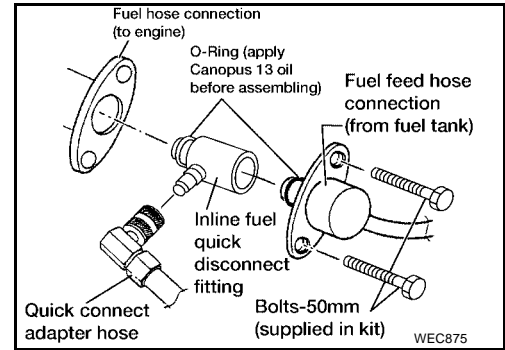
If results are unsatisfactory, perform Fuel Pressure Regulator Check.

### Fuel Pressure Regulator Check

1. Stop engine and disconnect fuel pressure regulator vacuum hose from 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

*UBS005WQ*

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 | X   | X            | X                 | X                          | X        | —          |
| GST        | X   | X*1          | X                 | —                          | X        | X          |

\*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-1251](#).)

### Two Trip Detection Logic

*UBS005WR*

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 | X        | —           | —        | —           | —                   | —                   | X                   | —                   |
| Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected | —        | —           | X        | —           | —                   | X                   | —                   | —                   |
| One trip detection diagnosis (refer to <a href="#">EC-1190</a> .)                   | —        | X           | —        | —           | X                   | —                   | —                   | —                   |
| Except above  | —        | —           | —        | X           | —                   | X                   | X                   | —                   |



# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33ER]

UBS005WS

## Emission-related Diagnostic Information EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable —: Not applicable

| Items<br>(CONSULT-II screen terms)                          | DTC*1 *2          | SRT code | Test value/<br>Test limit<br>(GST only) | 1st trip DTC*1 | Reference page          |
|---|-------------------|----------|---|----------------|-------------------------|
|   | CONSULT-II<br>GST |          |   |                |                         |
| <b>NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.</b> | <b>P0000</b>      | —        | —                                       | —              | —                       |
| HO2S1 HTR (B1)  | P0031             | X        | X                                       | X*5            | <a href="#">EC-1308</a> |
| HO2S1 HTR (B1)  | P0032             | X        | X                                       | X*5            | <a href="#">EC-1308</a> |
| SCB/V CONT SOL/V  | P0034             | —        | —                                       | X              | <a href="#">EC-1316</a> |
| HO2S2 HTR (B1)  | P0037             | X        | X                                       | X*5            | <a href="#">EC-1322</a> |
| HO2S2 HTR (B1)  | P0038             | X        | X                                       | X*5            | <a href="#">EC-1322</a> |
| HO2S1 HTR (B2)  | P0051             | X        | X                                       | X*5            | <a href="#">EC-1308</a> |
| HO2S1 HTR (B2)  | P0052             | X        | X                                       | X*5            | <a href="#">EC-1308</a> |
| HO2S2 HTR (B2)  | P0057             | X        | X                                       | X*5            | <a href="#">EC-1322</a> |
| HO2S2 HTR (B2)  | P0058             | X        | X                                       | X*5            | <a href="#">EC-1322</a> |
| MAF SEN/CIRCUIT   | P0101             | —        | —                                       | X              | <a href="#">EC-1331</a> |
| MAF SEN/CIRCUIT   | P0102*3           | —        | —                                       | —              | <a href="#">EC-1338</a> |
| MAF SEN/CIRCUIT   | P0103*3           | —        | —                                       | —              | <a href="#">EC-1338</a> |
| IAT SEN/CIRCUIT   | P0112             | —        | —                                       | —              | <a href="#">EC-1344</a> |
| IAT SEN/CIRCUIT   | P0113             | —        | —                                       | —              | <a href="#">EC-1344</a> |
| ECT SEN/CIRCUIT   | P0117*3           | —        | —                                       | —              | <a href="#">EC-1349</a> |
| ECT SEN/CIRCUIT   | P0118*3           | —        | —                                       | —              | <a href="#">EC-1349</a> |
| TP SEN/CIRCUIT  | P0121             | —        | —                                       | X              | <a href="#">EC-1354</a> |
| TP SEN/CIRCUIT  | P0122*3           | —        | —                                       | —              | <a href="#">EC-1363</a> |
| TP SEN/CIRCUIT  | P0123*3           | —        | —                                       | —              | <a href="#">EC-1363</a> |
| ECT SENSOR  | P0125             | —        | —                                       | X              | <a href="#">EC-1371</a> |
| IAT SENSOR  | P0127             | —        | —                                       | X              | <a href="#">EC-1374</a> |
| THERMSTAT FNCTN   | P0128             | —        | —                                       | X              | <a href="#">EC-1377</a> |
| HO2S1 (B1)  | P0132             | X        | X                                       | X*5            | <a href="#">EC-1379</a> |
| HO2S1 (B1)  | P0133             | X        | X                                       | X*5            | <a href="#">EC-1388</a> |
| HO2S1 (B1)  | P0134             | X        | X                                       | X*5            | <a href="#">EC-1401</a> |
| HO2S2 (B1)  | P0138             | X        | X                                       | X*5            | <a href="#">EC-1412</a> |
| HO2S2 (B1)  | P0139             | X        | X                                       | X*5            | <a href="#">EC-1421</a> |
| HO2S1 (B2)  | P0152             | X        | X                                       | X*5            | <a href="#">EC-1379</a> |
| HO2S1 (B2)  | P0153             | X        | X                                       | X*5            | <a href="#">EC-1388</a> |
| HO2S1 (B2)  | P0154             | X        | X                                       | X*5            | <a href="#">EC-1401</a> |
| HO2S2 (B2)  | P0158             | X        | X                                       | X*5            | <a href="#">EC-1412</a> |
| HO2S2 (B2)  | P0159             | X        | X                                       | X*5            | <a href="#">EC-1421</a> |
| FUEL SYS-LEAN-B1  | P0171             | —        | —                                       | X              | <a href="#">EC-1431</a> |
| FUEL SYS-RICH-B1  | P0172             | —        | —                                       | X              | <a href="#">EC-1439</a> |

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33ER]

| Items<br>(CONSULT-II screen terms) | DTC*1 *2          | SRT code | Test value/<br>Test limit<br>(GST only) | 1st trip DTC*1 | Reference page          |
|------------------------------------|-------------------|----------|---|----------------|-------------------------|
|                                    | CONSULT-II<br>GST |          |   |                |                         |
| FUEL SYS-LEAN-B2                   | P0174             | —        | —                                       | X              | <a href="#">EC-1431</a> |
| FUEL SYS-RICH-B2                   | P0175             | —        | —                                       | X              | <a href="#">EC-1439</a> |
| FTT SENSOR                         | P0181             | —        | —                                       | X              | <a href="#">EC-1447</a> |
| FTT SEN/CIRCUIT                    | P0182             | —        | —                                       | X              | <a href="#">EC-1452</a> |
| FTT SEN/CIRCUIT                    | P0183             | —        | —                                       | X              | <a href="#">EC-1452</a> |
| ENG OVER TEMP                      | P0217             | —        | —                                       | X              | <a href="#">EC-1456</a> |
| SC FUNCTION                        | P0299             | —        | —                                       | X              | <a href="#">EC-1461</a> |
| MULTI CYL MISFIRE                  | P0300             | —        | —                                       | X              | <a href="#">EC-1464</a> |
| CYL1 MISFIRE                       | P0301             | —        | —                                       | X              | <a href="#">EC-1464</a> |
| CYL2 MISFIRE                       | P0302             | —        | —                                       | X              | <a href="#">EC-1464</a> |
| CYL3 MISFIRE                       | P0303             | —        | —                                       | X              | <a href="#">EC-1464</a> |
| CYL4 MISFIRE                       | P0304             | —        | —                                       | X              | <a href="#">EC-1464</a> |
| CYL5 MISFIRE                       | P0305             | —        | —                                       | X              | <a href="#">EC-1464</a> |
| CYL6 MISFIRE                       | P0306             | —        | —                                       | X              | <a href="#">EC-1464</a> |
| KNOCK SEN/CIRC-B1                  | P0327             | —        | —                                       | —              | <a href="#">EC-1472</a> |
| KNOCK SEN/CIRC-B1                  | P0328             | —        | —                                       | —              | <a href="#">EC-1472</a> |
| CKP SEN/CIRCUIT                    | P0335             | —        | —                                       | X              | <a href="#">EC-1476</a> |
| CMP SEN/CIRCUIT                    | P0340             | —        | —                                       | X              | <a href="#">EC-1482</a> |
| TW CATALYST SYS-B1                 | P0420             | X        | X                                       | X*5            | <a href="#">EC-1489</a> |
| TW CATALYST SYS-B2                 | P0430             | X        | X                                       | X*5            | <a href="#">EC-1489</a> |
| EVAP PURG FLOW/MON                 | P0441             | X        | X                                       | X*5            | <a href="#">EC-1495</a> |
| EVAP SMALL LEAK                    | P0442             | X        | X                                       | X*5            | <a href="#">EC-1503</a> |
| PURG VOLUME CONT/V                 | P0444             | —        | —                                       | X              | <a href="#">EC-1515</a> |
| PURG VOLUME CONT/V                 | P0445             | —        | —                                       | X              | <a href="#">EC-1515</a> |
| VENT CONTROL VALVE                 | P0447             | —        | —                                       | X              | <a href="#">EC-1522</a> |
| EVAP SYS PRES SEN                  | P0452             | —        | —                                       | X              | <a href="#">EC-1528</a> |
| EVAP SYS PRES SEN                  | P0453             | —        | —                                       | X              | <a href="#">EC-1534</a> |
| EVAP GROSS LEAK                    | P0455             | X        | X                                       | X*5            | <a href="#">EC-1542</a> |
| EVAP VERY SML LEAK                 | P0456             | X*4      | X                                       | X*5            | <a href="#">EC-1551</a> |
| FUEL LEV SEN SLOSH                 | P0460             | —        | —                                       | X              | <a href="#">EC-1562</a> |
| FUEL LEVEL SENSOR                  | P0461             | —        | —                                       | X              | <a href="#">EC-1566</a> |
| FUEL LEVL SEN/CIRC                 | P0462             | —        | —                                       | X              | <a href="#">EC-1568</a> |
| FUEL LEVL SEN/CIRC                 | P0463             | —        | —                                       | X              | <a href="#">EC-1568</a> |
| VEH SPEED SEN/CIRC                 | P0500*5           | —        | —                                       | X              | <a href="#">EC-1572</a> |
| ISC SYSTEM/CIRC                    | P0505             | —        | —                                       | X              | <a href="#">EC-1577</a> |
| CLOSED TP SW/CIRC                  | P0510             | —        | —                                       | X              | <a href="#">EC-1584</a> |
| A/T COMM LINE                      | P0600*4           | —        | —                                       | —              | <a href="#">EC-1591</a> |
| ECM                                | P0605             | —        | —                                       | X              | <a href="#">EC-1597</a> |
| PNP SW/CIRC                        | P0705             | —        | —                                       | X              | <a href="#">AT-249</a>  |
| ATF TEMP SEN/CIRC                  | P0710             | —        | —                                       | X              | <a href="#">AT-255</a>  |
| VEH SPD SEN/CIR AT                 | P0720             | —        | —                                       | X              | <a href="#">AT-261</a>  |

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33ER]

| Items<br>(CONSULT-II screen terms) | DTC*1 *2          | SRT code | Test value/<br>Test limit<br>(GST only) | 1st trip DTC*1 | Reference page          |
|------------------------------------|-------------------|----------|---|----------------|-------------------------|
|                                    | CONSULT-II<br>GST |          |   |                |                         |
| ENGINE SPEED SIG                   | P0725             | —        | —                                       | X              | <a href="#">AT-266</a>  |
| A/T 1ST GR FNCTN                   | P0731             | —        | —                                       | X              | <a href="#">AT-270</a>  |
| A/T 2ND GR FNCTN                   | P0732             | —        | —                                       | X              | <a href="#">AT-276</a>  |
| A/T 3RD GR FNCTN                   | P0733             | —        | —                                       | X              | <a href="#">AT-281</a>  |
| A/T 4TH GR FNCTN                   | P0734             | —        | —                                       | X              | <a href="#">AT-286</a>  |
| TCC SOLENOID/CIRC                  | P0740             | —        | —                                       | X              | <a href="#">AT-293</a>  |
| A/T TCC S/V FNCTN                  | P0744             | —        | —                                       | X              | <a href="#">AT-298</a>  |
| L/PRESS SOL/CIRC                   | P0745             | —        | —                                       | X              | <a href="#">AT-306</a>  |
| SFT SOL A/CIRC                     | P0750*3           | —        | —                                       | X              | <a href="#">AT-311</a>  |
| SFT SOL B/CIRC                     | P0755*3           | —        | —                                       | X              | <a href="#">AT-316</a>  |
| HO2S1 (B1)                         | P1143             | X        | X                                       | X*5            | <a href="#">EC-1599</a> |
| HO2S1 (B1)                         | P1144             | X        | X                                       | X*5            | <a href="#">EC-1606</a> |
| HO2S2 (B1)                         | P1146             | X        | X                                       | X*5            | <a href="#">EC-1613</a> |
| HO2S2 (B1)                         | P1147             | X        | X                                       | X*5            | <a href="#">EC-1624</a> |
| CLOSED LOOP-B1                     | P1148             | —        | —                                       | X*5            | <a href="#">EC-1635</a> |
| HO2S1 (B2)                         | P1163             | X        | X                                       | X*5            | <a href="#">EC-1599</a> |
| HO2S1 (B2)                         | P1164             | X        | X                                       | X*5            | <a href="#">EC-1606</a> |
| HO2S2 (B2)                         | P1166             | X        | X                                       | X*5            | <a href="#">EC-1613</a> |
| HO2S2 (B2)                         | P1167             | X        | X                                       | X*5            | <a href="#">EC-1624</a> |
| CLOSED LOOP-B2                     | P1168             | —        | —                                       | X              | <a href="#">EC-1635</a> |
| ENG OVER TEMP                      | P1217             | —        | —                                       | X              | <a href="#">EC-1637</a> |
| CKP SENSOR (COG)                   | P1336             | —        | —                                       | X              | <a href="#">EC-1641</a> |
| EVAP SMALL LEAK                    | P1442             | X        | X                                       | X*5            | <a href="#">EC-1646</a> |
| PURG VOLUME CONT/V                 | P1444             | —        | —                                       | X              | <a href="#">EC-1648</a> |
| VENT CONTROL VALVE                 | P1446             | —        | —                                       | X              | <a href="#">EC-1657</a> |
| VENT CONTROL VALVE                 | P1448             | —        | —                                       | X              | <a href="#">EC-1663</a> |
| EVAP VERY SML LEAK                 | P1456             | X*4      | X                                       | X*5            | <a href="#">EC-1671</a> |
| FUEL LEVEL SEN/CIRC                | P1464             | —        | —                                       | X              | <a href="#">EC-1681</a> |
| VC/V BYPASS/V                      | P1490             | —        | —                                       | X              | <a href="#">EC-1684</a> |
| VC CUT/V BYPASS/V                  | P1491             | —        | —                                       | X              | <a href="#">EC-1690</a> |
| A/T DIAG COMM LINE                 | P1605             | —        | —                                       | X              | <a href="#">EC-1702</a> |
| TP SEN/CIRC A/T                    | P1705*5           | —        | —                                       | X              | <a href="#">AT-249</a>  |
| P-N POS SW/CIRCUIT                 | P1706             | —        | —                                       | X              | <a href="#">EC-1707</a> |
| O/R CLTCH SOL/CIRC                 | P1760             | —        | —                                       | X              | <a href="#">AT-329</a>  |

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

\*2: These numbers are prescribed by SAE J2012.

\*3: When the fail-safe operation occurs, the MIL illuminates.

\*4: SRT code will not be set if the self-diagnostic result is NG.

\*5: These are not displayed with GST.

**NOTE:**

Regarding D22 models, "B1" indicates bank 1, "B2" indicates bank 2.

## DTC AND 1ST TRIP DTC

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

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

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in [EC-1237, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#) .

For malfunctions in which 1st trip DTCs are displayed, refer to [EC-1225, "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-1246, "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       |   | 1st trip DTC display | SELF DIAG RESULTS       |    |
|             | DTC RESULTS             |   |                      | DTC RESULTS             |    |
|             | CKP SEN/CIRCUIT [P0335] | 0 |                      | CKP SEN/CIRCUIT [P0335] | 1t |
|             |                         |   |                      |                         |    |
|             |                         |   |                      |                         |    |

PBIB0911E

### FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed 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-1283, "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<br>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-1237, "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.

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33ER]

## SRT Item

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

| SRT item<br>(CONSULT-II indication) | Performance<br>Priority * | Required self-diagnostic items to set the SRT to "CMPLT" | Corresponding DTC<br>No.      |
|-------------------------------------|---------------------------|--|-------------------------------|
| CATALYST                            | 2                         | Three way catalyst function                              | P0420, P0430                  |
| EVAP 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                                   | P0132, P0152                  |
|                                     |                           | Heated oxygen sensor 1                                   | P0133, P0153                  |
|                                     |                           | Heated oxygen sensor 1                                   | P0134, P0154                  |
|                                     |                           | Heated oxygen sensor 1                                   | P1143, P1163                  |
|                                     |                           | Heated oxygen sensor 1                                   | P1144, P1164                  |
|                                     |                           | Heated oxygen sensor 2                                   | P0138, P0158                  |
|                                     |                           | Heated oxygen sensor 2                                   | P0139, P0157                  |
|                                     |                           | Heated oxygen sensor 2                                   | P1146, P1166                  |
|                                     |                           | Heated oxygen sensor 2                                   | P1147, P1167                  |
| HO2S HEATER                         | 2                         | Heated oxygen sensor 1 heater                            | P0031, P0032, P0051,<br>P0052 |
|                                     |                           | Heated oxygen sensor 2 heater                            | P0037, P0038, P0057,<br>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<br>OFF – ON –<br>OFF | Ignition<br>OFF – ON –<br>OFF | Ignition<br>OFF – ON –<br>OFF | Ignition<br>OFF – ON –<br>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.

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33ER]

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”.

A

EC

C

D

E

F

G

H

I

J

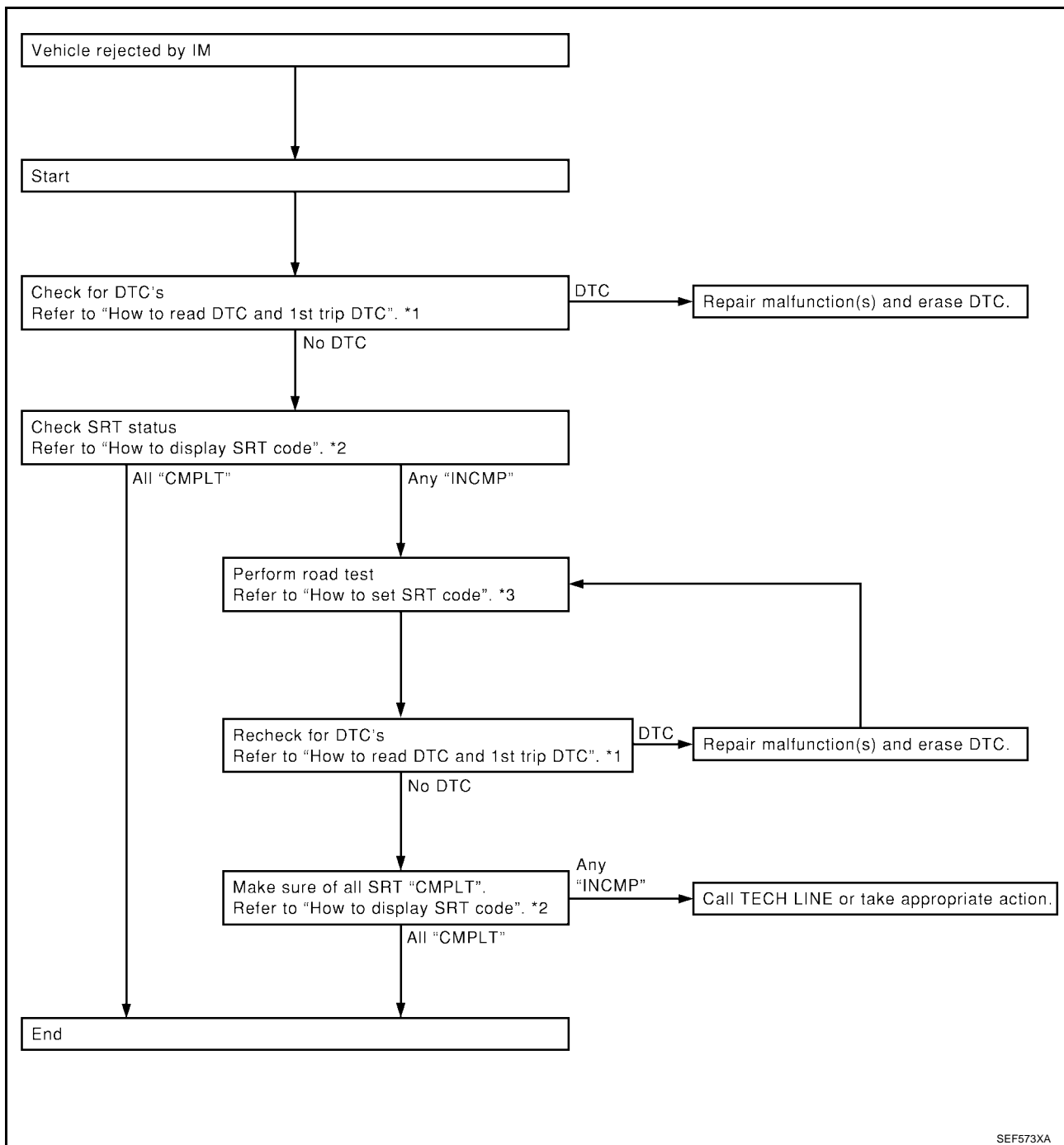
K

L

M

## 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.



SEF573XA

\*1 [EC-1228](#)

\*2 [EC-1233](#)

\*3 [EC-1233](#)



## 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.

| SRT STATUS  |       |
|-------------|-------|
| CATALYST    | CMPLT |
| EVAP SYSTEM | INCMP |
| HO2S HTR    | CMPLT |
| HO2S        | CMPLT |

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### 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-1230, "SRT Item"](#).

### Without CONSULT-II

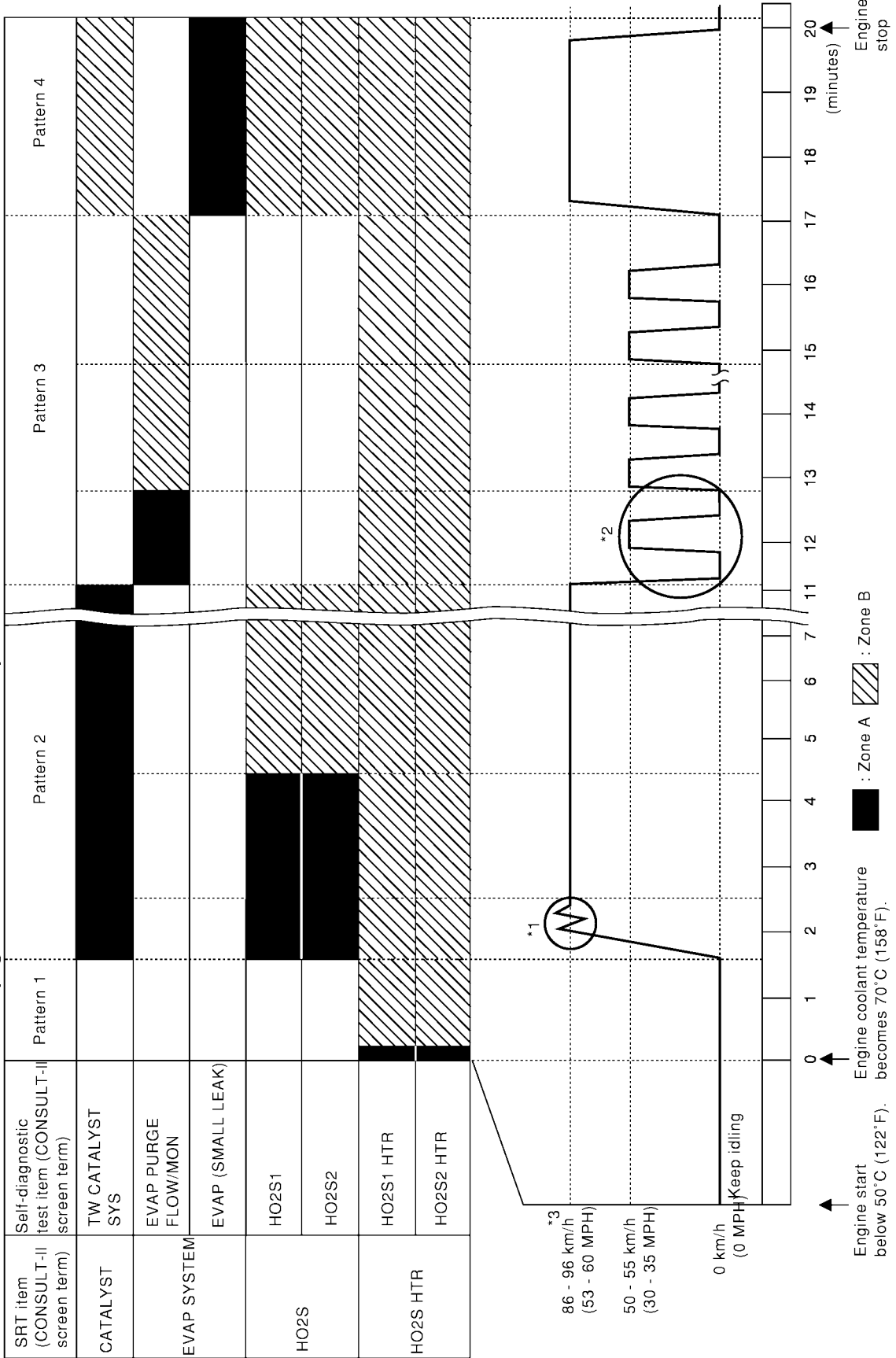
The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

## Driving Pattern

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

### Driving pattern



# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33ER]

- 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:

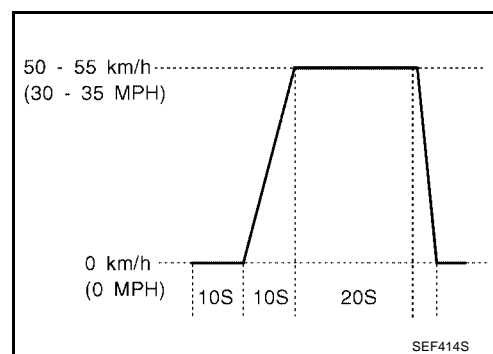
- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

\*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.

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33ER]

|             | For normal acceleration in low altitude areas<br>[less than 1,219 m (4,000 ft)]: | For quick acceleration in low altitude areas<br>and high altitude areas [over 1,219 m (4,000<br>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)<br>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.

Items for which these data (test value and test limit) are displayed are the same as SRT code items (30 test items).

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

X: Applicable —: Not applicable

| SRT item    | Self-diagnostic test item                 | Test value (GST display) |     | Test limit | Application |
|-------------|---|--------------------------|-----|------------|-------------|
|             |   | TID                      | CID |            |             |
| CATALYST    | Three way catalyst function (Bank 1)      | 01H                      | 01H | Max.       | X           |
|             | Three way catalyst function (Bank 2)      | 03H                      | 02H | Max.       | X           |
| EVAP SYSTEM | EVAP control system (Small leak)          | 05H                      | 03H | Max.       | X           |
|             | EVAP control system purge flow monitoring | 06H                      | 83H | Min.       | X           |

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33ER]

| SRT item    | Self-diagnostic test item       | Test value (GST display) |      | Test limit | Application |
|-------------|---------------------------------|--------------------------|------|------------|-------------|
|             |                                 | TID                      | CID  |            |             |
| HO2S        | Heated oxygen sensor 1 (bank 1) | 09H                      | 04H  | Max.       | X           |
|             |                                 | 0AH                      | 84H  | Min.       | X           |
|             |                                 | 0BH                      | 04H  | Max.       | X           |
|             |                                 | 0CH                      | 04H  | Max.       | X           |
|             |                                 | 0DH                      | 04H  | Max.       | X           |
|             | Heated oxygen sensor 1 (bank 2) | 11H                      | 05H  | Max.       | X           |
|             |                                 | 12H                      | 85H  | Min.       | X           |
|             |                                 | 13H                      | 05H  | Max.       | X           |
|             |                                 | 14H                      | 05H  | Max.       | X           |
|             |                                 | 15H                      | 05H  | Max.       | X           |
|             | Heated oxygen sensor 2 (bank 1) | 19H                      | 86H  | Min.       | X           |
|             |                                 | 1AH                      | 86H  | Min.       | X           |
|             |                                 | 1BH                      | 06H  | Max.       | X           |
|             |                                 | 1CH                      | 06H  | Max.       | X           |
|             | Heated oxygen sensor 2 (bank 2) | 21H                      | 87H  | Min.       | X           |
|             |                                 | 22H                      | 87H  | Min.       | X           |
| 23H         |                                 | 07H                      | Max. | X          |             |
| 24H         |                                 | 07H                      | Max. | X          |             |
| HO2S HEATER | Heated oxygen sensor 1 (bank 1) | 29H                      | 08H  | Max.       | X           |
|             |                                 | 2AH                      | 88H  | Min.       | X           |
|             | Heated oxygen sensor 1 (bank 2) | 2BH                      | 09H  | Max.       | X           |
|             |                                 | 2CH                      | 89H  | Min.       | X           |
|             | Heated oxygen sensor 2 (bank 1) | 2DH                      | 0AH  | Max.       | X           |
|             |                                 | 2EH                      | 8AH  | Min.       | X           |
|             | Heated oxygen sensor 2 (bank 2) | 2FH                      | 0BH  | Max.       | X           |
|             |                                 | 30H                      | 8BH  | Min.       | X           |

## 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-1190](#) ), skip steps 2 through 4.**

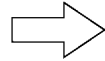
1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Turn CONSULT-II "ON" and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". [The DTC in the TCM (Transmission control module) 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).

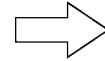
### How to erase DTC (With CONSULT-II)

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.

|               |
|---------------|
| SELECT SYSTEM |
| ENGINE        |
| A/T           |
|               |
|               |
|               |
|               |
|               |
|               |



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

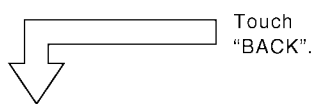


|                    |      |
|--------------------|------|
| SELF-DIAG RESULTS  |      |
| DTC RESULTS        | TIME |
| SHIFT SOLENOID/V A |      |
|                    |      |
|                    |      |

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

3. Touch "SELF-DIAG RESULTS".

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



|               |
|---------------|
| SELECT SYSTEM |
| ENGINE        |
| A/T           |
|               |
|               |
|               |
|               |
|               |
|               |

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

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

5. Touch "ENGINE".

6. Touch "SELF-DIAG RESULTS".

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

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

### How to Erase DTC ( With GST)

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

**NOTE:**

**If the DTC is not for A/T related items (see [EC-1190](#) ), 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 "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT-II)" in AT section titled "TROUBLE DIAGNOSIS", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
  3. Select Mode 4 with GST (Generic Scan Tool).
- **If the battery is disconnected, the emission-related diagnostic information will be lost after approx. 24 hours.**
  - **Erasing the emission-related diagnostic information using CONSULT-II or GST is easier and quicker than switching the mode selector on the ECM.**
  - **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

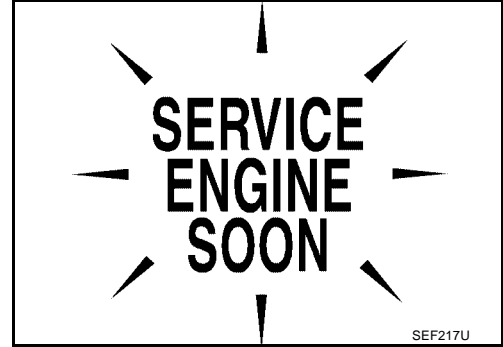
Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

## Malfunction Indicator Lamp (MIL) DESCRIPTION

UBS005WT




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-1743](#).
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<br><br><br>Engine stopped<br> | BULB CHECK          | This function checks the MIL bulb for damage (blown, open circuit, etc.).<br>If the MIL does not come on, check MIL circuit. (See <a href="#">EC-1743, "MIL AND DATA LINK CONNECTOR"</a> )  |
|                      | Engine running<br>   | 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.<br>The following malfunctions will light up or blink the MIL in the 1st trip. <ul style="list-style-type: none"> <li>● "Misfire (Possible three way catalyst damage)"</li> <li>● "One trip detection diagnosis"</li> </ul> |

### 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-1743](#).

### 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

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

UBS005WU

- 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-1224, "Two Trip Detection Logic"](#).

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

[VG33ER]

- 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-1242](#) .

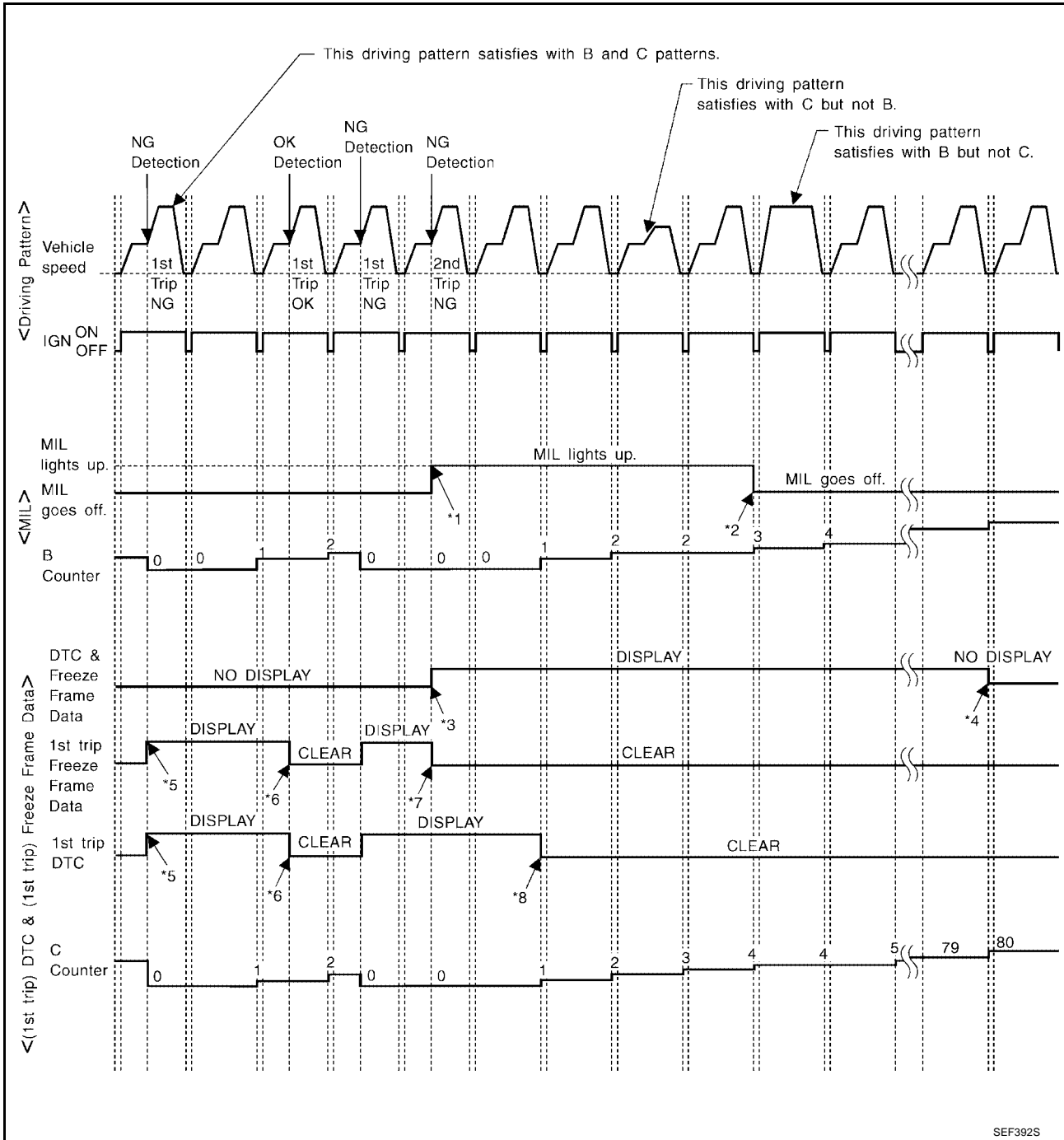
For details about patterns "A" and "B" under "Other", see [EC-1244](#) .

\*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 “MIS-FIRE” <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)  $\pm 375$  rpm

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

Engine coolant temperature (T) condition:

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

Example:

If the stored freeze frame data is as follows:

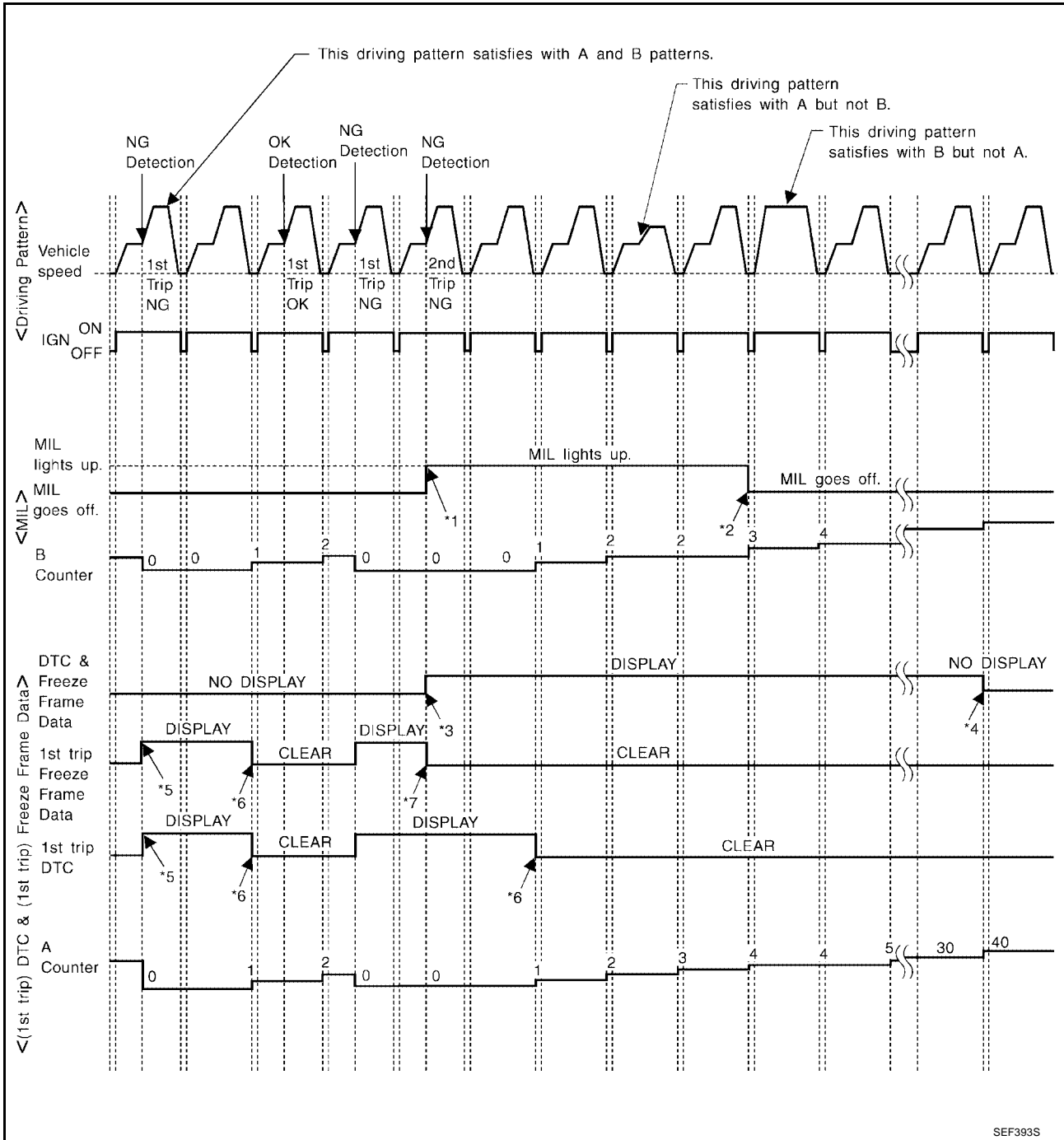
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

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

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

- The C counter will be cleared when the malfunction is detected regardless of 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.)

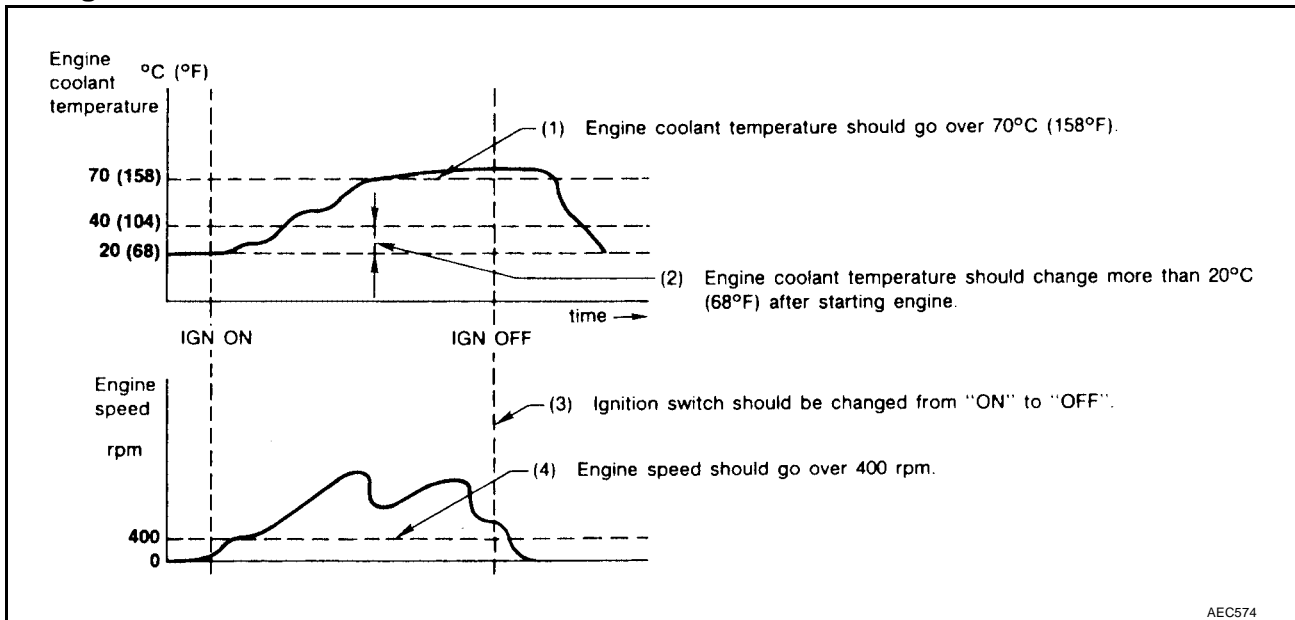
\*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

\*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:

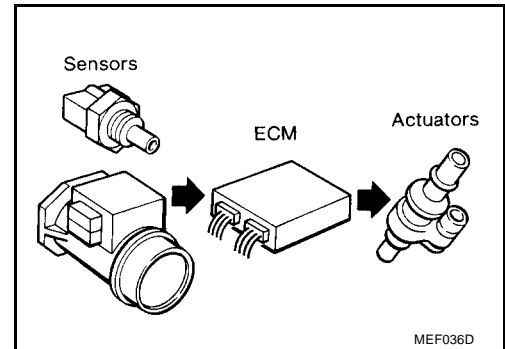
All components and systems should be monitored at least once by the OBD system.

- 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").

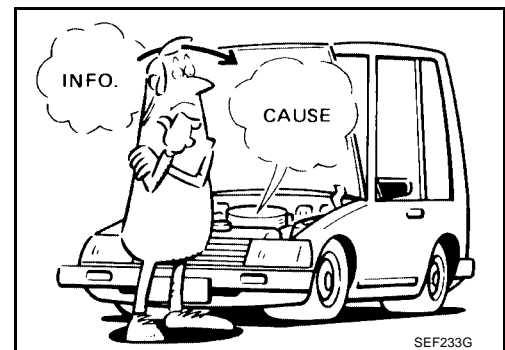
## TROUBLE DIAGNOSIS

Trouble Diagnosis Introduction  
INTRODUCTION

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



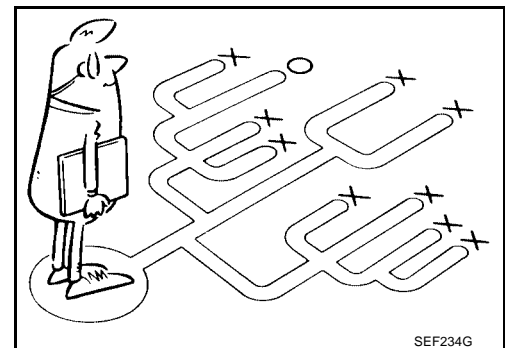
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



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-1246](#).

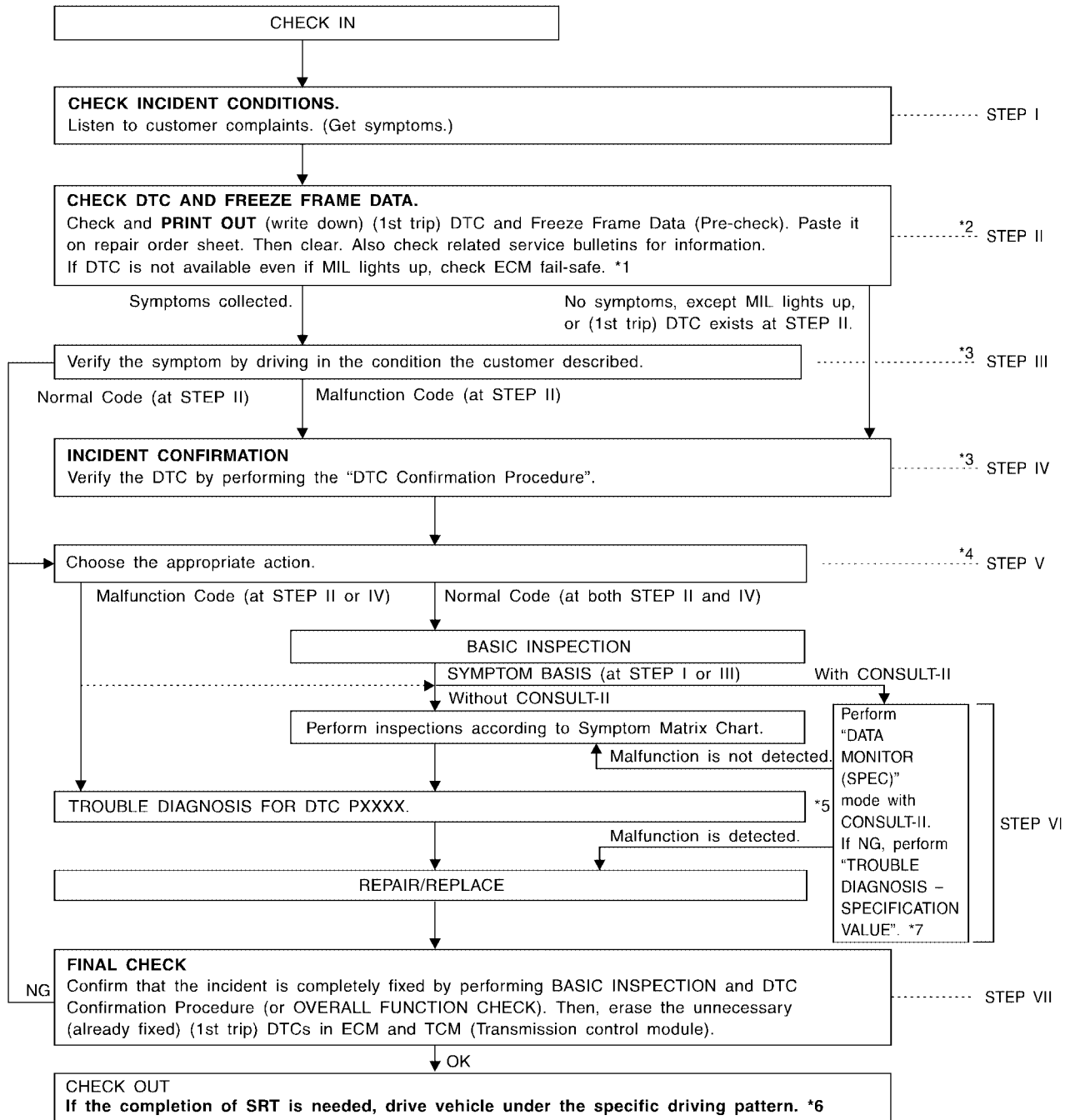
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A "Diagnostic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



\*1 If time data of "SELF-DIAG RESULTS" is other than "0" or "[1t]", perform [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

\*4 If malfunctioning part cannot be detected, perform [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

\*2 If the incident cannot be verified, perform [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

\*5 [EC-1234, "Driving Pattern"](#).

\*3 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to [EC-1302, "POWER SUPPLY CIRCUIT FOR ECM"](#).

\*6 [EC-1297, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE"](#).

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# TROUBLE DIAGNOSIS

[VG33ER]

## Description For Work Flow

| STEP     | DESCRIPTION   |
|----------|---|
| STEP I   | Get detailed information about the conditions and the environment when the incident/symptom occurred using the <a href="#">EC-1248, "DIAGNOSTIC WORKSHEET"</a> .  |
| STEP II  | Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to <a href="#">EC-1237</a> .) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV.<br>If the incident cannot be verified, perform <a href="#">EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"</a> .<br>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 <a href="#">EC-1264</a> .)<br>Also check related service bulletins for information.   |
| STEP III | Try to confirm the symptom and under what conditions the incident occurs.<br>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.<br>If the incident cannot be verified, perform <a href="#">EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"</a> .<br>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.<br>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.<br>If the incident cannot be verified, perform <a href="#">EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"</a> .<br>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.<br>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.<br>If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX.<br>If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to <a href="#">EC-1251</a> .) If CONSULT-II is available, perform "DATA MONITOR (SPEC)" mode with CONSULT-II and proceed to the <a href="#">EC-1297, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE"</a> . (If malfunction is detected, proceed to "REPAIR/REPLACE".) Then perform inspections according to the Symptom Matrix Chart. (Refer to <a href="#">EC-1264</a> .)  |
| 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".<br>Gently shake the related connectors, components or wiring harness with CONSULT-II set in "DATA MONITOR (AUTO TRIG)" mode.<br>Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to <a href="#">EC-1272, "ECM Terminals and Reference Value"</a> , <a href="#">EC-1292, "CONSULT-II Reference Value in Data Monitor Mode"</a> .<br>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 <a href="#">GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident"</a> .<br>Repair or replace the malfunction parts.<br>If malfunctioning part cannot be detected, perform <a href="#">EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"</a> . |
| 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.<br>Perform the "DTC Confirmation Procedure" and confirm the normal code [DTC No. P0000 or 0505] is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one.<br>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 <a href="#">EC-1237</a> and <a href="#">AT-187</a> )   |

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

**DIAGNOSTIC WORKSHEET****Description**

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make 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 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 [for the models with EVAP (SMALL LEAK) diagnosis].

**KEY POINTS**

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

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## DTC Inspection Priority Chart

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        | <ul style="list-style-type: none"> <li>● P0101, P0102, P0103 Mass air flow sensor</li> <li>● P0112, P0113, P0127 Intake air temperature sensor</li> <li>● P0117, P0118, P0125 Engine coolant temperature sensor</li> <li>● P0121, P0122, P0123 Throttle position sensor</li> <li>● P0181, P0182, P0183 Fuel tank temperature sensor</li> <li>● P0327, P0328 Knock sensor</li> <li>● P0335 P1336 CKP sensor (OBD)</li> <li>● P0340 CMP sensor</li> <li>● P0460 P0461 P1464 Fuel level sensor</li> <li>● P0500 VSS</li> <li>● P0600 A/T control</li> <li>● P0605 ECM</li> <li>● P1605 A/T diagnosis communication line</li> <li>● P1706 PNP switch</li> </ul>  |
| 2        | <ul style="list-style-type: none"> <li>● P0132-P0134, P1143, P1144/P0152-P0154, P1163, P1164 HO2S1</li> <li>● P0031, P0032/P0051, P0052 HO2S1 heater</li> <li>● P0138, P0139, P1146, P1147/P0158, P0159, P1166, P1167 HO2S2</li> <li>● P0037, P0038/P0057, P0058 HO2S2 heater</li> <li>● P0217 Engine coolant overtemperature enrichment protection</li> <li>● P0444, P0445, P1444 EVAP canister purge volume control solenoid valve</li> <li>● P0447, P1446, P1448 EVAP canister vent control valve</li> <li>● P0452, P0453 EVAP control system pressure sensor</li> <li>● P0510 CTP switch</li> <li>● P0705-P0755, P1705, P1760 A/T related sensors, solenoid valves and switches</li> <li>● P0456, P1456 EVAP control system</li> <li>● P0441 EVAP control system purge flow monitoring</li> <li>● P1490 P1491 Vacuum cut valve bypass valve</li> </ul> |
| 3        | <ul style="list-style-type: none"> <li>● P0171, P0172, P0174, P0175 Fuel injection system function</li> <li>● P0306 - P0300 Misfire</li> <li>● P0420, P0430 Three way catalyst function</li> <li>● P0442/P1442 EVAP control system</li> <li>● P0455 EVAP control system</li> <li>● P0505 ISC valve</li> <li>● P0731-P0734 P0744 A/T function</li> <li>● P1148, P1168 Closed loop control</li> </ul>  |

# TROUBLE DIAGNOSIS

[VG33ER]

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## Fail-safe Chart

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

| DTC No.              | Detected items                            | Engine operating condition in fail-safe mode   |   |
|----------------------|---|--|---|
| P0102<br>P0103       | Mass air flow sensor circuit              | Engine speed will not rise more than 2,400 rpm due to the fuel cut.  |   |
| P0117<br>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".<br>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)<br>(Depends on the time)                            |
| P0122<br>P0123       | Throttle position sensor circuit          | Throttle position will be determined based on the injected fuel amount and the engine speed.<br>Therefore, acceleration will be poor.  |   |
|                      |   | Condition  | Driving condition   |
|                      |   | When engine is idling  | Normal  |
|                      |   | When accelerating  | Poor acceleration   |
| Unable to access ECM | ECM                                       | <b>ECM fail-safe activating condition</b><br>The computing function of the ECM was judged to be malfunctioning.<br>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.<br>However it is not possible to access ECM and DTC cannot be confirmed. |   |
|                      |   | <b>Engine control with fail-safe</b><br>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  |   |
|                      |   | <b>Engine speed</b>  | <b>Engine speed will not rise more than 3,000 rpm</b>                       |
|                      |   | 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

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### Precaution:

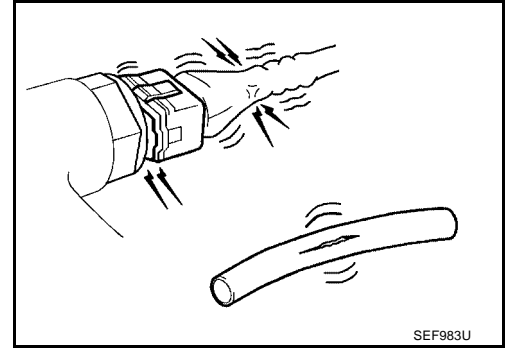
**Perform Basic Inspection without electrical or mechanical loads applied;**

- 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

Models with CONSULT-II>>GO TO 2.  
Models with GST>>GO TO 2.  
Models 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-1282, "CONSULT-II INSPECTION PROCEDURE"](#) .

### With GST

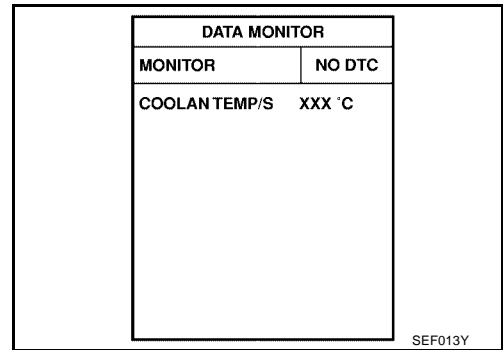
Connect "GST" to the data link connector for GST.  
Refer to [EC-1291, "GST INSPECTION PROCEDURE"](#) .

Models with CONSULT-II>>GO TO 3.  
Models with GST>>GO TO 14.

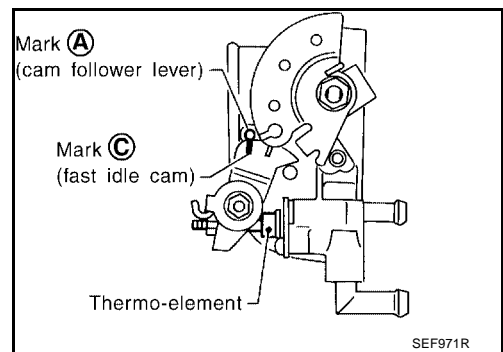
**3. CHECK FI CAM FUNCTION**

**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.



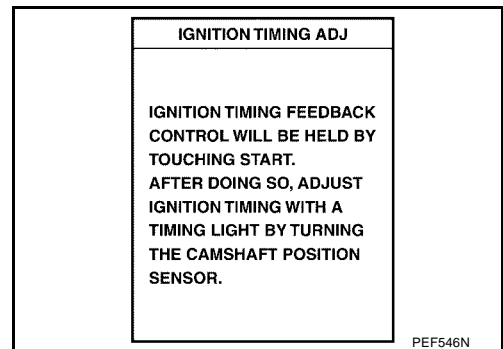
**OK or NG**

- OK >> GO TO 4.
- NG >> 1. Check FI cam. Refer to [EC-1220, "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".

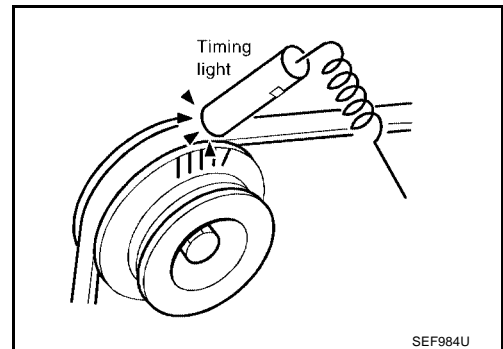


3. Check ignition timing at idle using a timing light.

**Ignition timing : 10°±2° BTDC**

**OK or NG**

- OK >> GO TO 5.
- NG >> 1. Adjust ignition timing by turning distributor. Refer to [EC-1210, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment"](#).
- 2. GO TO 5.



## 5. CHECK BASE IDLE SPEED

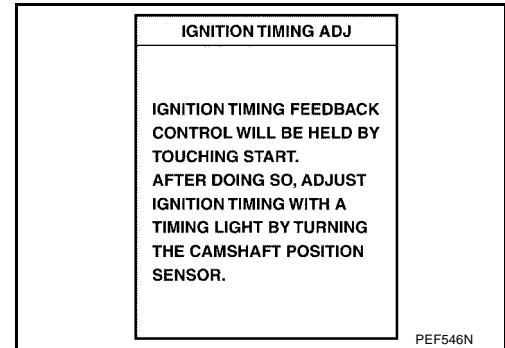
### With CONSULT-II

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

**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-1210, "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:

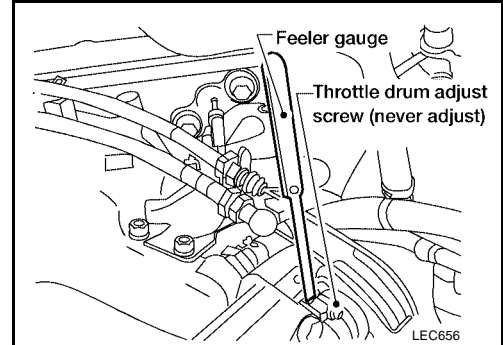
**Always check ignition timing and base idle speed before performing the following.**

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:**

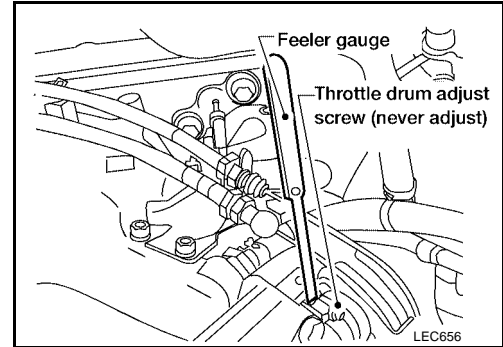
- Never adjust throttle adjust screw (TAS).
- Do not touch throttle drum when checking "CLSD THL/P SW" signal, doing so may cause an incorrect adjustment.

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   |
|                            |      |
|                            |      |
|                            |      |
|                            |      |
|                            |      |
|                            |      |

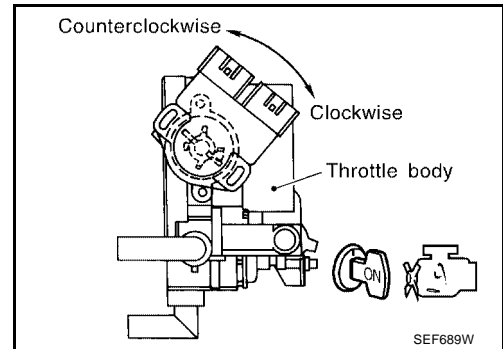
SEF715Y

**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.

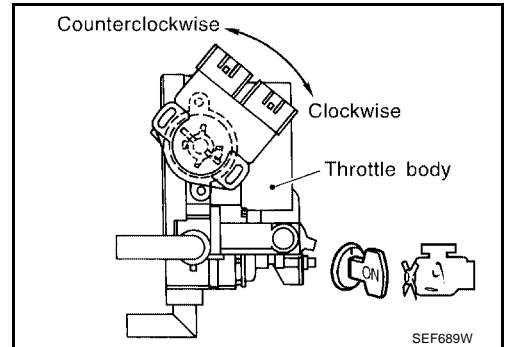




11. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-IV

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.

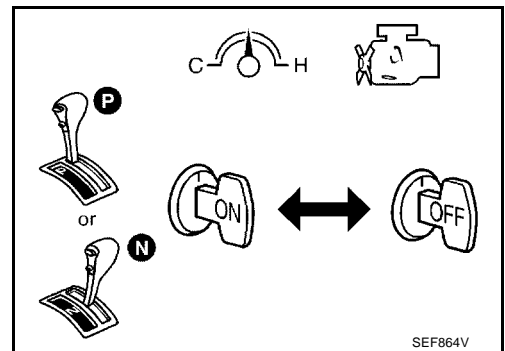
12. RESET THROTTLE POSITION SENSOR IDLE POSITION MEMORY

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    |
|                            |       |
|                            |       |
|                            |       |
|                            |       |
|                            |       |
|                            |       |

## 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.

**750±50 rpm (in "P" or "N" position)**

#### OK or NG

OK >> **INSPECTION END.**

NG >> 1. Adjust idle speed. Refer to [EC-1210, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment"](#)

2. GO TO 27.

## 14. CHECK FI CAM FUNCTION

### With GST

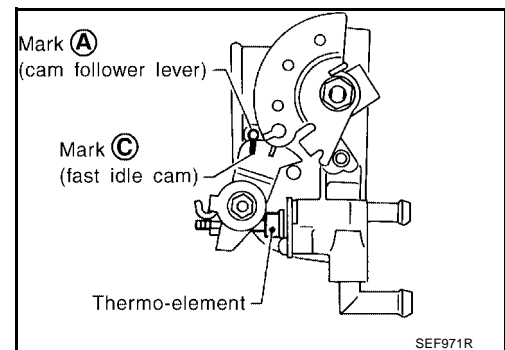
1. Turn ignition switch ON.
2. Select "MODE 1" with GST.
3. Start engine and warm it up.
4. When engine coolant temperature is 75 to 85°C (167 to 185°F), check the following.
  - The center of mark **A** is aligned with mark **C** .
  - The cam follower lever's roller is not touching the fast idle cam.

#### OK or NG

OK >> GO TO 16.

NG >> 1. Check FI cam. Refer to [EC-1220, "Fast Idle Cam \(FIC\) Inspection and Adjustment"](#) .

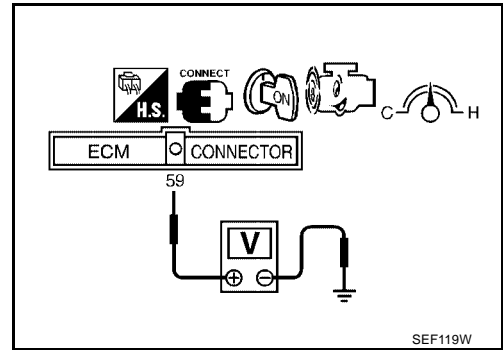
2. GO TO 16.



15. CHECK FI CAM FUNCTION

 **No Tools**

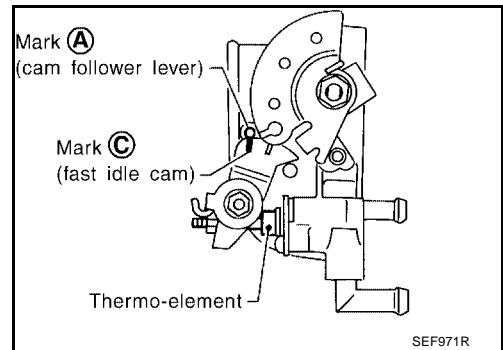
1. Set the voltmeter between ECM terminal 59 (Engine coolant temperature sensor signal) and ground.
2. Start engine and warm it up.



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

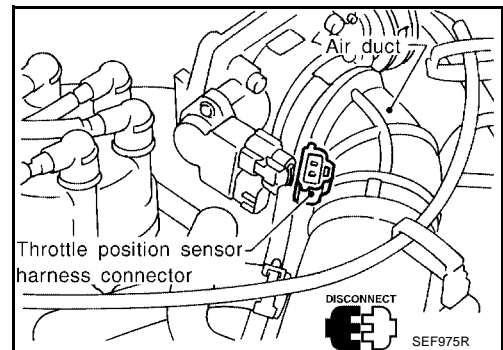
- OK >> GO TO 16.
- NG >> 1. Check FI cam. Refer to [EC-1220, "Fast Idle Cam \(FIC\) Inspection and Adjustment"](#).
- 2. GO TO 16.



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.

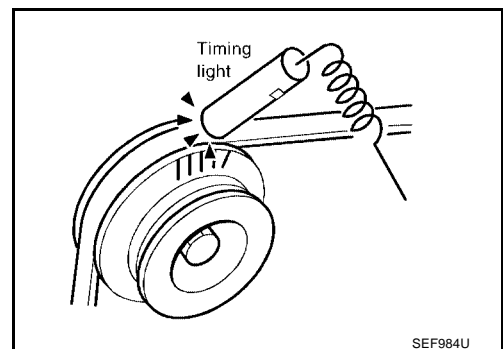


4. Check ignition timing at idle using a timing light.

**Ignition timing : 10°±2° BTDC**

OK or NG

- OK >> GO TO 17.
- NG >> 1. Adjust ignition timing by turning distributor. Refer to [EC-1210, "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?

**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-1210, "Idle Speed/Ignition Timing/Idle Mixture Ratio Adjustment"](#) .

2. GO TO 18.

## 18. CHECK CLOSED THROTTLE POSITION SWITCH IDLE POSITION

### ⊗ Without CONSULT-II

#### NOTE:

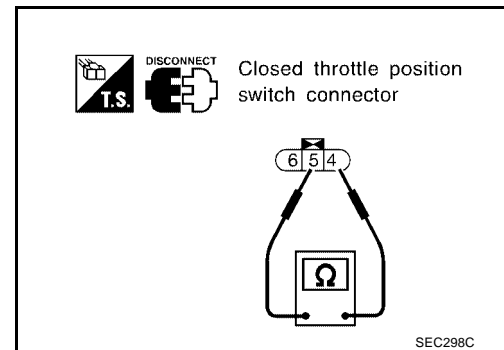
**Always check ignition timing and base idle speed before performing the following.**

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.

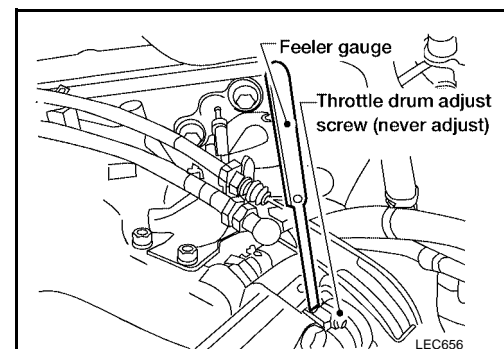


- Insert the 0.3 mm (0.012 in) and 0.4 mm (0.016 in) feeler gauge alternately between the throttle adjust screw (TAS) and throttle drum as shown in the figure.  
**"Continuity should exist" while inserting 0.3 mm (0.012 in) feeler gauge.**  
**"Continuity should not exist" while inserting 0.4 mm (0.016 in) feeler gauge.**

OK or NG

OK >> GO TO 24.

NG >> GO TO 20.



20. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION

⊗ Without CONSULT-II

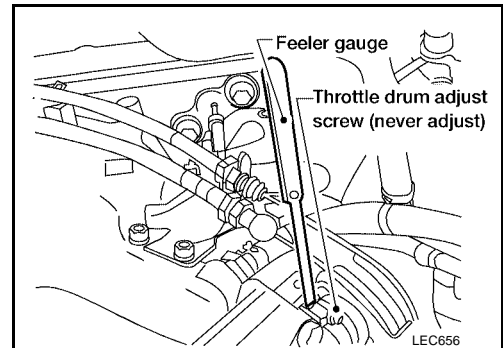
NOTE:

- 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 12 or 13.
  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.

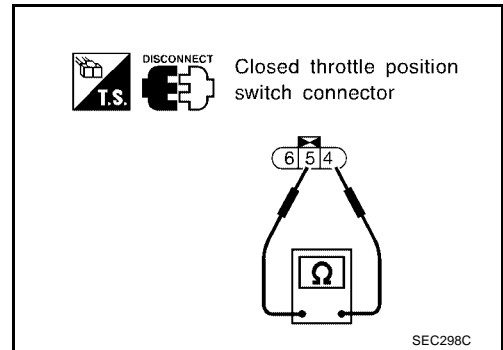


4. Check continuity between closed throttle position switch terminals 4 and 5.

**Continuity should not exist while closing the throttle position sensor.**

OK or NG

- OK >> GO TO 23.
- NG >> GO TO 22.

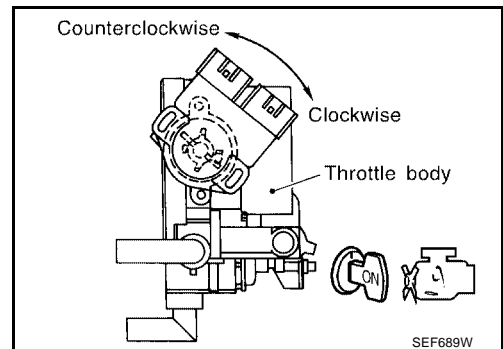


22. ADJUSTMENT THROTTLE POSITION SWITCH IDLE POSITION-III

⊗ Without CONSULT-II

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

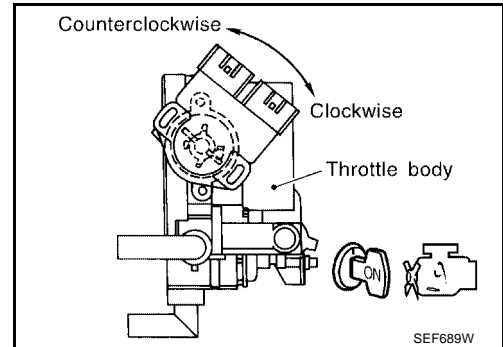
>> GO TO 23.



**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**

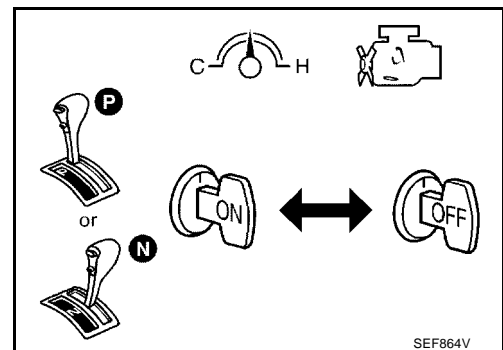
⊗ Without CONSULT-II

**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, 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.

**750±50 rpm (in "P" or "N" position)**

OK or NG

OK >> GO TO 27.

NG >> 1. Adjust idle speed. Refer to [EC-1210, "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-1237, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#) and [AT-187, "HOW TO ERASE DTC"](#).

>> **INSPECTION END.**

A

EC

C

D

E

F

G

H

I

J

K

L

M

# TROUBLE DIAGNOSIS

[VG33ER]

UBS005X0

## Symptom Matrix Chart 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              | <a href="#">EC-1729</a>     |
|                                      | Injector circuit                      |                                  |              |                              |                        |                                 |                    | 2                  |                  |                        |                                  |                            |                           |                | <a href="#">EC-1720</a>     |
|                                      | Fuel pressure regulator system        |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                           |                | <a href="#">EC-1223</a>     |
|                                      | Evaporative emission system           | 4                                | 4            | 4                            | 4                      | 4                               | 4                  | 4                  | 3                | 3                      |                                  | 4                          |                           |                | <a href="#">EC-1744</a>     |
| Air                                  | Positive crankcase ventilation system |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            | 1                         |                | <a href="#">EC-1762</a>     |
|                                      | Incorrect idle speed adjustment       | 3                                | 3            |                              |                        |                                 | 1                  | 1                  | 1                | 1                      |                                  | 1                          |                           |                | <a href="#">EC-1210</a>     |
|                                      | IACV-AAC valve circuit                |                                  | 1            |                              |                        |                                 | 2                  | 2                  |                  |                        |                                  |                            |                           | 1              | <a href="#">EC-1577</a>     |
|                                      | IACV-FICD solenoid valve circuit      | 2                                | 2            | 3                            | 3                      | 3                               | 3                  | 3                  | 2                | 2                      |                                  | 3                          |                           |                | <a href="#">EC-1738</a>     |
| Ignition                             | Incorrect ignition timing adjustment  | 3                                | 3            | 1                            | 1                      | 1                               |                    | 1                  | 1                |                        |                                  | 1                          |                           |                | <a href="#">EC-1210</a>     |
|                                      | Ignition circuit                      | 1                                | 1            | 2                            | 2                      | 2                               |                    | 2                  | 2                |                        |                                  | 2                          |                           |                | <a href="#">EC-1714</a>     |
| Main power supply and ground circuit |                                       | 1                                |              |                              |                        |                                 |                    |                    |                  |                        | 1                                |                            |                           |                | <a href="#">EC-1302</a>     |
| Air conditioner circuit              |                                       | 2                                | 2            | 3                            | 3                      | 3                               | 3                  | 3                  | 2                | 2                      |                                  | 3                          |                           | 1              | <a href="#">MTC-24</a>      |

1 - 6: The numbers refer to the order of inspection.  
(continued on next page)



# TROUBLE DIAGNOSIS

[VG33ER]

|   | SYMPTOM                          |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                             | Reference<br>page   |
|---|----------------------------------|--------------|------------------------------|------------------------|---------------------------------|--------------------|--------------------|------------------|------------------------|---------------------------------|----------------------------|---------------------------|-----------------------------|---|
|   | HARD/NO START/RESTART (EXCP. HA) | ENGINE STALL | HESITATION/SURGING/FLAT SPOT | SPARK KNOCK/DETONATION | LACK OF POWER/POOR ACCELERATION | HIGH IDLE/LOW IDLE | ROUGH IDLE/HUNTING | IDLING VIBRATION | SLOW/NO RETURN TO IDLE | OVERHEATSWATER TEMPERATURE HIGH | EXCESSIVE FUEL CONSUMPTION | EXCESSIVE OIL CONSUMPTION | BATTERY DEAD (UNDER CHARGE) |   |
| Warranty symptom code                         | AA                               | AB           | AC                           | AD                     | AE                              | AF                 | AG                 | AH               | AJ                     | AK                              | AL                         | AM                        | HA                          |   |
| Camshaft position sensor circuit              | 1                                |              |                              | 2                      |                                 |                    |                    | 2                |                        |                                 |                            |                           |                             | <a href="#">EC-1482</a>   |
| Mass air flow sensor circuit                  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                             | <a href="#">EC-1331</a> ,<br><a href="#">EC-1338</a>  |
| Heated oxygen sensor 1 circuit                |                                  | 1            | 2                            | 3                      | 2                               |                    | 2                  |                  |                        |                                 | 2                          |                           |                             | <a href="#">EC-1379</a> ,<br><a href="#">EC-1388</a> ,<br><a href="#">EC-1401</a> ,<br><a href="#">EC-1599</a> ,<br><a href="#">EC-1606</a> |
| Engine coolant temperature sensor circuit     | 1                                | 2            | 3                            |                        | 3                               | 3                  |                    |                  | 2                      |                                 |                            | 3                         |                             | <a href="#">EC-1349</a> ,<br><a href="#">EC-1371</a>  |
| Throttle position sensor circuit              |                                  | 1            | 2                            |                        | 2                               | 2                  |                    |                  |                        |                                 |                            | 2                         |                             | <a href="#">EC-1354</a>   |
| Incorrect throttle position sensor adjustment |                                  | 3            | 1                            |                        | 1                               | 1                  | 1                  | 1                | 1                      |                                 |                            | 1                         |                             | <a href="#">EC-1251</a>   |
| Vehicle speed sensor circuit                  |                                  | 2            |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                             | <a href="#">EC-1464</a>   |
| Knock sensor circuit                          |                                  |              | 3                            | 3                      | 3                               |                    |                    |                  |                        |                                 |                            | 3                         |                             | <a href="#">EC-1472</a>   |
| ECM   | 2                                | 2            |                              | 3                      |                                 | 3                  | 3                  | 2                | 2                      | 1                               |                            |                           |                             | <a href="#">EC-1597</a> ,<br><a href="#">EC-1251</a>  |
| Start signal circuit                          | 1                                |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                           |                             | <a href="#">EC-1725</a>   |
| Park/neutral position (PNP) switch circuit    |                                  |              | 3                            |                        | 3                               |                    |                    |                  |                        |                                 |                            | 3                         |                             | <a href="#">EC-1707</a>   |
| Power steering oil pressure switch circuit    |                                  | 2            |                              |                        |                                 |                    | 3                  | 2                |                        |                                 |                            |                           |                             | <a href="#">EC-1734</a>   |

1 - 6: The numbers refer to the order of inspection.  
(continued on next page)

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

# TROUBLE DIAGNOSIS

[VG33ER]

## 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            |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                   |                           | <a href="#">FL-2</a>        |                        |   |  |  |  |  |  |                       |
|                       | Fuel piping  |                                  |              | 5                            | 5                      | 5                               |                    | 5                  | 4                |                        |                                  | 5                          |                   |                           |                             |                        |   |  |  |  |  |  |                       |
|                       | Vapor lock   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                   |                           |                             |                        |   |  |  |  |  |  |                       |
|                       | Valve deposit  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                   |                           |                             |                        |   |  |  |  |  |  |                       |
|                       | Poor fuel (Heavy weight gasoline, Low octane)                    | 5                                |              | 5                            | 5                      | 5                               |                    | 5                  | 4                |                        |                                  | 5                          |                   |                           |                             |                        |   |  |  |  |  |  |                       |
| Air                   | Air duct   | 5                                | 5            | 5                            | 5                      | 5                               | 5                  | 4                  | 4                | 5                      | 5                                | 5                          | 5                 | 5                         | —                           |                        |   |  |  |  |  |  |                       |
|                       | Air cleaner  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                   |                           |                             |                        |   |  |  |  |  |  |                       |
|                       | Air leakage from air duct (Mass air flow sensor — throttle body) |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                   |                           |                             |                        |   |  |  |  |  |  |                       |
|                       | Throttle body, Throttle wire                                     |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                   |                           |                             |                        |   |  |  |  |  |  | <a href="#">ACC-2</a> |
|                       | Air leakage from intake manifold/Collector/Gasket                |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                   |                           |                             |                        | 5 |  |  |  |  |  | —                     |
| Crank-<br>ing         | Battery  | 1                                | 1            | 1                            |                        | 1                               |                    | 1                  | 1                |                        |                                  | 1                          | 1                 | 1                         | <a href="#">SC-2</a>        |                        |   |  |  |  |  |  |                       |
|                       | Generator circuit  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                   |                           |                             |                        |   |  |  |  |  |  |                       |
|                       | Starter circuit  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                   |                           |                             |                        |   |  |  |  |  |  |                       |
|                       | Park/neutral position (PNP) switch                               |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                   |                           |                             | <a href="#">AT-249</a> |   |  |  |  |  |  |                       |
|                       | Drive plate/Flywheel   |                                  | 6            |                              |                        |                                 |                    |                    |                  |                        |                                  |                            |                   |                           |                             | <a href="#">EM-140</a> |   |  |  |  |  |  |                       |

1 - 6: The numbers refer to the order of inspection.  
(continued on next page)

# TROUBLE DIAGNOSIS

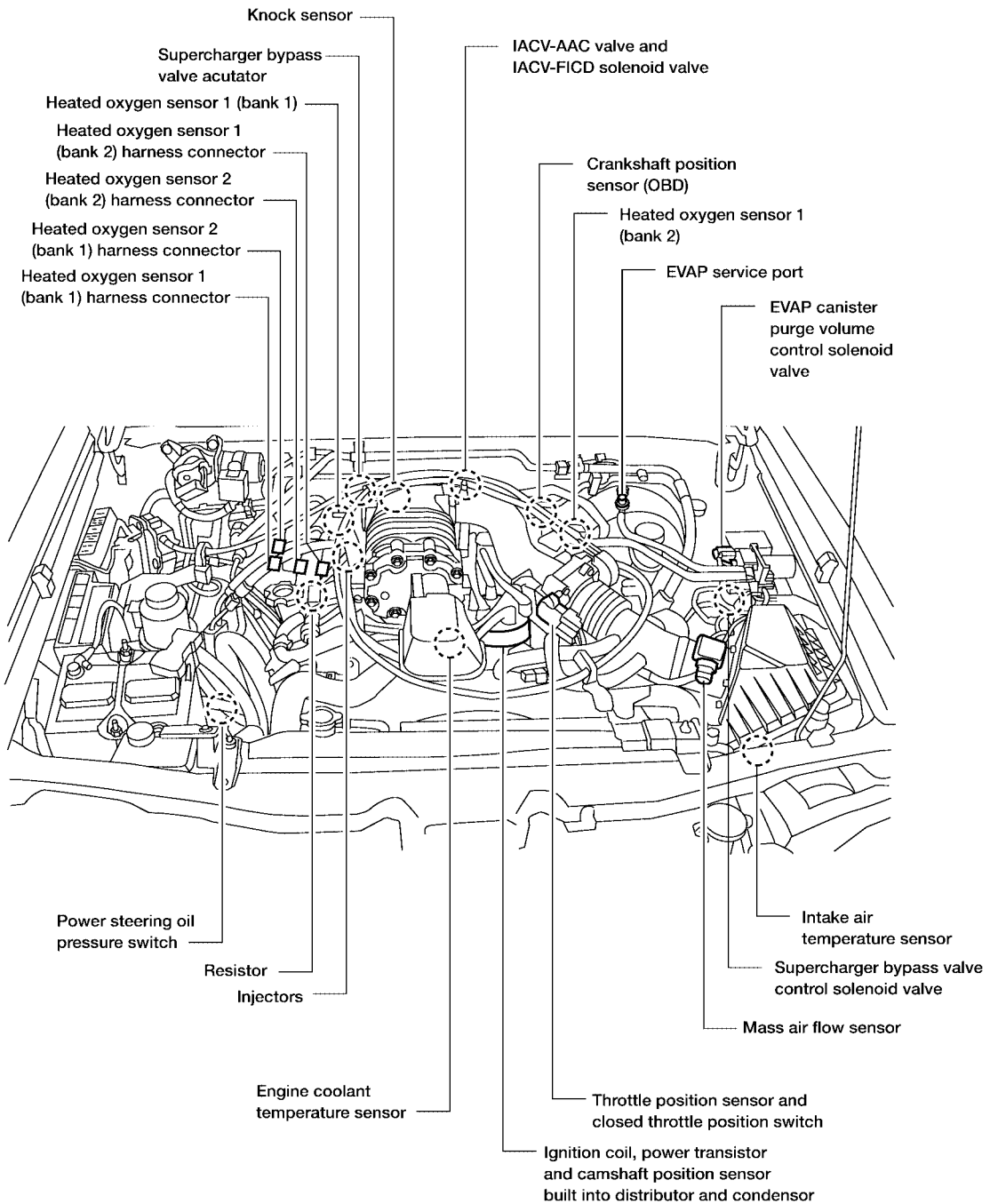
[VG33ER]

|                       |  | 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 | OVERHEAT/WATER TEMPERATURE HIGH | EXCESSIVE FUEL CONSUMPTION |                   | EXCESSIVE OIL CONSUMPTION   |
| Warranty symptom code |  | AA                               | AB           | AC                           | AD                     | AE                              | AF                 | AG                 | AH               | AJ                     | AK                              | AL                         | AM                | HA  |
| Engine                | Cylinder head  | 5                                | 5            | 5                            | 5                      |                                 |                    | 5                  | 5                |                        |                                 | 5                          |                   | <a href="#">EM-102</a>  |
|                       | Cylinder head gasket                                 |                                  |              |                              |                        |                                 |                    |                    |                  |                        | 2                               |                            | 2                 |   |
|                       | Cylinder block                                       |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                   |   |
|                       | Piston   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            | 3                 |   |
|                       | Piston ring  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                   |   |
|                       | Connecting rod                                       | 6                                | 6            | 6                            | 6                      | 6                               |                    | 6                  | 6                |                        |                                 | 6                          |                   |   |
|                       | Bearing  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                   |   |
|                       | Crankshaft   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                   |   |
| Valve mechanism       | Timing belt  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                   | <a href="#">EX-3</a>  |
|                       | Camshaft   | 6                                |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                   |   |
|                       | Intake valve   |                                  | 6            | 6                            | 6                      | 6                               |                    | 6                  | 6                |                        | 6                               | 2                          |                   |   |
|                       | Exhaust valve  |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                   |   |
|                       | Hydraulic lash adjuster                              |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                   |   |
| Exhaust               | Exhaust manifold/Tube/Muffler/Gasket                 | 6                                | 6            | 6                            | 6                      | 6                               |                    | 6                  | 6                |                        |                                 | 6                          |                   | <a href="#">EX-3</a>  |
|                       | Three way catalyst                                   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                   |   |
| Lubrication           | Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery | 6                                | 6            | 6                            | 6                      | 6                               |                    | 6                  | 6                |                        |                                 | 6                          | 2                 | <a href="#">LU-15</a> , <a href="#">LU-16</a> , <a href="#">LU-14</a> , <a href="#">EM-88</a> |
|                       | Oil level (Low/Filthy) oil                           |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                   | <a href="#">MA-30</a>   |
| Cooling               | Radiator/Hose/Radiator filler cap                    |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                   | <a href="#">CO-25</a> , <a href="#">CO-28</a> , <a href="#">CO-32</a>                         |
|                       | Thermostat   |                                  |              |                              |                        |                                 | 5                  |                    |                  | 5                      |                                 |                            |                   |   |
|                       | Water pump   |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                   |   |
|                       | Water gallery  | 6                                | 6            | 6                            | 6                      | 6                               |                    | 6                  | 6                |                        | 2                               | 6                          |                   |   |
|                       | Cooling fan  |                                  |              |                              |                        |                                 | 5                  |                    |                  |                        |                                 |                            | 5                 |   |
|                       | Coolant level (low)/Contaminated coolant             |                                  |              |                              |                        |                                 |                    |                    |                  |                        |                                 |                            |                   |   |

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

### Engine Control Component Parts Location

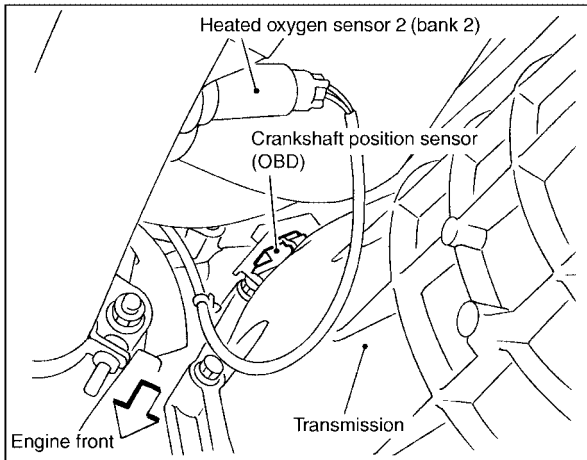
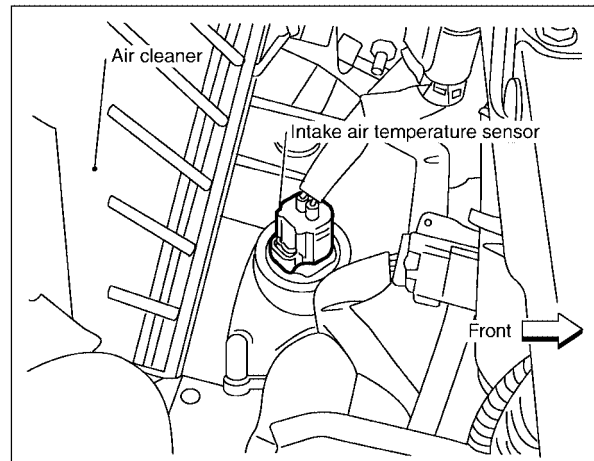
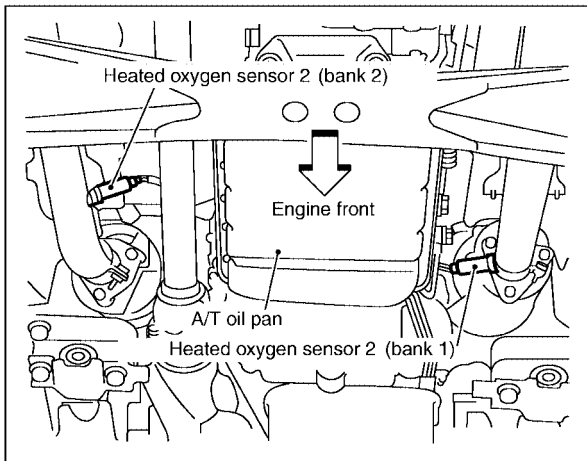
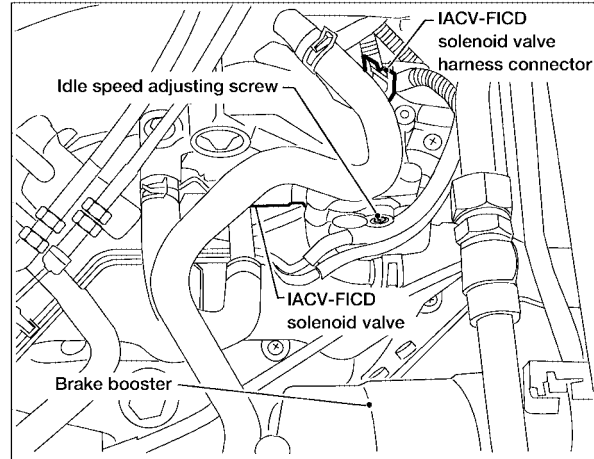
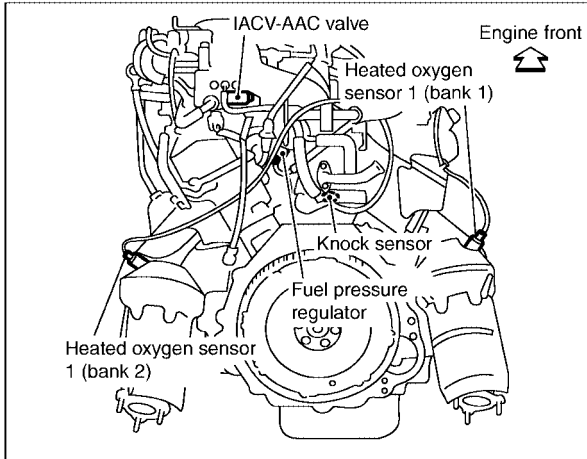
UBS005X1



BBIA0185E

# TROUBLE DIAGNOSIS

[VG33ER]

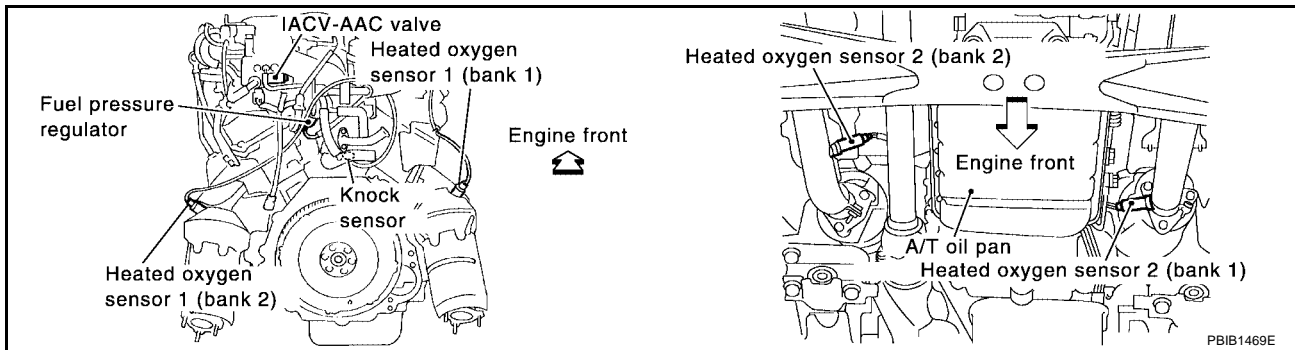
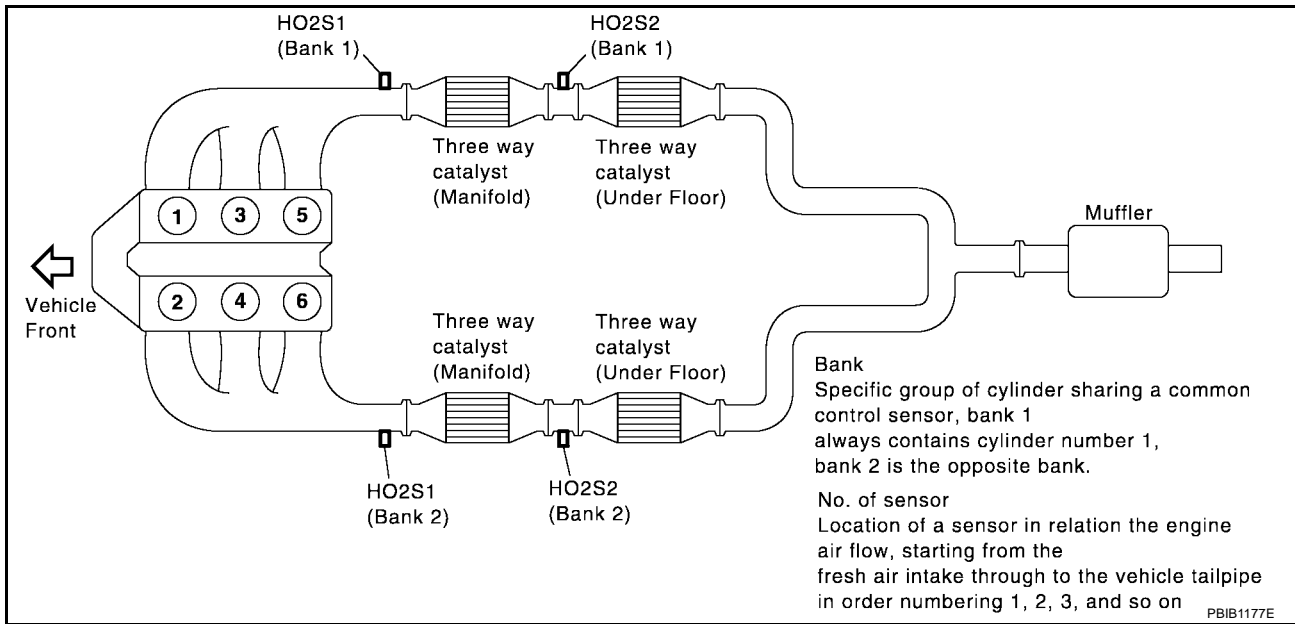


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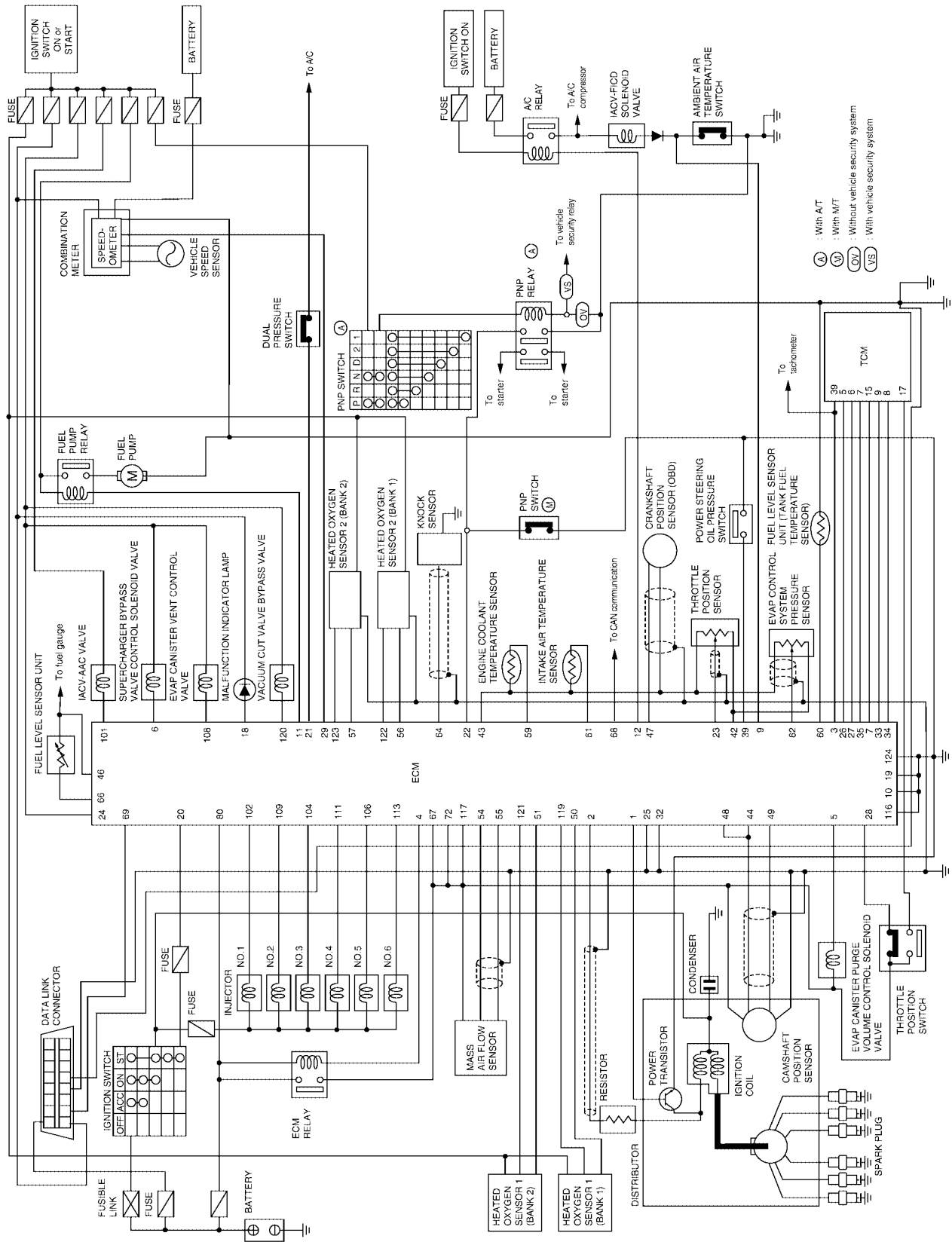
BBIA0186E

# TROUBLE DIAGNOSIS

[VG33ER]



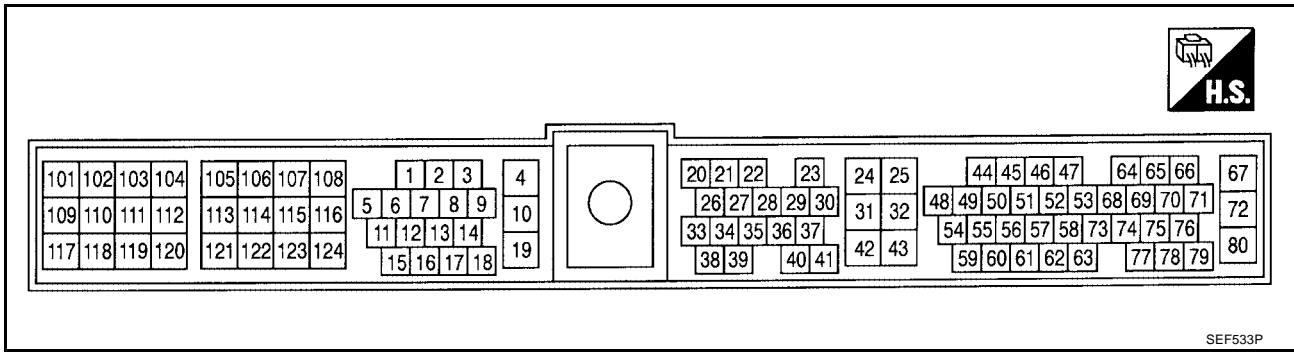
### Circuit Diagram



EC  
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## ECM Harness Connector Terminal Layout

UBS006VU



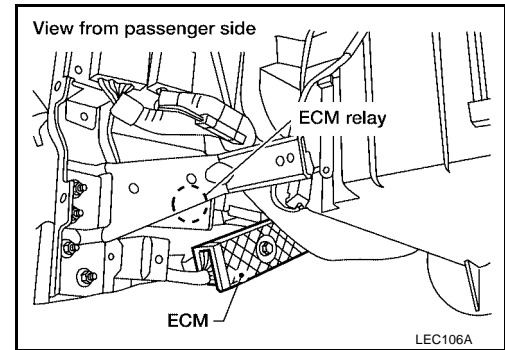
## ECM Terminals and Reference Value

### PREPARATION

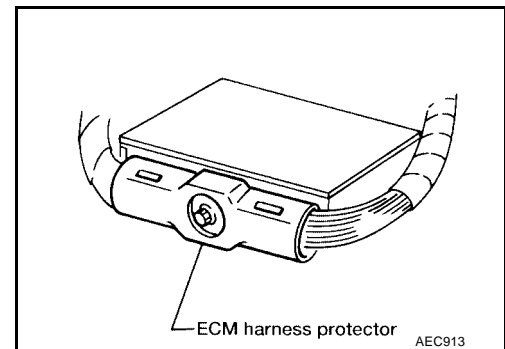
UBS005X3

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

- Remove instrument lower cover.

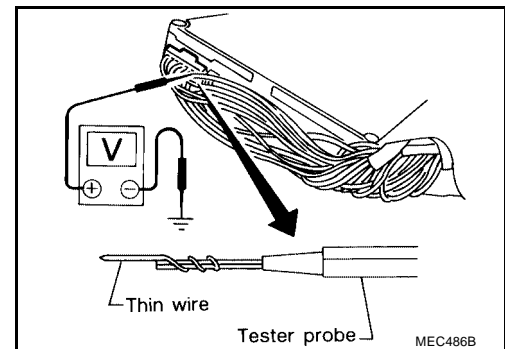


2. Remove ECM harness protector.



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



## ECM INSPECTION TABLE

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

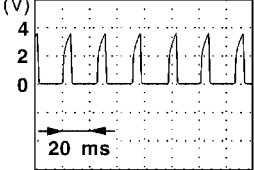
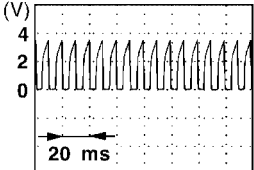
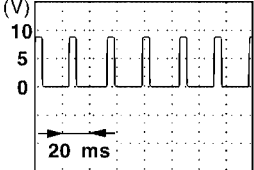
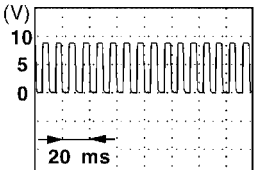
### CAUTION:

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



# TROUBLE DIAGNOSIS

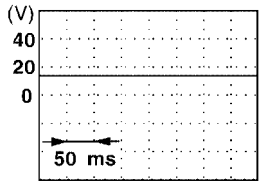
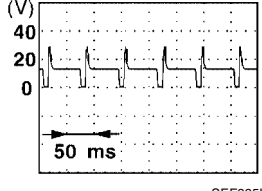
[VG33ER]

| TER-MINAL NO. | WIRE COLOR | ITEM                      | CONDITION  | DATA (DC Voltage)  |
|---------------|------------|---------------------------|--|--|
| 1             | PU/W       | Ignition signal           | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>   | <p>Approximately 0.7V★</p>  |
|               |            |                           | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>  | <p>1.1 - 1.5V★</p>          |
| 3             | P/L        | Tachometer                | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>  | <p>1 - 2V★</p>              |
|               |            |                           | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>  | <p>3 - 5V★</p>            |
| 4             | OR/B       | ECM relay (Self shut-off) | <p><b>[Engine is running]</b><br/><b>[Ignition switch OFF]</b></p> <ul style="list-style-type: none"> <li>● For a few seconds after turning ignition switch OFF</li> </ul> | 0 - 1.5V   |
|               |            |                           | <p><b>[Ignition switch OFF]</b></p> <ul style="list-style-type: none"> <li>● A few seconds passed after turning ignition switch OFF</li> </ul>                             | BATTERY VOLTAGE<br>(11 - 14V)  |

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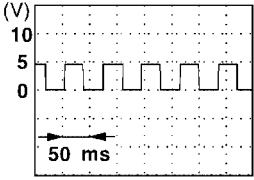
# TROUBLE DIAGNOSIS

[VG33ER]

| TER-MINAL NO. | WIRE COLOR | ITEM  | CONDITION  | DATA (DC Voltage)   |
|---------------|------------|---|--|---|
| 5             | R/Y        | EVAP canister purge volume control solenoid valve | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> </ul>   | BATTERY VOLTAGE<br>(11 - 14V)★<br> |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm (More than 100 seconds after starting engine)</li> </ul>  | BATTERY VOLTAGE<br>(11 - 14V)★<br> |
| 6             | G/W        | SCB valve control solenoid valve                  | <b>[Ignition switch ON]</b><br><ul style="list-style-type: none"> <li>● Engine stopped</li> </ul>  | BATTERY VOLTAGE<br>(11 - 14V)   |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> </ul>   | Approximately 0V  |
| 7             | Y/G        | A/T check signal                                  | <b>[Ignition switch ON]</b><br><b>[Engine is running]</b>  | 0 - 3.0V  |
| 9             | B/Y        | Ambient air temperature switch                    | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> <li>● Ambient air temperature is above 25°C (77°F)</li> <li>● Air conditioner is operating</li> </ul>     | 0V  |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> <li>● Ambient air temperature is below 19°C (66°F)</li> <li>● Air conditioner is operating</li> </ul>     | BATTERY VOLTAGE<br>(11 - 14V)   |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> <li>● Ambient air temperature is below 19°C (66°F)</li> <li>● Air conditioner is not operating</li> </ul> | Approximately 5V  |
| 10            | B/R        | ECM ground  | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> </ul>   | Engine ground   |
| 11            | W/R        | Fuel pump relay                                   | <b>[Ignition switch ON]</b><br><ul style="list-style-type: none"> <li>● For 5 seconds after turning ignition switch ON</li> </ul>  | 0 - 1V  |
|               |            |   | <b>[Engine is running]</b><br><b>[Ignition switch ON]</b><br><ul style="list-style-type: none"> <li>● More than 5 seconds after turning ignition switch ON</li> </ul>                            | BATTERY VOLTAGE<br>(11 - 14V)   |
| 12            | P          | Air conditioner relay                             | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Both A/C switch and blower switch are ON*</li> </ul>  | 0 - 1V  |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● A/C switch is OFF</li> </ul>  | BATTERY VOLTAGE<br>(11 - 14V)   |

# TROUBLE DIAGNOSIS

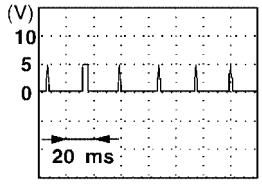
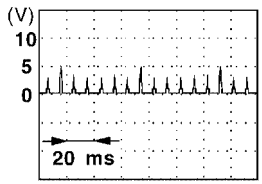
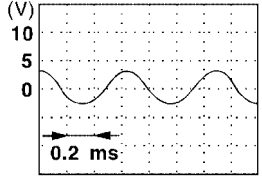
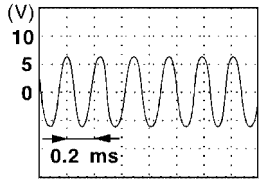
[VG33ER]

| TER-MINAL NO. | WIRE COLOR | ITEM                                       | CONDITION   | DATA (DC Voltage)  | A  |
|---------------|------------|--|---|--|----|
| 18            | R/W        | Malfunction indicator lamp                 | [Ignition switch ON]  | 0 - 1V   | EC |
|               |            |  | [Engine is running]<br>● Idle speed   | BATTERY VOLTAGE<br>(11 - 14V)  |    |
| 19            | B/R        | ECM ground                                 | [Engine is running]<br>● Idle speed   | Engine ground  | C  |
| 20            | L/OR       | Start signal                               | [Ignition switch ON]  | Approximately 0V   | D  |
|               |            |  | [Ignition switch START]   | 9 - 12V  |    |
| 21            | G/R        | Air conditioner switch                     | [Engine is running]<br>● Both A/C switch and blower switch are ON<br>(Compressor operates)*   | Approximately 0V   | E  |
|               |            |  | [Engine is running]<br>● A/C switch is OFF  | BATTERY VOLTAGE<br>(11 - 14V)  |    |
| 22            | L/B        | Park/neutral position (PNP) switch         | [Ignition switch ON]<br>● Gear position is "N" or "P"   | Approximately 0V   | F  |
|               |            |  | [Ignition switch ON]<br>● Except the above gear position  | Approximately 5V   | G  |
| 23            | L          | Throttle position sensor                   | [Engine is running]<br>● Warm-up condition<br>● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.<br>● Accelerator pedal fully released | 0.15 - 0.85V   | H  |
|               |            |  | [Ignition switch ON]<br>● Accelerator pedal fully depressed   | 3.5 - 4.7V   | I  |
| 24            | W/L        | Ignition switch                            | [Ignition switch OFF]   | 0V   | J  |
|               |            |  | [Ignition switch ON]  | BATTERY VOLTAGE<br>(11 - 14V)  | K  |
| 25            | B/Y        | ECM ground                                 | [Engine is running]<br>● Idle speed   | Engine ground  | L  |
| 26            | PU/W       | A/T signal No. 1                           | [Engine is running]<br>● Idle speed   | Approximately 0 - 1.0V   | M  |
| 27            | P/B        | A/T signal No. 2                           | [Engine is running]<br>● Idle speed   | Approximately 0 - 1.0V   | M  |
| 28            | BR/W       | Throttle position switch (Closed position) | [Engine is running]<br>● Warm-up condition<br>● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.<br>● Accelerator pedal fully released | BATTERY VOLTAGE<br>(11 - 14V)  |    |
|               |            |  | [Ignition switch ON]<br>● Accelerator pedal depressed   | Approximately 0V   |    |
| 29            | G/B        | Vehicle speed sensor                       | [Engine is running]<br>● Lift up the vehicle.<br>● In 2nd gear position<br>● Vehicle speed is 40 km/h (25 MPH)  | 2 - 3V★<br> |    |

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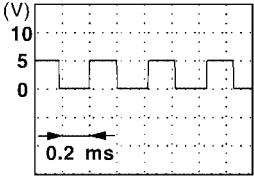
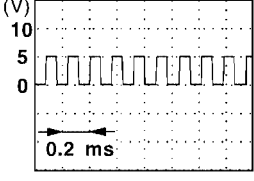
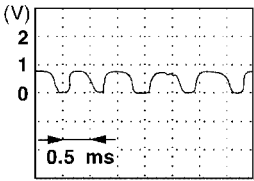
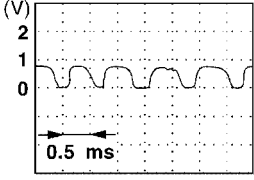
# TROUBLE DIAGNOSIS

**[VG33ER]**

| TER-MINAL NO. | WIRE COLOR | ITEM  | CONDITION   | DATA (DC Voltage)  |
|---------------|------------|---|---|--|
| 32            | B/Y        | ECM ground                                  | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> </ul>                              | Engine ground  |
| 35            | G/R        | A/T signal No. 3                            | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> </ul>                              | Approximately 0 - 1.0V   |
| 39            | GY/R       | Power steering oil pressure switch          | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Steering wheel is being turned</li> </ul>          | Approximately 0V   |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Steering wheel is not being turned</li> </ul>      | Approximately 5V   |
| 42            | B/W        | Sensors' power supply                       | <b>[Ignition switch ON]</b>   | Approximately 5V   |
| 43            | BR         | Sensors' ground                             | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul> | Approximately 0V   |
| 44            | PU         | Camshaft position sensor (Reference signal) | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Idle speed</li> </ul>                              | 0.3 - 0.5V★<br>             |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>               | 0.3 - 0.5V★<br>           |
| 46            | G          | Fuel level sensor                           | <b>[Ignition switch ON]</b>   | Approximately 0 - 4.8V<br>Output voltage varies with fuel level.   |
| 47            | L          | Crankshaft position sensor (OBD)            | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul> | 1 - 2V<br>(AC range)★<br> |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>               | 3 - 4V<br>(AC range)★<br> |

# TROUBLE DIAGNOSIS

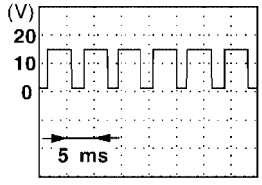
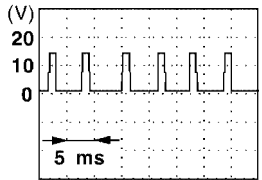
[VG33ER]

| TER-MINAL NO. | WIRE COLOR | ITEM                                       | CONDITION  | DATA (DC Voltage)  |
|---------------|------------|--|--|--|
| 49            | LG         | Camshaft position sensor (Position signal) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>  | <p>Approximately 2.5V★</p>        |
|               |            |  | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>  | <p>Approximately 2.5V★</p>        |
| 50            | B          | Heated oxygen sensor 1 (bank 1)            | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul>   | <p>0 - Approximately 1.0V★</p>    |
| 51            | G          | Heated oxygen sensor 1 (bank 2)            | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul>   | <p>0 - Approximately 1.0V★</p>  |
| 54            | R          | Mass air flow sensor                       | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>  | 1.0 - 1.7V   |
|               |            |  | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,500 rpm</li> </ul>   | 1.7 - 2.3V   |
| 55            | G          | Mass air flow sensor ground                | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>  | Approximately 0V   |
| 56            | OR         | Heated oxygen sensor 2 (bank 1)            | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine speed is below 3,600 rpm after the following conditions are met.                             <ul style="list-style-type: none"> <li>- Engine after warming up.</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> </li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V   |

A  
EC  
C  
D  
E  
F  
G  
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I  
J  
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L  
M

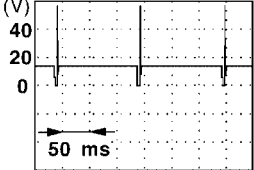
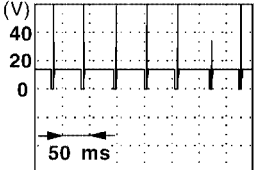
# TROUBLE DIAGNOSIS

[VG33ER]

| TER-MINAL NO. | WIRE COLOR | ITEM                                | CONDITION   | DATA (DC Voltage)   |
|---------------|------------|-------------------------------------|---|---|
| 57            | Y          | Heated oxygen sensor 2 (bank 2)     | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is below 3.600 rpm after the following conditions are met.                             <ul style="list-style-type: none"> <li>- Engine after warming up.</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> </li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V  |
| 59            | LG/R       | Engine coolant temperature sensor   | <b>[Engine is running]</b>  | Approximately 0 - 4.8V<br>Output voltage varies with engine coolant temperature   |
| 60            | Y/B        | Fuel tank temperature sensor        | <b>[Engine is running]</b>  | Approximately 0 - 4.8V<br>Output voltage varies with fuel temperature   |
| 61            | PU/R       | Intake air temperature sensor       | <b>[Engine is running]</b>  | Approximately 0 - 4.8V<br>Output voltage varies with intake air temperature.  |
| 62            | Y          | EVAP control system pressure sensor | <b>[Ignition switch ON]</b>   | Approximately 1.8 - 4.8V  |
| 64            | W          | Knock sensor                        | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>   | Approximately 2.5V  |
| 66            | B          | Fuel level sensor ground            | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>   | Approximately 0V  |
| 67            | B/P        | Power supply for ECM                | <b>[Ignition switch ON]</b>   | BATTERY VOLTAGE (11 - 14V)  |
| 69            | LG/R       | Data link connector                 | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed (CONSULT-II or GST is disconnected)</li> </ul>   | 6 - 10V   |
| 72            | B/P        | Power supply for ECM                | <b>[Ignition switch ON]</b>   | BATTERY VOLTAGE (11 - 14V)  |
| 80            | SB         | Power supply (Back-up)              | <b>[Ignition switch OFF]</b>  | BATTERY VOLTAGE (11 - 14V)  |
| 101           | OR/L       | IACV-AAC valve                      | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>  | 8 - 11V★<br> <p style="text-align: right; font-size: small;">SEF005V</p> |
|               |            |                                     | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 3,000 rpm</li> </ul>   | 7 - 10V★<br> <p style="text-align: right; font-size: small;">SEF692W</p> |

# TROUBLE DIAGNOSIS

[VG33ER]

| TER-MINAL NO.                          | WIRE COLOR                            | ITEM   | CONDITION   | DATA (DC Voltage)   |  |
|--|---------------------------------------|--|---|---|--|
| 102<br>104<br>106<br>109<br>111<br>113 | W/B<br>W/R<br>W/G<br>W/L<br>W/PU<br>W | Injector No. 1<br>Injector No. 3<br>Injector No. 5<br>Injector No. 2<br>Injector No. 4<br>Injector No. 6 | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>  | BATTERY VOLTAGE<br>(11 - 14V)★<br> | A<br>EC<br>C<br>D<br>E<br>F<br>G<br>H<br>I<br>J<br>K<br>L<br>M |
|  |                                       |  | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul>   | BATTERY VOLTAGE<br>(11 - 14V)★<br> |  |
| 108                                    | R/G                                   | EVAP canister vent control valve   | <b>[Ignition switch ON]</b>   | BATTERY VOLTAGE<br>(11 - 14V)   |  |
| 116                                    | B/R                                   | ECM ground   | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>   | Engine ground   |  |
| 117                                    | B/P                                   | Current return   | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>   | BATTERY VOLTAGE<br>(11 - 14V)   |  |
| 119                                    | BR/Y                                  | Heated oxygen sensor 1 heater (bank 1)   | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is below 2,800 rpm</li> </ul>  | Approximately 0.4V  |  |
|  |                                       |  | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is above 2,800 rpm</li> </ul>  | BATTERY VOLTAGE<br>(11 - 14V)   |  |
| 120                                    | P/B                                   | Vacuum cut valve bypass valve  | <b>[Ignition switch ON]</b>   | BATTERY VOLTAGE<br>(11 - 14V)   |  |
| 121                                    | BR                                    | Heated oxygen sensor 1 heater (bank 2)   | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is below 2,800 rpm</li> </ul>  | Approximately 0.4V  |  |
|  |                                       |  | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is above 2,800 rpm</li> </ul>  | BATTERY VOLTAGE<br>(11 - 14V)   |  |
| 122                                    | R/B                                   | Heated oxygen sensor 2 heater (bank 1)   | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is below 3,600 rpm after the following conditions are met.               <ul style="list-style-type: none"> <li>- Engine: After warming up</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> </li> </ul> | 0 - 1.0V  |  |
|  |                                       |  | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"> <li>● Engine stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is above 3,600 rpm</li> </ul>   | BATTERY VOLTAGE<br>(11 - 14V)   |  |

# TROUBLE DIAGNOSIS

**[VG33ER]**

| TER-MINAL NO. | WIRE COLOR | ITEM                                   | CONDITION   | DATA (DC Voltage)             |
|---------------|------------|--|---|-------------------------------|
| 123           | R/Y        | Heated oxygen sensor 2 heater (bank 2) | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is below 3,600 rpm after the following conditions are met.                             <ul style="list-style-type: none"> <li>– Engine: After warming up</li> <li>– Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> </li> </ul> | 0 - 1.0V                      |
|               |            |  | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"> <li>● Engine stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is above 3,600 rpm</li> </ul>   | BATTERY VOLTAGE<br>(11 - 14V) |
| 124           | B/R        | ECM ground                             | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> </ul>   | 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 FUNCTION

UBS005X4

| Diagnostic test mode    | Function   |
|-------------------------|--|
| Work support            | This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.    |
| Self-diagnostic results | Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*1 |
| Data monitor            | Input/Output data in the ECM can be read.  |
| Data monitor (SPEC)     | Input/Output 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 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.   |

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

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



# TROUBLE DIAGNOSIS

[VG33ER]

## ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

| Item                           |   | DIAGNOSTIC TEST MODE     |                          |                     |               |                      |             |                         |                   |  |
|--------------------------------|---|--------------------------|--------------------------|---------------------|---------------|----------------------|-------------|-------------------------|-------------------|--|
|                                |   | WORK SUP-PORT            | SELF-DIAGNOS-TIC RESULTS |                     | DATA MONI-TOR | DATA MONI-TOR (SPEC) | ACTIVE TEST | DTC & SRT CON-FIRMATION |                   |  |
|                                |   |                          | DTC*1                    | FREEZE FRAME DATA*2 |               |                      |             | SRT STA-TUS             | DTC WORK SUP-PORT |  |
| ENGINE CONTROL COMPONENT PARTS | INPUT   | Camshaft position sensor |                          | X                   | X             | X                    | X           |                         |                   |  |
|                                | Mass air flow sensor  |                          | X                        |                     | X             | X                    |             |                         |                   |  |
|                                | Engine coolant temperature sensor                                 |                          | X                        | X                   | X             | X                    | X           |                         |                   |  |
|                                | Heated oxygen sensor 1  |                          | X                        |                     | X             | X                    |             | X                       | X                 |  |
|                                | Heated oxygen sensor 2  |                          | X                        |                     | X             | X                    |             | X                       | X                 |  |
|                                | Vehicle speed sensor  |                          | X                        | X                   | X             | X                    |             |                         |                   |  |
|                                | Throttle position sensor  | X                        | X                        |                     | X             | X                    |             |                         |                   |  |
|                                | Fuel tank temperature sensor                                      |                          | X                        |                     | X             | X                    | X           |                         |                   |  |
|                                | EVAP control system pressure sensor                               |                          | X                        |                     | X             | X                    |             |                         |                   |  |
|                                | Intake air temperature sensor                                     |                          | X                        |                     | X             | X                    |             |                         |                   |  |
|                                | Crankshaft position sensor (OBD)                                  |                          | X                        |                     |               |                      |             |                         |                   |  |
|                                | Knock sensor  |                          | X                        |                     |               |                      |             |                         |                   |  |
|                                | Ignition switch (start signal)                                    |                          |                          |                     | X             | X                    |             |                         |                   |  |
|                                | Closed throttle position switch                                   |                          | X                        |                     | X             | X                    |             |                         |                   |  |
|                                | Closed throttle position switch (throttle position sensor signal) |                          |                          |                     | X             | X                    |             |                         |                   |  |
|                                | Air conditioner switch  |                          |                          |                     | X             | X                    |             |                         |                   |  |
|                                | Park/neutral position (PNP) switch                                |                          | X                        |                     | X             | X                    |             |                         |                   |  |
|                                | Power steering oil pressure switch                                |                          |                          |                     | X             | X                    |             |                         |                   |  |
|                                | Battery voltage   |                          |                          |                     | X             | X                    |             |                         |                   |  |
|                                | Ambient air temperature switch                                    |                          |                          |                     | X             | X                    |             |                         |                   |  |
| ENGINE CONTROL COMPONENT PARTS | OUTPUT  | Injectors                |                          |                     | X             | X                    | X           |                         |                   |  |
|                                | Power transistor (Ignition timing)                                | X                        |                          |                     | X             | X                    | X           |                         |                   |  |
|                                | IACV-AAC valve  | X                        | X                        |                     | X             | X                    | X           |                         |                   |  |
|                                | EVAP canister purge volume control solenoid valve                 |                          | X                        |                     | X             | X                    | X           |                         | X                 |  |
|                                | Air conditioner relay   |                          |                          |                     | X             | X                    |             |                         |                   |  |
|                                | Fuel pump relay   | X                        |                          |                     | X             | X                    | X           |                         |                   |  |
|                                | Heated oxygen sensor 1 heater                                     |                          | X                        |                     | X             | X                    |             | X                       |                   |  |
|                                | Heated oxygen sensor 2 heater                                     |                          | X                        |                     | X             | X                    |             | X                       |                   |  |
|                                | EVAP canister vent control valve                                  |                          | X                        |                     | X             | X                    | X           |                         |                   |  |
|                                | Vacuum cut valve bypass valve                                     |                          | X                        |                     | X             | X                    | X           |                         | X                 |  |
|                                | SCB valve control solenoid valve                                  |                          | X                        |                     | X             | X                    | X           |                         |                   |  |
|                                | Calculated load value   |                          |                          | X                   | X             | X                    |             |                         |                   |  |

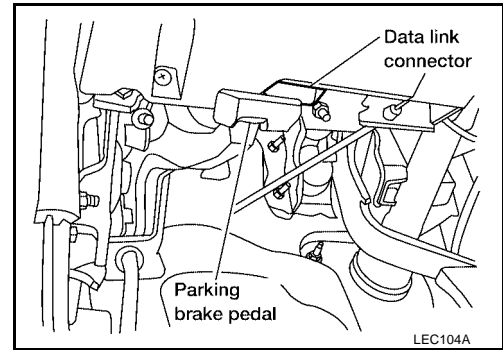
X: Applicable

\*1: This item includes 1st trip DTCs.

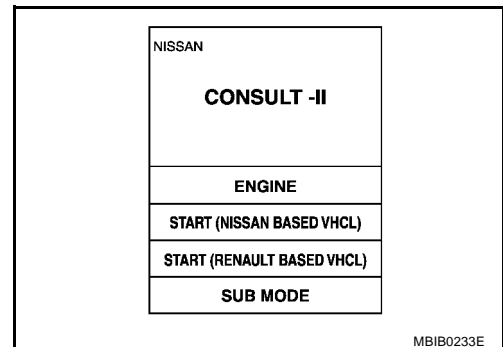
\*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to [EC-1283, "Freeze Frame Data and 1st Trip Freeze Frame Data"](#).

## CONSULT-II INSPECTION PROCEDURE

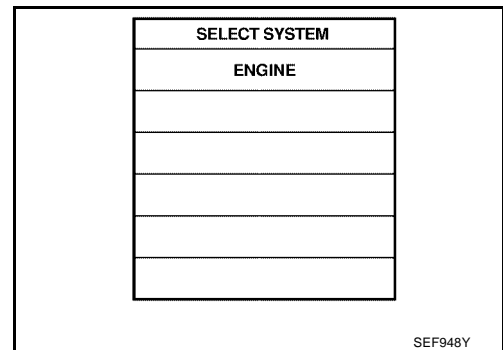
1. Turn ignition switch OFF.
2. Connect "CONSULT-II" and "CONSULT-II CONVERTER" to data link connector which is located under LH dash panel near the fuse box cover.



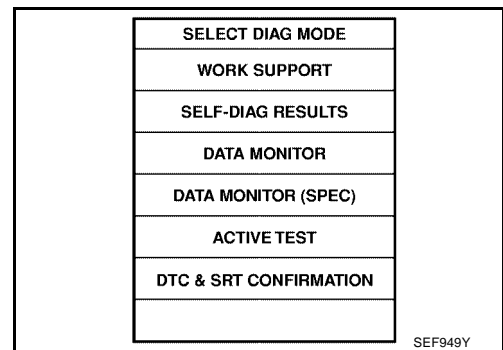
3. Turn ignition switch ON.
4. Touch "START (NISSAN BASED VHCL)".



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.**



# TROUBLE DIAGNOSIS

[VG33ER]

## WORK SUPPORT MODE

### Work Item

| WORK ITEM                  | CONDITION   | USAGE   |
|----------------------------|---|---|
| TP SW/TP SEN IDLE POSI ADJ | <ul style="list-style-type: none"> <li>FOLLOW THE BASIC INSPECTION INSTRUCTION IN THE SERVICE MANUAL.</li> </ul>  | When adjusting the idle throttle position   |
| IGNITION TIMING ADJ        | <ul style="list-style-type: none"> <li>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.</li> </ul>  | When adjusting target ignition timing<br>After adjustment, confirm target ignition timing with a timing light by turning the distributor. |
| FUEL PRESSURE RELEASE      | <ul style="list-style-type: none"> <li>FUEL PUMP WILL STOP BY TOUCHING "START" DURING IDLING.<br/>CRANK A FEW TIMES AFTER ENGINE STALLS.</li> </ul>   | When releasing fuel pressure from fuel line   |
| SELF-LEARNING CONT         | <ul style="list-style-type: none"> <li>THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.</li> </ul>   | When clean the coefficient of self-learning control valve   |
| EVAP SYSTEM CLOSE          | <p>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.</p> <ul style="list-style-type: none"> <li>IGN SW ON</li> <li>ENGINE NOT RUNNING</li> <li>AMBIENT TEMPERATURE IS ABOVE 0°C (32°F).</li> <li>NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM</li> <li>FUEL TANK TEMP. IS MORE THAN 0°C (32°F).</li> <li>WITHIN 10 MINUTES AFTER STARTING "EVAP SYSTEM CLOSE"</li> <li>WHEN TRYING TO EXECUTE "EVAP SYSTEM CLOSE" UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION.</li> </ul> <p><b>NOTE:</b><br/><b>WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY "BATTERY VOLTAGE IS LOW. CHARGE BATTERY", EVEN IN USING CHARGED BATTERY.</b></p> | When detecting EVAP vapor leak point of EVAP system   |
| TARGET IDLE RPM ADJ*       | <p>SET ENGINE SPEED AT THE SPECIFIED VALUE UNDER THE FOLLOWING CONDITIONS.</p> <ul style="list-style-type: none"> <li>ENGINE WARMED UP</li> <li>NO-LOAD</li> </ul>  | When adjusting initial ignition timing and 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 "INDEX for DTC" (See [EC-1190](#).)

### Freeze Frame Data and 1st Trip Freeze Frame Data

| Freeze frame data item *1 | Description  |
|---------------------------|--|
| DIAG TROUBLE CODE [PXXXX] | <ul style="list-style-type: none"> <li>The engine control component part/control system has a trouble code, it is displayed as "PXXXX". (Refer to <a href="#">EC-1190</a>.)</li> </ul> |

# TROUBLE DIAGNOSIS

[VG33ER]

| Freeze frame data item *1  | Description   |
|----------------------------|---|
| FUEL SYS-B1 *2             | <ul style="list-style-type: none"> <li>● "Fuel injection system status" at the moment a malfunction is detected is displayed.</li> </ul>  |
| FUEL SYS-B2 *2             | <ul style="list-style-type: none"> <li>● One mode in the following is displayed.<br/>                     "MODE 2": Open loop due to detected system malfunction<br/>                     "MODE 3": Open loop due to driving conditions (power enrichment, deceleration enrichment)<br/>                     "MODE 4": Closed loop - using oxygen sensor(s) as feedback for fuel control<br/>                     "MODE 5": Open loop - has not yet satisfied condition to go to closed loop</li> </ul> |
| CAL/LD VALUE [%]           | <ul style="list-style-type: none"> <li>● The calculated load value at the moment a malfunction is detected is displayed.</li> </ul>   |
| COOLANT TEMP [°C] or [°F]  | <ul style="list-style-type: none"> <li>● The engine coolant temperature at the moment a malfunction is detected is displayed.</li> </ul>  |
| S-FUEL TRIM-B1 [%]         | <ul style="list-style-type: none"> <li>● "Short-term fuel trim" at the moment a malfunction is detected is displayed.</li> </ul>  |
| S-FUEL TRIM-B2 [%]         | <ul style="list-style-type: none"> <li>● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.</li> </ul>  |
| L-FUEL TRIM-B1 [%]         | <ul style="list-style-type: none"> <li>● "Long-term fuel trim" at the moment a malfunction is detected is displayed.</li> </ul>   |
| L-FUEL TRIM-B2 [%]         | <ul style="list-style-type: none"> <li>● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.</li> </ul>  |
| ENGINE SPEED [rpm]         | <ul style="list-style-type: none"> <li>● The engine speed at the moment a malfunction is detected is displayed.</li> </ul>  |
| VHCL SPEED [km/h] or [mph] | <ul style="list-style-type: none"> <li>● The vehicle speed at the moment a malfunction is detected is displayed.</li> </ul>   |
| ABSOL TH-P/S [%]           | <ul style="list-style-type: none"> <li>● The throttle valve opening angle at the moment a malfunction is detected is displayed.</li> </ul>  |
| B/FUEL SCHDL [msec]        | <ul style="list-style-type: none"> <li>● The base fuel schedule at the moment a malfunction is detected is displayed.</li> </ul>  |
| INT/A TEMP SE [°C] or [°F] | <ul style="list-style-type: none"> <li>● The intake air temperature at the moment a malfunction is detected is displayed.</li> </ul>  |

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

\*2: Regarding D22 model, "-B1" indicates right bank and "-B2" indicates left bank.

## DATA MONITOR MODE

### Monitored Item

×: Applicable

| Monitored item [Unit]      | ECM INPUT SIGNALS | MAIN SIGNALS | Description  | Remarks  |
|----------------------------|-------------------|--------------|--|--|
| ENG SPEED [rpm]            | ×                 | ×            | <ul style="list-style-type: none"> <li>● Indicates the engine speed computed from the REF signal (120° signal) of the camshaft position sensor.</li> </ul>                       |  |
| MAS A/F SE-B1 [V]          | ×                 | ×            | <ul style="list-style-type: none"> <li>● The signal voltage of the mass air flow sensor is displayed.</li> </ul>   | <ul style="list-style-type: none"> <li>● When the engine is stopped, a certain value is indicated.</li> </ul>  |
| B/FUEL SCHDL [msec]        |                   | ×            | <ul style="list-style-type: none"> <li>● "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.</li> </ul> |  |
| A/F ALPHA-B1 [%]           |                   | ×            | <ul style="list-style-type: none"> <li>● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.</li> </ul>                                      | <ul style="list-style-type: none"> <li>● When the engine is stopped, a certain value is indicated.</li> <li>● This data also includes the data for the air-fuel ratio learning control.</li> </ul>                       |
| A/F ALPHA-B2 [%]           |                   | ×            |  |  |
| COOLAN TEMP/S [°C] or [°F] | ×                 | ×            | <ul style="list-style-type: none"> <li>● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.</li> </ul>     | <ul style="list-style-type: none"> <li>● 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.</li> </ul> |
| HO2S1 (B1) [V]             | ×                 | ×            | <ul style="list-style-type: none"> <li>● The signal voltage of the heated oxygen sensor 1 is displayed.</li> </ul>   |  |
| HO2S1 (B2) [V]             | ×                 | ×            |  |  |

# TROUBLE DIAGNOSIS

[VG33ER]

| Monitored item [Unit]         | ECM INPUT SIGNALS | MAIN SIGNALS | Description  | Remarks   |    |
|-------------------------------|-------------------|--------------|--|---|----|
| HO2S2 (B1) [V]                | ×                 | ×            | <ul style="list-style-type: none"> <li>The signal voltage of the heated oxygen sensor 2 is displayed.</li> </ul>   |   | A  |
| HO2S2 (B2) [V]                | ×                 | ×            |  |   | EC |
| HO2S1 MNTR (B1) [RICH/LEAN]   | ×                 |              | <ul style="list-style-type: none"> <li>Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control:<br/>RICH ... means the mixture became "rich", and control is being affected toward a leaner mixture.<br/>LEAN ... means the mixture became "lean", and control is being affected toward a rich mixture.</li> </ul> | <ul style="list-style-type: none"> <li>After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins.</li> <li>When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.</li> </ul> | C  |
| HO2S1 MNTR (B2) [RICH/LEAN]   | ×                 |              |  |   | D  |
| HO2S2 MNTR (B1) [RICH/LEAN]   | ×                 |              | <ul style="list-style-type: none"> <li>Display of heated oxygen sensor 2 signal:<br/>RICH ... means the amount of oxygen after three way catalyst is relatively small.<br/>LEAN ... means the amount of oxygen after three way catalyst is relatively large.</li> </ul>  | <ul style="list-style-type: none"> <li>When the engine is stopped, a certain value is indicated.</li> </ul>   | E  |
| HO2S2 MNTR (B2) [RICH/LEAN]   | ×                 |              |  |   | F  |
| VHCL SPEED SE [km/h] or [mph] | ×                 | ×            | <ul style="list-style-type: none"> <li>The vehicle speed computed from the vehicle speed sensor signal is displayed.</li> </ul>  |   | G  |
| BATTERY VOLT [V]              | ×                 | ×            | <ul style="list-style-type: none"> <li>The power supply voltage of ECM is displayed.</li> </ul>  |   | H  |
| THRTL POS SEN [V]             | ×                 | ×            | <ul style="list-style-type: none"> <li>The throttle position sensor signal voltage is displayed.</li> </ul>  |   | I  |
| FUEL T/TMP SE [°C] or [°F]    | ×                 |              | <ul style="list-style-type: none"> <li>The fuel temperature judged from the fuel tank temperature sensor signal voltage is displayed.</li> </ul>   |   | J  |
| INT/A TEMP SE [°C] or [°F]    | ×                 | ×            | <ul style="list-style-type: none"> <li>The intake air temperature determined by the signal voltage of the intake air temperature sensor is indicated.</li> </ul>   |   | K  |
| EVAP SYS PRES [V]             |                   |              | <ul style="list-style-type: none"> <li>The signal voltage of EVAP control system pressure sensor is displayed.</li> </ul>  |   | L  |
| ABSOL PRES/SE [V]             |                   |              | <ul style="list-style-type: none"> <li>The signal voltage of the absolute pressure sensor is displayed.</li> </ul>   |   | L  |
| FUEL LEVEL SE [V]             | ×                 |              | <ul style="list-style-type: none"> <li>The signal voltage of the fuel level sensor is displayed.</li> </ul>  |   | M  |
| START SIGNAL [ON/OFF]         | ×                 | ×            | <ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition from the starter signal.</li> </ul>  | <ul style="list-style-type: none"> <li>After starting the engine, [OFF] is displayed regardless of the starter signal.</li> </ul>   |    |
| CLSD THL POS [ON/OFF]         | ×                 | ×            | <ul style="list-style-type: none"> <li>Indicates idle position [ON/OFF] computed by ECM according to the throttle position sensor signal.</li> </ul>   |   |    |
| CLSD THL/P SW [ON/OFF]        | ×                 |              | <ul style="list-style-type: none"> <li>Indicates mechanical contact [ON/OFF] condition of the closed throttle position switch.</li> </ul>  |   |    |
| AIR COND SIG [ON/OFF]         | ×                 | ×            | <ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.</li> </ul>  |   |    |
| P/N POSI SW [ON/OFF]          | ×                 | ×            | <ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.</li> </ul>   |   |    |

# TROUBLE DIAGNOSIS

[VG33ER]

| Monitored item [Unit]   | ECM INPUT SIGNALS | MAIN SIGNALS | Description   | Remarks  |
|-------------------------|-------------------|--------------|---|--|
| PW/ST SIGNAL [ON/OFF]   | ×                 | ×            | <ul style="list-style-type: none"> <li>● [ON/OFF] condition of the power steering oil pressure switch determined by the power steering oil pressure signal is indicated.</li> </ul>   |  |
| AMB TEMP SW [ON/OFF]    | ×                 |              | <ul style="list-style-type: none"> <li>● Indicates [ON/OFF] condition from the ambient air temperature switch signal.</li> </ul>  |  |
| IGNITION SW [ON/OFF]    | ×                 |              | <ul style="list-style-type: none"> <li>● Indicates [ON/OFF] condition from ignition switch.</li> </ul>  |  |
| INJ PULSE-B1 [msec]     |                   | ×            | <ul style="list-style-type: none"> <li>● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.</li> </ul>  | <ul style="list-style-type: none"> <li>● When the engine is stopped, a certain computed value is indicated.</li> </ul> |
| INJ PULSE-B2 [msec]     |                   |              |   |  |
| IGN TIMING [BTDC]       |                   | ×            | <ul style="list-style-type: none"> <li>● Indicates the ignition timing computed by ECM according to the input signals.</li> </ul>   | <ul style="list-style-type: none"> <li>● When the engine is stopped, a certain value is indicated.</li> </ul>          |
| CAL/LD VALUE [%]        |                   |              | <ul style="list-style-type: none"> <li>● "Calculated load value" indicates the value of the current airflow divided by peak airflow.</li> </ul>   |  |
| ABSOL TH-P/S [%]        |                   |              | <ul style="list-style-type: none"> <li>● "Absolute throttle position sensor" indicates the throttle opening computed by ECM according to the signal voltage of the throttle position sensor.</li> </ul>   |  |
| MASS AIRFLOW [g·m/s]    |                   |              | <ul style="list-style-type: none"> <li>● Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.</li> </ul>  |  |
| IACV-AAC/V [%]          |                   | ×            | <ul style="list-style-type: none"> <li>● Indicates the IACV-AAC valve control value computed by ECM according to the input signals.</li> </ul>  |  |
| PURG VOL C/V [%]        |                   |              | <ul style="list-style-type: none"> <li>● Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals.</li> <li>● The opening becomes larger as the value increases.</li> </ul> |  |
| AIR COND RLY [ON/OFF]   |                   | ×            | <ul style="list-style-type: none"> <li>● The air conditioner relay control condition (determined by ECM according to the input signal) is indicated.</li> </ul>   |  |
| FUEL PUMP RLY [ON/OFF]  |                   | ×            | <ul style="list-style-type: none"> <li>● Indicates the fuel pump relay control condition determined by ECM according to the input signals.</li> </ul>   |  |
| VENT CONT/V [ON/OFF]    |                   |              | <ul style="list-style-type: none"> <li>● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signal) is indicated.</li> <li>● ON ... Closed</li> <li>● OFF ... Open</li> </ul>                  |  |
| VC/V BYPASS/V [ON/OFF]  |                   |              | <ul style="list-style-type: none"> <li>● The control condition of the vacuum cut valve bypass valve (determined by ECM according to the input signal) is indicated.</li> <li>● ON ... Open</li> <li>● OFF ... Closed</li> </ul>                     |  |
| HO2S1 HTR (B1) [ON/OFF] |                   |              | <ul style="list-style-type: none"> <li>● Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals.</li> </ul>   |  |
| HO2S1 HTR (B1) [ON/OFF] |                   |              |   |  |

# TROUBLE DIAGNOSIS

[VG33ER]

| Monitored item [Unit]           | ECM INPUT SIGNALS | MAIN SIGNALS | Description   | Remarks   |
|---------------------------------|-------------------|--------------|---|---|
| HO2S2 HTR (B1) [ON/OFF]         |                   |              | <ul style="list-style-type: none"> <li>Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.</li> </ul>   |   |
| HO2S2 HTR (B2) [ON/OFF]         |                   |              |   |   |
| SCB/V CON S/V                   |                   |              | <ul style="list-style-type: none"> <li>The control condition of the SCB valve control solenoid valve (determined by ECM according to the input signals) is indicated.</li> <li>ON ... SCB valve is closed.</li> <li>OFF ... SCB valve is opened.</li> </ul> |   |
| VOLTAGE [V]                     |                   |              | <ul style="list-style-type: none"> <li>Voltage measured by the voltage probe.</li> </ul>  |   |
| FREQUENCY [msec] or [Hz] or [%] |                   |              | <ul style="list-style-type: none"> <li>Pulse width, frequency or duty cycle measured by the pulse probe.</li> </ul>   | <ul style="list-style-type: none"> <li>Only “#” is displayed if item is unable to be measured.</li> <li>Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.</li> </ul> |

## NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding D22 model, “B1” indicates bank 1 and “B2” indicates bank 2.

## DATA MONITOR (SPEC) MODE

### Monitored Items

| Monitored item [Unit] | ECM input signals | Main signals | Description  | Remarks   |
|-----------------------|-------------------|--------------|--|---|
| MAS A/F SE-B1 [V]     | ×                 | ×            | <ul style="list-style-type: none"> <li>The signal voltage of the mass air flow sensor specification is displayed.</li> </ul>   | <ul style="list-style-type: none"> <li>When the engine is running, specification range is indicated.</li> </ul>             |
| B/FUEL SCHDL [msec]   |                   | ×            | <ul style="list-style-type: none"> <li>“Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.</li> </ul> | <ul style="list-style-type: none"> <li>When the engine is running, specification range is indicated.</li> </ul>             |
| A/F ALPHA-B1 [%]      |                   | ×            | <ul style="list-style-type: none"> <li>Indicates the mean value of the air-fuel ratio feedback correction factor per cycle.</li> </ul>   | <ul style="list-style-type: none"> <li>When the engine is running, specification range is indicated.</li> </ul>             |
| A/F ALPHA-B2 [%]      |                   | ×            |  | <ul style="list-style-type: none"> <li>This data also includes the data for the air-fuel ratio learning control.</li> </ul> |

## NOTE:

- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
- Regarding D22 model, “B1” indicates bank 1 and “B2” indicates bank 2.

## ACTIVE TEST MODE

### Test Item

| TEST ITEM       | CONDITION   | JUDGEMENT   | CHECK ITEM (REMEDY)   |
|-----------------|---|---|---|
| FUEL INJECTION  | <ul style="list-style-type: none"> <li>Engine: Return to the original trouble condition</li> <li>Change the amount of fuel injection using CONSULT-II.</li> </ul>                   | <p>If trouble symptom disappears, see CHECK ITEM.</p> | <ul style="list-style-type: none"> <li>Harness and connector</li> <li>Fuel injectors</li> <li>Heated oxygen sensor 1</li> </ul> |
| IGNITION TIMING | <ul style="list-style-type: none"> <li>Engine: Return to the original trouble condition</li> <li>Timing light: Set</li> <li>Retard the ignition timing using CONSULT-II.</li> </ul> | <p>If trouble symptom disappears, see CHECK ITEM.</p> | <ul style="list-style-type: none"> <li>Adjust initial ignition timing</li> </ul>  |

# TROUBLE DIAGNOSIS

**[VG33ER]**

| TEST ITEM             | CONDITION   | JUDGEMENT  | CHECK ITEM (REMEDY)  |
|-----------------------|---|--|--|
| IACV-AAC/V<br>OPENING | <ul style="list-style-type: none"> <li>● Engine: After warming up, idle the engine.</li> <li>● Change the IACV-AAC valve opening percent using CONSULT-II.</li> </ul>   | Engine speed changes according to the opening percent. | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● IACV-AAC valve</li> </ul>  |
| POWER BAL-<br>ANCE    | <ul style="list-style-type: none"> <li>● Engine: After warming up, idle the engine.</li> <li>● A/C switch "OFF"</li> <li>● Shift lever "N"</li> <li>● Cut off each injector signal one at a time using CONSULT-II.</li> </ul> | Engine runs rough or dies.                             | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Compression</li> <li>● Injectors</li> <li>● Power transistor</li> <li>● Spark plugs</li> <li>● Ignition coils</li> </ul> |
| ENG COOLANT<br>TEMP   | <ul style="list-style-type: none"> <li>● Engine: Return to the original trouble condition</li> <li>● Change the engine coolant temperature using CONSULT-II.</li> </ul>   | If trouble symptom disappears, see CHECK ITEM.         | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Engine coolant temperature sensor</li> <li>● Fuel injectors</li> </ul>   |
| FUEL PUMP<br>RELAY    | <ul style="list-style-type: none"> <li>● Ignition switch: ON (Engine stopped)</li> <li>● Turn the fuel pump relay "ON" and "OFF" using CONSULT-II and listen to operating sound.</li> </ul>                                   | Fuel pump relay makes the operating sound.             | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Fuel pump relay</li> </ul>   |
| PURG VOL<br>CONT/V    | <ul style="list-style-type: none"> <li>● Engine: After warming up, run engine at 1,500 rpm.</li> <li>● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.</li> </ul>              | Engine speed changes according to the opening percent. | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Solenoid valve</li> </ul>  |
| FUEL/T TEMP<br>SEN    | <ul style="list-style-type: none"> <li>● Change the fuel tank temperature using CONSULT-II.</li> </ul>  |  |  |
| VENT CON-<br>TROL/V   | <ul style="list-style-type: none"> <li>● Ignition switch: ON (Engine stopped)</li> <li>● Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound.</li> </ul>                                     | Solenoid valve makes an operating sound.               | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Solenoid valve</li> </ul>  |
| VC/V BYPASS/V         | <ul style="list-style-type: none"> <li>● Ignition switch: ON (Engine stopped)</li> <li>● Turn solenoid valve "ON" and "OFF" with the CONSULT-II and listen to operating sound.</li> </ul>                                     | Solenoid valve makes an operating sound.               | <ul style="list-style-type: none"> <li>● Harness and connector</li> <li>● Solenoid valve</li> </ul>  |

## DTC & SRT CONFIRMATION MODE

### SRT STATUS Mode

For details, refer to [EC-1229, "SYSTEM READINESS TEST \(SRT\) CODE"](#) .

### SRT Work Support Mode

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



## DTC Work Support Mode

| Test mode   | Test item                 | Condition   | Reference page                  |
|-------------|---------------------------|---|---------------------------------|
| EVAP SYSTEM | EVAP SML LEAK P0442/P1442 | Refer to corresponding trouble diagnosis for DTC. | <a href="#">EC-1503/EC-1646</a> |
|             | EVAP V/S LEAK P0456/P1456 |   | <a href="#">EC-1551/EC-1671</a> |
|             | PURG VOL CN/V P1444       |   | <a href="#">EC-1648</a>         |
|             | PURGE FLOW P0441          |   | <a href="#">EC-1495</a>         |
|             | VC CUT/V BP/V P1491       |   | <a href="#">EC-1690</a>         |
| HO2S1       | HO2S1 (B1) P0134          |   | <a href="#">EC-1401</a>         |
|             | HO2S1 (B1) P1143          |   | <a href="#">EC-1599</a>         |
|             | HO2S1 (B1) P1144          |   | <a href="#">EC-1606</a>         |
|             | HO2S1 (B1) P0133          |   | <a href="#">EC-1388</a>         |
|             | HO2S1 (B2) P0154          |   | <a href="#">EC-1401</a>         |
|             | HO2S1 (B2) P1163          |   | <a href="#">EC-1599</a>         |
|             | HO2S1 (B2) P1164          |   | <a href="#">EC-1606</a>         |
|             | HO2S1 (B2) P0153          |   | <a href="#">EC-1388</a>         |
| HO2S2       | HO2S2 (B1) P1146          |   | <a href="#">EC-1613</a>         |
|             | HO2S2 (B1) P1147          |   | <a href="#">EC-1637</a>         |
|             | HO2S2 (B1) P0139          | <a href="#">EC-1421</a>                           |                                 |
|             | HO2S2 (B2) P1166          | <a href="#">EC-1613</a>                           |                                 |
|             | HO2S2 (B2) P1167          | <a href="#">EC-1624</a>                           |                                 |
|             | HO2S2 (B2) P0159          | <a href="#">EC-1421</a>                           |                                 |

## 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.

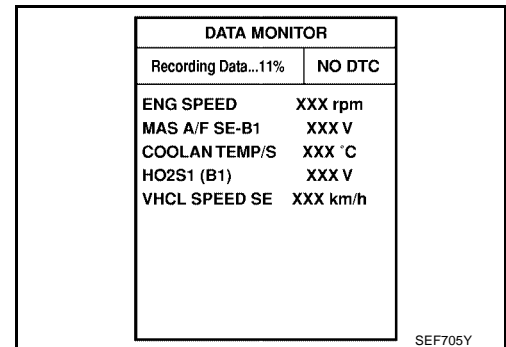
In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.

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.

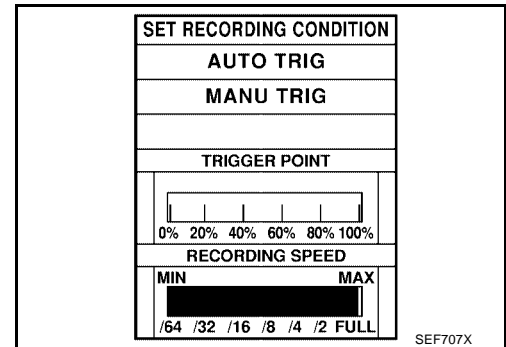
2. "MANU TRIG" (Manual trigger):

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.



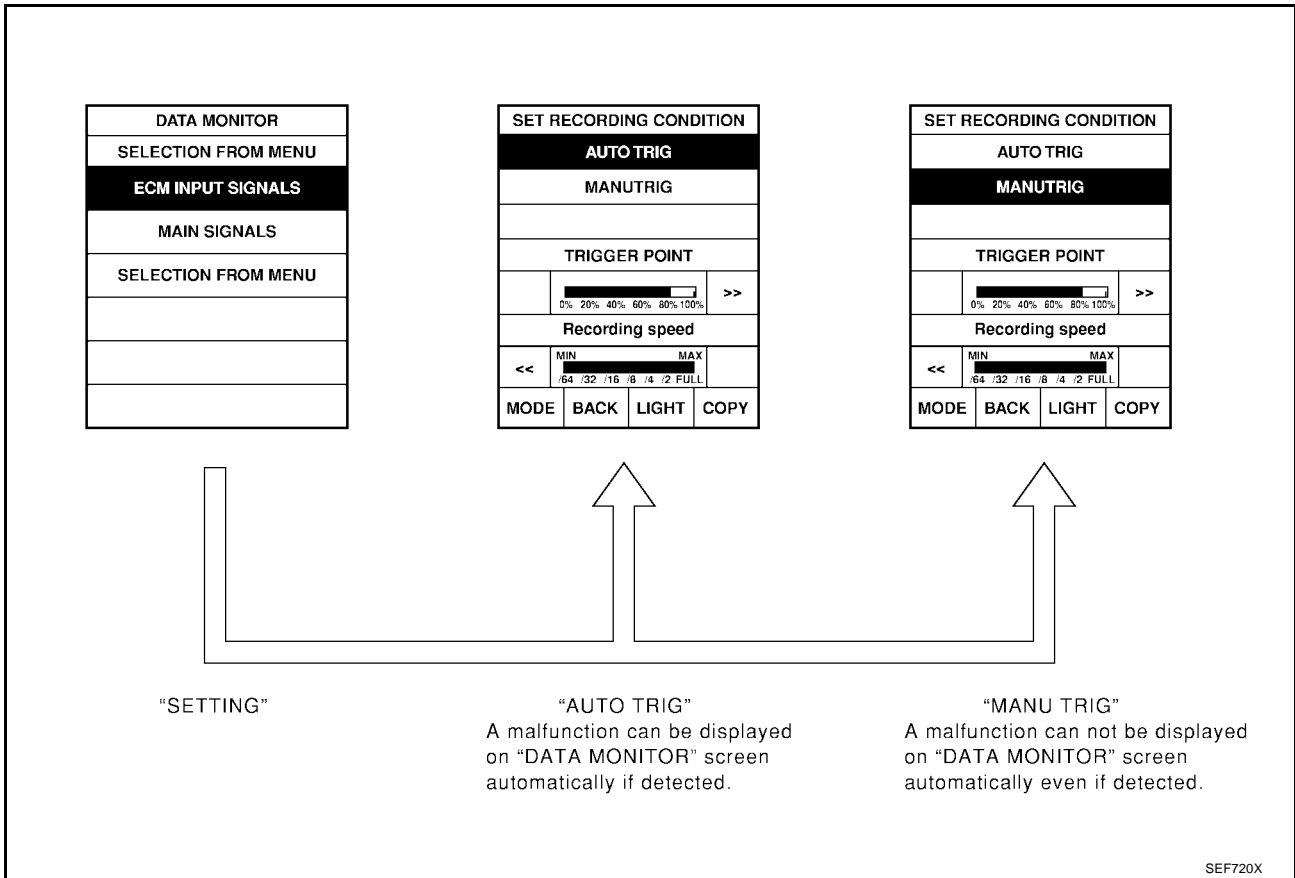
"REAL-TIME DIAG" screen is also displayed.



### Operation

1. "AUTO TRIG"

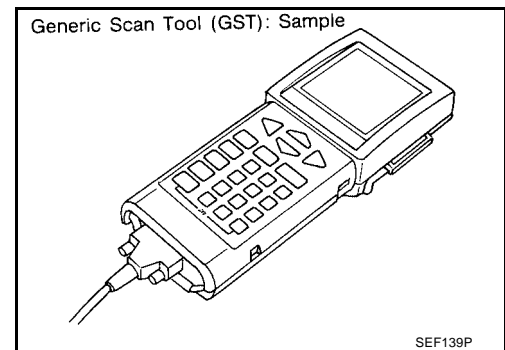
- While trying to detect the DTC/1st trip DTC by performing the “DTC Confirmation Procedure”, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.
  - While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO 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 DESCRIPTION

UBS005X5

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 7 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.



# TROUBLE DIAGNOSIS

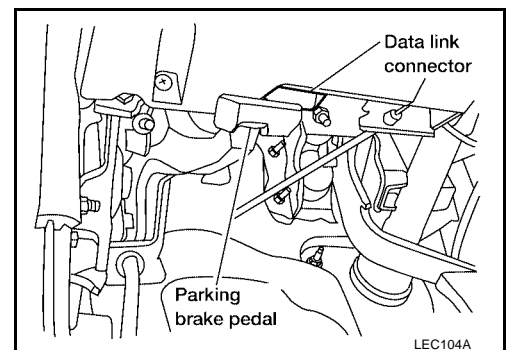
[VG33ER]

## FUNCTION

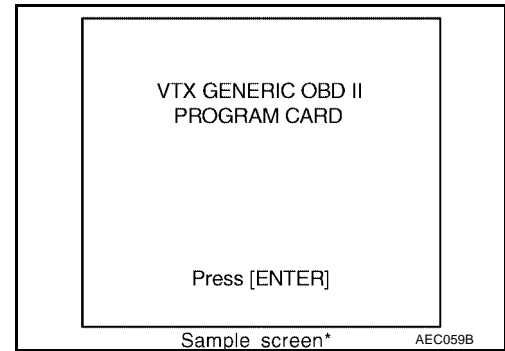
| Diagnostic test mode |                  | Function  |
|----------------------|------------------|---|
| MODE 1               | READINESS TESTS  | This mode gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.   |
| 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 "Freeze Frame Data" (EC-1283 ).]   |
| 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: <ul style="list-style-type: none"> <li>● Clear number of diagnostic trouble codes (MODE 1)</li> <li>● Clear diagnostic trouble codes (MODE 3)</li> <li>● Clear trouble code for freeze frame data (MODE 1)</li> <li>● Clear freeze frame data (MODE 2)</li> <li>● Reset status of system monitoring test (MODE 1)</li> <li>● Clear on board monitoring test results (MODE 6 and 7)</li> </ul>   |
| 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. <ul style="list-style-type: none"> <li>● EVAP canister vent control valve open</li> <li>● Vacuum cut valve bypass valve closed</li> </ul> In the following conditions, this mode cannot function. <ul style="list-style-type: none"> <li>● Low ambient temperature</li> <li>● Low battery voltage</li> <li>● Engine running</li> <li>● Ignition switch OFF</li> <li>● Low fuel temperature</li> <li>● Too much pressure is applied to EVAP system</li> </ul> |
| 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.   |

## GST INSPECTION PROCEDURE

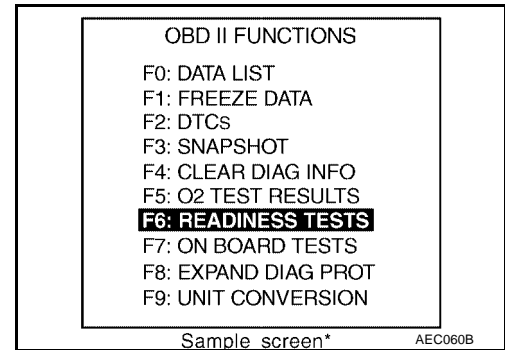
1. Turn ignition switch OFF.
2. Connect "GST" to data link connector which is located under LH dash panel near the fuse box cover.



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



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



## CONSULT-II Reference Value in Data Monitor Mode

UBS005X6

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   | Idle   | 1.0 - 1.7V  |
|                                    | ● Air conditioner switch: OFF<br>● Shift lever: "N"<br>● No-load   | 2,500 rpm  | 1.7 - 2.3V  |
| COOLAN TEMP/S                      | ● Engine: After warming up   |  | More than 70°C (158°F)                                      |
| HO2S1 (B1)<br>HO2S1 (B2)           | ● Engine: After warming up   | Maintaining engine speed at 2,000 rpm.           | 0 - 0.3V ↔ Approx. 0.6 - 1.0V                               |
| HO2S1 MNTR (B1)<br>HO2S1 MNTR (B2) |  |  | LEAN ↔ RICH<br>Changes more than 5 times during 10 seconds. |
| HO2S2 (B1)<br>HO2S2 (B2)           | ● Warm-up condition<br>● After keeping engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load. | Revving engine from idle up to 3,000 rpm quickly | 0 - 0.3V ↔ Approx. 0.6 - 1.0V                               |
| HO2S2 MNTR (B1)<br>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 (a)                 | 0.15 - 0.85V  |
|                                    | ● Engine: After warming up<br>● Ignition switch: ON (Engine stopped)   | Throttle valve: Partially open                   | Between (a) and (b)   |
|                                    |  | Throttle valve: fully opened (b)                 | 3.5 - 4.7V  |

# TROUBLE DIAGNOSIS

[VG33ER]

| MONITOR ITEM                     | CONDITION  | SPECIFICATION  |                    |
|----------------------------------|--|--|--------------------|
| START SIGNAL                     | ● Ignition switch: ON → START → ON   | OFF → ON → OFF   |                    |
| CLSD THL POS<br>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"                                | 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<br>● 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<br>INJ PULSE-B2     | ● Engine: After warming up<br>● Air conditioner switch: OFF<br>● Shift lever: "N"<br>● No-load | Idle   | 2.4 - 3.7 msec     |
|                                  |  | 2,000 rpm  | 1.9 - 3.3 msec     |
| B/FUEL SCHDL                     | ● Engine: After warming up<br>● Air conditioner switch: OFF<br>● Shift lever: "N"<br>● No-load | Idle   | 1.0 - 1.6 msec     |
|                                  |  | 2,000 rpm  | 0.7 - 1.4 msec     |
| IGN TIMING                       | ● Engine: After warming up<br>● Air conditioner switch: OFF<br>● Shift lever: "N"<br>● No-load | Idle   | 10°±2° BTDC        |
|                                  |  | 2,000 rpm  | More than 25° BTDC |
| IACV-AAC/V                       | ● Engine: After warming up<br>● Air conditioner switch: OFF<br>● Shift lever: "N"<br>● No-load | Idle   | 10 - 20%           |
|                                  |  | 2,000 rpm  | —                  |
| PURG VOL C/V                     | ● Engine: After warming up<br>● Air conditioner switch: OFF<br>● Shift lever: "N"<br>● No-load | Idle   | 0%                 |
|                                  |  | 2,000 rpm  | —                  |
| A/F ALPHA-B1<br>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)<br>● Engine running and cranking    |  | ON                 |
|                                  | Except as shown above  |  | OFF                |
| VENT CONT/V                      | ● Ignition switch: ON  |  | OFF                |
| HO2S1 HTR (B1)<br>HO2S1 HTR (B2) | ● Engine speed: Below 2,800 rpm  |  | ON                 |
|                                  | ● Engine speed: Above 2,800 rpm  |  | OFF                |

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# TROUBLE DIAGNOSIS

[VG33ER]

| MONITOR ITEM                     | CONDITION  | SPECIFICATION                               |
|----------------------------------|--|---|
| HO2S2 HTR (B1)<br>HO2S2 HTR (B2) | <ul style="list-style-type: none"> <li>● Engine speed: Below 3,600 rpm after the following conditions are met.</li> <li>● Engine: After warming up</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> | ON  |
|                                  | <ul style="list-style-type: none"> <li>● Engine speed: Above 3,600 rpm</li> </ul>  | OFF   |
| SCB/V CON S/V                    | <ul style="list-style-type: none"> <li>● More than 5 seconds after turning ignition switch ON (Engine stopped)</li> </ul>  | OFF   |
|                                  | <ul style="list-style-type: none"> <li>● Engine speed: Idle</li> </ul>   | ON  |
| VC/V BYPASS/V                    | Ignition switch: ON  | OFF   |
| CAL/LD VALUE                     | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul>   | Idle<br>18.5 - 26.0%                        |
|                                  |  | 2,500 rpm<br>18.0 - 21.0%                   |
| ABSOL TH·P/S                     | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Ignition switch: ON</li> <li>● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.</li> </ul>   | Throttle valve: fully closed<br>0.0%        |
|                                  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Ignition switch: ON (Engine stopped)</li> </ul>   | Throttle valve: fully opened<br>Approx. 80% |
| MASS AIRFLOW                     | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul>   | Idle<br>3.3 - 4.8 g·m/s                     |
|                                  |  | 2,500 rpm<br>12.0 - 14.9 g·m/s              |

## Major Sensor Reference Graph in Data Monitor Mode

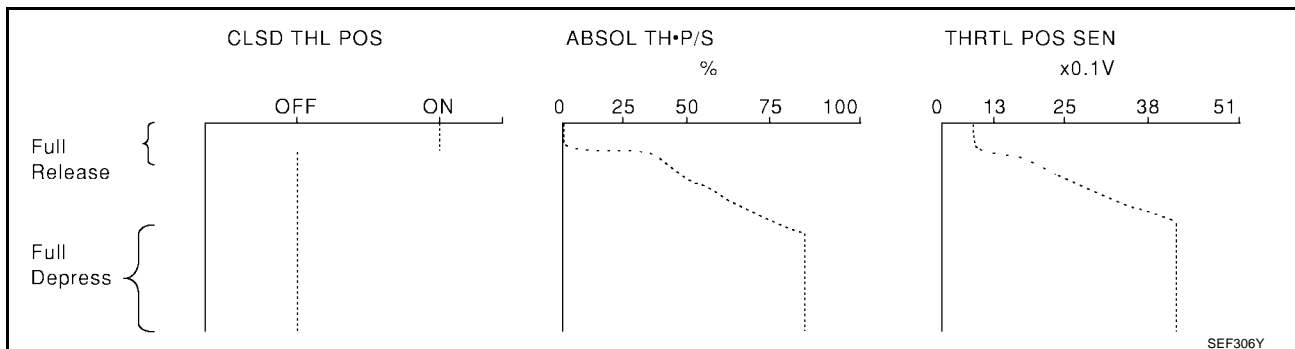
UBS005X7

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".



SEF306Y

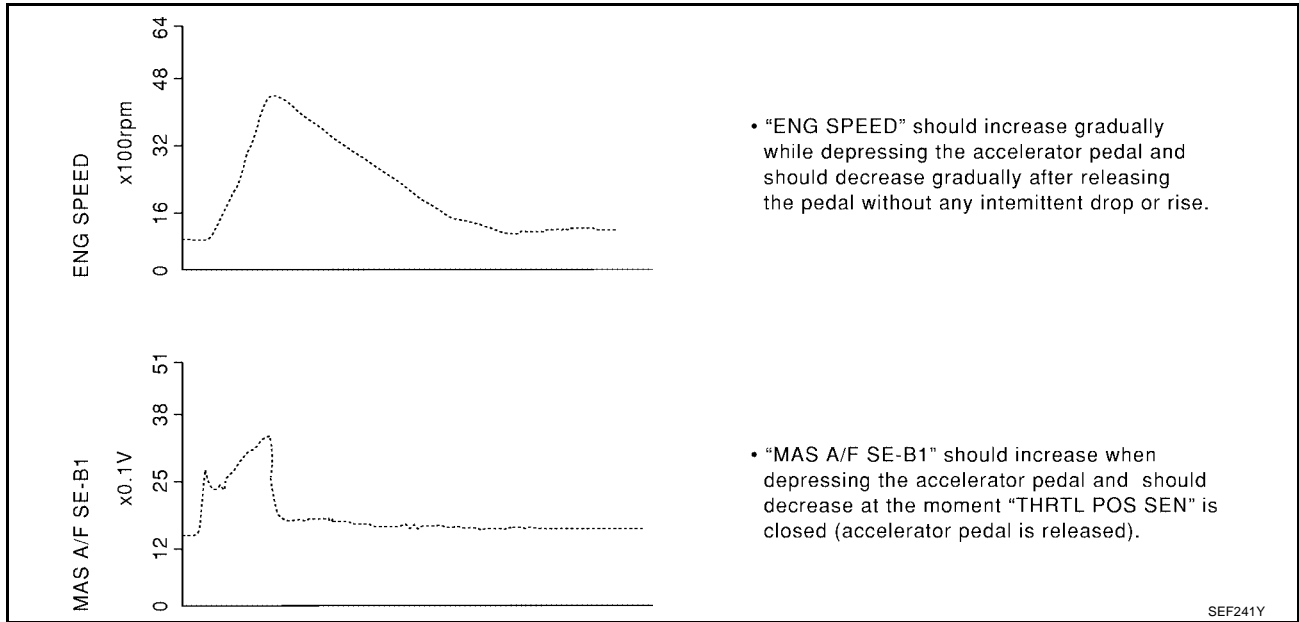
### ENG SPEED, MAS A/F SE-B1, THRTL POS SEN, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

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.

# TROUBLE DIAGNOSIS

[VG33ER]

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



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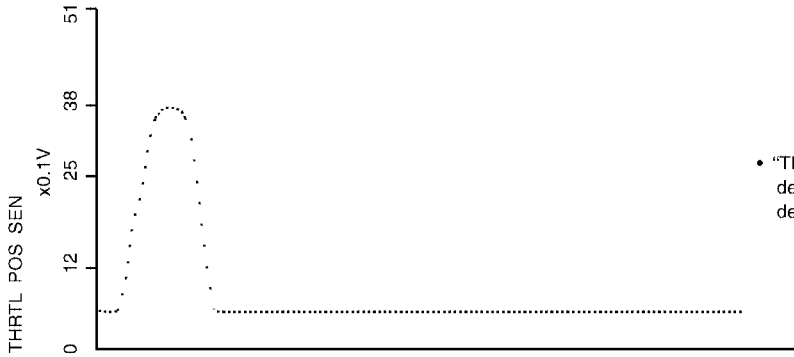
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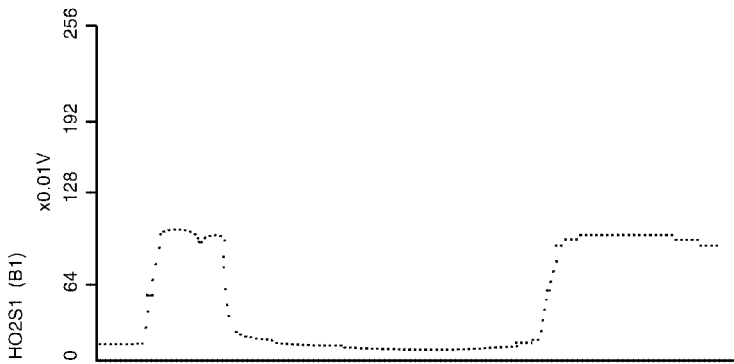
M



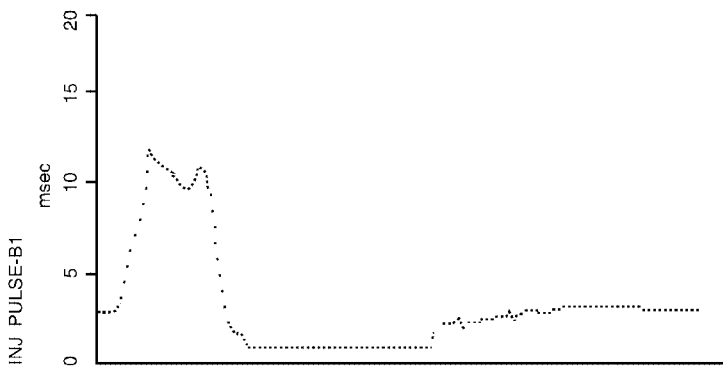
- "THRTL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "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.



## TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

### Description

UBS005X8

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

UBS005X9

- 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.

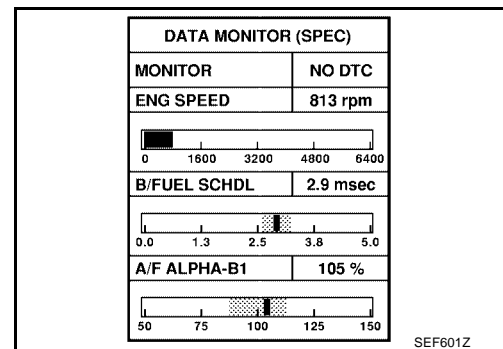
### Inspection Procedure

UBS005XA

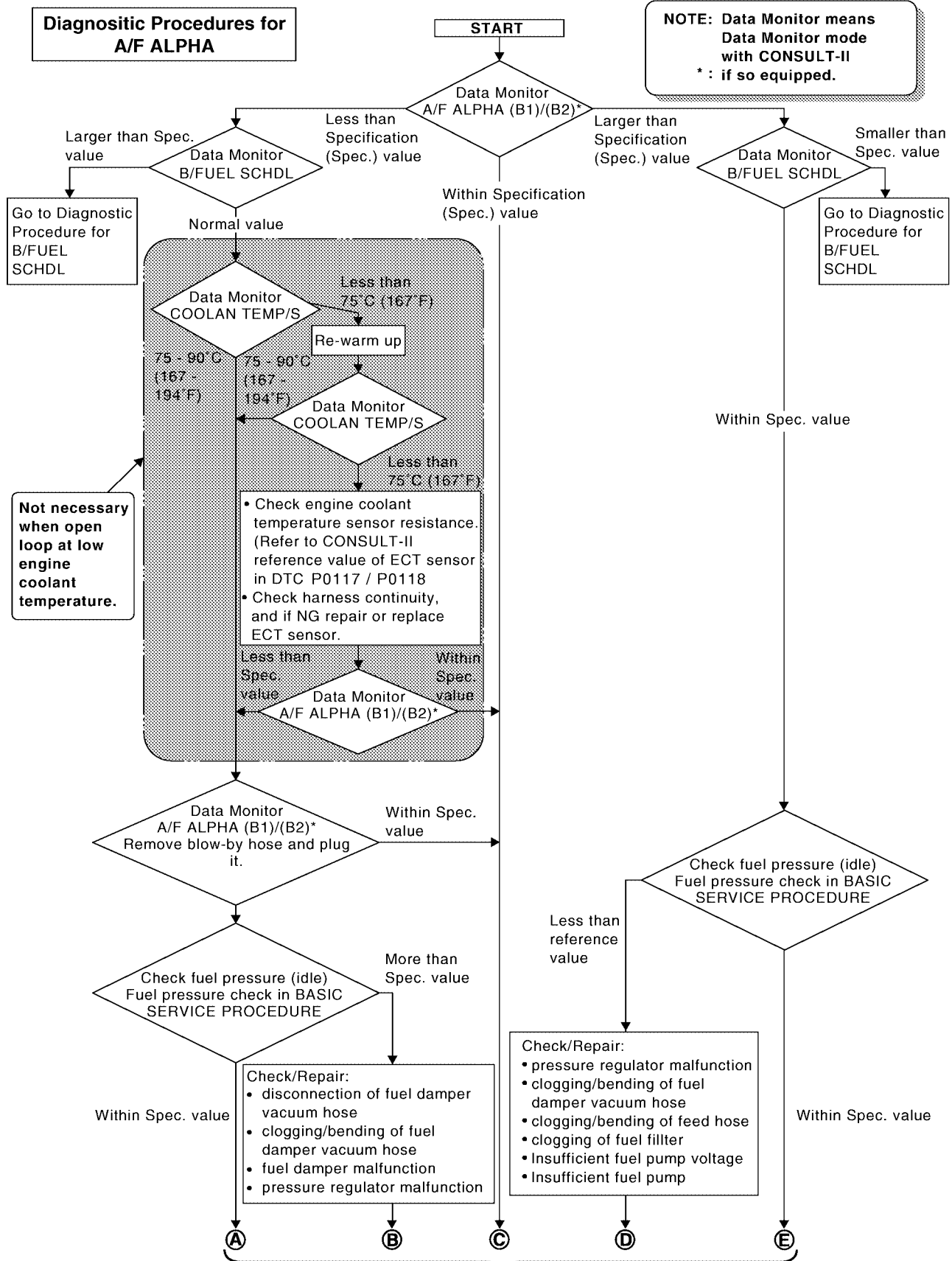
#### NOTE:

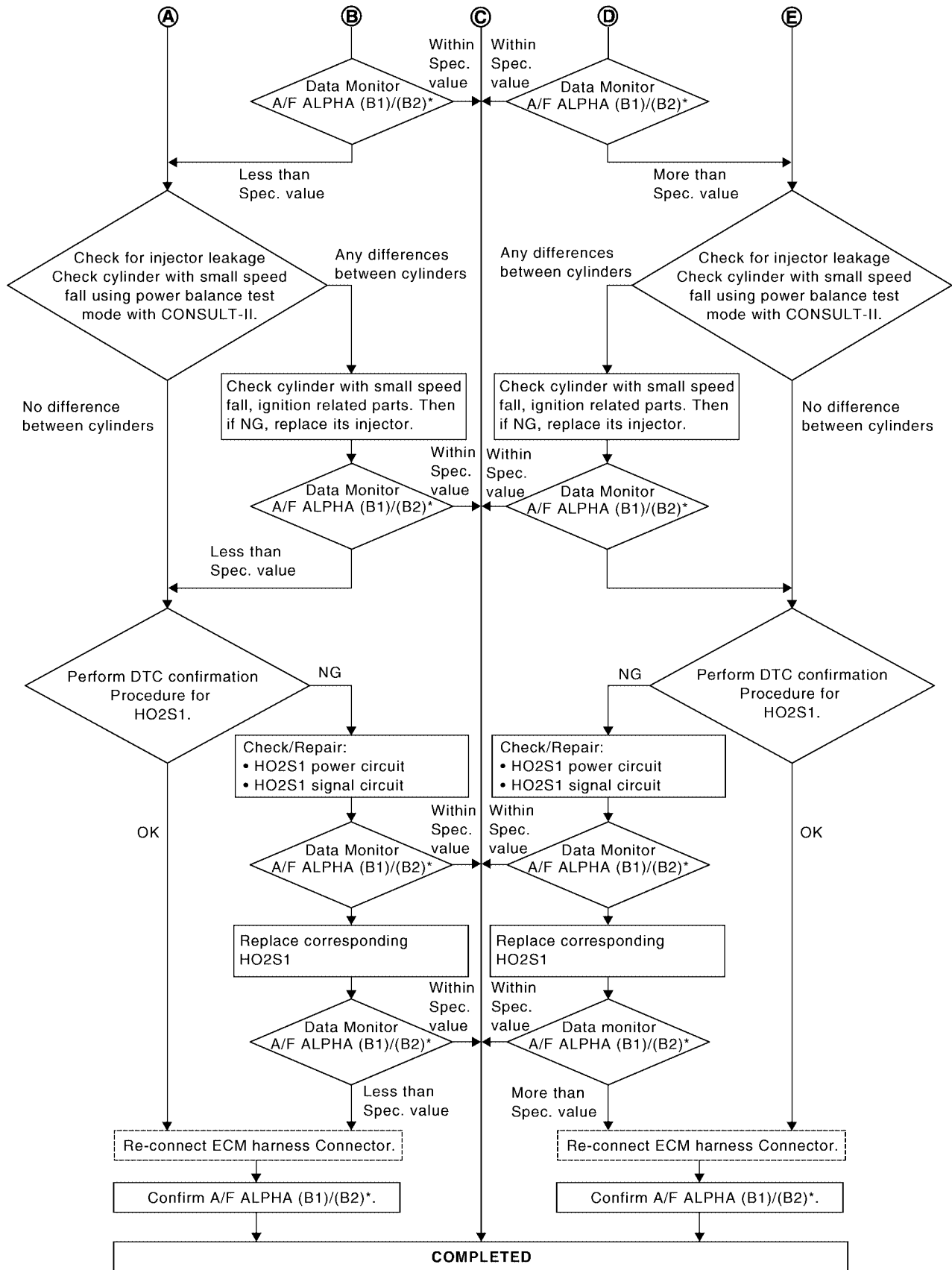
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

1. Perform [EC-1251, "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-1298, "Diagnostic Procedure"](#) .



Diagnostic Procedure

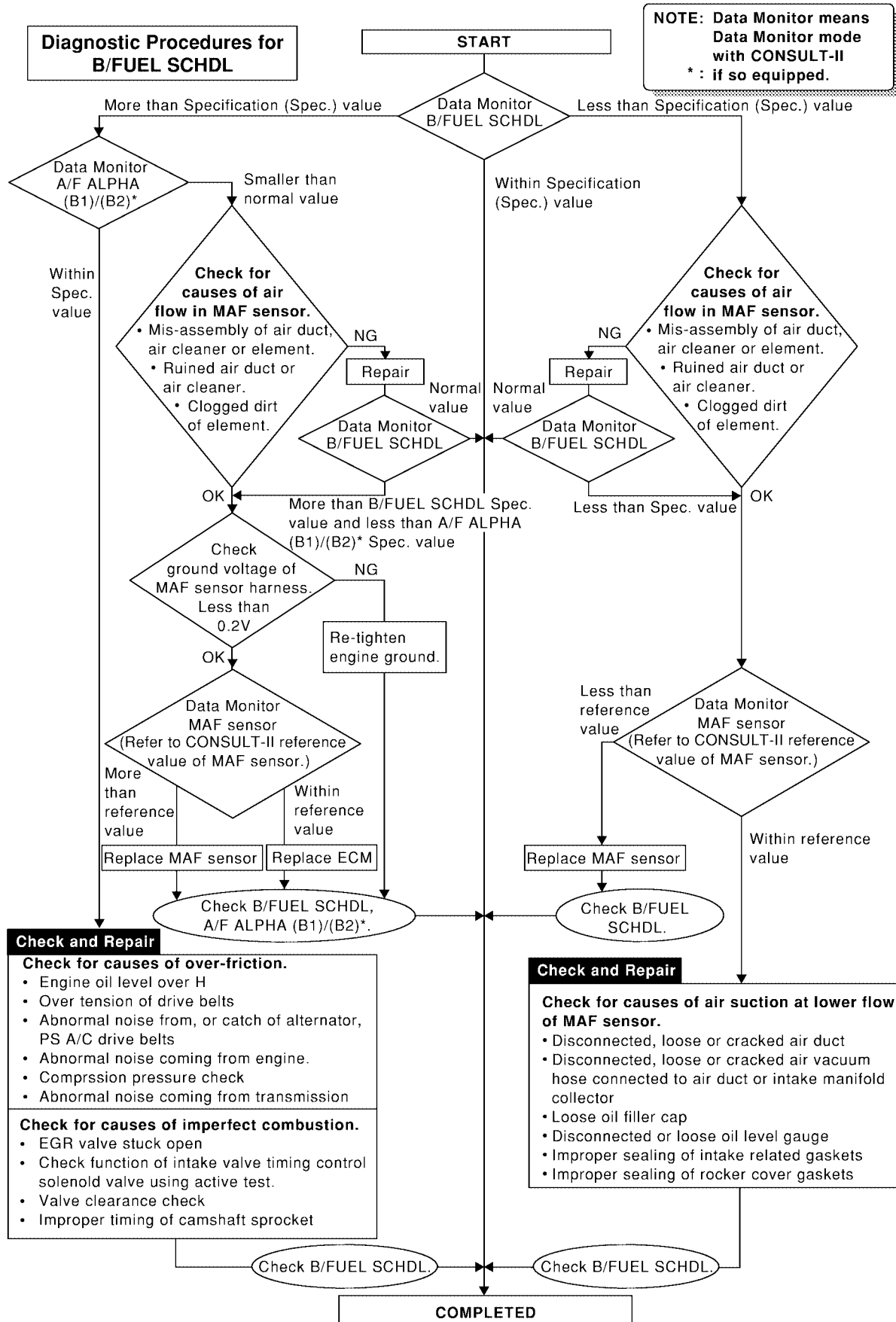




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# TROUBLE DIAGNOSIS - SPECIFICATION VALUE

[VG33ER]



LEC090A

**TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT****Description**

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****1. INSPECTION START**

Erase (1st trip) DTCs. Refer to [EC-1237, "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"](#).

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"](#).

OK or NG

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

**4. CHECK CONNECTOR TERMINALS**

Refer to [GI-22, "How to Check Terminal"](#).

OK or NG

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

# POWER SUPPLY CIRCUIT FOR ECM

[VG33ER]

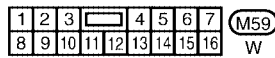
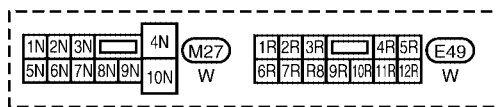
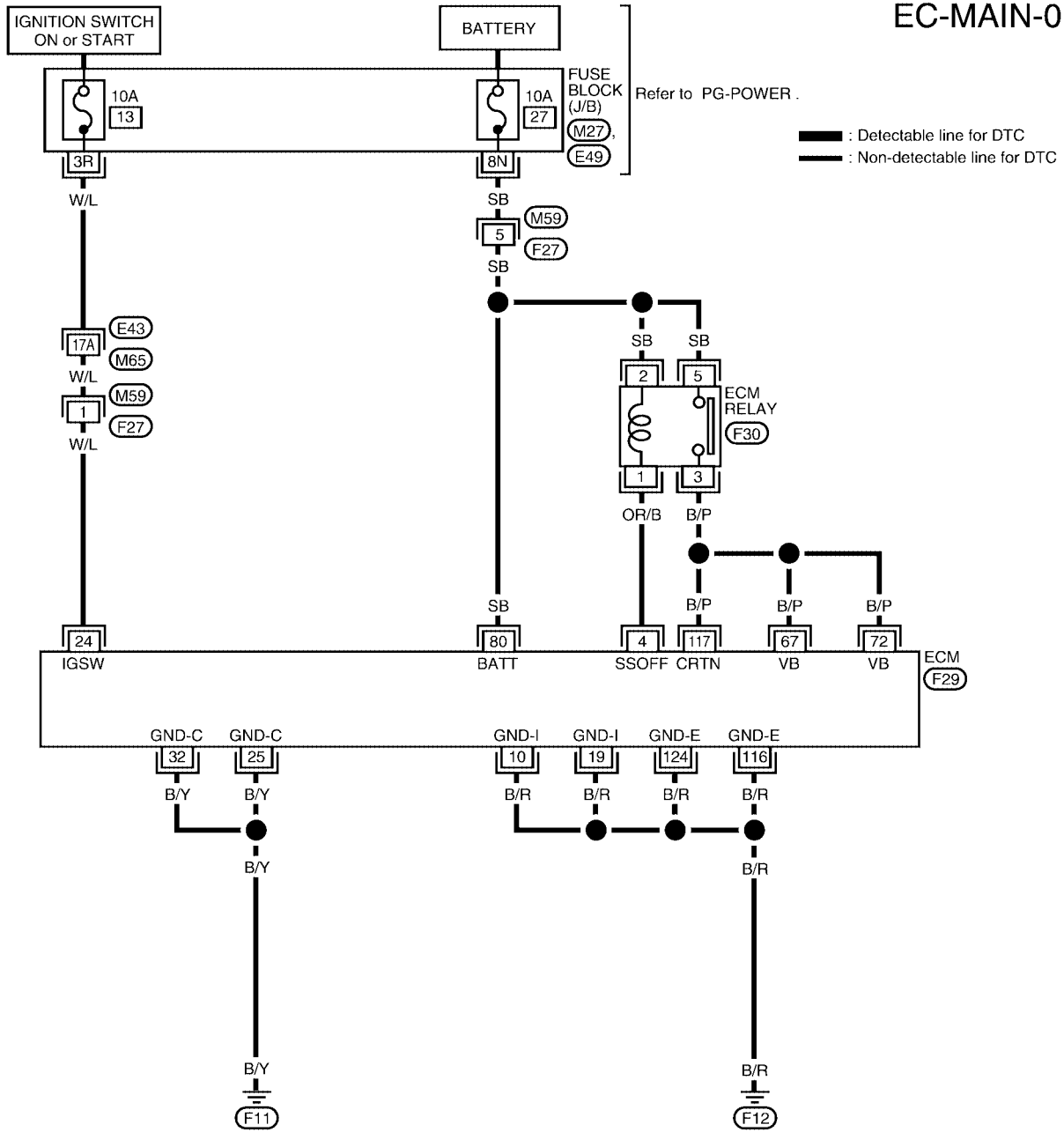
## POWER SUPPLY CIRCUIT FOR ECM

FPF:24110

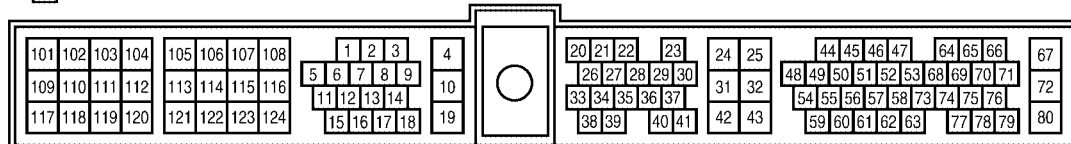
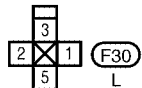
### Wiring Diagram

UBS005XE

EC-MAIN-01



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



# POWER SUPPLY CIRCUIT FOR ECM

[VG33ER]

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

**CAUTION:**

**Do not use 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 COLO R | ITEM                     | CONDITION   | DATA (DC Voltage)          |
|---------------|-------------|--------------------------|---|----------------------------|
| 4             | OR/B        | ECM relay (Self-shutoff) | [Engine is running]<br>[Ignition switch OFF]<br>● For a few seconds after turning ignition switch OFF | 0 - 1.5V                   |
|               |             |                          | [Ignition switch OFF]<br>● A few seconds passed after turning ignition switch OFF                     | BATTERY VOLTAGE (11 - 14V) |
| 10            | B/R         | ECM ground               | [Engine is running]<br>● Idle speed   | Engine ground              |
| 19            | B/R         | ECM ground               | [Engine is running]<br>● 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]<br>● Idle speed   | Engine ground              |
| 32            | B/Y         | ECM ground               | [Engine is running]<br>● 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]<br>● Idle speed   | Engine ground              |
| 117           | B/P         | Current return           | [Engine is running]<br>● Idle speed   | BATTERY VOLTAGE (11 - 14V) |
| 124           | B/R         | ECM ground               | [Engine is running]<br>● Idle speed   | Engine ground              |

## Diagnostic Procedure

### 1. INSPECTION START

UBS005XG

Start engine.

**Is engine running?**

Yes or No

Yes >> GO TO 6.

No >> GO TO 2.

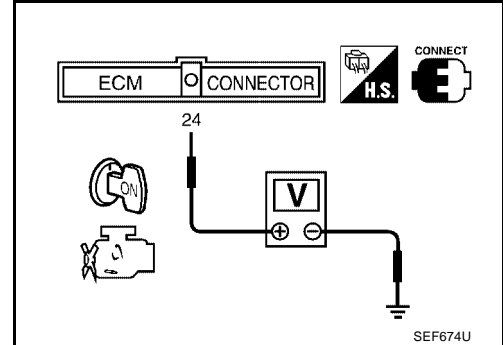
## 2. CHECK ECM POWER SUPPLY CIRCUIT-I

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 ECM GROUND CIRCUIT-I FOR OPEN AND SHORT

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

**Continuity should exist.**

4. Also check harness for short to power.

OK or NG

- OK >> GO TO 15.  
 NG >> GO TO 5.

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open between ECM and engine ground

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



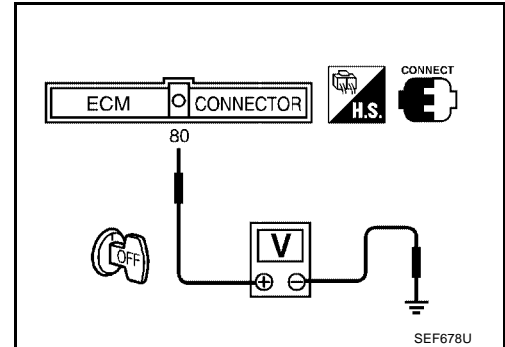
**6. CHECK ECM POWER SUPPLY CIRCUIT-II**

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 M81, F36
- Fuse block (J/B) connector M27
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair harness or connectors.

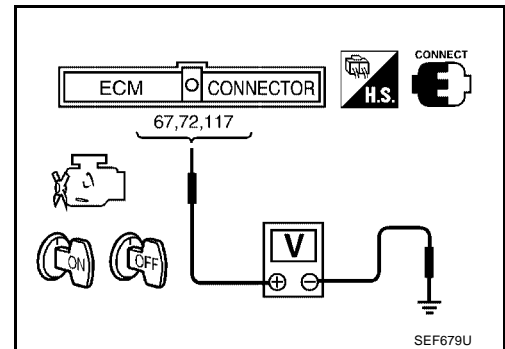
**8. CHECK ECM POWER SUPPLY CIRCUIT-III**

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.**

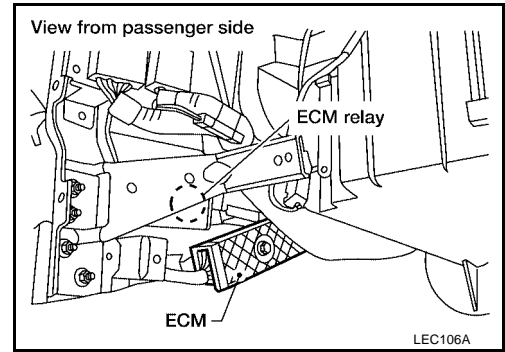
OK or NG

- 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 13.



**9. CHECK ECM POWER SUPPLY CIRCUIT-IV**

1. Disconnect ECM relay.

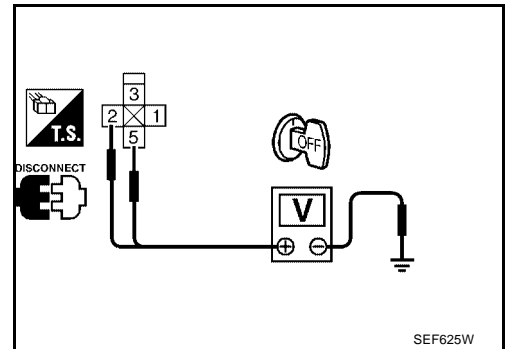


2. Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.

**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 connectors M59, F27

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

**11. 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 12.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

**12. CHECK HARNESS CONTINUITY BETWEEN ECM RELAY AND ECM FOR OPEN AND SHORT**

1. Check harness continuity between ECM terminals 67, 72, 117 and ECM relay terminal 3. Refer to WIRING DIAGRAM.

**Continuity should exist.**

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

OK or NG

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

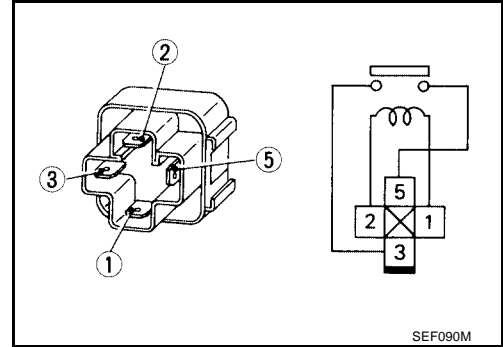
**13. CHECK ECM RELAY**

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 ECM GROUND CIRCUIT-II FOR OPEN AND SHORT**

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

**Continuity should exist.**

4. Also check harness for short to power.

OK or NG

- OK >> GO TO 15.  
 NG >> GO TO 5.

**15. CHECK INTERMITTENT INCIDENT**

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

**>> INSPECTION END.**

# DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

[VG33ER]

## DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

PFV:22690

### Description SYSTEM DESCRIPTION

UBS005XH

| Sensor                   | Input Signal to ECM | ECM function                          | Actuator                       |
|--------------------------|---------------------|---------------------------------------|--------------------------------|
| Camshaft position sensor | Engine speed        | Heated oxygen sensor 1 heater control | Heated oxygen sensor 1 heaters |

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

### OPERATION

| Engine speed rpm | Heated oxygen sensor 1 heaters |
|------------------|--------------------------------|
| Above 2,800      | OFF                            |
| Below 2,800      | ON                             |

### CONSULT-II Reference Value in Data Monitor Mode

UBS005XI

Specification data are reference values.

| MONITOR ITEM   | CONDITION                       | SPECIFICATION |
|----------------|---------------------------------|---------------|
| HO2S1 HTR (B1) | ● Engine speed: Below 2,800 rpm | ON            |
| HO2S1 HTR (B2) | ● Engine speed: Above 2,800 rpm | OFF           |

### On Board Diagnosis Logic

UBS006VV

| DTC No.           | Trouble diagnosis name                             | DTC detecting condition   | Possible cause   |
|-------------------|--|---|--|
| P0031<br>(Bank 1) | 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.<br>(An excessively low voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)  | <ul style="list-style-type: none"> <li>● Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.)</li> <li>● Heater oxygen sensor 1 heater</li> </ul> |
| P0051<br>(Bank 2) |  |   |  |
| P0032<br>(Bank 1) | 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.<br>(An excessively high voltage signal is sent to ECM through the heated oxygen sensor 1 heater.) | <ul style="list-style-type: none"> <li>● Harness or connectors (The heated oxygen sensor 1 heater circuit is shorted.)</li> <li>● Heater oxygen sensor 1 heater</li> </ul>         |
| P0052<br>(Bank 2) |  |   |  |

### DTC Confirmation Procedure

UBS005XL

#### 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 run it for at least 6 seconds at idle speed.
3. If 1st trip DTC is detected, go to [EC-1313, "Diagnostic Procedure"](#)

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

 **WITH GST**

1. Start engine and run it for at least 6 seconds at idle speed.
  2. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
  3. Start engine and run it for at 6 seconds at idle speed.
  4. Select "MODE 3" with GST.
  5. If DTC is detected, go to [EC-1313, "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.**

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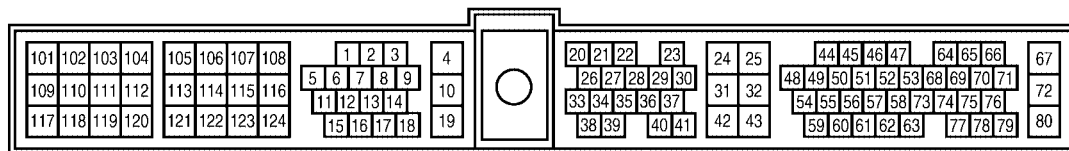
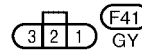
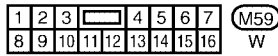
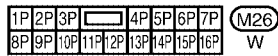
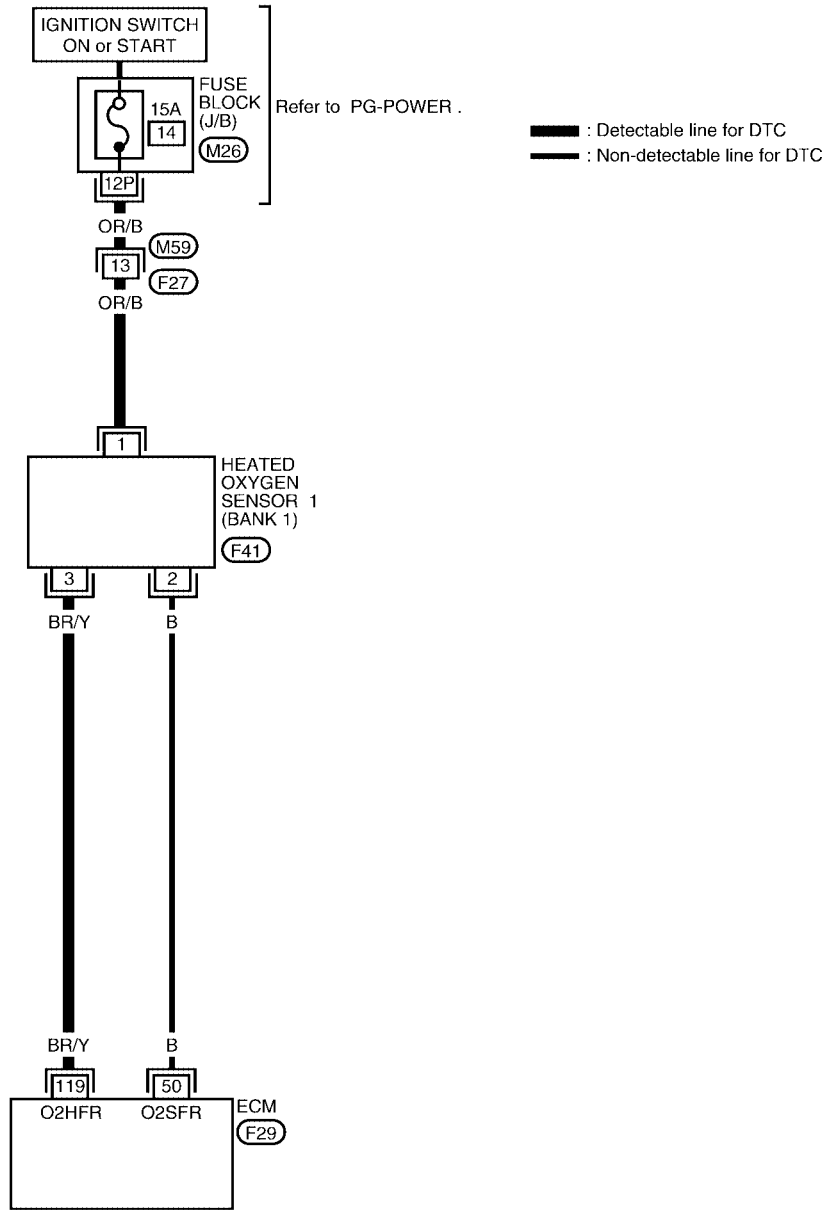
# DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

[VG33ER]

UBS005XM

## Wiring Diagram BANK 1

EC-O2H1B1-01



# DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

[VG33ER]

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

**CAUTION:**

Do not use 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 COLO R | ITEM                                   | CONDITION  | DATA (DC Voltage)          |
|---------------|-------------|--|--|----------------------------|
| 119           | BR/Y        | Heated oxygen sensor 1 heater (bank 1) | [Engine is running]<br>● Engine speed is below 2,800 rpm | Approximately 0.4V         |
|               |             |  | [Engine is running]<br>● Engine speed is above 2,800 rpm | BATTERY VOLTAGE (11 - 14V) |
| 121           | BR          | Heated oxygen sensor 1 heater (bank 2) | [Engine is running]<br>● Engine speed is below 2,800 rpm | Approximately 0.4V         |
|               |             |  | [Engine is running]<br>● Engine speed is above 2,800 rpm | BATTERY VOLTAGE (11 - 14V) |

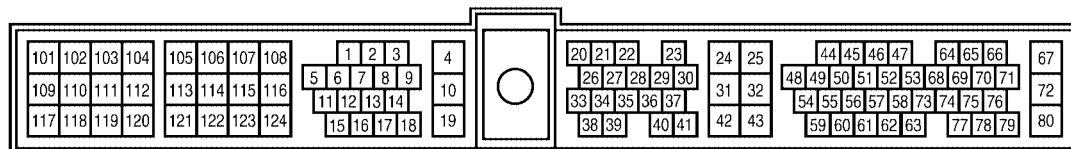
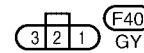
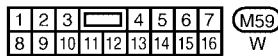
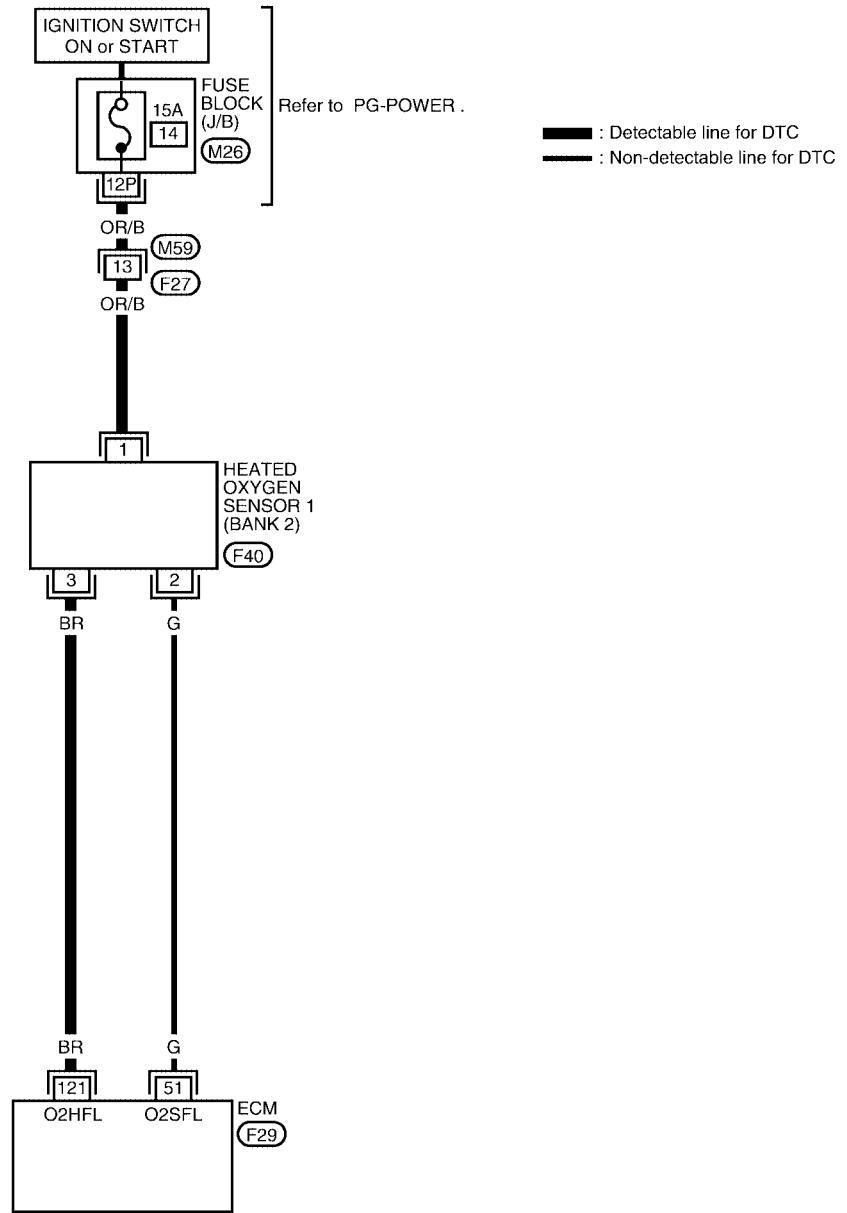
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# DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

[VG33ER]

BANK 2

EC-O2H1B2-01





# DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

[VG33ER]

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

**CAUTION:**

Do not use 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.

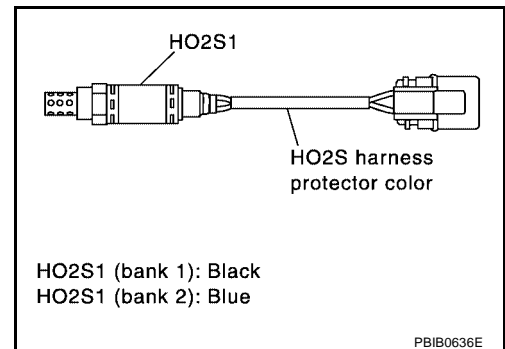
| TER-MINAL NO. | WIRE COLO R | ITEM                                   | CONDITION  | DATA (DC Voltage)          |
|---------------|-------------|--|--|----------------------------|
| 119           | BR/Y        | Heated oxygen sensor 1 heater (bank 1) | [Engine is running]<br>● Engine speed is below 2,800 rpm | Approximately 0.4V         |
|               |             |  | [Engine is running]<br>● Engine speed is above 2,800 rpm | BATTERY VOLTAGE (11 - 14V) |
| 121           | BR          | Heated oxygen sensor 1 heater (bank 2) | [Engine is running]<br>● Engine speed is below 2,800 rpm | Approximately 0.4V         |
|               |             |  | [Engine is running]<br>● Engine speed is above 2,800 rpm | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

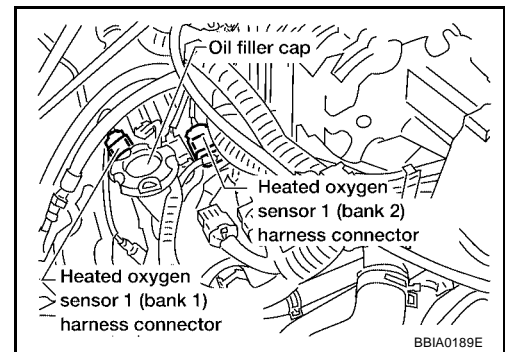
UBS005XN

### 1. CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Check heated oxygen sensor 1 harness protector.



3. Disconnect corresponding heated oxygen sensor 1 harness connector.
4. Turn ignition switch ON.

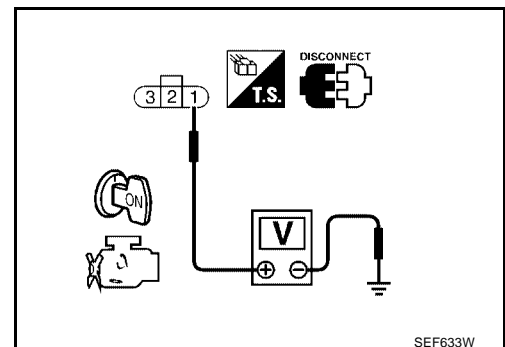


5. Check voltage between HO2S1 terminal 1 and ground with CONSULT-II or tester.

**Voltage : Battery voltage**

OK or NG

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



## 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Fuse block (J/B) connector M26
- 10A fuse
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair harness or connectors.

## 3. 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 4.

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

## 4. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to [EC-1314, "Component Inspection"](#) .

OK or NG

OK >> GO TO 5.

NG >> Replace malfunctioning heated oxygen sensor 1.

## 5. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION EN

### Component Inspection HEATED OXYGEN SENSOR 1 HEATER

UBS007G3

1. Check resistance between HO2S1 terminals 3 and 1.

**Resistance : 2.3 - 4.3Ω at 25°C (77°F)**

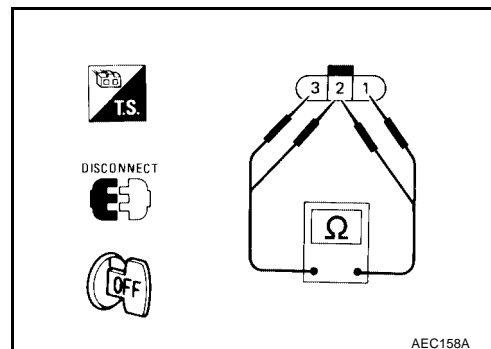
2. Check continuity between HO2S1 terminals 2 and 1, 3 and 2.

**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.



# DTC P0031, P0032, P0051, P0052 HO2S1 HEATER

[VG33ER]

- 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.

A

## Removal and Installation HEATED OXYGEN SENSOR 1

UBS006VW

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

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## DTC P0034 SCB VALVE CONTROL SOLENOID VALVE

PFP:14110

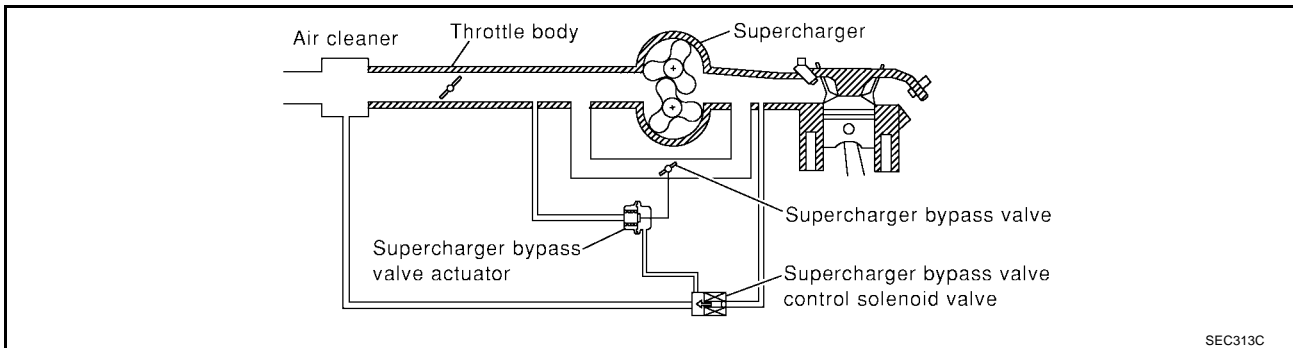
### Description SYSTEM DESCRIPTION

UBS0060D

| Sensor                            | Input Signal to ECM        | ECM function              | Actuator                         |
|-----------------------------------|----------------------------|---------------------------|----------------------------------|
| Camshaft position sensor          | Engine speed               | Super-charged 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 super-charged 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

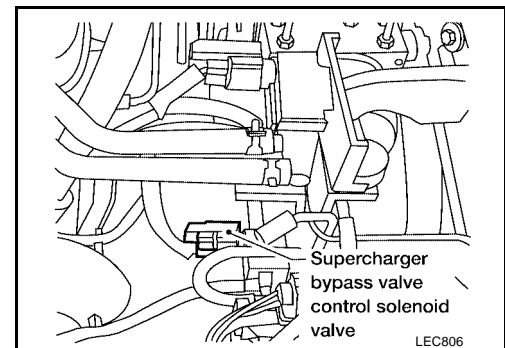


### COMPONENT DESCRIPTION

#### 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

UBS0060E

Specification data are reference values.

# DTC P0034 SCB VALVE CONTROL SOLENOID VALVE

[VG33ER]

| 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

UBS0060G

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The SCB valve control solenoid valve circuit is open or shorted)</li> <li>● SCB valve control solenoid valve.</li> </ul> |

## DTC Confirmation Procedure

UBS0060H

### 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-1319, "Diagnostic Procedure"](#).

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

### WITH GST

Follow the procedure "WITH CONSULT-II" above.

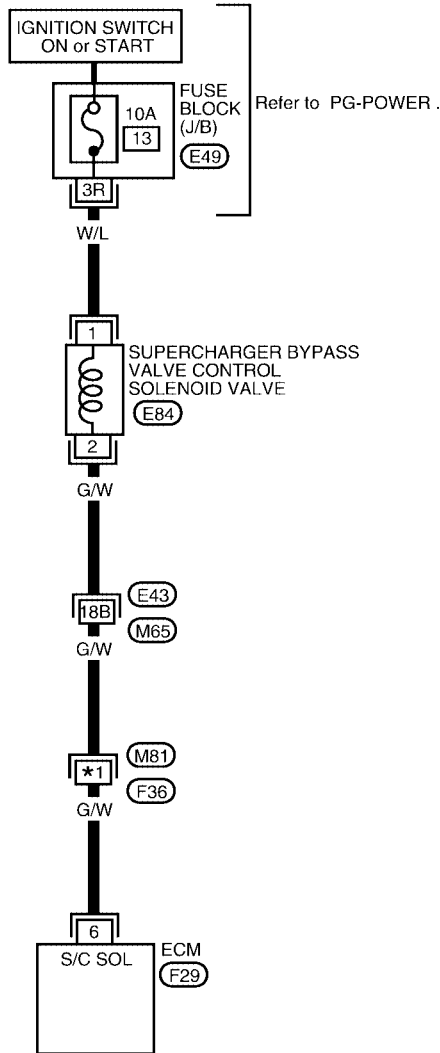
# DTC P0034 SCB VALVE CONTROL SOLENOID VALVE

[VG33ER]

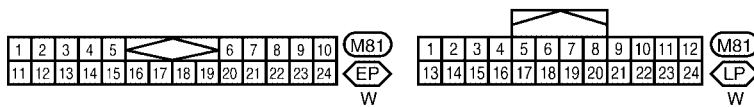
UBS0060I

## Wiring Diagram

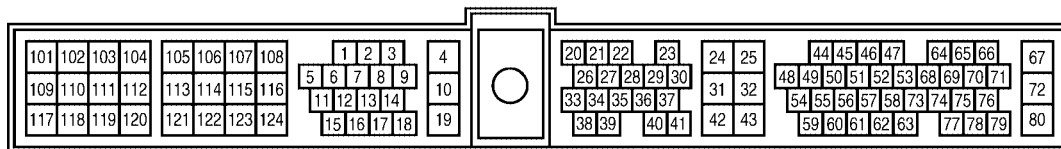
EC-S/CHGR-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- \*1 EP : 17
- LP : 19



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



WBWA0046E

# DTC P0034 SCB VALVE CONTROL SOLENOID VALVE

[VG33ER]

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

**CAUTION:**

Do not use 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.

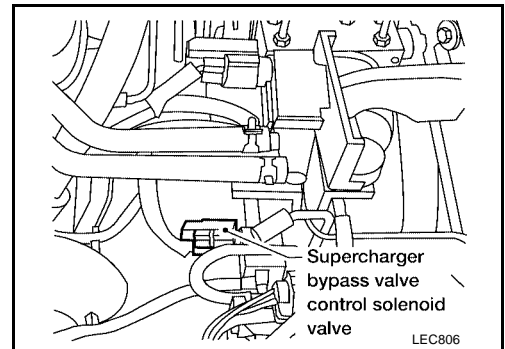
| TER-MINAL NO. | WIRE COLO R | ITEM                             | CONDITION                                | DATA (DC Voltage)          |
|---------------|-------------|----------------------------------|--|----------------------------|
| 6             | G/W         | SCB valve control solenoid valve | [Ignition switch ON]<br>● Engine stopped | BATTERY VOLTAGE (11 - 14V) |
|               |             |                                  | [Engine is running]<br>● Idle speed      | Approximately 0V           |

## Diagnostic Procedure

UBS0060J

### 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".

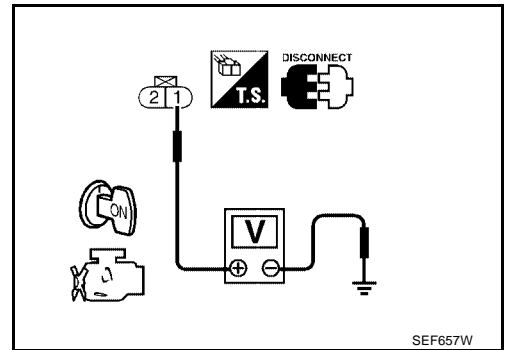


4. Check voltage between SCB valve control solenoid valve terminal 1 and ground with CONSULT-II or tester.

**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 M58, F28
- 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-1320, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 6.
- NG >> Replace SCB valve control solenoid valve.

**6. CHECK INTERMITTENT INCIDENT**

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

**Component Inspection  
SCB VALVE CONTROL SOLENOID VALVE**

UBS007G4

 **With CONSULT-II**

1. Perform "SCB/V CONT SOL/V" in "ACTIVE TEST" mode.

|                    |        |
|--------------------|--------|
| <b>ACTIVE TEST</b> |        |
| SCB/V CONT SOL/V   | ON     |
| <b>MONITOR</b>     |        |
| ENG SPEED          | XXXrpm |
| IACV-AAC/V         | XXX%   |
|                    |        |
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|                    |        |

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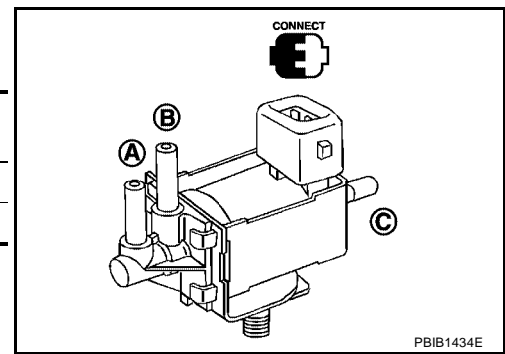


# DTC P0034 SCB VALVE CONTROL SOLENOID VALVE

[VG33ER]

2. Check air passage continuity and operation delay time under the following conditions.

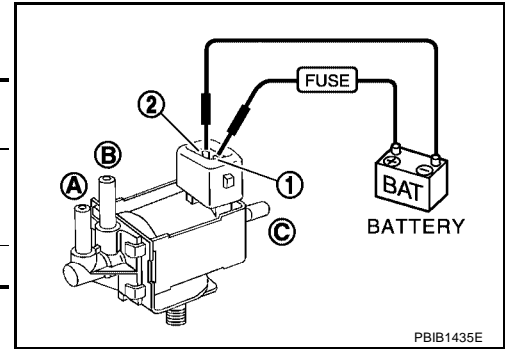
| Conditions | Air passage between continuity between A and B | Air passage between continuity between A and C |
|------------|--|--|
| ON         | Yes  | No   |
| OFF        | No   | Yes  |



**⊗ 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  |



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# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

[VG33ER]

## DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

PF2:226A0

### Description SYSTEM DESCRIPTION

UBS005XO

| Sensor                   | Input Signal to ECM | ECM function                          | Actuator                       |
|--------------------------|---------------------|---------------------------------------|--------------------------------|
| Camshaft position sensor | Engine speed        | Heated oxygen sensor 2 heater control | Heated oxygen sensor 2 heaters |

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. <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> | ON                            |

### CONSULT-II Reference Value in Data Monitor Mode

UBS005XP

Specification data are reference values.

| MONITOR ITEM                     | CONDITION  | SPECIFICATION |
|----------------------------------|--|---------------|
| HO2S2 HTR (B1)<br>HO2S2 HTR (B2) | <ul style="list-style-type: none"> <li>● Engine speed: Below 3,600 rpm after the following conditions are met.</li> <li>● Engine: After warming up</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> | ON            |
|                                  | <ul style="list-style-type: none"> <li>● Engine speed: Above 3,600 rpm</li> </ul>  | OFF           |

### On Board Diagnosis Logic

UBS006VX

| DTC No.                          | Trouble diagnosis name                             | DTC detecting condition  | Possible cause   |
|----------------------------------|--|--|--|
| P0037 (Bank 1)<br>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.)  | <ul style="list-style-type: none"> <li>● Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.)</li> <li>● Heater oxygen sensor 2 heater</li> </ul> |
| P0038 (Bank 1)<br>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.) | <ul style="list-style-type: none"> <li>● Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.)</li> <li>● Heater oxygen sensor 2 heater</li> </ul>         |

### DTC Confirmation Procedure

UBS005XS

#### 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 one minute under no load.
5. Let engine idle for one minute.
6. If 1st trip DTC is detected, go to [EC-1328, "Diagnostic Procedure"](#) .

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

 **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 one minute under no load.
  3. Let engine idle for one 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 one minute under no load.
  6. Let engine idle for one minute.
  7. Select "MODE 3" with GST.
  8. If DTC is detected, go to [EC-1328, "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.**

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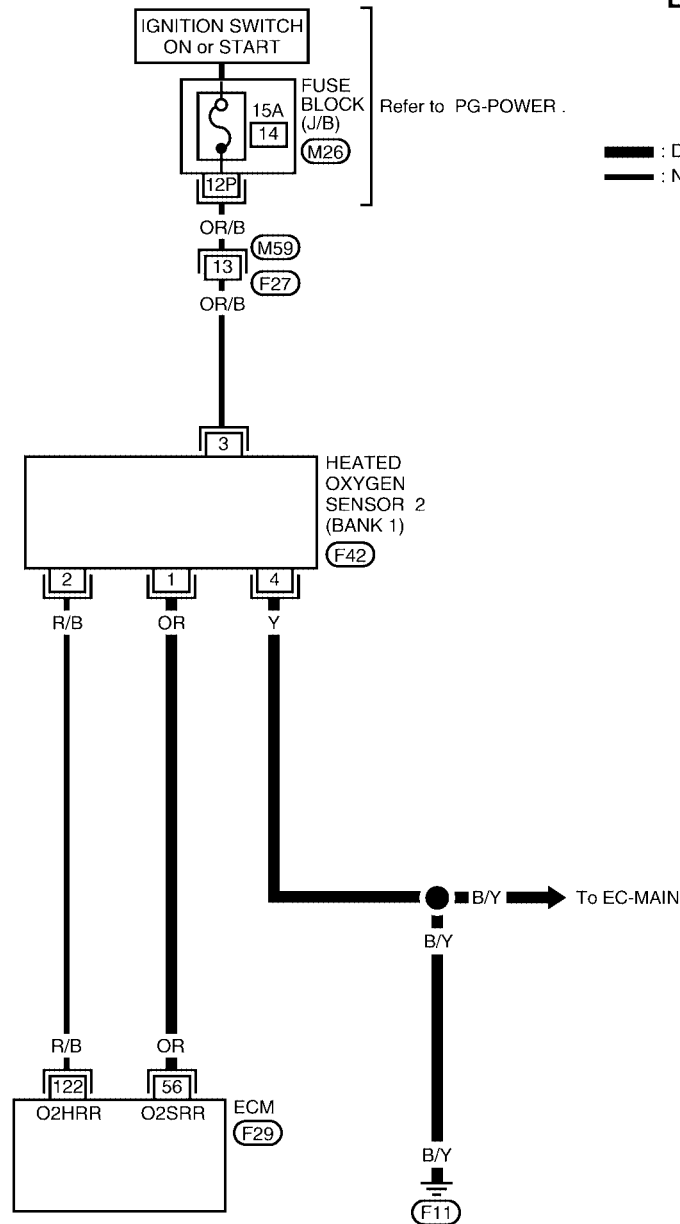
# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

[VG33ER]

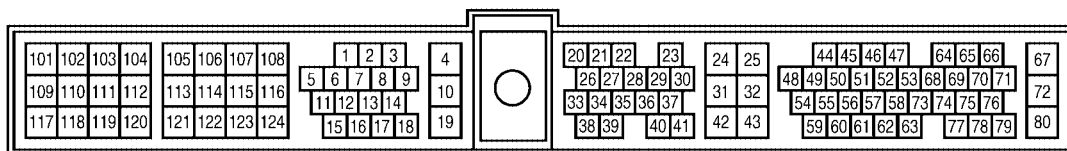
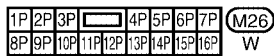
UBS005XT

## Wiring Diagram BANK 1

EC-O2S2B1-01



— : Detectable line for DTC  
— : Non-detectable line for DTC



BBWA0476E

# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

[VG33ER]

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

**CAUTION:**

**Do not use 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 COLO R | ITEM                                   | CONDITION   | DATA (DC Voltage)          |
|---------------|-------------|--|---|----------------------------|
| 122           | R/B         | Heated oxygen sensor 2 heater (bank 1) | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is below 3,600 rpm after the following conditions are met.</li> <li>– Engine: After warning up</li> <li>– Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> | 0 - 1.0V                   |
|               |             |  | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"> <li>● Engine stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is above 3,600 rpm</li> </ul>   | BATTERY VOLTAGE (11 - 14V) |

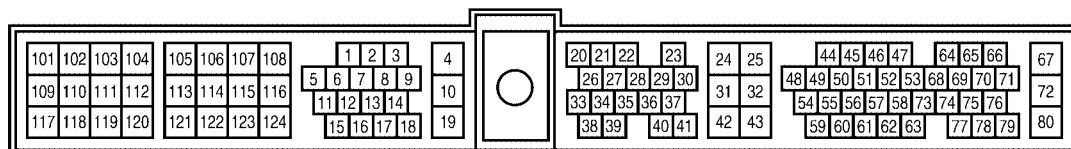
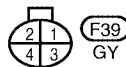
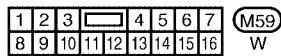
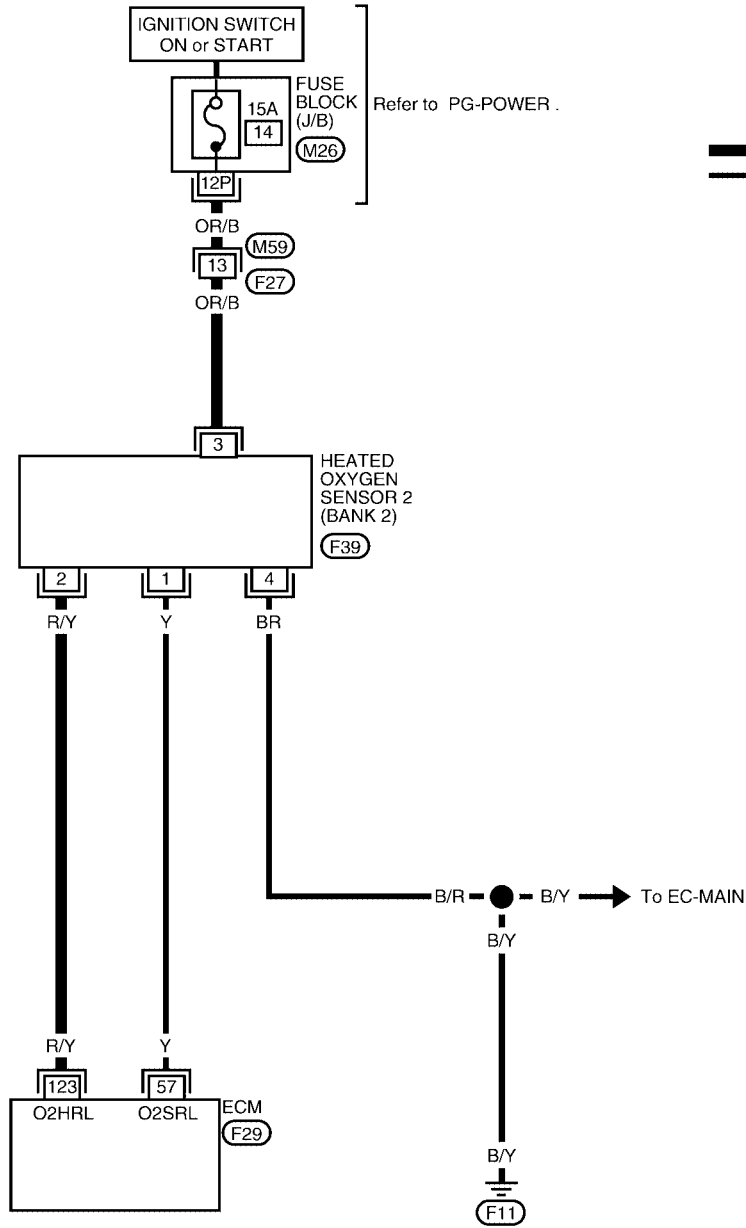
A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

[VG33ER]

BANK 2

EC-O2H2B2-01



WBWA0027E

# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

[VG33ER]

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

**CAUTION:**

Do not use 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.

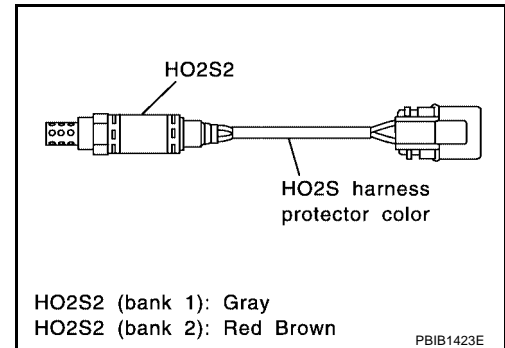
| TER-MINAL NO. | WIRE COLO R | ITEM                                   | CONDITION   | DATA (DC Voltage)          |
|---------------|-------------|--|---|----------------------------|
| 123           | R/Y         | Heated oxygen sensor 2 heater (bank 2) | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is below 3,600 rpm after the following conditions are met.</li> <li>– Engine: After warning up</li> <li>– Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> | 0 - 1.0V                   |
|               |             |  | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"> <li>● Engine stopped</li> </ul> <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine speed is above 3,600 rpm</li> </ul>   | BATTERY VOLTAGE (11 - 14V) |

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

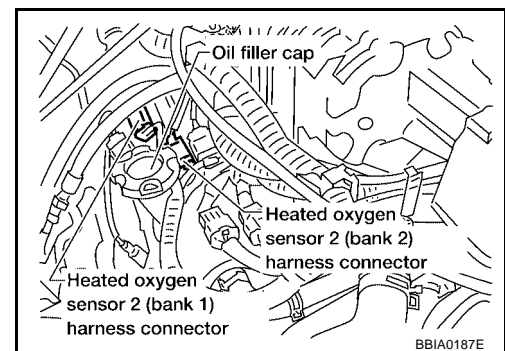
## Diagnostic Procedure

### 1. CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 harness protector color.



3. Disconnect corresponding heated oxygen sensor 2 harness connector.
4. Turn ignition switch ON.

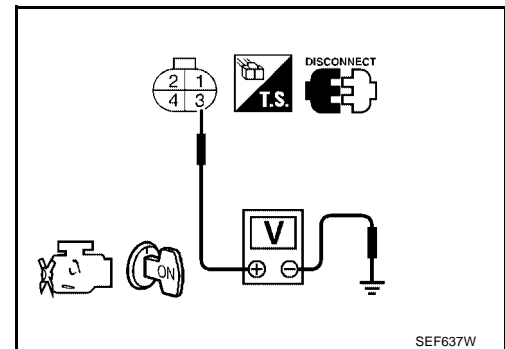


5. Check voltage between HO2S2 terminal 3 and ground.

**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 M26
- 10A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair harness or connectors.



### 3. 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,<br>P0038 | 122       | 2      | Bank 1 |
| P0057,<br>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 >> GO TO 4.

### 4. DETECT MALFUNCTIONING PART

Check the following.

- Joint connector-3
- Harness for open or short between heated oxygen sensor 2 and engine ground.

>> 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-1329, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 6.
- NG >> Replace malfunctioning heated oxygen sensor 2.

### 6. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Component Inspection HEATED OXYGEN SENSOR 2 HEATER

Check the following.

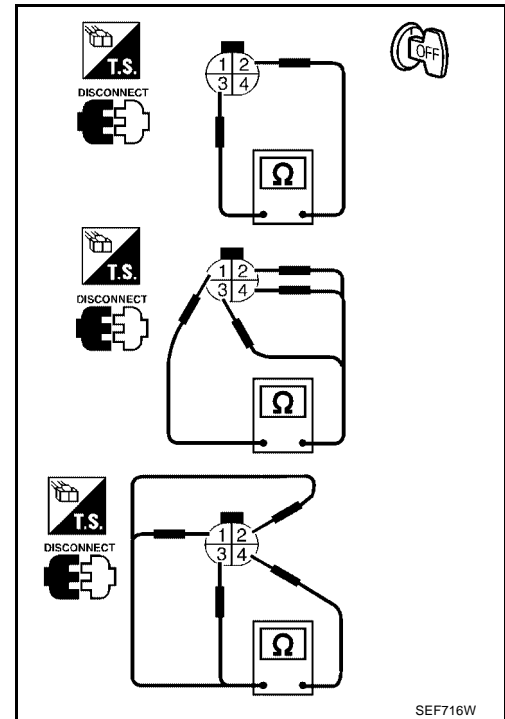
UBS007G6

# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

[VG33ER]

1. Check resistance between HO2S2 terminals 2 and 3.

**Resistance : 2.3 - 4.3Ω 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 HEATED OXYGEN SENSOR 2

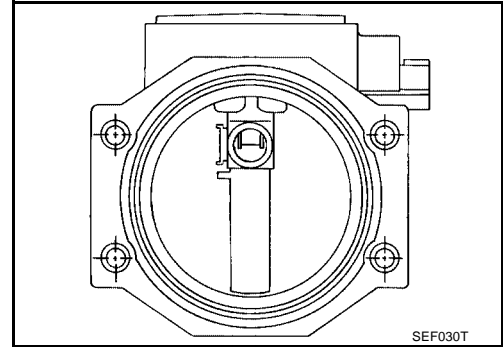
Refer to [EX-3, "EXHAUST SYSTEM"](#) .

UBS006VY

**DTC P0101 MAF SENSOR**

**Component Description**

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot wire that is supplied with electric current from the ECM. The temperature of the hot wire is controlled by the ECM 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 ECM must supply more 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.



**CONSULT-II Reference Value in Data Monitor Mode**

Specification data are reference values.

| MONITOR ITEM  | CONDITION  |           | SPECIFICATION     |
|---------------|--|-----------|-------------------|
| MAS A/F SE-B1 | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 1.0 - 1.7V        |
|               |  | 2,500 rpm | 1.7 - 2.3V        |
| CAL/LD VALUE  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 18.5 - 26.0%      |
|               |  | 2,500 rpm | 18.0 - 21.0%      |
| MASS AIRFLOW  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 3.3 - 4.8 g·m/s   |
|               |  | 2,500 rpm | 12.0 - 14.9 g·m/s |

**On Board Diagnosis Logic**

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Mass air flow sensor</li> </ul>                             |
|         |  | B)                      | A low voltage from the sensor is sent to ECM under heavy load driving condition.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Intake air leaks</li> <li>● Mass air flow sensor</li> </ul> |

**DTC Confirmation Procedure**

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-1335, "Diagnostic Procedure"](#) .

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |

SEF174Y

**With GST**

Follow the procedure "With CONSULT-II".

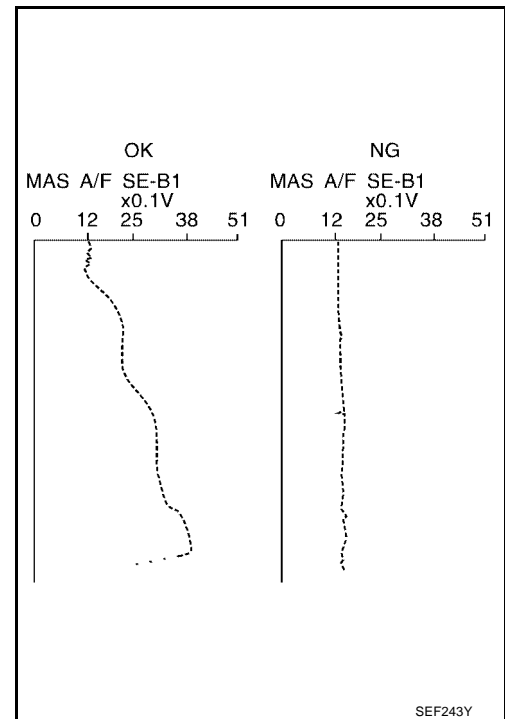
**PROCEDURE FOR MALFUNCTION B**

**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-1335, "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-1335, "Diagnostic Procedure"](#) ..  
If OK, go to following step.



# DTC P0101 MAF SENSOR

[VG33ER]

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. |

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| VHCL SPEED SE | XXX km/h |
| THRTL POS SEN | XXX V    |

SEF175Y

8. If 1st trip DTC is detected, go to [EC-1335, "Diagnostic Procedure"](#).

## Overall Function Check PROCEDURE FOR MALFUNCTION B

UBS005Y0

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-1335, "Diagnostic Procedure"](#).

|              |                   |
|--------------|-------------------|
| CALC LOAD    | 20%               |
| COOLANT TEMP | 95°C              |
| SHORT FT #1  | 2%                |
| LONG FT #1   | 0%                |
| SHORT FT #2  | 4%                |
| LONG FT #2   | 0%                |
| ENGINE SPD   | 2637RPM           |
| VEHICLE SPD  | 0MPH              |
| IGN ADVANCE  | 41.0°             |
| INTAKE AIR   | 41°C              |
| <b>MAF</b>   | <b>14.1gm/sec</b> |
| THROTTLE POS | 3%                |

SEF534P

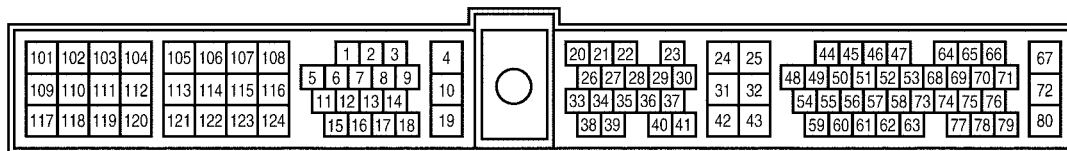
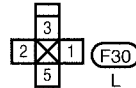
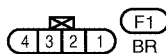
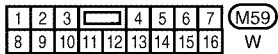
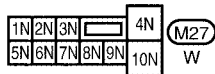
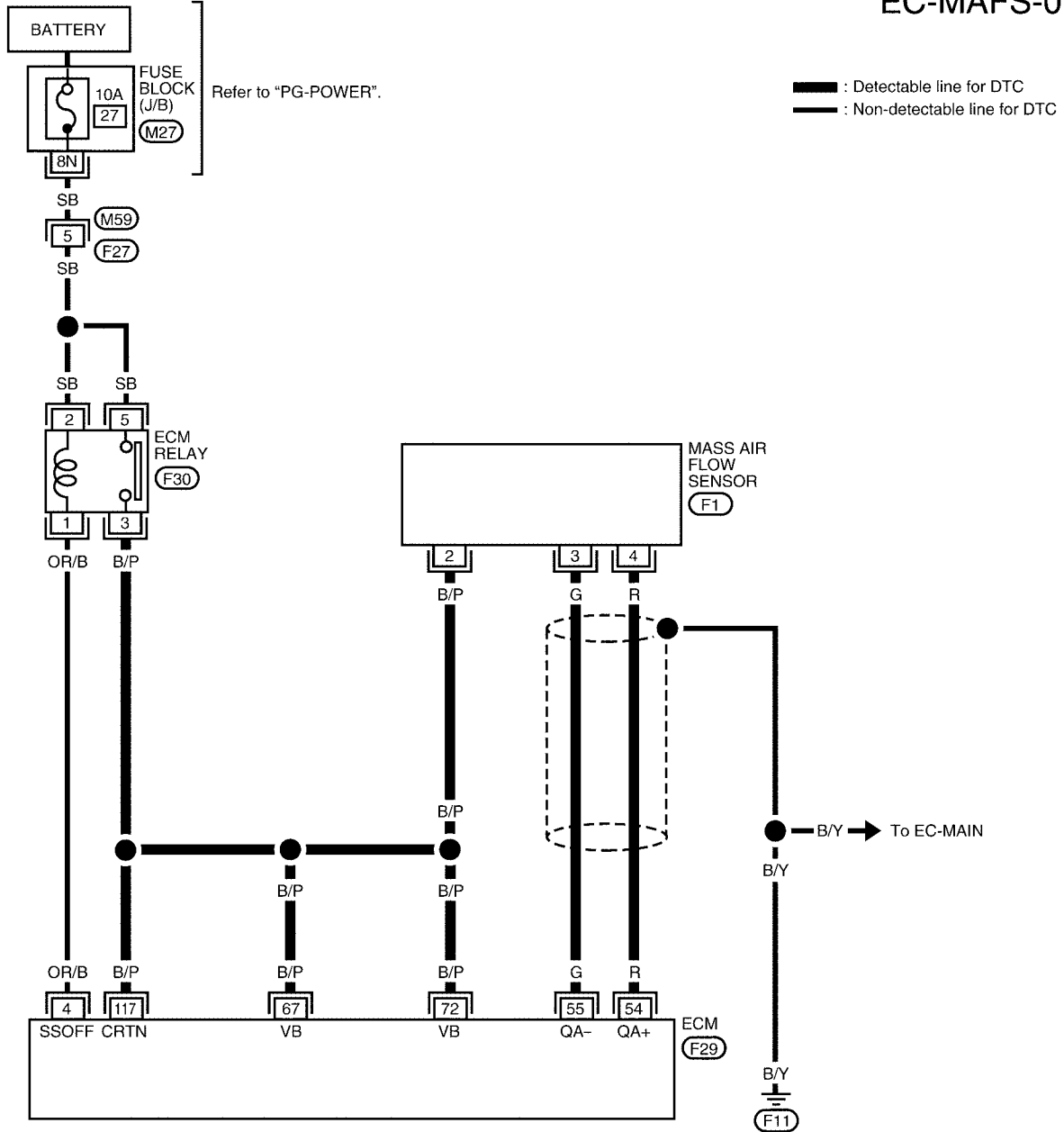
# DTC P0101 MAF SENSOR

[VG33ER]

UBS005Y1

## Wiring Diagram

EC-MAFS-01



BBWA0470E

# DTC P0101 MAF SENSOR

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use 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 COLO R | ITEM                        | CONDITION   | DATA (DC Voltage)          |
|---------------|-------------|-----------------------------|---|----------------------------|
| 54            | R           | Mass air flow sensor        | [Engine is running]<br>● Warm-up condition<br>● Idle speed                | 1.0 - 1.7V                 |
|               |             |                             | [Engine is running]<br>● Warm-up condition<br>● Engine speed is 2,500 rpm | 1.7 - 2.3V                 |
| 55            | G           | Mass air flow sensor ground | [Engine is running]<br>● Warm-up condition<br>● 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) |

## Diagnostic Procedure

UBS005Y2

### 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

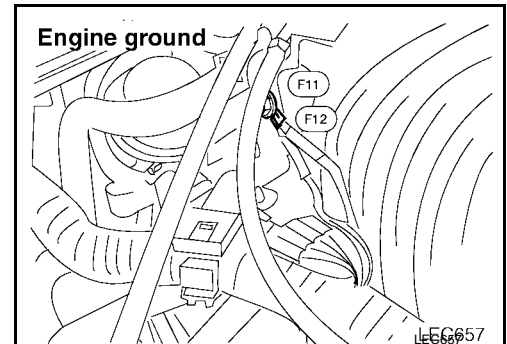
OK or NG

- OK >> GO TO 3.
- NG >> Reconnect the parts.

### 3. RETIGHTEN GROUND SCREWS

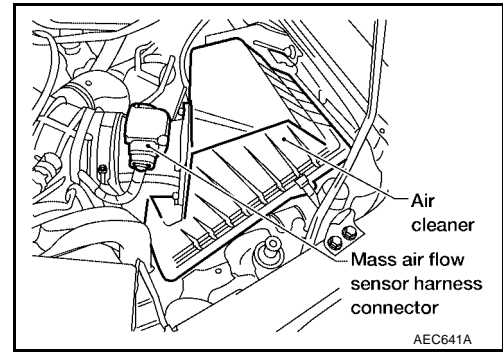
1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 4.



## 4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch "ON".

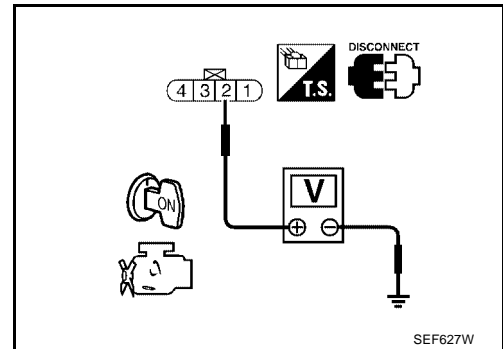


3. Check voltage between terminal 2 and ground with CONSULT-II or tester.

**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 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-1337, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 9.
- NG >> Replace mass air flow sensor.

**9. CHECK INTERMITTENT INCIDENT**

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Component Inspection  
MASS AIR FLOW SENSOR**

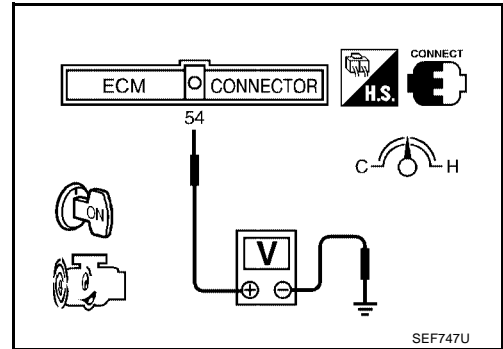
UBS007G8

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.



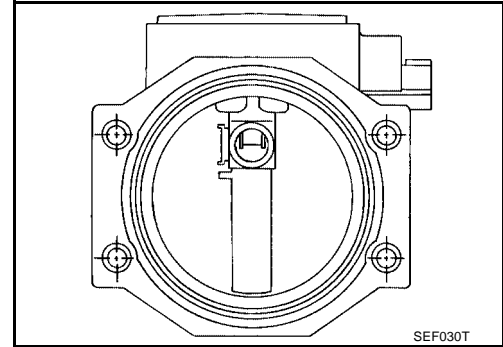
## DTC P0102, P0103 MAF SENSOR

PFP:22680

### Component Description

UBS006QX

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. It consists of a hot wire that is supplied with electric current from the ECM. The temperature of the hot wire is controlled by the ECM 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 ECM must supply more 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.



### CONSULT-II Reference Value in Data Monitor Mode

UBS006QY

Specification data are reference values.

| MONITOR ITEM  | CONDITION  |           | SPECIFICATION     |
|---------------|--|-----------|-------------------|
| MAS A/F SE-B1 | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 1.0 - 1.7V        |
|               |  | 2,500 rpm | 1.7 - 2.3V        |
| CAL/LD VALUE  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 18.5 - 26.0%      |
|               |  | 2,500 rpm | 18.0 - 21.0%      |
| MASS AIRFLOW  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 3.3 - 4.8 g·m/s   |
|               |  | 2,500 rpm | 12.0 - 14.9 g·m/s |

### On Board Diagnosis Logic

UBS006W1

| 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.<br><b>This self-diagnosis have the one trip detection logic.</b> | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Intake air leaks</li> <li>● Mass air flow sensor</li> </ul> |
| P0103   | Mass air flow sensor circuit high input | An excessively high voltage from the sensor is sent to ECM.   | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Mass air flow sensor</li> </ul>                             |

### 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

UBS006W2

#### 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-1341, "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-1341, "Diagnostic Procedure"](#) .

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

### With GST

Follow the procedure "With CONSULT-II".

## 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-1341, "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-1341, "Diagnostic Procedure"](#) .

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

### With GST

Follow the procedure "With CONSULT-II".

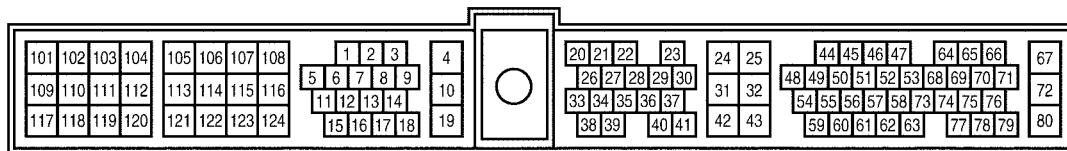
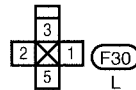
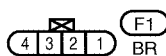
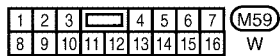
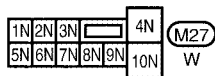
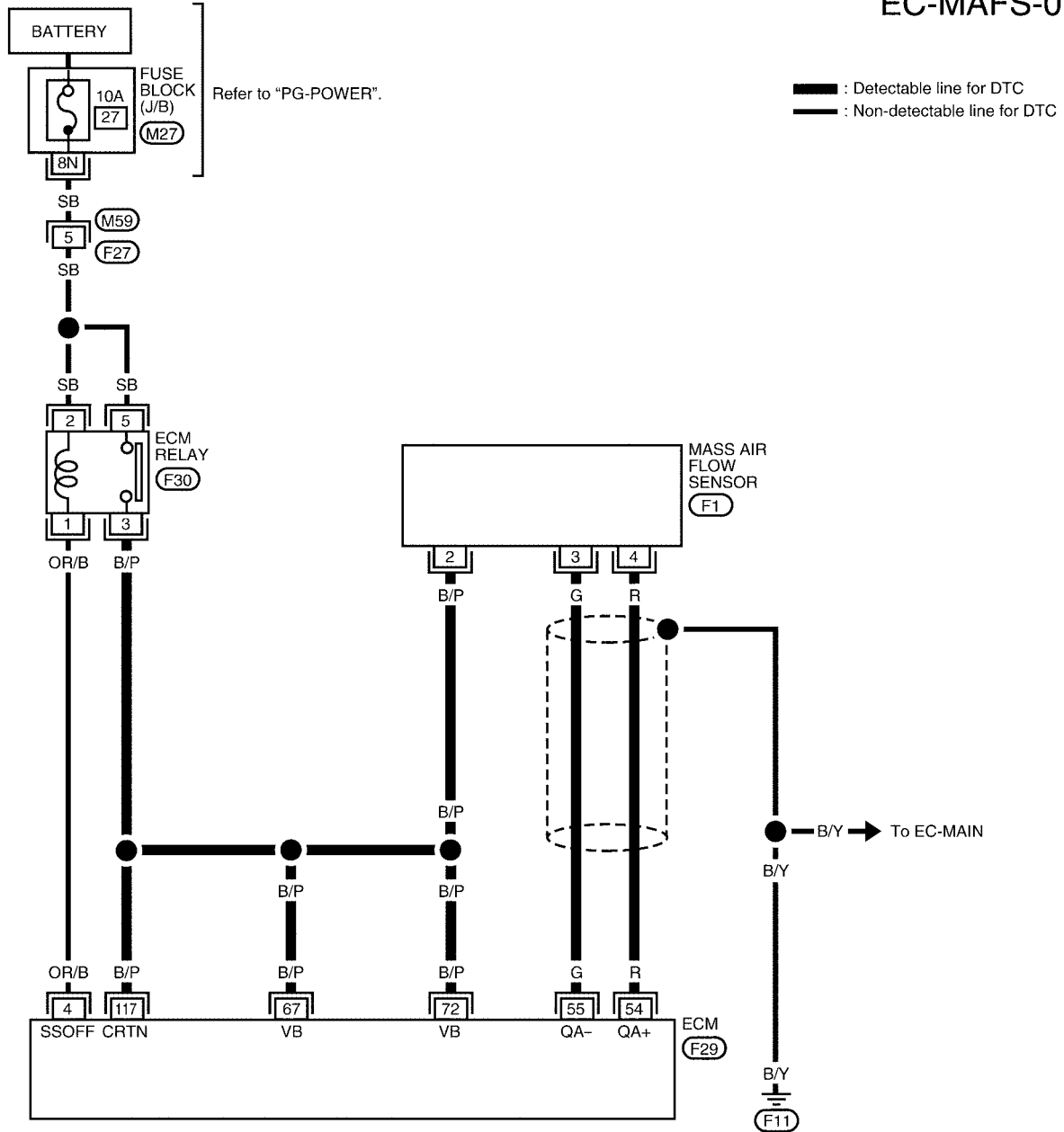
# DTC P0102, P0103 MAF SENSOR

[VG33ER]

UBS006W3

## Wiring Diagram

EC-MAFS-01



BBWA0470E

# DTC P0102, P0103 MAF SENSOR

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

## CAUTION:

Do not use 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) |
|---------------|------------|-----------------------------|---|-------------------|
| 54            | R          | Mass air flow sensor        | [Engine is running]<br>● Warm-up condition<br>● Idle speed                | 1.0 - 1.7V        |
|               |            |                             | [Engine is running]<br>● Warm-up condition<br>● Engine speed is 2,500 rpm | 1.7 - 2.3V        |
| 55            | G          | Mass air flow sensor ground | [Engine is running]<br>● Warm-up condition<br>● Idle speed                | Approximately 0V  |

## Diagnostic Procedure

UBS006W4

### 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

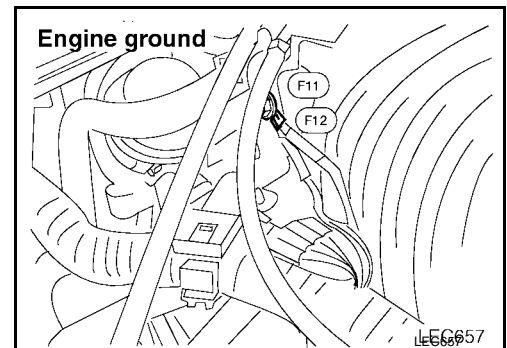
OK >> GO TO 3.

NG >> Reconnect the parts.

### 3. RETIGHTEN GROUND SCREWS

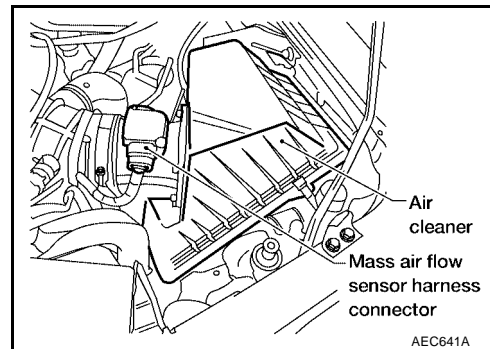
1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

>> GO TO 4.



#### 4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor harness connector.
2. Turn ignition switch ON.

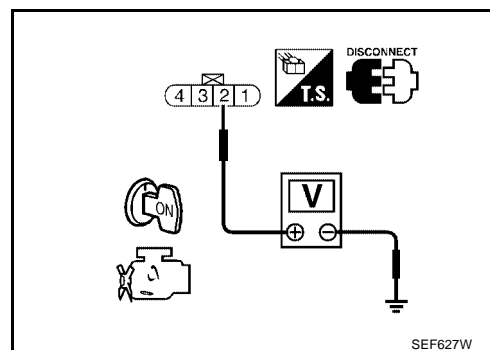


3. Check voltage between terminal 2 and ground with CONSULT-II or tester.

**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 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 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-1343, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 9.
- NG >> Replace mass air flow sensor.

**9. CHECK INTERMITTENT INCIDENT**

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Component Inspection  
MASS AIR FLOW SENSOR**

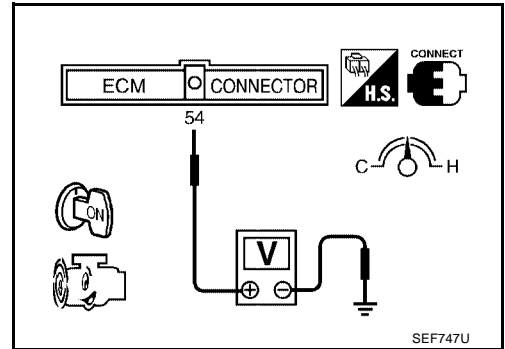
UBS00909

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.

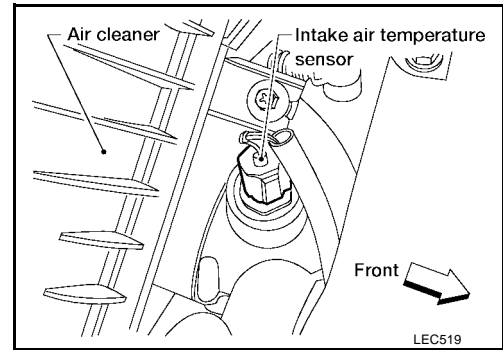


DTC P0112, P0113 IAT SENSOR

Component Description

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.



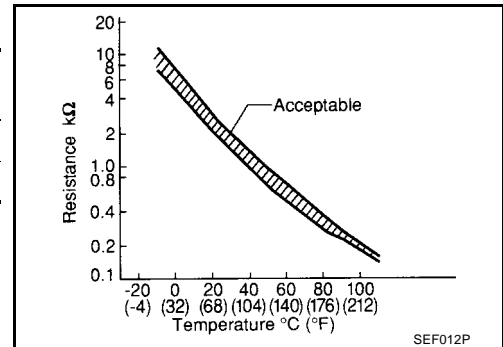
<Reference data>

| 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

| 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.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Intake air temperature sensor</li> </ul> |
| P0113   | Intake air temperature sensor circuit high input | An excessively high voltage from the sensor is sent to ECM. |   |

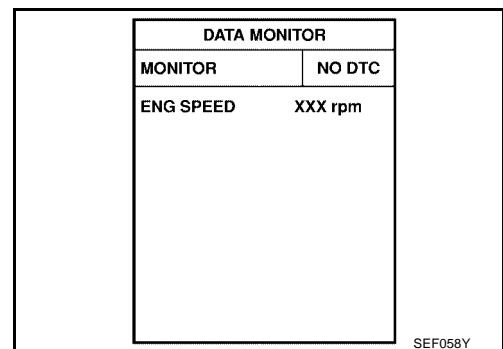
DTC Confirmation Procedure

**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.

④ 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-1347, "Diagnostic Procedure"](#).





# DTC P0112, P0113 IAT SENSOR

[VG33ER]



## WITH GST

Follow the procedure "With CONSULT-II".

A

EC

C

D

E

F

G

H

I

J

K

L

M

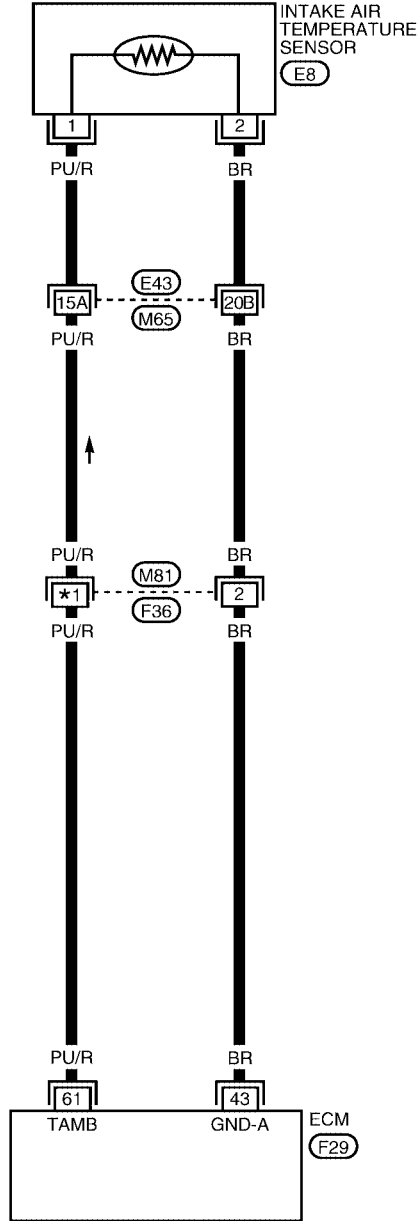
# DTC P0112, P0113 IAT SENSOR

[VG33ER]

UBS005Y6

## Wiring Diagram

EC-IATS-01

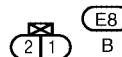
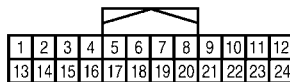
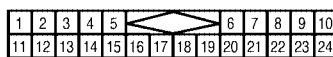


: Detectable line for DTC  
 : Non-detectable line for DTC

EP : EARLY PRODUCTION  
LP : LATE PRODUCTION

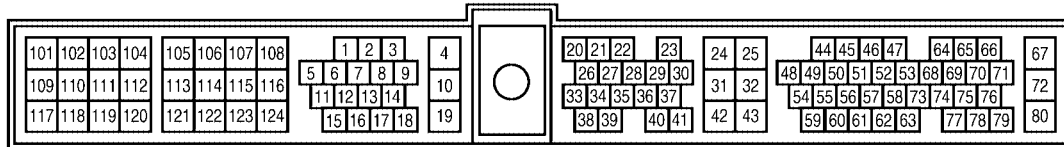
EP : 22  
LP : 24

\*1



Refer to the following.

E43 - SUPER MULTIPLE JUNCTION (SMJ)



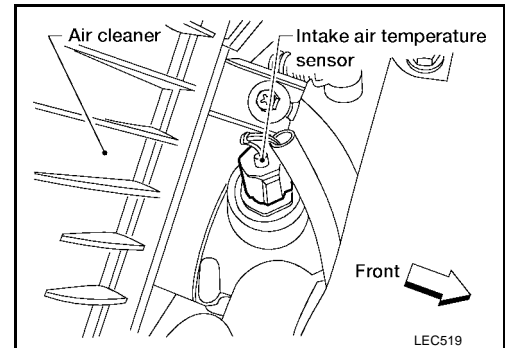
F29  
 GY



WBWA0028E

**Diagnostic Procedure****1. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT**

1. Turn ignition switch OFF.
2. Disconnect intake air temperature sensor harness connector.
3. Turn ignition switch ON.

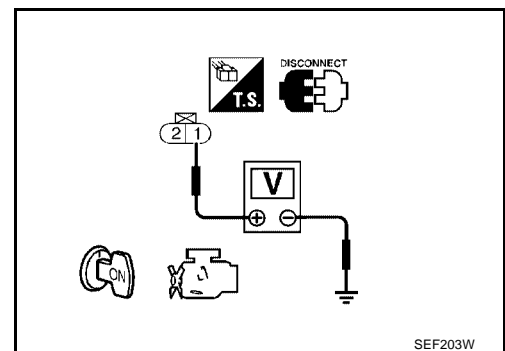


4. Check voltage between terminal 1 and ground.

**Voltage** : **Approximately 5V**

OK or NG

- OK >> GO TO 3.  
NG >> GO TO 2.

**2. 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.

**3. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch OFF.
2. Check harness continuity between intake air temperature sensor terminal 2 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 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 ECM and intake air temperature sensor

>> Repair open circuit or short to power in harness or connectors.

#### 5. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-1348, "Component Inspection"](#)

OK or NG

OK >> GO TO 6.

NG >> Replace intake air temperature sensor.

#### 6. CHECK INTERMITTENT INCIDENT

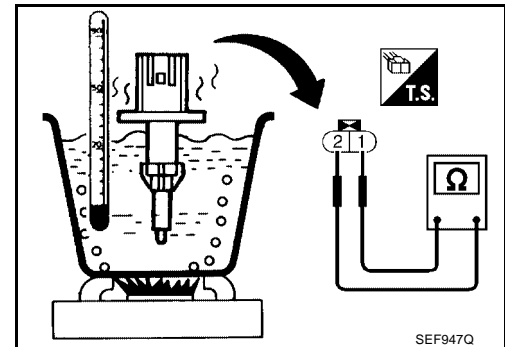
Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Component Inspection INTAKE AIR TEMPERATURE SENSOR

Check resistance as shown in the figure.

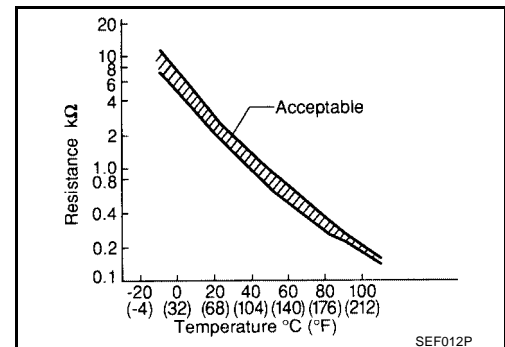
UBS007GA



SEF947Q

#### <Reference data>

| Intake air temperature °C (°F) | Resistance kΩ |
|--------------------------------|---------------|
| 20 (68)                        | 2.1 - 2.9     |
| 80 (176)                       | 0.27 - 0.38   |

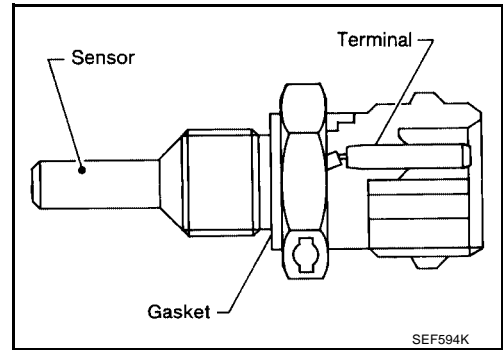


SEF012P

## DTC P0117, P0118 ECT SENSOR

### Component Description

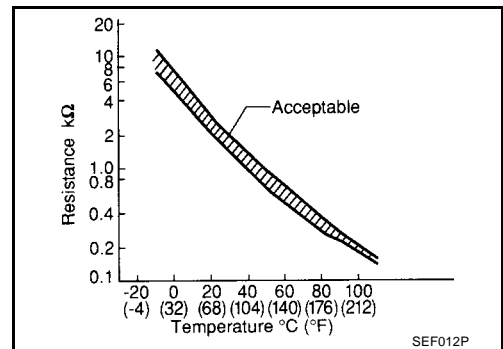
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



### <Reference data>

| Engine coolant temperature °C (°F) | Voltage* (V) | Resistance (kΩ) |
|------------------------------------|--------------|-----------------|
| -10 (14)                           | 4.4          | 7.0 - 11.4      |
| 20 (68)                            | 3.5          | 2.1 - 2.9       |
| 50 (122)                           | 2.2          | 0.68 - 1.00     |
| 90 (194)                           | 0.9          | 0.236 - 0.260   |

\*: These data are reference values and are measured between ECM terminal 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

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.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Engine coolant temperature sensor</li> </ul> |
| 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".<br>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)<br>(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

UBS005YA

### 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-1352, "Diagnostic Procedure"](#).

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

### WITH GST

Follow the procedure "With CONSULT-II".

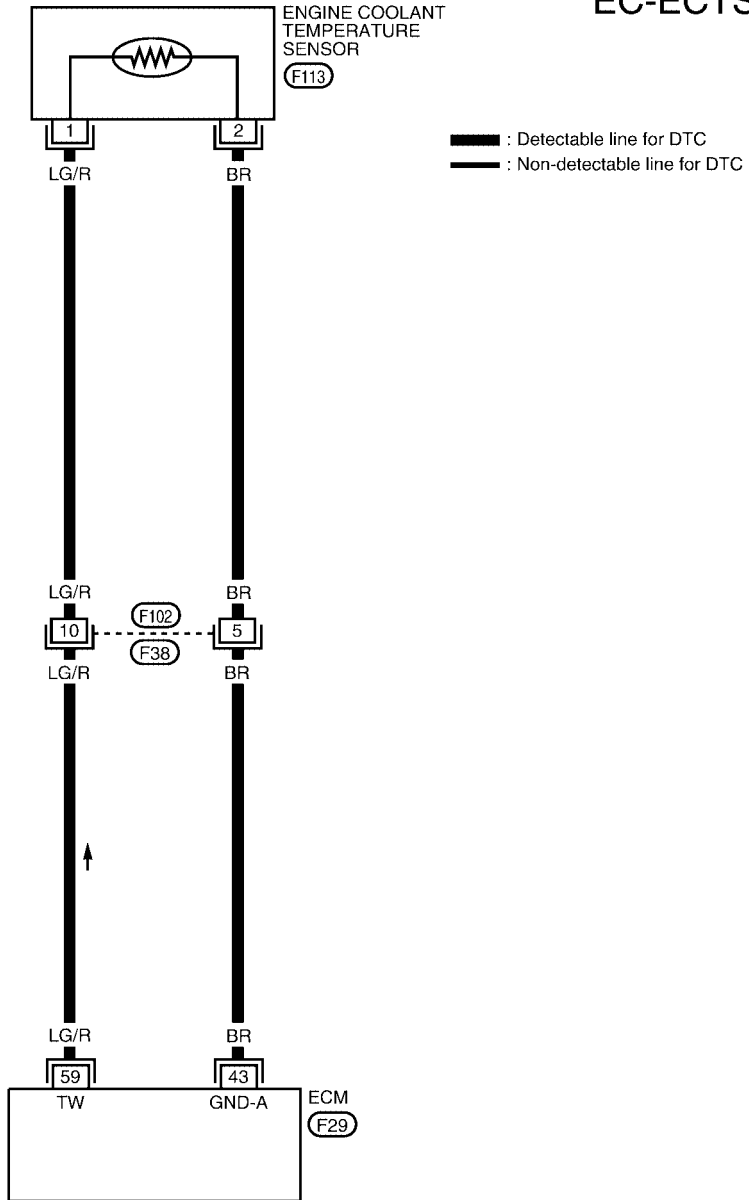
# DTC P0117, P0118 ECT SENSOR

[VG33ER]

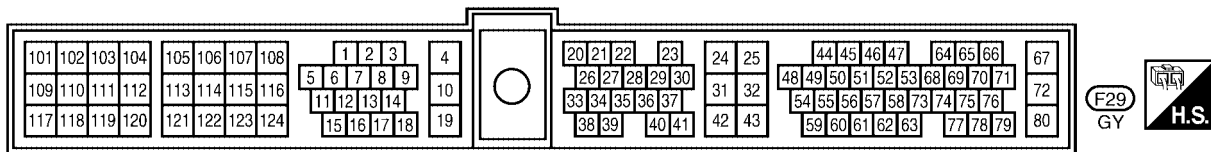
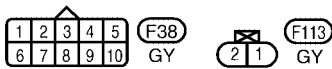
## Wiring Diagram

UBS005YB

EC-ECTS-01



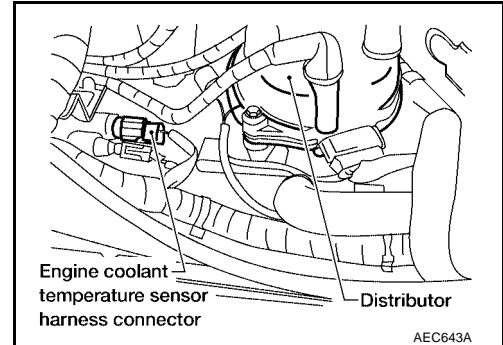
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BBWA0508E

**Diagnostic Procedure****1. CHECK ECTS POWER SUPPLY CIRCUIT**

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature (ECT) sensor harness connector.
3. Turn ignition switch ON.

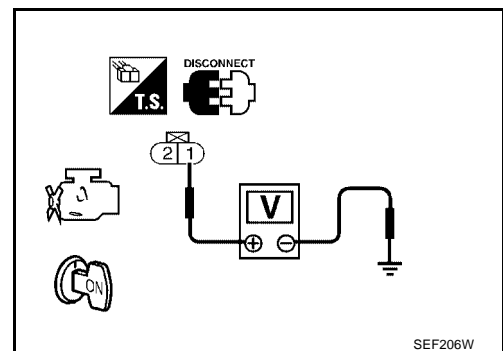


4. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

**Voltage** : Approximately 5V

OK or NG

- OK >> GO TO 3.  
 NG >> GO TO 2.

**2. DETECT MALFUNCTIONING PART**

Check the following.

- Harness 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.

**3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch OFF.
2. Check harness continuity between ECT sensor terminal 2 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 5.  
 NG >> GO TO 4.

**4. 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 power in harness or connectors.



**5. CHECK ENGINE COOLANT TEMPERATURE SENSOR**

Refer to [EC-1353, "Component Inspection"](#) .

OK or NG

OK >> GO TO 6.

NG >> Replace engine coolant temperature sensor.

**6. CHECK INTERMITTENT INCIDENT**

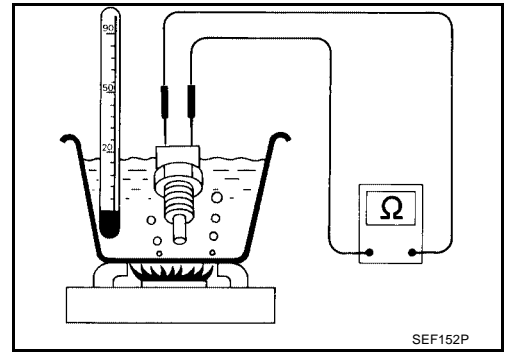
Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Component Inspection  
ENGINE COOLANT TEMPERATURE SENSOR**

Check resistance as shown in the figure.

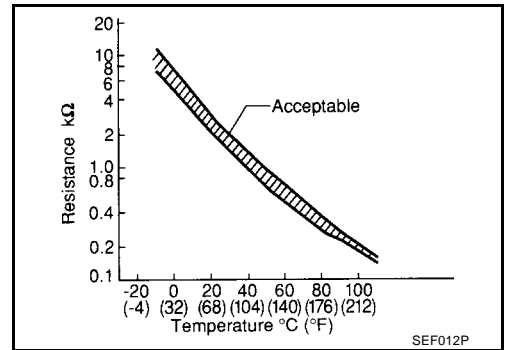
UBS007GB



SEF152P

**<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 |



SEF012P

**Removal and Installation  
ENGINE COOLANT TEMPERATURE SENSOR**

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

UBS006W9

**DTC P0121 TP SENSOR**

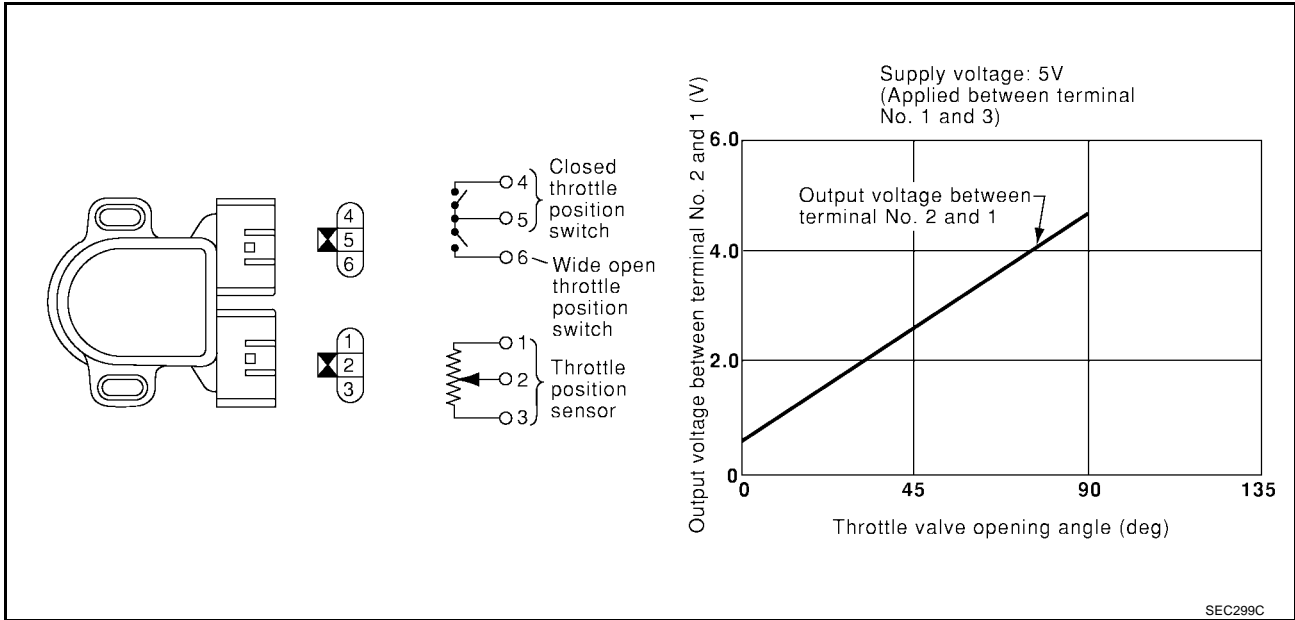
**Component Description**

**NOTE:**

If DTC P0121 is displayed with DTC P0510, first perform the trouble diagnosis for DTC P0510. Refer to [EC-1584](#).

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**

Specification data are reference values.

| MONITOR ITEM  | CONDITION  | SPECIFICATION                                      |
|---------------|--|--|
| THRTL POS SEN | <ul style="list-style-type: none"> <li>● Engine: After warming up, idle the engine</li> </ul>  | Throttle valve: fully closed (a) 0.15 - 0.85V      |
|               | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Ignition switch: ON (Engine stopped)</li> </ul>   | Throttle valve: Partially open Between (a) and (b) |
|               |  | Throttle valve: fully opened (b) 3.5 - 4.7V        |
| ABSOL TH-P/S  | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Ignition switch: ON</li> <li>● More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.</li> </ul> | Throttle valve: fully closed 0.0%                  |
|               | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Ignition switch: ON (Engine stopped)</li> </ul>   | Throttle valve: fully opened Approx. 80%           |

**On Board Diagnosis Logic**

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The TP sensor circuit is open or shorted.)</li> <li>● TP sensor</li> <li>● Fuel injector</li> <li>● Camshaft position sensor</li> <li>● Mass air flow sensor</li> </ul> |
|         |  | B)                      | A low voltage from the sensor is sent to ECM under heavy load driving condition.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The TP sensor circuit is open or shorted.)</li> <li>● Intake air leaks</li> <li>● TP sensor</li> </ul>  |

**DTC Confirmation Procedure**

**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.

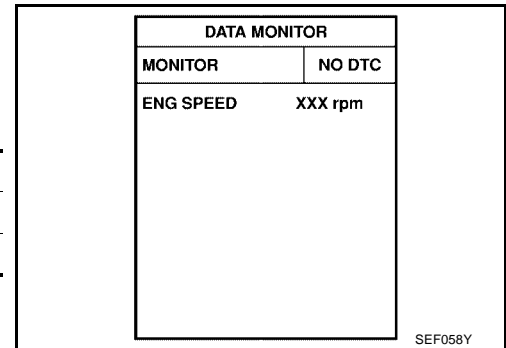
**PROCEDURE FOR MALFUNCTION A**

Ⓟ **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-1358, "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.

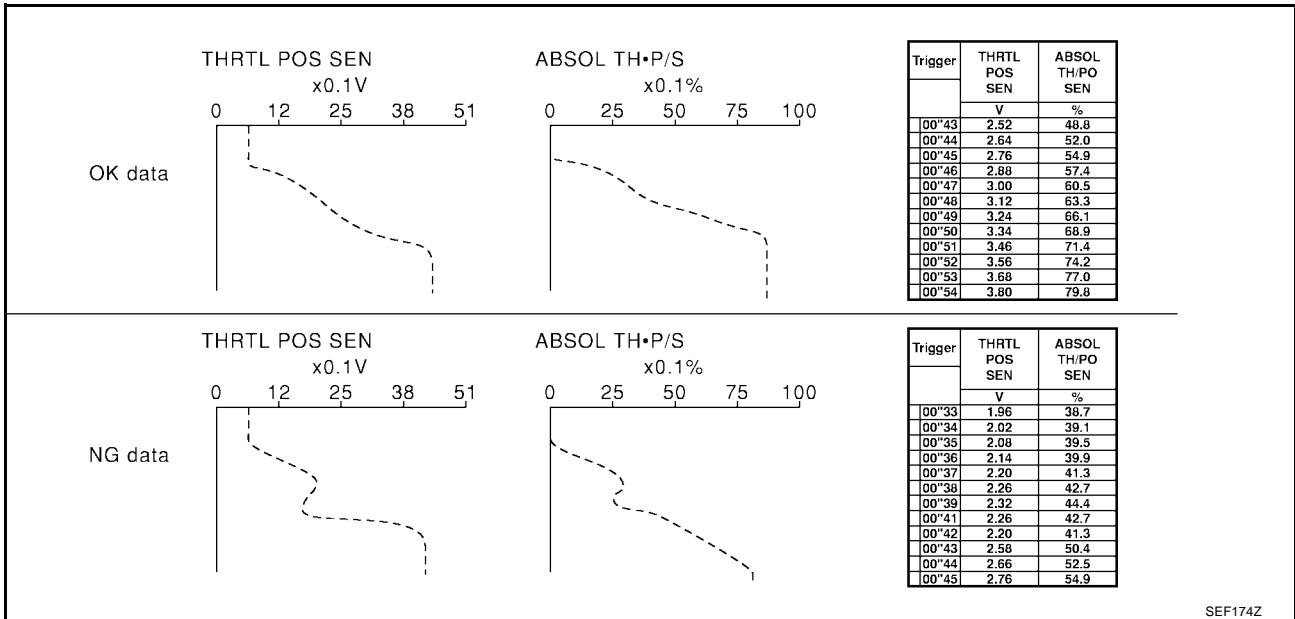
# DTC P0121 TP SENSOR

[VG33ER]

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-1358, "Diagnostic Procedure"](#) .  
 If OK, go to following step.

| DATA MONITOR  |        |
|---------------|--------|
| MONITOR       | NO DTC |
| THRTL POS SEN | XXX V  |
| ABSOL TH·P/S  | XXX %  |

SEF177Y



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-1358, "Diagnostic Procedure"](#) .

**With GST**

Follow the procedure "With CONSULT-II".

# DTC P0121 TP SENSOR

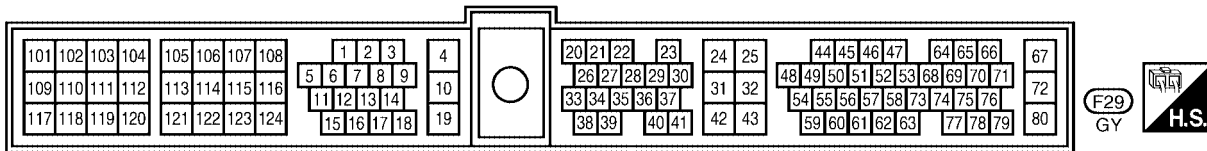
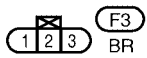
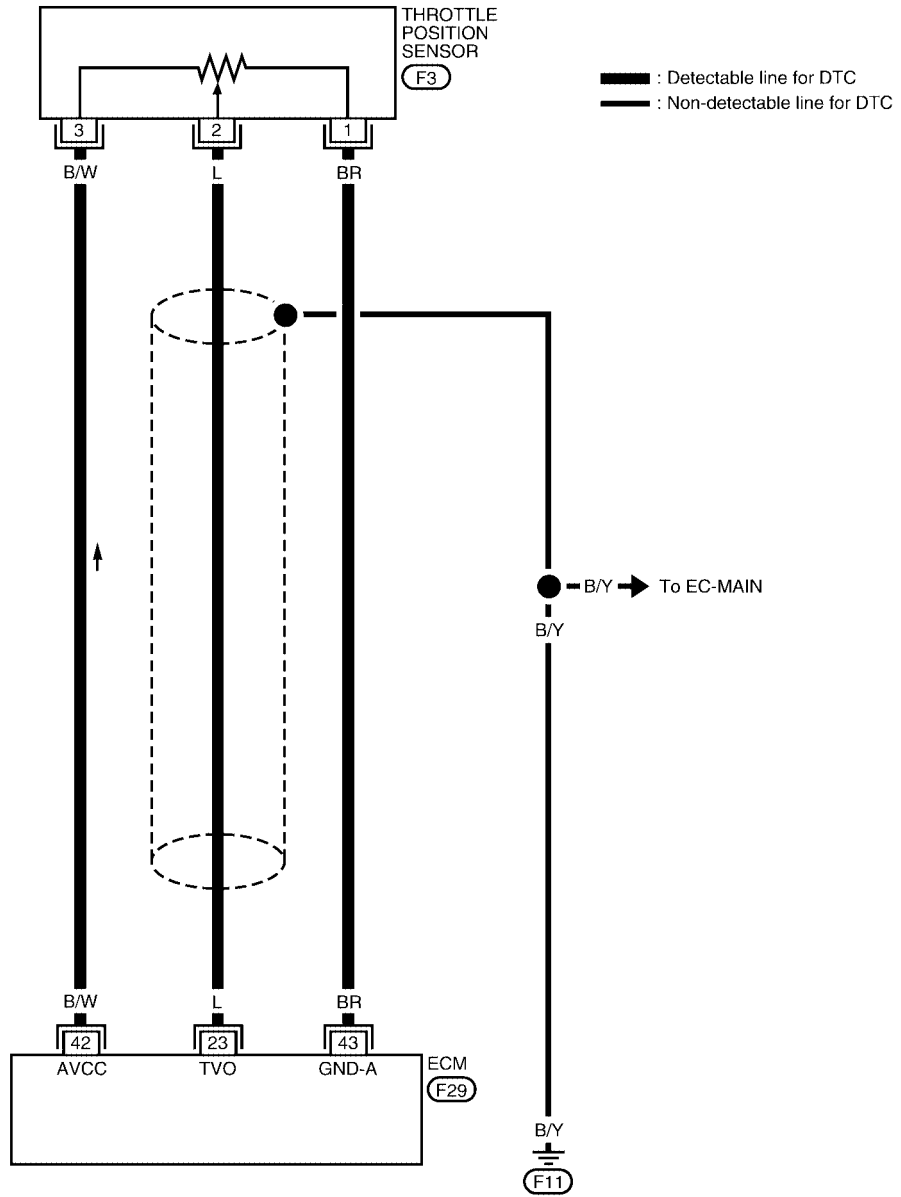
[VG33ER]

UBS005Y1

## Wiring Diagram

EC-TPS-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



BBWA0473E

# DTC P0121 TP SENSOR

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

## CAUTION:

**Do not use 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 COLO R | ITEM                     | CONDITION   | DATA (DC Voltage) |
|---------------|-------------|--------------------------|---|-------------------|
| 23            | L           | Throttle position sensor | <b>[Engine is running]</b> <ul style="list-style-type: none"><li>● Warm-up condition</li><li>● Accelerator pedal fully released</li></ul> | 0.15 - 0.85V      |
|               |             |                          | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"><li>● Accelerator pedal fully depressed</li></ul>                           | 3.5 - 4.7V        |
| 42            | B/W         | Sensors' power supply    | <b>[Ignition switch ON]</b>   | Approximately 5V  |
| 43            | BR          | Sensors' ground          | <b>[Engine is running]</b> <ul style="list-style-type: none"><li>● Warm-up condition</li><li>● Idle speed</li></ul>                       | Approximately 0V  |

## Diagnostic Procedure

UBS005YJ

### 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-1358, "Diagnostic Procedure"](#)

| Items  | Specifications   |
|--|--|
| Ignitions timing   | 10° ± 2° BTDC  |
| Base idle speed  | 700 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.3 mm (0.012 in): ON<br>0.4 mm (0.016 in): OFF |
| Target idle speed  | 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

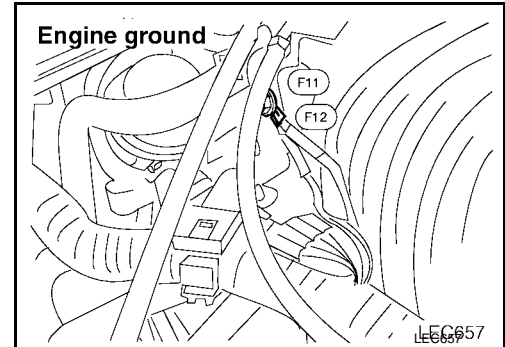
OK or NG

- OK >> GO TO 4.
- NG >> Reconnect the parts.

#### 4. RETIGHTEN GROUND SCREWS

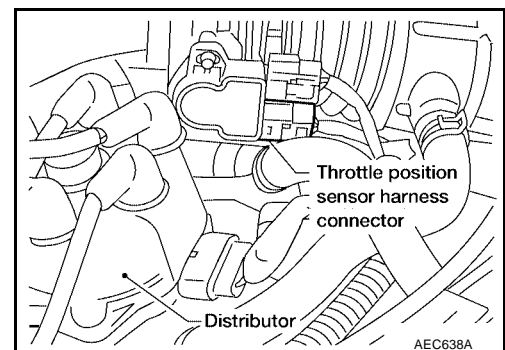
1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

>> GO TO 5.



#### 5. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect throttle position sensor harness connector.
2. Turn ignition switch ON.

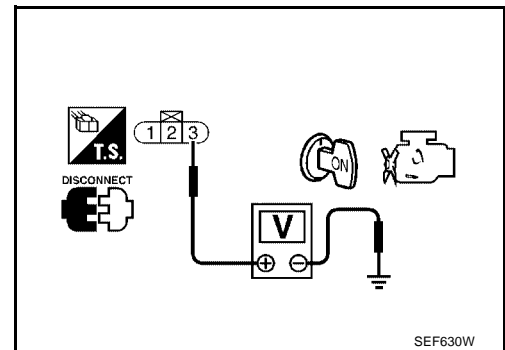


3. Check voltage between sensor terminal 3 and ground with CONSULT-II or tester.

**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. Check harness continuity between throttle position sensor terminal 1 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

##### OK or NG

- OK >> GO TO 8.  
 NG >> GO TO 7.

#### 7. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM and throttle position sensor.

>> Repair open circuit or short to power in harness or connectors.

**8. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 23 and throttle position sensor terminal 2.  
Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 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-1362, "Component Inspection"](#) .

OK or NG

OK >> GO TO 11.

NG >> GO TO 10.

**10. ADJUST CLOSED THROTTLE POSITION SWITCH**

Adjust closed throttle position switch. Refer to [EC-1251, "Basic Inspection"](#) .

| Items  | Specifications   |
|--|--|
| Ignitions timing   | 10° ± 2° BTDC  |
| Base idle speed  | 700 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.3 mm (0.012 in): ON<br>0.4 mm (0.016 in): OFF |
| Target idle speed  | 750 ± 50 rpm (in P or N position)  |

OK or NG

OK >> GO TO 11.

NG >> Replace throttle position sensor. To adjust it, perform [EC-1251, "Basic Inspection"](#) .

**11. CHECK MASS AIR FLOW SENSOR**

Refer to [EC-1337, "Component Inspection"](#) .

OK or NG

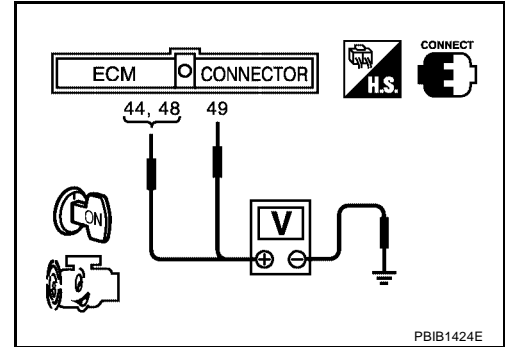
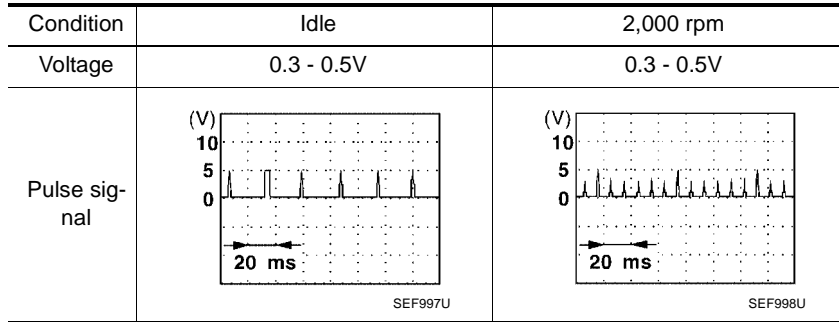
OK >> GO TO 12.

NG >> Replace mass air flow sensor.

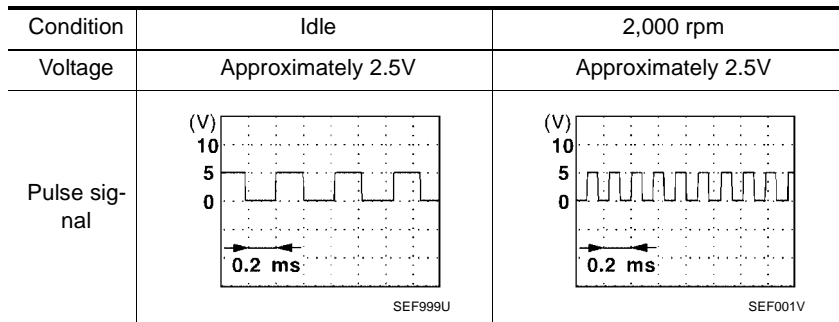


## 12. CHECK CAMSHAFT POSITION SENSOR

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.  
**<Terminal 44 or 48 and engine ground>**



### <Terminal 49 and engine ground>



### OK or NG

- OK >> GO TO 13.
- NG >> Replace distributor assembly with camshaft position sensor.

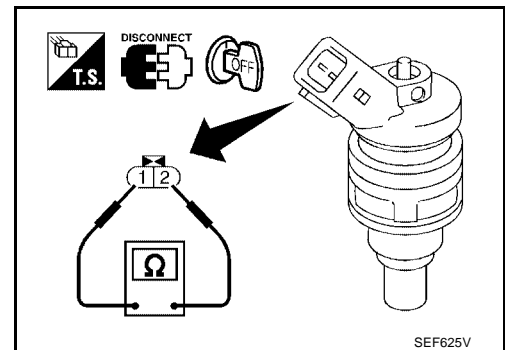
## 13. CHECK FUEL INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

**Resistance : 10 - 14Ω [at 25°C (77°F)]**

### OK or NG

- OK >> GO TO 14.
- NG >> Replace fuel injector.



## 14. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Component Inspection**  
**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 (a)     | 0.15 - 0.85V        |
| Partially open            | Between (a) and (b) |
| Completely open (b)       | 3.5 - 4.7V          |

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |
| THRTL POS SEN | XXX V   |

SEF719Y

**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 (a)     |
| Partially open            | Between (a) and (b) |
| Completely open           | 3.5 - 4.7 (b)       |

DTC P0122, P0123 TP SENSOR

PF16119

Component Description

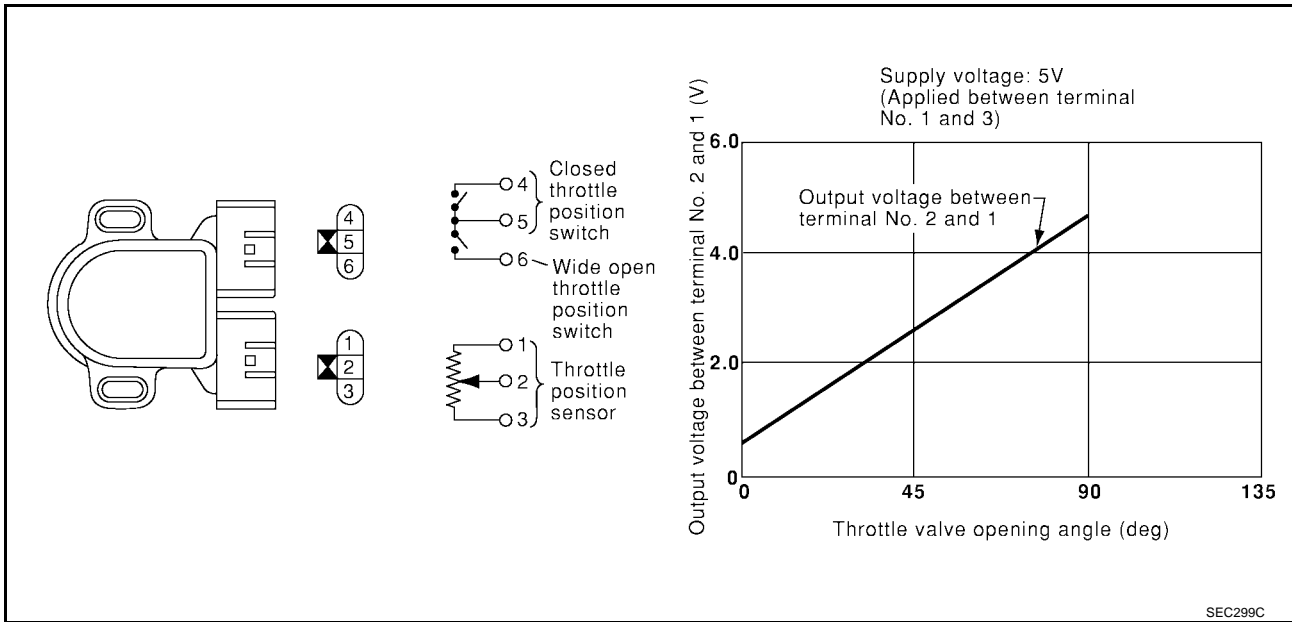
UBS006R5

NOTE:

If DTC P0122, P0123 is displayed with DTC P0510, first perform the trouble diagnosis for DTC P0510. Refer to EC-1584 .

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

UBS006R6

Specification data are reference values.

| MONITOR ITEM  | CONDITION  | SPECIFICATION                                      |
|---------------|--|--|
| THRTL POS SEN | <ul style="list-style-type: none"> <li>Engine: After warming up, idle the engine</li> </ul>  | Throttle valve: fully closed (a) 0.15 - 0.85V      |
|               | <ul style="list-style-type: none"> <li>Engine: After warming up</li> </ul>   | Throttle valve: Partially open Between (a) and (b) |
|               | <ul style="list-style-type: none"> <li>Ignition switch: ON (Engine stopped)</li> </ul>   | Throttle valve: fully opened (b) 3.5 - 4.7V        |
| ABSOL TH-P/S  | <ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Ignition switch: ON</li> <li>More than -40.0 kpa (-300 mmHg, -11.81 inHg) of vacuum is applied to the throttle opener with a hand vacuum pump.</li> </ul> | Throttle valve: fully closed 0.0%                  |
|               | <ul style="list-style-type: none"> <li>Engine: After warming up</li> <li>Ignition switch: ON (Engine stopped)</li> </ul>   | Throttle valve: fully opened Approx. 80%           |

On Board Diagnosis Logic

UBS006R8

These self-diagnosis have one trip detection logic.

# DTC P0122, P0123 TP SENSOR

[VG33ER]

| 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  | <ul style="list-style-type: none"> <li>● Harness or connectors (The TP sensor circuit is open or shorted.)</li> <li>● TP sensor</li> </ul> |
| 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

UBS006R9

### 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 1st trip DTC is detected, go to [EC-1366, "Diagnostic Procedure"](#).

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| VHCL SPEED SE | XXX km/h |
| P/N POSI SW   | OFF      |

SEF065Y

### WITH GST

Follow the procedure "With CONSULT-II".

# DTC P0122, P0123 TP SENSOR

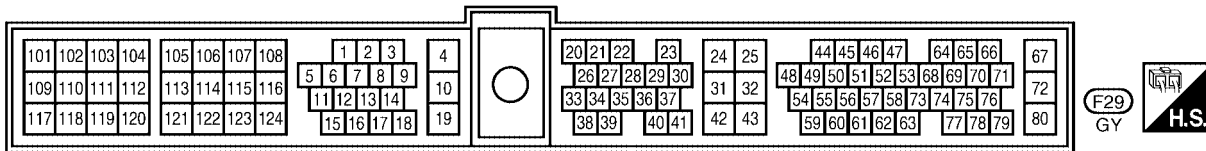
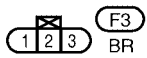
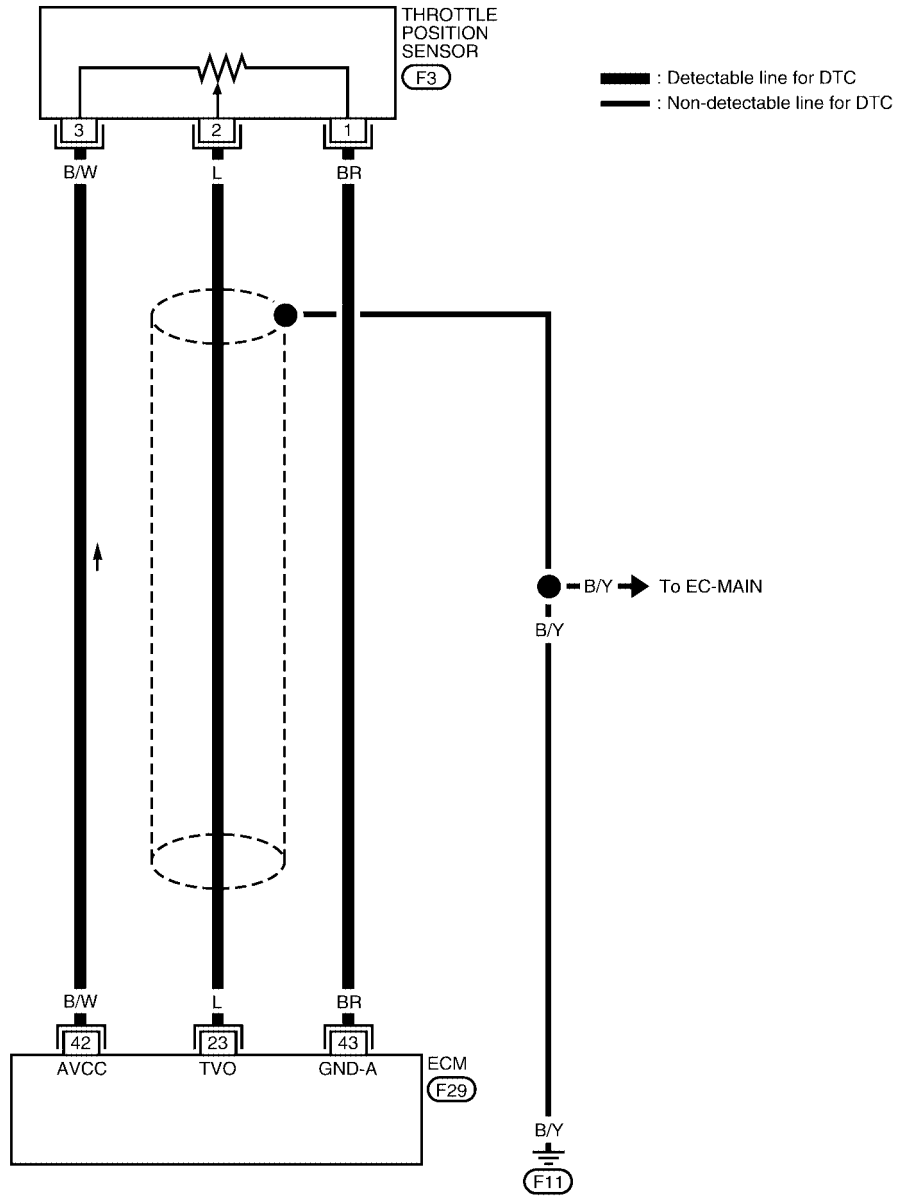
[VG33ER]

UBS006RA

## Wiring Diagram

EC-TPS-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



BBWA0473E

# DTC P0122, P0123 TP SENSOR

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use 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) |
|---------------|------------|--------------------------|---|-------------------|
| 23            | L          | Throttle position sensor | <b>[Engine is running]</b> <ul style="list-style-type: none"><li>● Warm-up condition</li><li>● Accelerator pedal fully released</li></ul> | 0.15 - 0.85V      |
|               |            |                          | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"><li>● Accelerator pedal fully depressed</li></ul>                           | 3.5 - 4.7V        |
| 42            | B/W        | Sensors' power supply    | <b>[Ignition switch ON]</b>   | Approximately 5V  |
| 43            | BR         | Sensors' ground          | <b>[Engine is running]</b> <ul style="list-style-type: none"><li>● Warm-up condition</li><li>● Idle speed</li></ul>                       | Approximately 0V  |

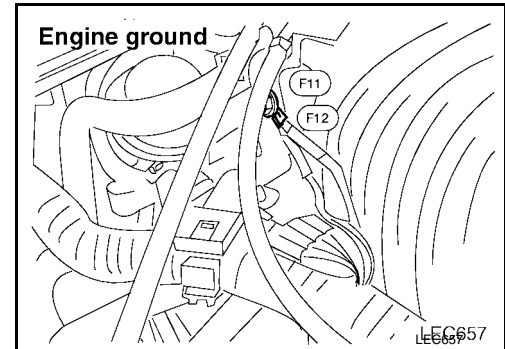
## Diagnostic Procedure

UBS006RB

### 1. RETIGHTEN GROUND SCREWS

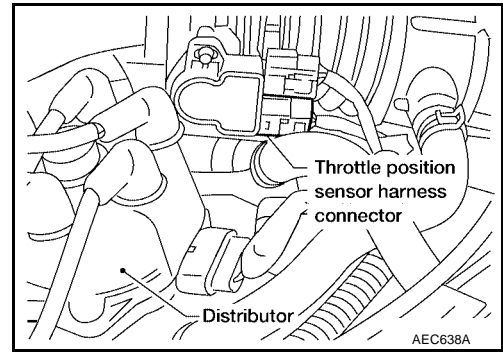
1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



**2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT**

1. Disconnect throttle position sensor harness connector.
2. Turn ignition switch ON.

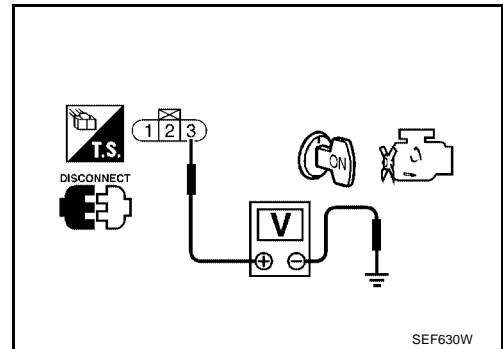


3. Check voltage between sensor terminal 3 and ground with CONSULT-II or tester.

**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. Check harness continuity between throttle position sensor terminal 1 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 5.
- NG >> GO TO 4.

**4. DETECT MALFUNCTIONING PART**

Check the harness for open or short between ECM and throttle position sensor.

>> Repair open circuit or short to power in harness or connectors.

**5. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 23 and throttle position sensor terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 6.
- NG >> Repair open circuit or short to ground or short to power in harness or connectors.

**6. CHECK THROTTLE POSITION SENSOR**

Refer to [EC-1370, "Component Inspection"](#) .

OK or NG

- OK >> GO TO 8.
- NG >> GO TO 7.

**7. ADJUST CLOSED THROTTLE POSITION SWITCH**

Adjust closed throttle position switch. Refer to [EC-1251, "Basic Inspection"](#) .

| Items  | Specifications   |
|--|--|
| Ignitions timing   | 10° ± 2° BTDC  |
| Base idle speed  | 700 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.3 mm (0.012 in): ON<br>0.4 mm (0.016 in): OFF |
| Target idle speed  | 750 ± 50 rpm (in P or N position)  |

OK or NG

- OK >> GO TO 8.
- NG >> Replace throttle position sensor. To adjust it, perform [EC-1251, "Basic Inspection"](#) .

**8. CHECK MASS AIR FLOW SENSOR**

Refer to [EC-1337, "Component Inspection"](#) .

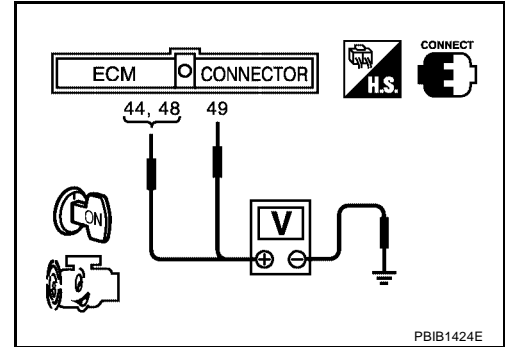
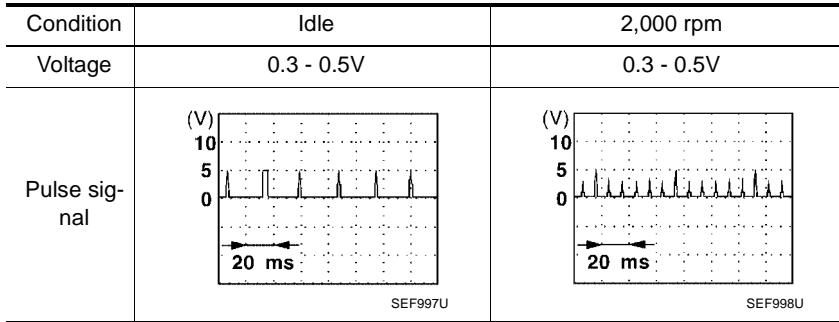
OK or NG

- OK >> GO TO 9.
- NG >> Replace mass air flow sensor.

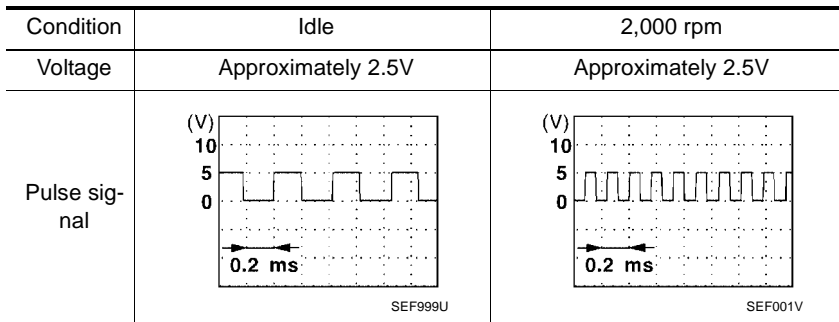


## 9. CHECK CAMSHAFT POSITION SENSOR

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.  
**<Terminal 44 or 48 and engine ground>**



### <Terminal 49 and engine ground>



### OK or NG

- OK >> GO TO 10.
- NG >> Replace distributor assembly with camshaft position sensor.

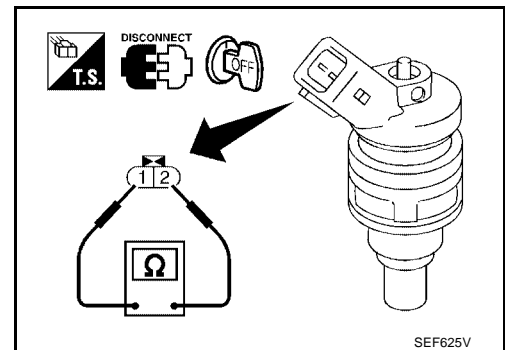
## 10. CHECK FUEL INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

**Resistance : 10 - 14Ω [at 25°C (77°F)]**

### OK or NG

- OK >> GO TO 11.
- NG >> Replace fuel injector.



## 11. CHECK INTERMITTENT INCIDENT

Refer to [EC-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## Component Inspection 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 (a)     | 0.15 - 0.85V        |
| Partially open            | Between (a) and (b) |
| Completely open (b)       | 3.5 - 4.7V          |

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |
| THRTL POS SEN | XXX V   |

SEF719Y

### 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 (a)     |
| Partially open            | Between (a) and (b) |
| Completely open           | 3.5 - 4.7 (b)       |

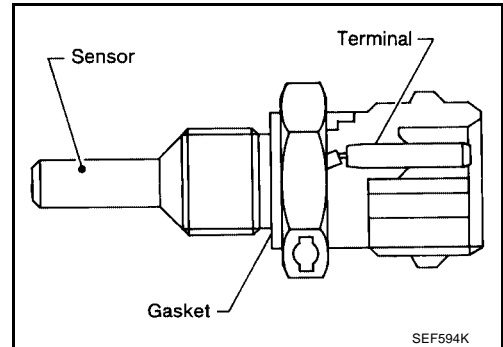
## DTC P0125 ECT SENSOR

### Component Description

**NOTE:**

If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to [EC-1349. "DTC P0117, P0118 ECT SENSOR"](#).

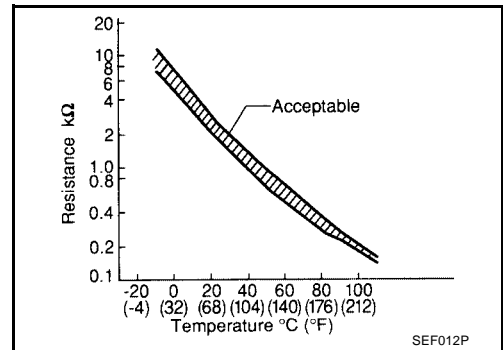
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The 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

| DTC No. | Trouble diagnosis name   | DTC detecting condition   | Possible cause  |
|---------|--|---|---|
| P0125   | Insufficient engine coolant temperature for closed loop fuel control | <ul style="list-style-type: none"> <li>Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine.</li> <li>Engine coolant temperature is insufficient for closed loop fuel control.</li> </ul> | <ul style="list-style-type: none"> <li>Harness or connectors (High resistance in the circuit)</li> <li>Engine coolant temperature sensor</li> <li>Thermostat</li> </ul> |

### DTC Confirmation Procedure

**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-1372, "Diagnostic Procedure"](#).

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |

SEF174Y

 **WITH GST**

Follow the procedure "With CONSULT-II".

## Diagnostic Procedure

UBS005YO

### 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-1372, "Component Inspection"](#).

OK or NG

- OK >> GO TO 2.
- NG >> Replace engine coolant temperature sensor.

### 2. CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

OK or NG

- OK >> GO TO 3.
- NG >> Replace thermostat. Refer to [CO-28, "THERMOSTAT"](#).

### 3. CHECK INTERMITTENT INCIDENT

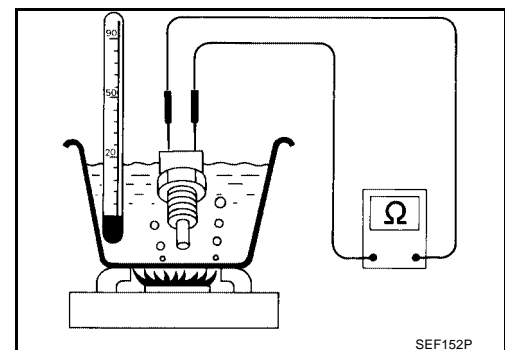
Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END.

## Component Inspection ENGINE COOLANT TEMPERATURE SENSOR

UBS007GI

1. Check resistance as shown in the figure.

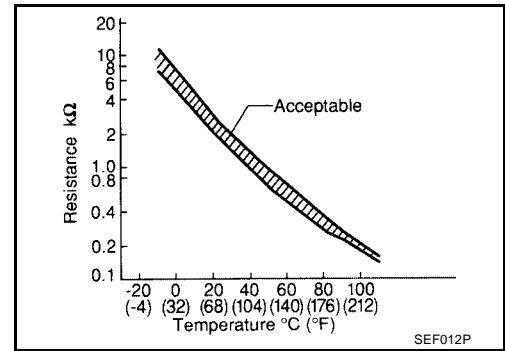


<Reference data>

# DTC P0125 ECT SENSOR

[VG33ER]

| 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 ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

UBS006WD

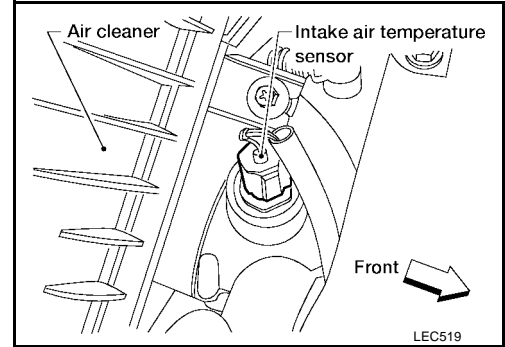
A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

**DTC P0127 IAT SENSOR**

**Component Description**

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.



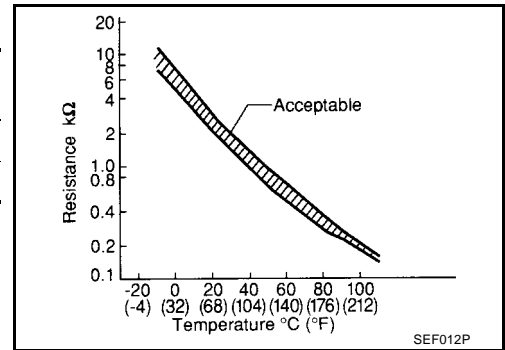
**<Reference data>**

| 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**

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Intake air temperature sensor</li> </ul> |

**DTC Confirmation Procedure**

**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.**

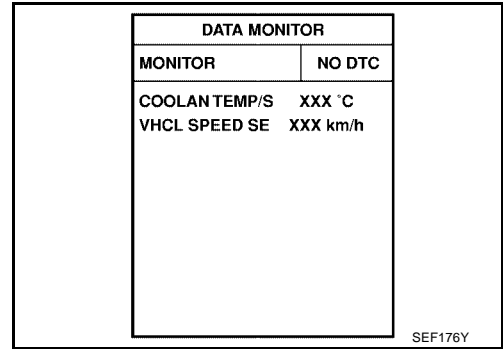
**TESTING CONDITION:**

**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-1375, "Diagnostic Procedure"](#).



**WITH GST**

Follow the procedure "With CONSULT-II".

## Diagnostic Procedure

### 1. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-1375, "Component Inspection"](#).

OK or NG

- OK >> GO TO 2.
- NG >> Replace intake air temperature sensor.

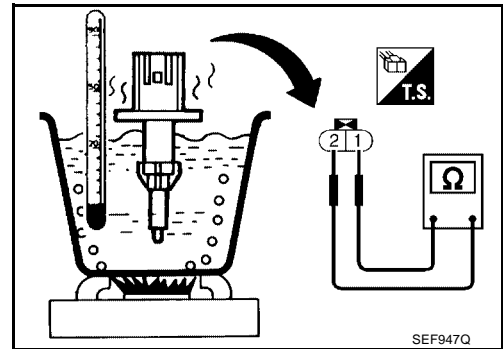
### 2. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).  
For Wiring Diagram, refer to [EC-1346, "Wiring Diagram"](#).

>> INSPECTION END.

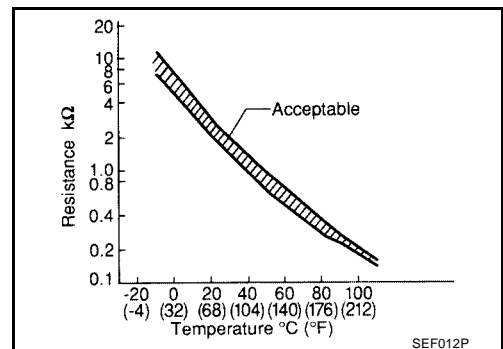
## Component Inspection INTAKE AIR TEMPERATURE SENSOR

1. Check resistance as shown in the figure.



<Reference data>

| Intake air temperature °C (°F) | Resistance kΩ |
|--------------------------------|---------------|
| 20 (68)                        | 2.1 - 2.9     |
| 80 (176)                       | 0.27 - 0.38   |



2. If NG, replace in take air temperature sensor.



## DTC P0128 THERMOSTAT FUNCTION

PFP:21200

### On Board Diagnosis Logic

UBS006WG

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. | <ul style="list-style-type: none"> <li>● Thermostat</li> <li>● Leakage from sealing portion of thermostat</li> <li>● Engine coolant temperature sensor</li> </ul> |

### DTC Confirmation Procedure

UBS005YQ

**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), stop engine and 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-1377, "Diagnostic Procedure"](#) .

**WITH GST**

Follow the procedure “WITH CONSULT-II” above.

### Diagnostic Procedure

UBS005YR

#### 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

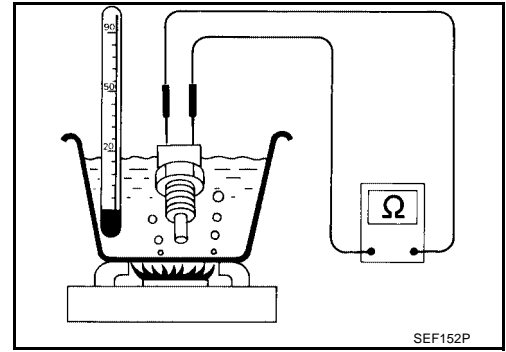
Refer to [EC-1378, "Component Inspection"](#) .

OK or NG

- OK >> **INSPECTION END.**
- NG >> Replace engine coolant temperature sensor.

## Component Inspection ENGINE COOLANT TEMPERATURE SENSOR

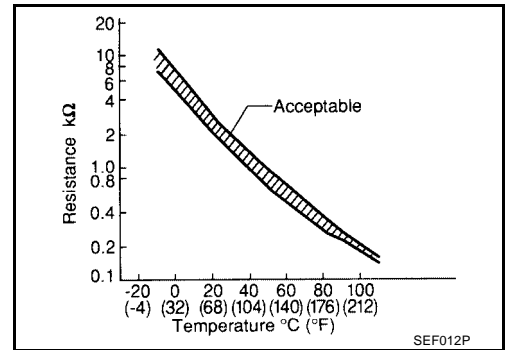
1. Check resistance as shown in the figure.



SEF152P

### <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 |



SEF012P

2. If NG, replace engine coolant temperature sensor.

## Removal and Installation ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

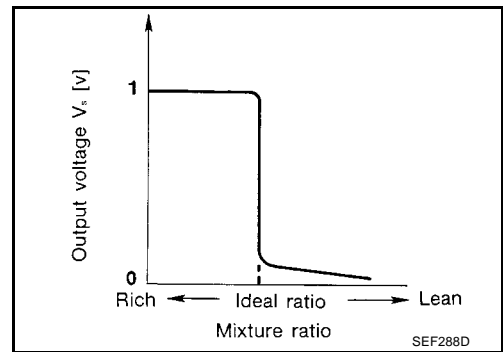
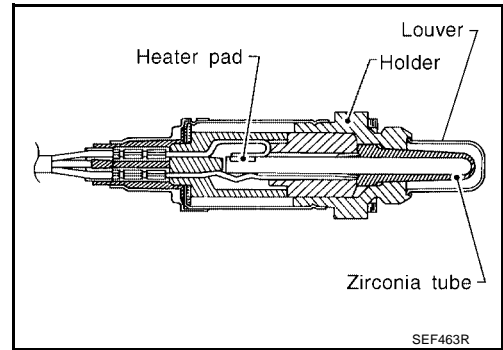
DTC P0132, P0152 HO2S1

PFP:22690

Component Description

UBS005YS

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

UBS005YT

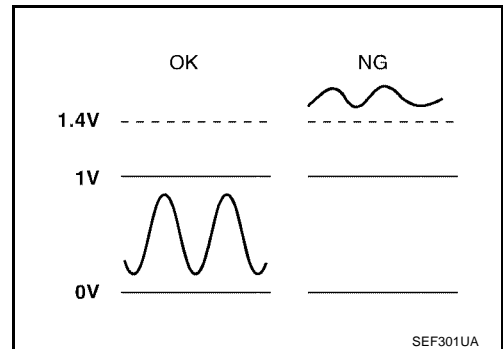
Specification data are reference values.

| MONITOR ITEM                       | CONDITION                  |                                       | SPECIFICATION   |
|------------------------------------|----------------------------|---------------------------------------|---|
| HO2S1 (B1)<br>HO2S1 (B2)           |                            |                                       | 0 - 0.3V ↔ Approx. 0.6 - 1.0V                               |
| HO2S1 MNTR (B1)<br>HO2S1 MNTR (B2) | ● Engine: After warming up | Maintaining engine speed at 2,000 rpm | LEAN ↔ RICH<br>Changes more than 5 times during 10 seconds. |

On Board Diagnosis Logic

UBS006WI

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) | Heated oxygen sensor 1 circuit high voltage | An excessively high voltage from the sensor is sent to ECM. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Heated oxygen sensor 1</li> </ul> |
| P0152 (Bank 2) |   |   |   |

## DTC Confirmation Procedure

### 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-1384, "Diagnostic Procedure"](#).

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |

SEP174Y

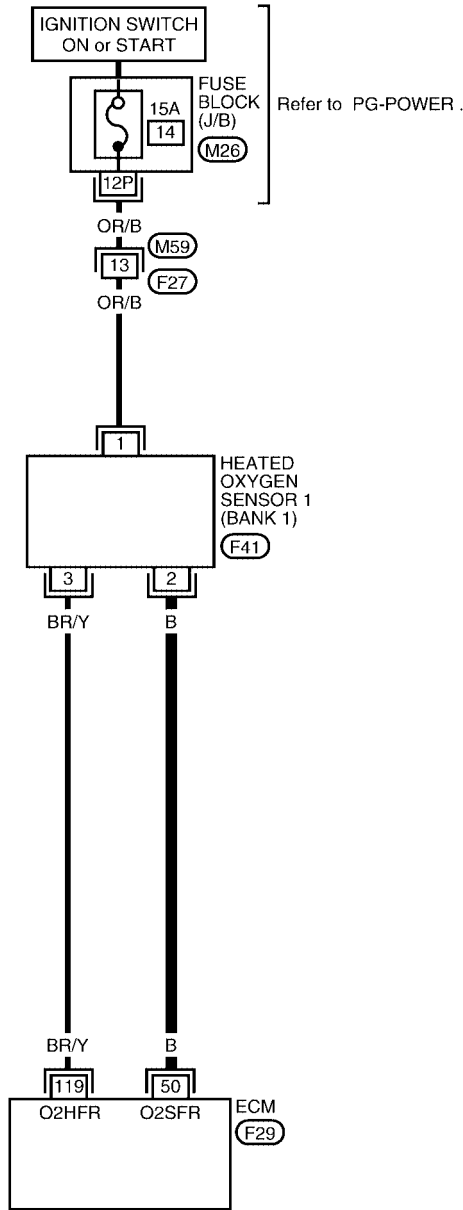
### Ⓟ WITH GST

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-1384, "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.**

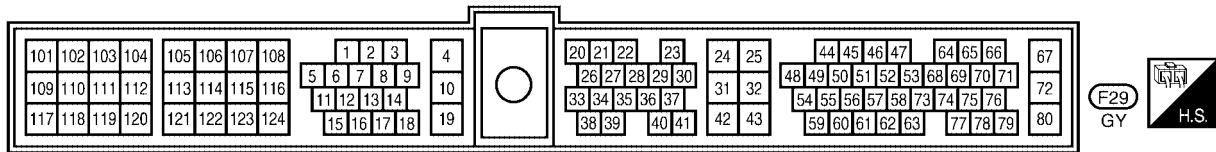
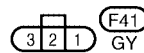
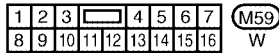
Wiring Diagram  
BANK 1

EC-O2S1B1-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



— : Detectable line for DTC  
— : Non-detectable line for DTC



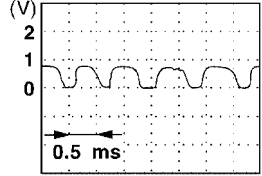
# DTC P0132, P0152 HO2S1

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

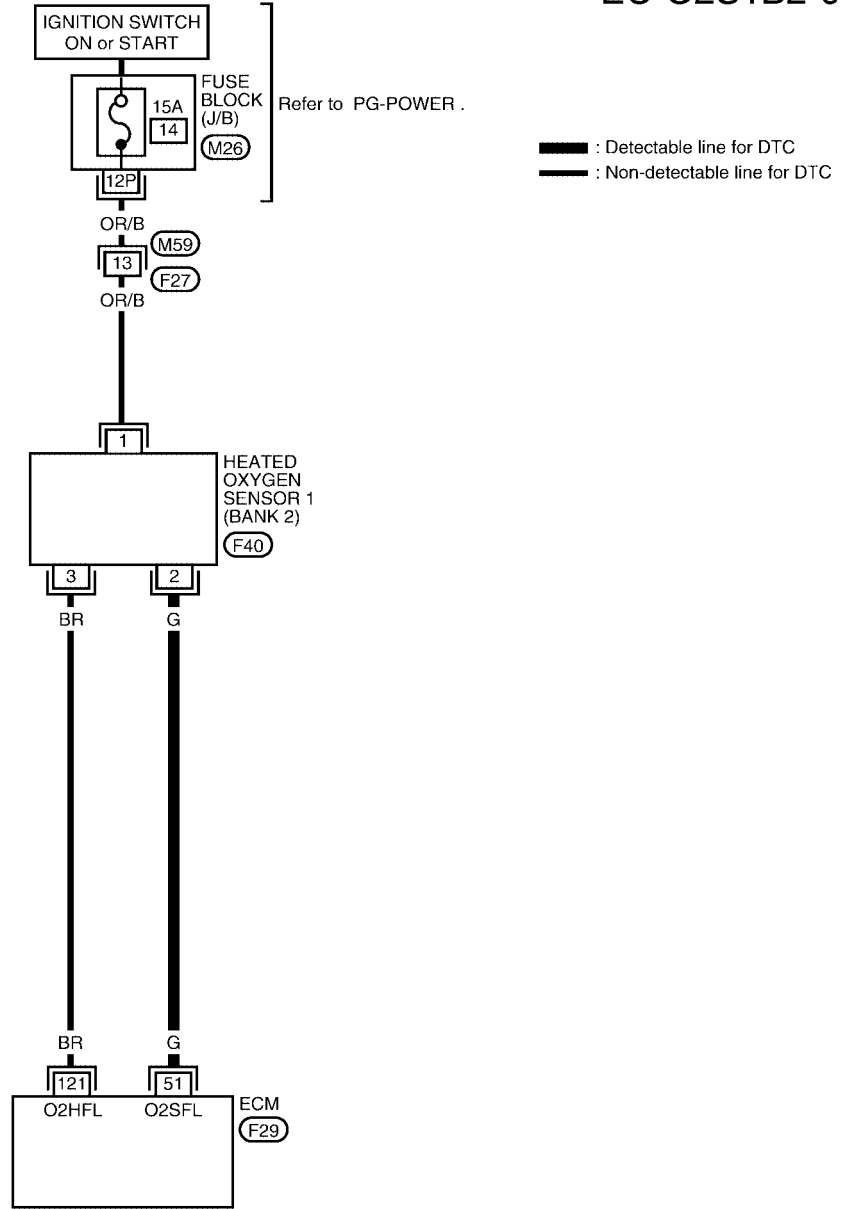
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

| TER-MINAL NO. | WIRE COLOR | ITEM                            | CONDITION  | DATA (DC Voltage)   |
|---------------|------------|---------------------------------|--|---|
| 50            | B          | Heated oxygen sensor 1 (bank 1) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>0 - Approximately 1.0V★</p>  <p style="text-align: right;"><small>SEF002V</small></p> |

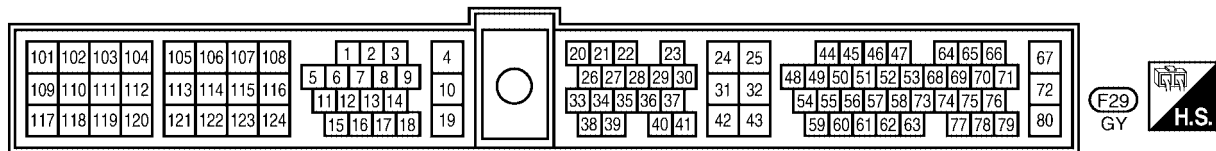
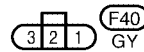
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope).

BANK 2

EC-O2S1B2-01



A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

| TER-MINAL NO. | WIRE COLOR | ITEM                            | CONDITION   | DATA (DC Voltage)              |
|---------------|------------|---------------------------------|---|--------------------------------|
| 51            | G          | Heated oxygen sensor 1 (bank 2) | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>0 - Approximately 1.0V★</p> |

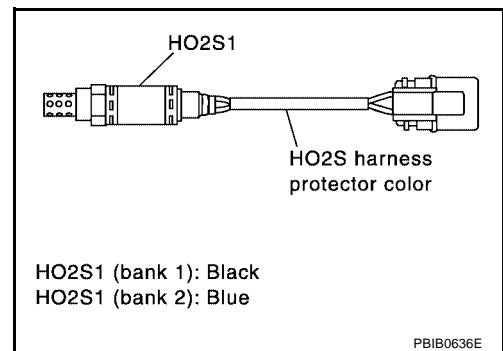
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope).

**Diagnostic Procedure**

UBS006WL

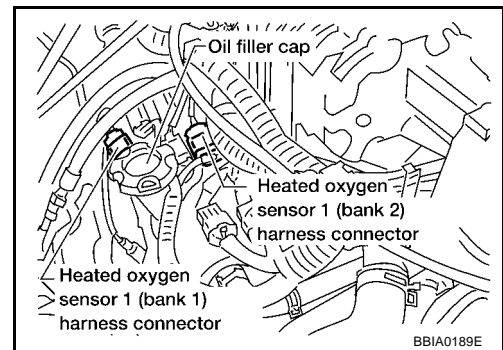
**1. INSPECTION START**

1. Turn ignition switch OFF.
2. Check heated oxygen sensor 1 harness protector.



3. Disconnect corresponding heated oxygen sensor 1 harness connector.

>> GO TO 2.



**2. RETIGHTEN HEATED OXYGEN SENSOR 1**

1. Loosen and retighten corresponding 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. 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.**

3. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows.

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P0132 | 50 or 2       | Ground | Bank 1 |
| P0152 | 51 or 2       | Ground | 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. 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 (With CONSULT-II)>>GO TO 5.  
 OK (Without CONSULT-II)>>GO TO 6.  
 NG >> Repair or replace harness or connectors.

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

**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 |
| COOLAN TEMP/S | XXX °C  |
| HO2S1 (B1)    | XXX V   |
| HO2S2 (B2)    | XXX V   |

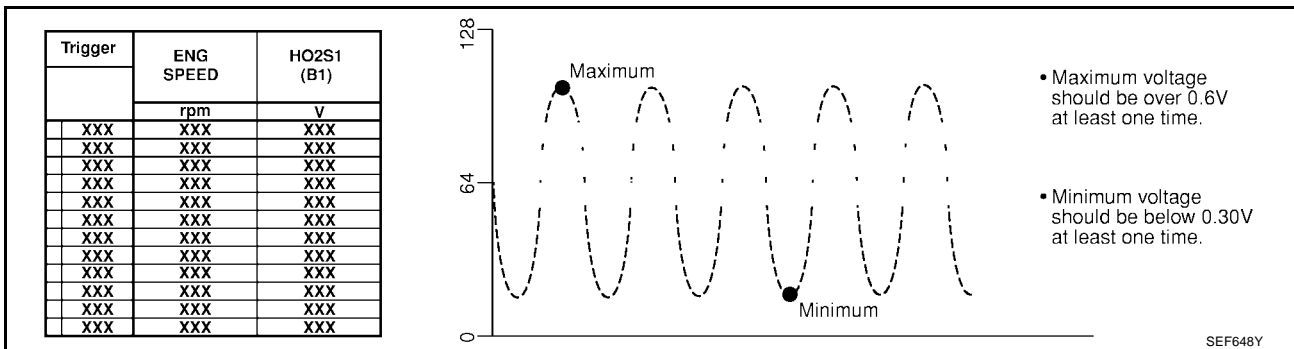
SEF967Y

5. Check the following.
  - "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown 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 |
| Bank 2 | cycle           | 1 | 2 | 3 | 4 | 5 |   |
|        | HO2S1 MNTR (B2) | R | L | R | L | R | L |

R means HO2S1  
 MNTR (B1)/(B2) indicates RICH  
 L means HO2S1  
 MNTR (B1)/(B2) indicates LEAN

SEF647Y



**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 engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
  - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
  - The maximum voltage is over 0.6V at least one time.
  - The minimum voltage is below 0.3V at least one time.
  - The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V

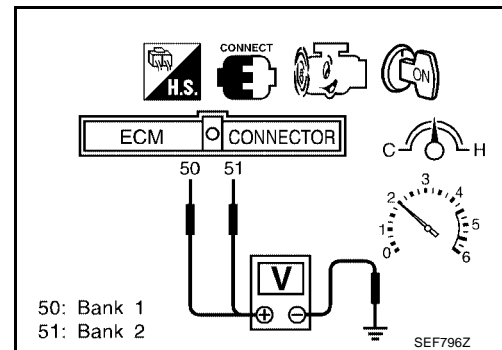
### CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK >> GO TO 7.

NG >> Replace malfunctioning heated oxygen sensor.



## 7. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 1

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

UBS0090H

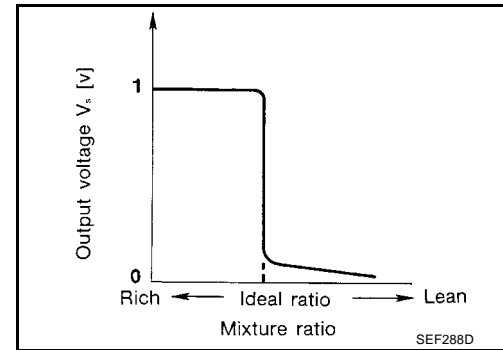
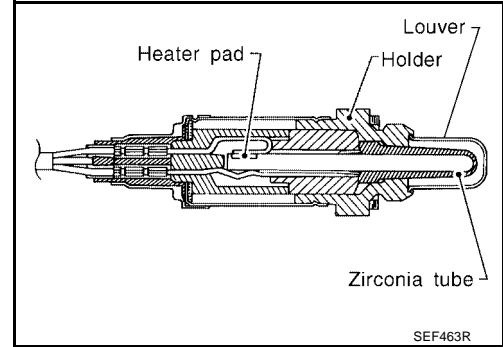
**DTC P0133, P0153 HO2S1**

PF0:22690

**Component Description**

UBS005YZ

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**

UBS005Z0

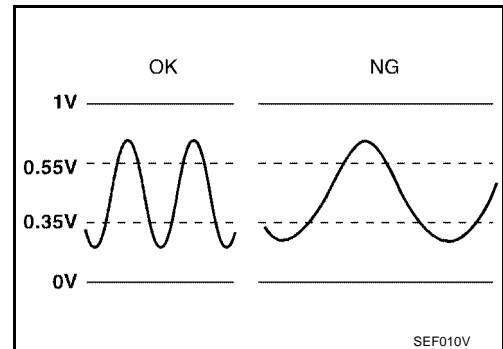
Specification data are reference values.

| MONITOR ITEM                       | CONDITION                  |                                       | SPECIFICATION   |
|------------------------------------|----------------------------|---------------------------------------|---|
| HO2S1 (B1)<br>HO2S1 (B2)           |                            |                                       | 0 - 0.3V ↔ Approx. 0.6 - 1.0V                               |
| HO2S1 MNTR (B1)<br>HO2S1 MNTR (B2) | ● Engine: After warming up | Maintaining engine speed at 2,000 rpm | LEAN ↔ RICH<br>Changes more than 5 times during 10 seconds. |

**On Board Diagnosis Logic**

UBS006WN

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<br>(Bank 1) | Heated oxygen sensor<br>1 circuit slow response | The response of the voltage signal from the<br>sensor takes more than the specified time. | <ul style="list-style-type: none"> <li>● Harness or connectors<br/>(The sensor circuit is open or shorted)</li> <li>● Heated oxygen sensor 1</li> <li>● Heated oxygen sensor 1 heater</li> <li>● Fuel pressure</li> <li>● Injectors</li> <li>● Intake air leaks</li> <li>● Exhaust gas leaks</li> <li>● PCV valve</li> <li>● Mass air flow sensor</li> </ul> |
| P0153<br>(Bank 2) |   |   |  |

**DTC Confirmation Procedure**

UBS006WO

**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  $-10^{\circ}\text{C}$  ( $14^{\circ}\text{F}$ ).
- 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”.

|                  |          |
|------------------|----------|
| 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

5. Start engine and let it idle for at least 3.5 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.)

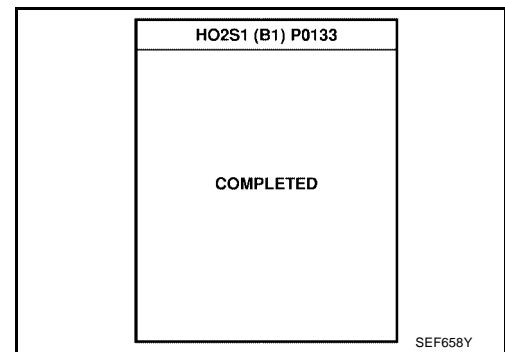
|                |                            |
|----------------|----------------------------|
| ENG SPEED      | 1,700 - 2,800 rpm          |
| Vehicle speed  | More than 80 km/h (50 MPH) |
| B/FUEL SCHDL   | 2.0 - 14.0 msec            |
| Selector lever | Suitable position          |

|                  |          |
|------------------|----------|
| 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-1394, "Diagnostic Procedure"](#).



UBS006WP

## Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

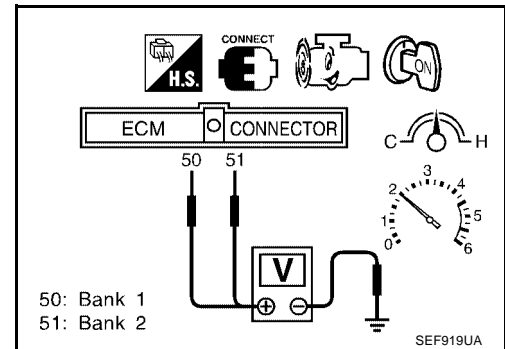
### WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HOS1 (B1) signal] or 51 [HOS1 (B2) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
  - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.

**1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V**

**2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V**

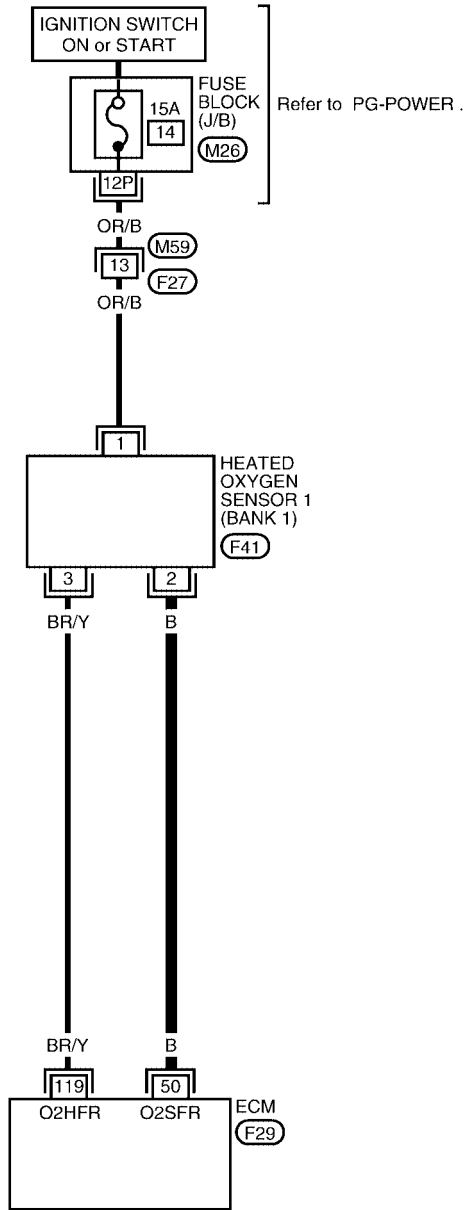
4. If NG, go to [EC-1394, "Diagnostic Procedure"](#).



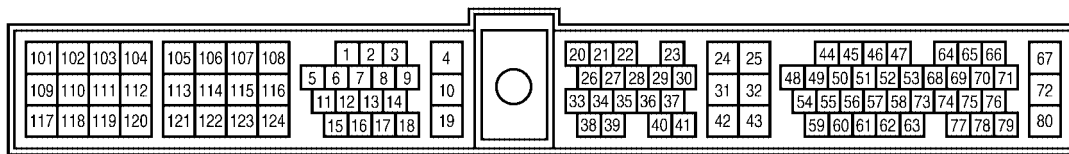
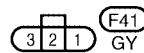
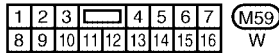
Wiring Diagram  
BANK 1

EC-O2S1B1-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



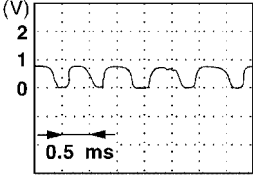
— : Detectable line for DTC  
— : Non-detectable line for DTC



Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

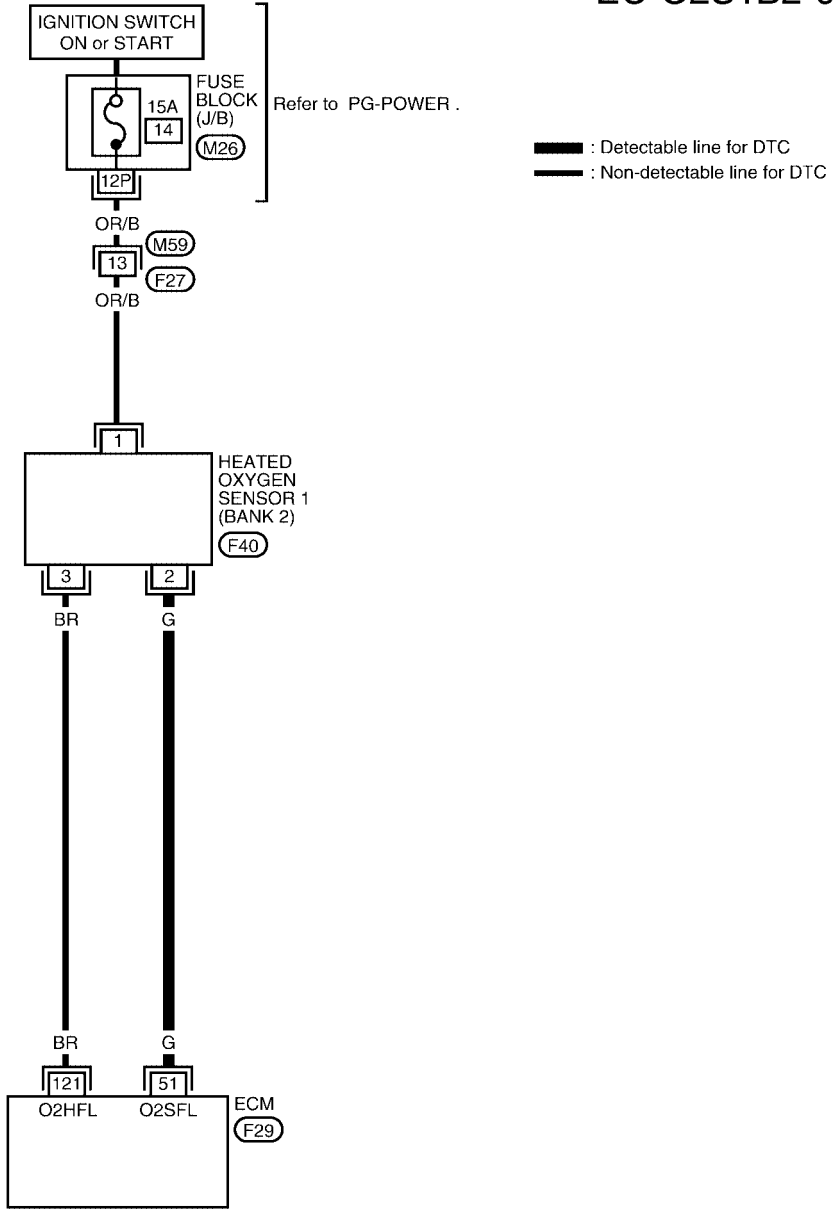
| TER-MINAL NO. | WIRE COLOR | ITEM                            | CONDITION  | DATA (DC Voltage)   |
|---------------|------------|---------------------------------|--|---|
| 50            | B          | Heated oxygen sensor 1 (bank 1) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>0 - Approximately 1.0V★</p>  <p style="text-align: right;"><small>SEF002V</small></p> |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope).

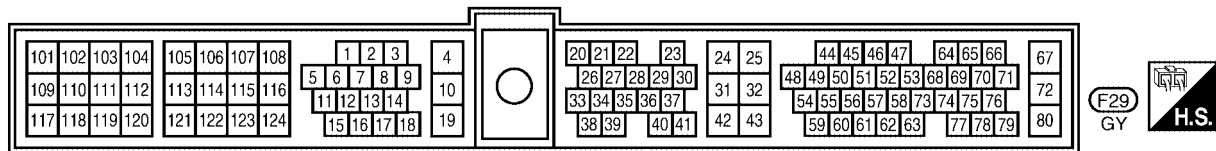
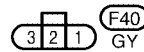
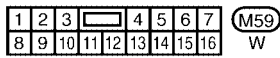
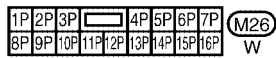


BANK 2

EC-O2S1B2-01



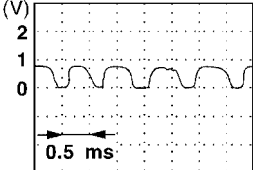
A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

| TER-MINAL NO. | WIRE COLOR | ITEM                            | CONDITION   | DATA (DC Voltage)   |
|---------------|------------|---------------------------------|---|---|
| 51            | G          | Heated oxygen sensor 1 (bank 2) | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>0 - Approximately 1.0V★</p>  <p>SEF002V</p> |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope).

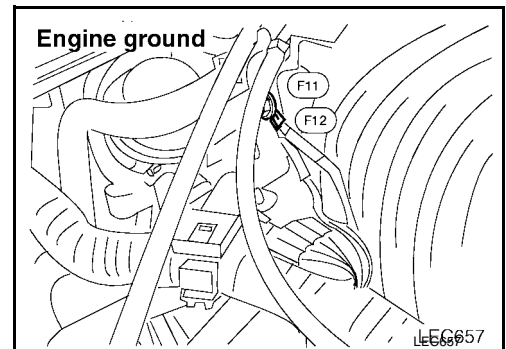
**Diagnostic Procedure**

UBS006WR

**1. RETIGHTEN GROUND SCREWS**

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



**2. RETIGHTEN HEATED OXYGEN SENSOR 1**

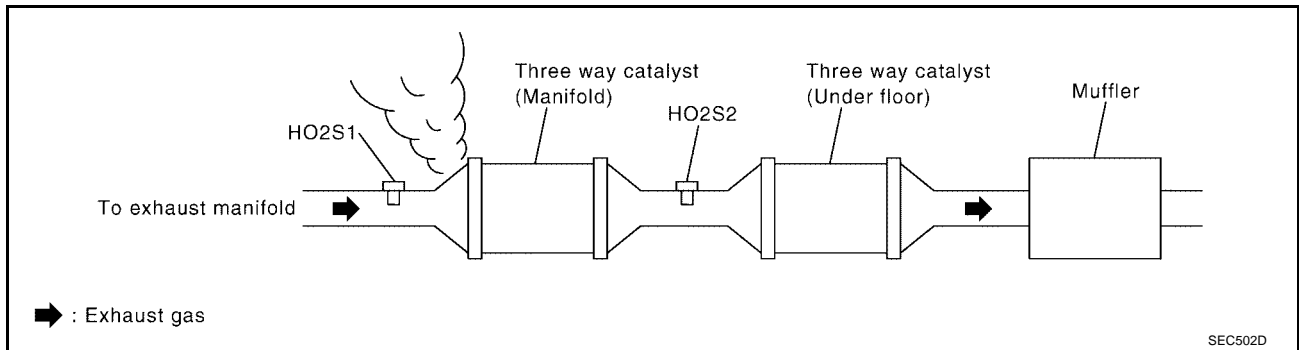
Loosen and retighten corresponding heated oxygen sensor 1.

**Tightening torque : 40 - 60 N-m (4.1 - 6.1 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.

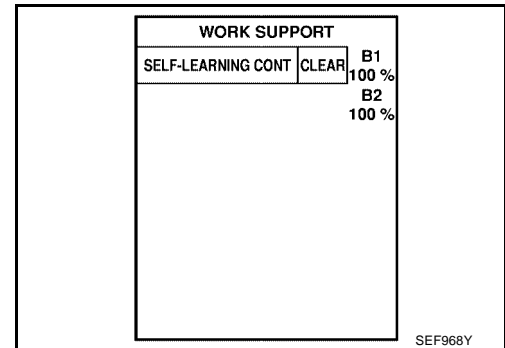
OK or NG

- 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, P0172, P0174 or P0175 detected?**  
**Is it difficult to start engine?**



### Without CONSULT-II

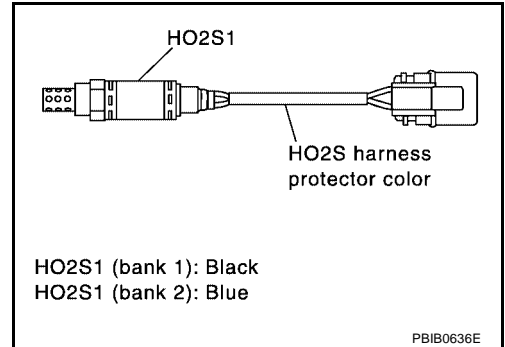
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to [EC-1225, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS"](#).
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?**  
**Is it difficult to start engine?**

#### Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to [EC-1431](#) or [EC-1439](#).
- No >> GO TO 6.

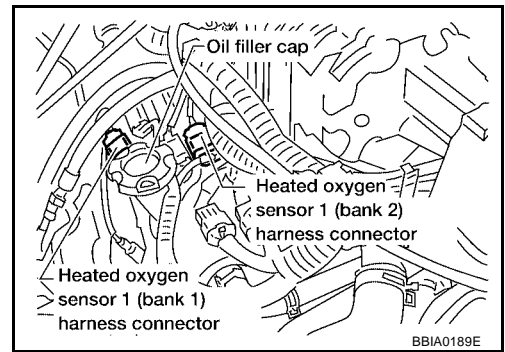
**6. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch OFF.
2. Check heated oxygen sensor 1 harness protector.



3. Disconnect corresponding heated oxygen sensor 1 harness connector.
4. Disconnect ECM harness connector.
5. 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.**

6. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows.  
Refer to Wiring Diagram.

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P0133 | 50 or 2       | Ground | Bank 1 |
| P0153 | 51 or 2       | Ground | Bank 2 |

**Continuity should not exist.**

7. 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 HEATED OXYGEN SENSOR 1 HEATER

Check resistance between HO2S1 terminals 3 and 1.

**Resistance : 2.3 - 4.3Ω at 25°C (77°F)**

Check continuity between HO2S1 terminals 2 and 1, 3 and 2.

**Continuity should not exist.**

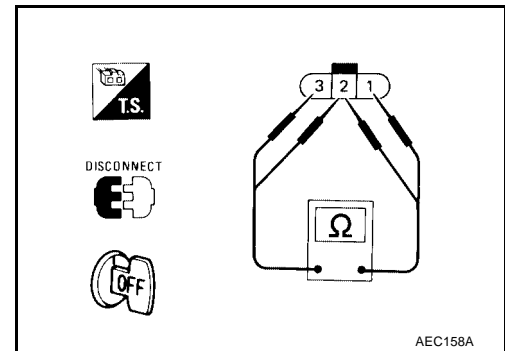
### CAUTION:

- 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 >> GO TO 8.

NG >> Replace malfunctioning heated oxygen sensor 1.



## 8. CHECK MASS AIR FLOW SENSOR

Refer to [EC-1337, "Component Inspection"](#).

OK or NG

OK >> GO TO 9.

NG >> Replace mass air flow sensor.

## 9. CHECK PCV VALVE

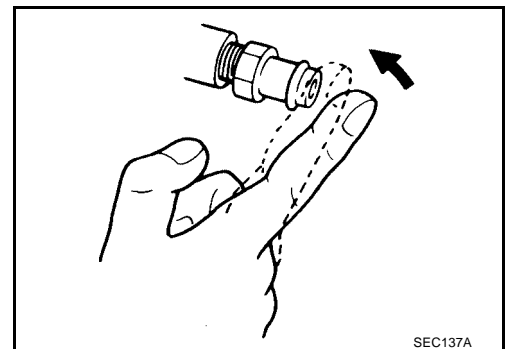
With engine running at idle, remove PCV valve from rocker cover; make sure that a hissing noise will be heard as air passes through it and a strong vacuum should be felt immediately when a finger is placed over valve inlet.

OK or NG

OK (With CONSULT-II)>>GO TO 10.

OK (Without CONSULT-II)>>GO TO 11.

NG >> Replace PCV valve.



10. 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 |
| COOLAN TEMP/S | XXX °C  |
| HO2S1 (B1)    | XXX V   |
| HO2S2 (B2)    | XXX V   |

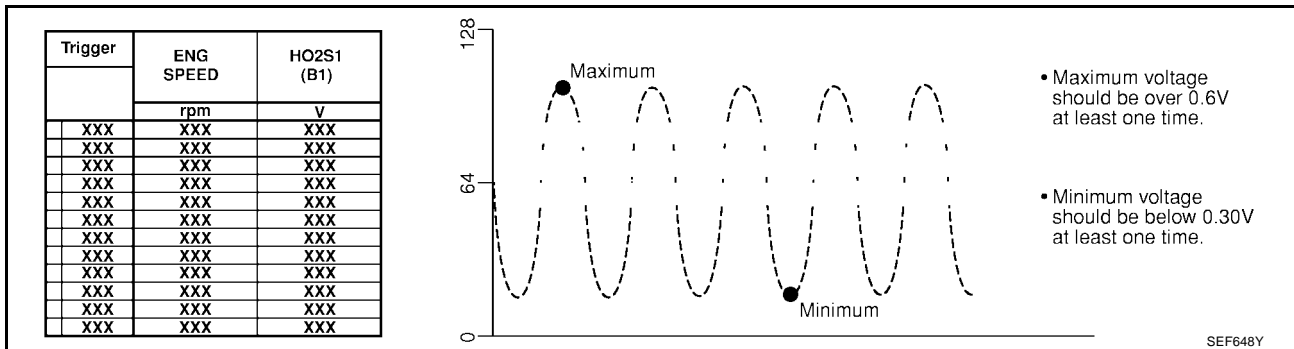
SEF967Y

5. Check the following.
  - "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown 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 | L | R | L | R |
| Bank 2 | cycle           | 1 | 2 | 3 | 4 | 5 |   |
|        | HO2S1 MNTR (B2) | R | L | L | R | L | R |

R means HO2S1 MNTR (B1)/(B2) indicates RICH  
L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y



**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 12.
- NG >> Replace malfunctioning heated oxygen sensor 1.

## 11. 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 engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
- The maximum voltage is over 0.6V at least one time.
- The minimum voltage is below 0.3V at least one time.
- The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V

### CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

OK or NG

OK >> GO TO 12.

NG >> Replace malfunctioning heated oxygen sensor 1.

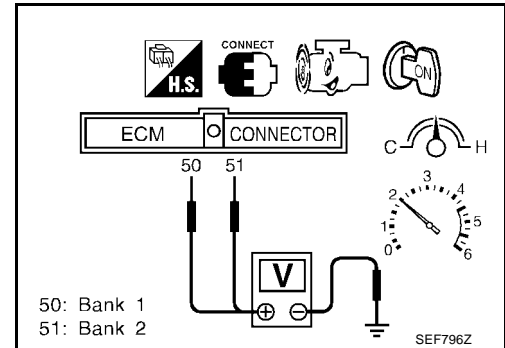
## 12. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 1

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .





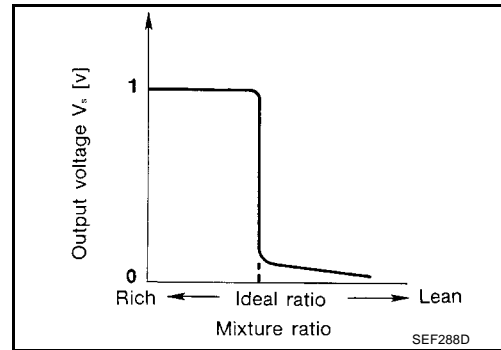
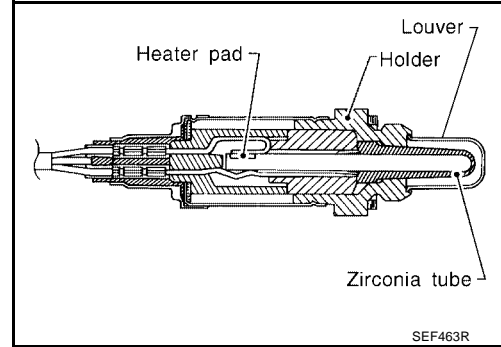
**DTC P0134, P0154 HO2S1**

PF2:22690

**Component Description**

UBS005Z7

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**

UBS005Z8

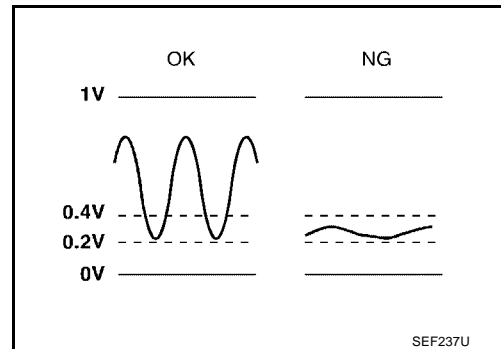
Specification data are reference values.

| MONITOR ITEM                       | CONDITION                  |                                       | SPECIFICATION   |
|------------------------------------|----------------------------|---------------------------------------|---|
| HO2S1 (B1)<br>HO2S1 (B2)           |                            |                                       | 0 - 0.3V ↔ Approx. 0.6 - 1.0V                               |
| HO2S1 MNTR (B1)<br>HO2S1 MNTR (B2) | ● Engine: After warming up | Maintaining engine speed at 2,000 rpm | LEAN ↔ RICH<br>Changes more than 5 times during 10 seconds. |

**On Board Diagnosis Logic**

UBS006WT

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) | Heated oxygen sensor 1 circuit no activity detected | The voltage from the sensor is constantly approx. 0.3V. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Heated oxygen sensor 1</li> </ul> |
| P0154 (Bank 2) |   |   |   |

**DTC Confirmation Procedure**

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 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 3.5 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      | 1,400 - 2,700 rpm          |
| Vehicle speed  | More than 65 km/h (40 MPH) |
| B/FUEL SCHDL   | 2.0 - 14.0 msec            |
| Selector lever | Suitable position          |

|                  |          |
|------------------|----------|
| 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

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-1408, "Diagnostic Procedure"](#).  
During this test, P1148 and P1168 may be stored in ECM.

|                  |  |
|------------------|--|
| HO2S1 (B1) P0134 |  |
| COMPLETED        |  |

LEC034A

**Overall Function Check**

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

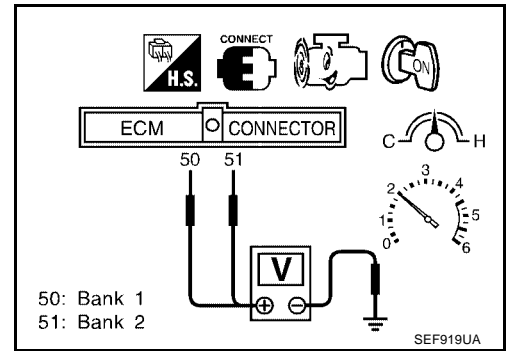
**WITH GST**

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and engine ground.

# DTC P0134, P0154 HO2S1

[VG33ER]

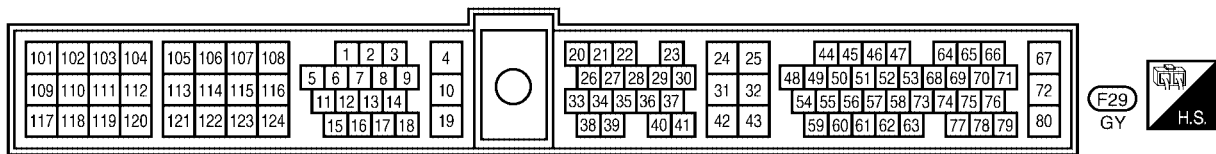
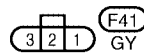
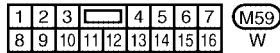
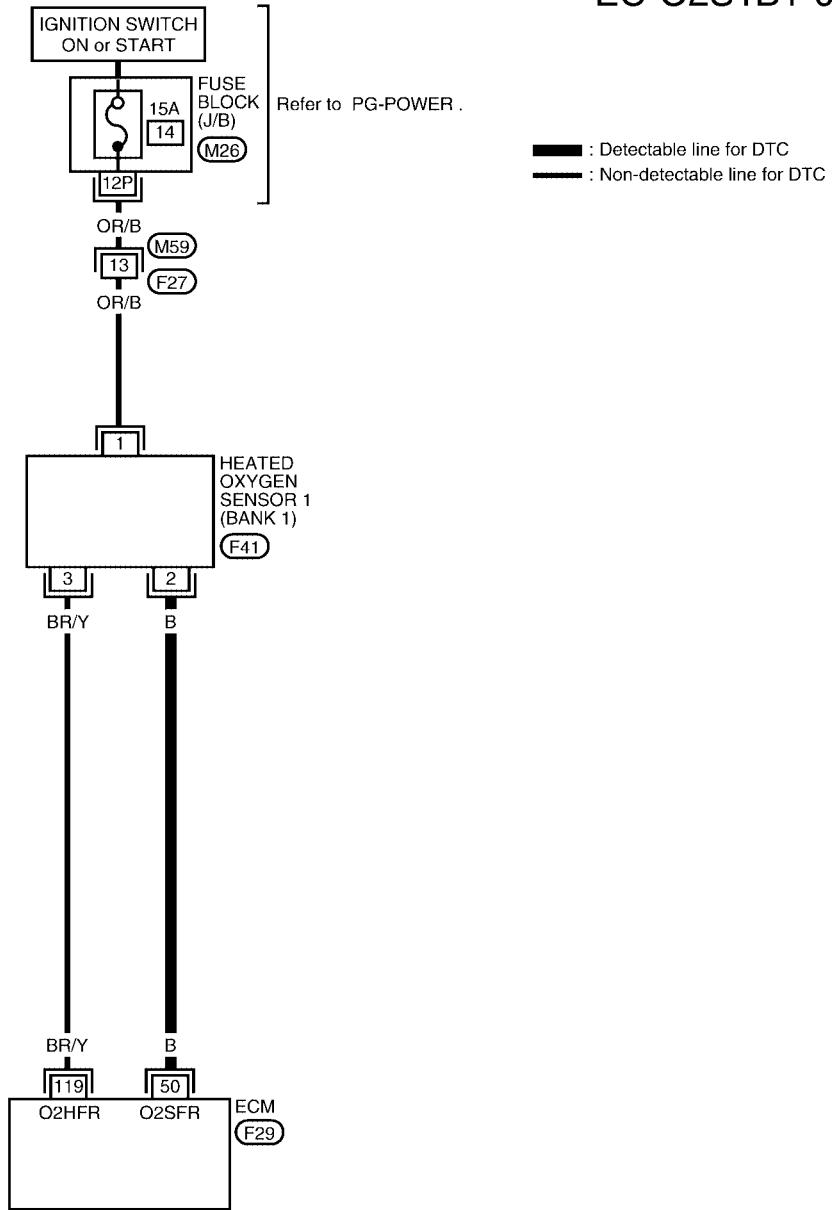
3. Check the following with engine speed held at 2,000 rpm constant under no load.
  - The voltage does not remain in the range of 0.2 - 0.4V.
4. If NG, go to [EC-1408, "Diagnostic Procedure"](#) .



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Wiring Diagram  
BANK 1

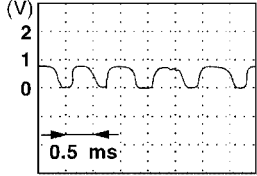
EC-O2S1B1-01



Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

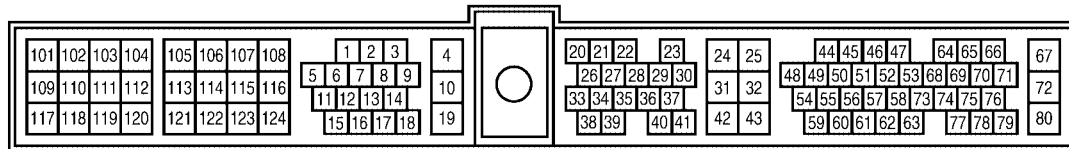
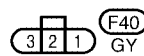
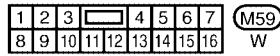
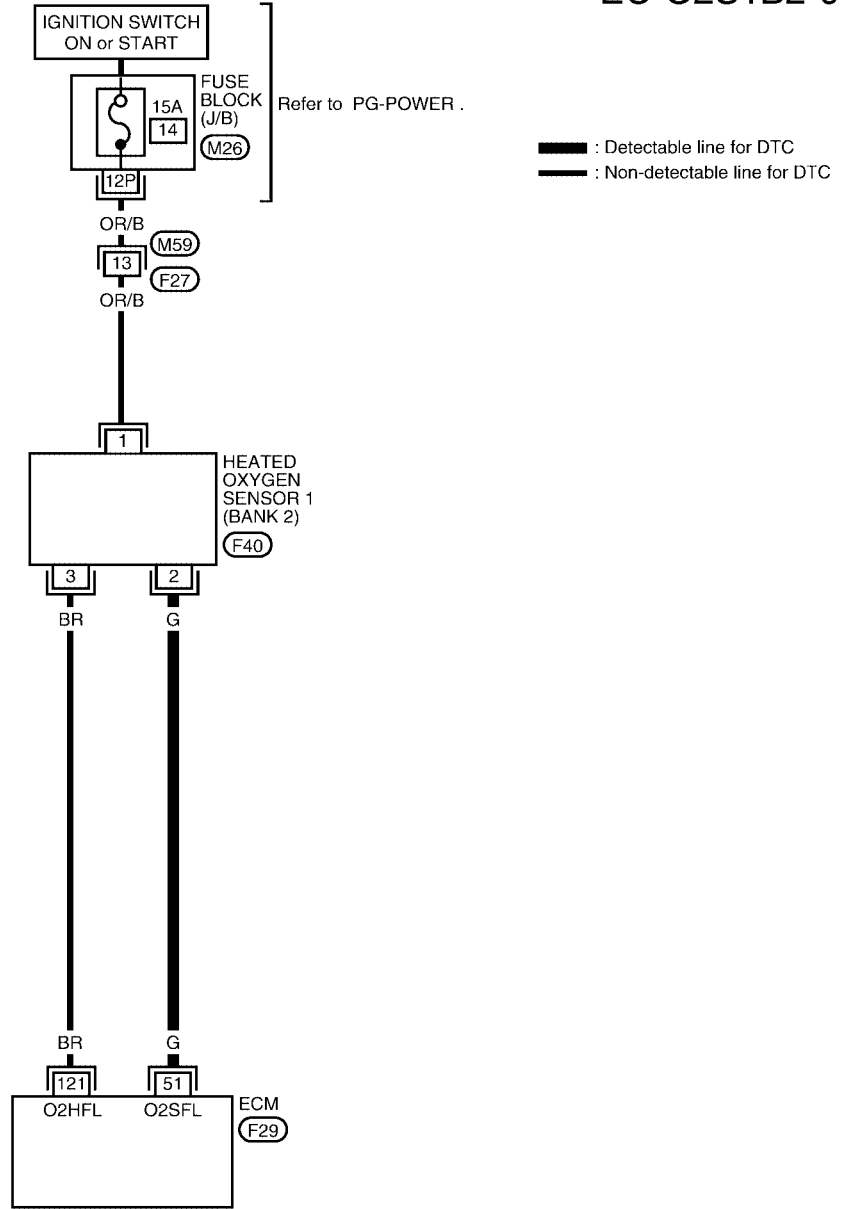
| TER-MINAL NO. | WIRE COLOR | ITEM                                    | CONDITION   | DATA (DC Voltage)  |
|---------------|------------|---|---|--|
| 50            | B          | Heated oxygen sensor 1 (front) (bank 1) | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>0 - Approximately 1.0V★</p>  |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope).

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BANK 2

EC-O2S1B2-01



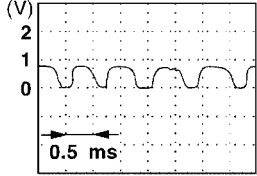
# DTC P0134, P0154 HO2S1

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use 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.

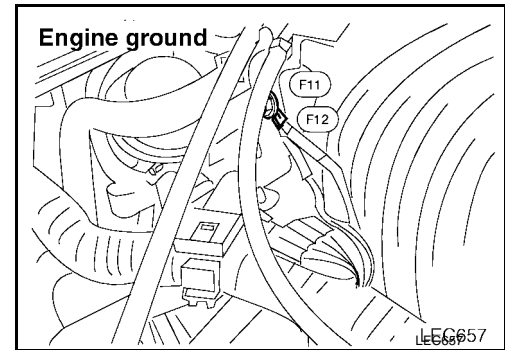
| TER-MINAL NO. | WIRE COLOR | ITEM                            | CONDITION   | DATA (DC Voltage)  |
|---------------|------------|---------------------------------|---|--|
| 51            | G          | Heated oxygen sensor 1 (bank 2) | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>0 - Approximately 1.0V★</p>  <p style="text-align: right;">SEF002V</p> |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

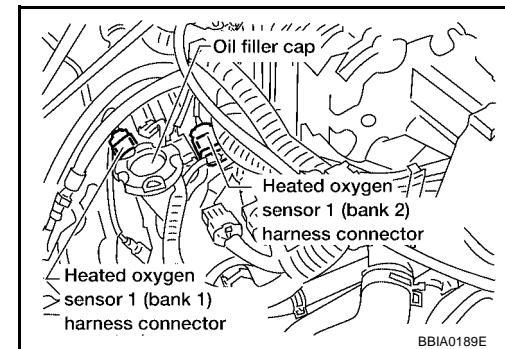
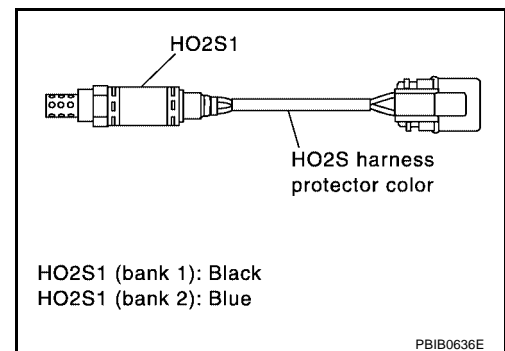
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**Diagnostic Procedure****1. INSPECTION START**

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.



3. Make sure HO2S 1 harness protector color, and disconnect corresponding heated oxygen sensor 1 harness connector.



>> GO TO 2.



**2. CHECK HO2S 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal and HO2S1 terminal as follows.  
Refer to Wiring Diagram.

| DTC   | Terminals |        | Bank   |
|-------|-----------|--------|--------|
|       | ECM       | Sensor |        |
| P0134 | 50        | 2      | Bank 1 |
| P0154 | 51        | 2      | Bank 2 |

**Continuity should exist.**

3. Check harness continuity between ECM terminal or HO2S1 terminal and ground as follows.  
Refer to Wiring Diagram.

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P0134 | 50 or 2       | Ground | Bank 1 |
| P0154 | 51 or 2       | Ground | Bank 2 |

**Continuity should not exist.**

4. 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.

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### 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 |
| COOLANT TEMP/S | XXX °C  |
| HO2S1 (B1)     | XXX V   |
| HO2S2 (B2)     | XXX V   |

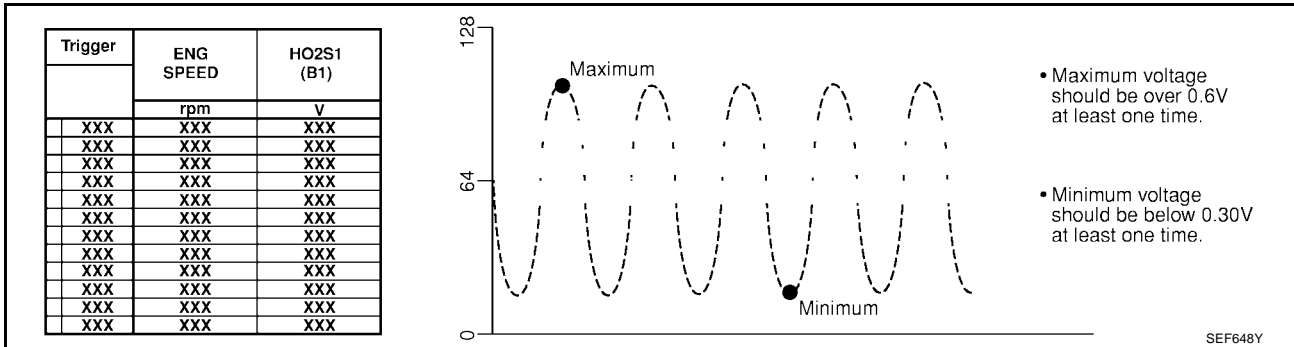
SEF967Y

5. Check the following.
  - "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown 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 |
| Bank 2 | cycle           | 1 | 2  | 3  | 4  | 5  |    |
|        | HO2S1 MNTR (B2) | R | -L | -R | -L | -R | -L |

R means HO2S1 MNTR (B1)/(B2) indicates RICH  
L means HO2S1 MNTR (B1)/(B2) indicates LEAN

SEF647Y



**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

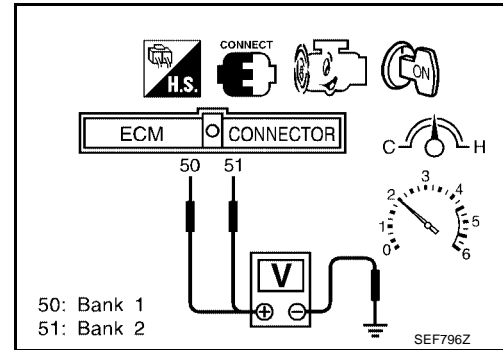
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B1) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
  - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
  - The maximum voltage is over 0.6V at least one time.
  - The minimum voltage is below 0.3V at least one time.
  - The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V

### CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.



OK or NG

OK >> GO TO 5.

NG >> Replace malfunctioning heated oxygen sensor 1.

## 5. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 1

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

UBS0090J

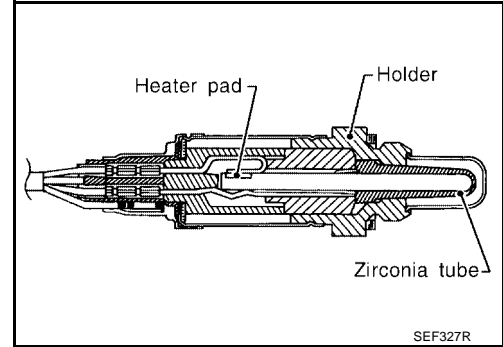
**DTC P0138, P0158 HO2S2**

PF0:226A0

**Component Description**

UBS005ZF

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**

UBS005ZG

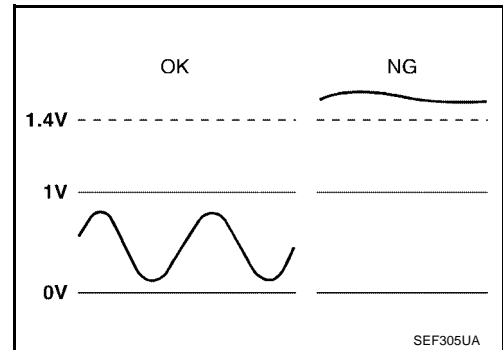
Specification data are reference values.

| MONITOR ITEM                       | CONDITION  |  | SPECIFICATION                 |
|------------------------------------|--|--|-------------------------------|
| HO2S2 (B1)<br>HO2S2 (B2)           | <ul style="list-style-type: none"> <li>Warm-up condition</li> <li>After keeping engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> | Revving engine from idle up to 3,000 rpm quickly | 0 - 0.3V ↔ Approx. 0.6 - 1.0V |
| HO2S2 MNTR (B1)<br>HO2S2 MNTR (B2) |  |  | LEAN ↔ RICH                   |

**On Board Diagnosis Logic**

UBS006WZ

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) | Heated oxygen sensor 2 circuit high voltage | An excessively high voltage from the sensor is sent to ECM. | <ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> </ul> |
| P0158 (Bank 2) |   |   |   |

**DTC Confirmation Procedure**

UBS006X0

**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 one minute under no load.
5. Let engine idle for two minutes.
6. If 1st trip DTC is detected, go to [EC-1417, "Diagnostic Procedure"](#) .

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

 **WITH GST**

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for two minutes.
5. Turn ignition switch "OFF" and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
7. Let engine idle for two minutes.
8. Select "Mode 3" with GST.
9. If DTC is detected, go to [EC-1417, "Diagnostic Procedure"](#) .

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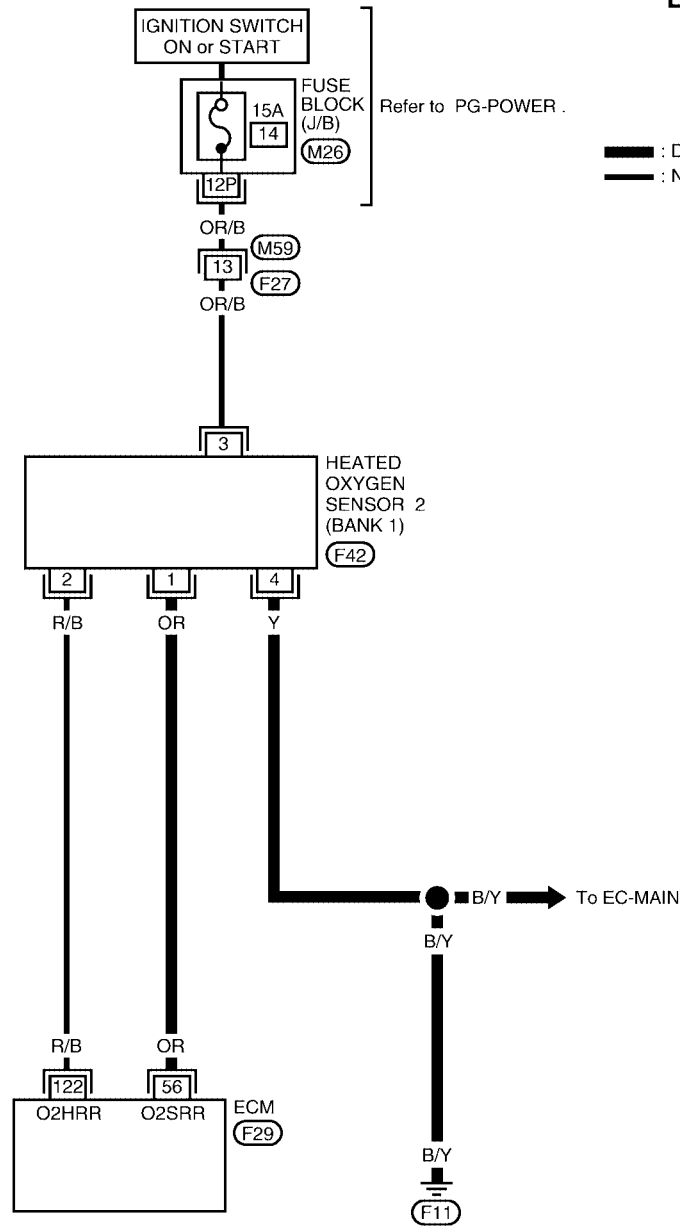
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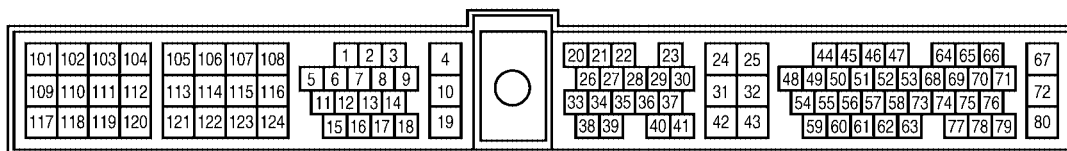
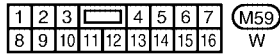
M

Wiring Diagram  
BANK 1

EC-O2S2B1-01



— : Detectable line for DTC  
— : Non-detectable line for DTC



# DTC P0138, P0158 HO2S2

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

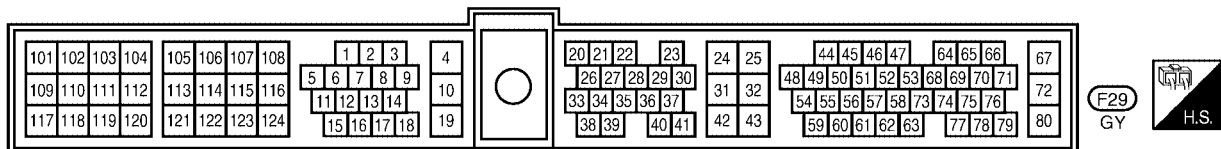
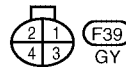
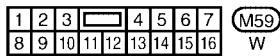
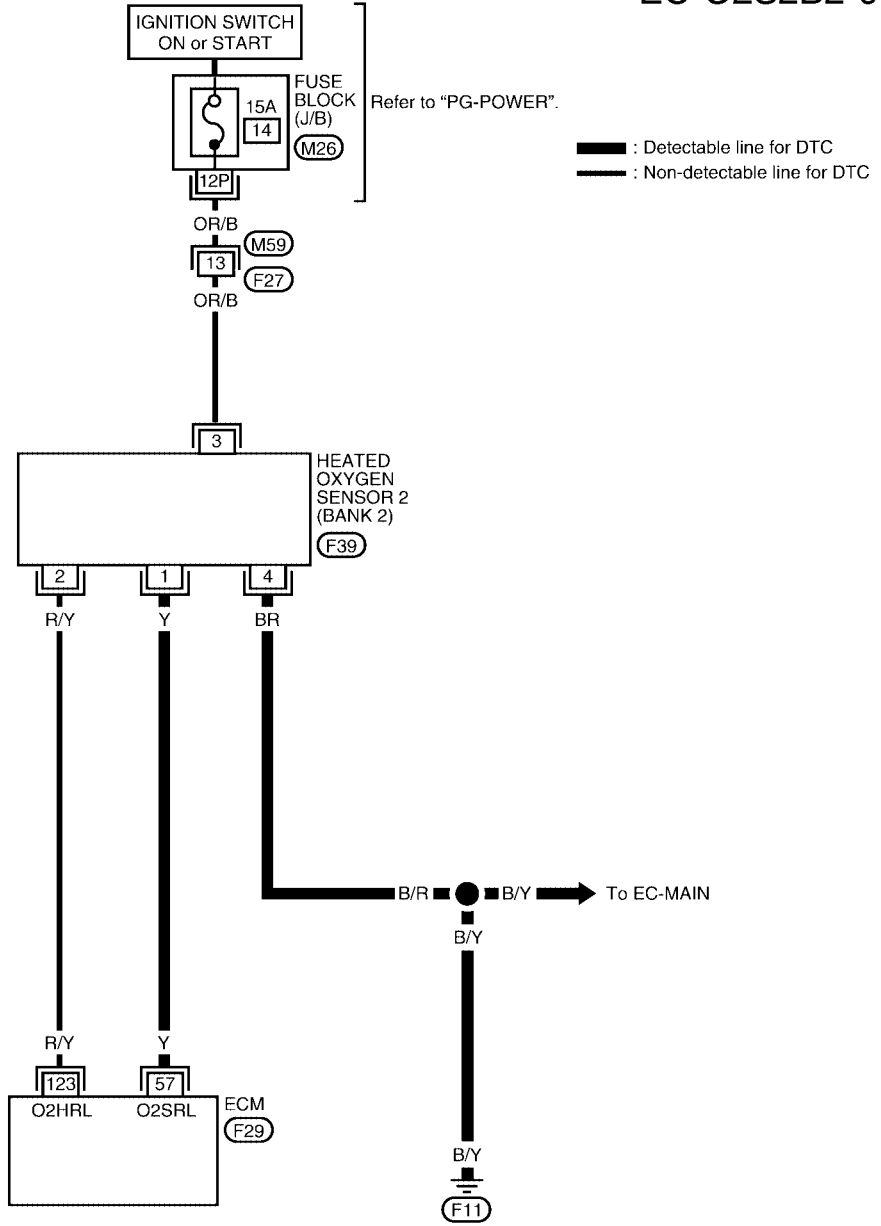
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

| TER-MINAL NO. | WIRE COLO R | ITEM                            | CONDITION  | DATA (DC Voltage)      |
|---------------|-------------|---------------------------------|--|------------------------|
| 56            | OR          | Heated oxygen sensor 2 (bank 1) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine speed is below 3.600 rpm after the following conditions are met.                             <ul style="list-style-type: none"> <li>– Engine after warming up.</li> <li>– Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> </li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V |

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BANK 2

EC-O2S2B2-01





Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

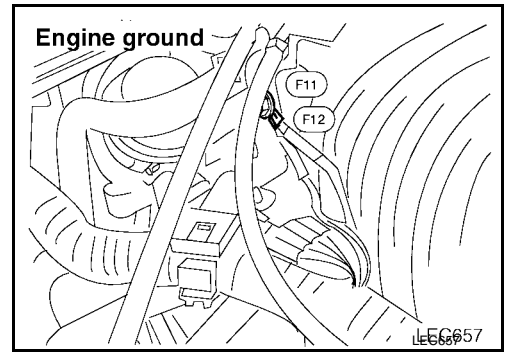
| TER-MINAL NO. | WIRE COLO R | ITEM                            | CONDITION  | DATA (DC Voltage)      |
|---------------|-------------|---------------------------------|--|------------------------|
| 57            | Y           | Heated oxygen sensor 2 (bank 2) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine speed is below 3.600 rpm after the following conditions are met.                             <ul style="list-style-type: none"> <li>- Engine after warming up.</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> </li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V |

**Diagnostic Procedure**

UBS006X3

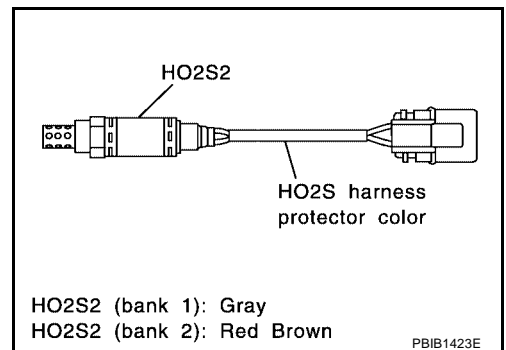
**1. INSPECTION START**

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.



3. Check heated oxygen sensor 2 harness protector color.
4. Disconnect corresponding heated oxygen sensor 2 harness connector.
5. Disconnect ECM harness connector.

>> GO TO 2.



## 2. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows.  
Refer to Wiring Diagram.

| DTC   | Terminals |        | Bank   |
|-------|-----------|--------|--------|
|       | ECM       | Sensor |        |
| P0138 | 56        | 1      | Bank 1 |
| P0158 | 57        | 1      | Bank 2 |

**Continuity should exist.**

2. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows.

Refer to Wiring Diagram.

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P0138 | 56 or 1       | Ground | Bank 1 |
| P0158 | 57 or 1       | Ground | Bank 2 |

**Continuity should not exist.**

3. 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 engine ground.  
Refer to Wiring Diagram.

**Continuity should 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 following.

- Harness for open between heated oxygen sensor 2 and engine ground.

>> Repair open circuit to ground or short to power in harness or connectors.

## 5. 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 6.

OK (Without CONSULT-II)>>GO TO 7.

NG >> Repair or replace harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 2

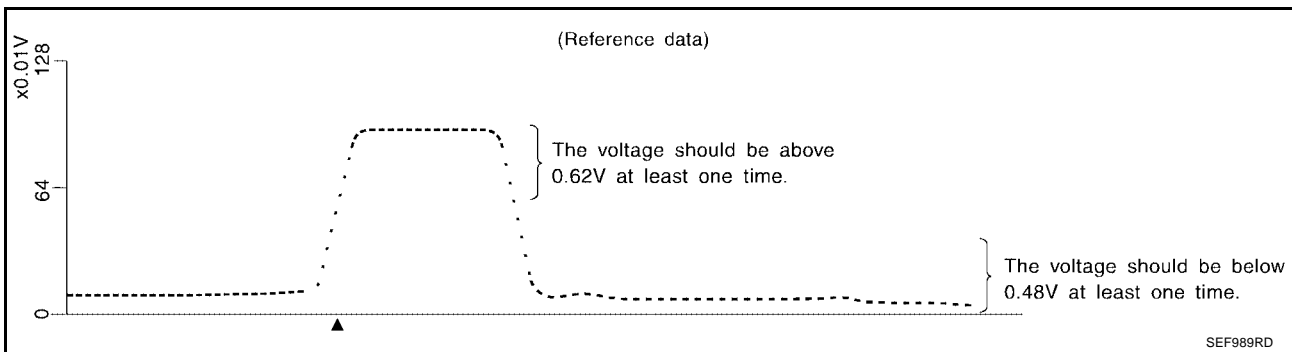
 With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch "OFF" and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
5. Let engine idle for one minutes.
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  $\pm 25\%$ .



"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 8.
- NG >> Replace malfunctioning heated oxygen sensor 2.

## 7. 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 one minute under no load.
4. Let engine idle for one minutes.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
(Depress and release accelerator pedal as soon as possible.)

**The voltage should be above 0.62V 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 8.  
NG >> Replace malfunctioning heated oxygen sensor 2.

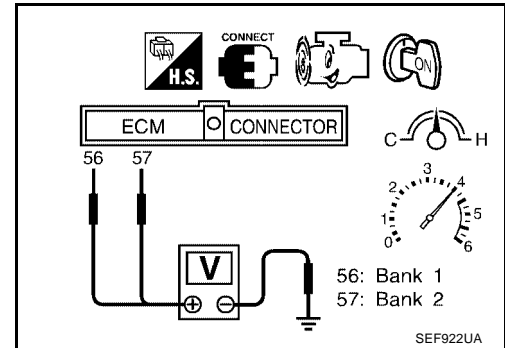
## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 2

Refer to [EX-3, "EXHAUST SYSTEM"](#) .



**DTC P0139, P0159 HO2S2**

PF2:226A0

**Component Description**

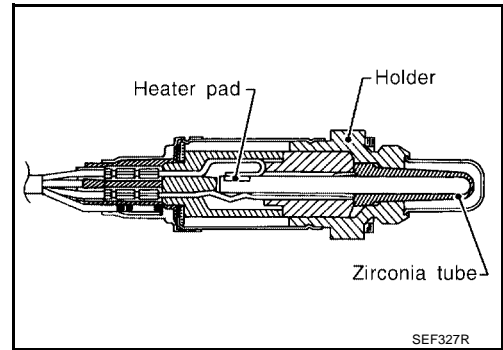
UBS005ZN

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.



SEF327R

**CONSULT-II Reference Value in Data Monitor Mode**

UBS005ZO

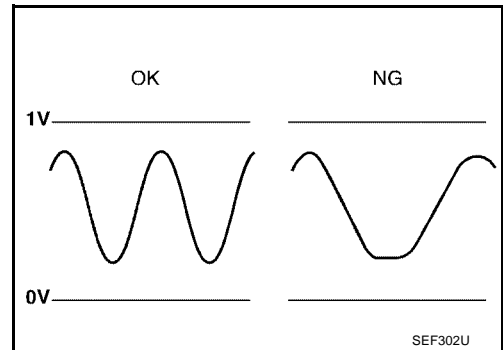
Specification data are reference values.

| MONITOR ITEM                       | CONDITION  |  | SPECIFICATION                 |
|------------------------------------|--|--|-------------------------------|
| HO2S2 (B1)<br>HO2S2 (B2)           | <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● After keeping engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> | Revving engine from idle up to 3,000 rpm quickly | 0 - 0.3V ↔ Approx. 0.6 - 1.0V |
| HO2S2 MNTR (B1)<br>HO2S2 MNTR (B2) |  |  | LEAN ↔ RICH                   |

**On Board Diagnosis Logic**

UBS006X5

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.



SEF302U

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Heated oxygen sensor 2</li> <li>● Fuel pressure</li> <li>● Injectors</li> <li>● Intake air leaks</li> </ul> |
| P0159 (Bank 2) |  |   |   |

**DTC Confirmation Procedure**

UBS005ZR

**NOTE:**

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

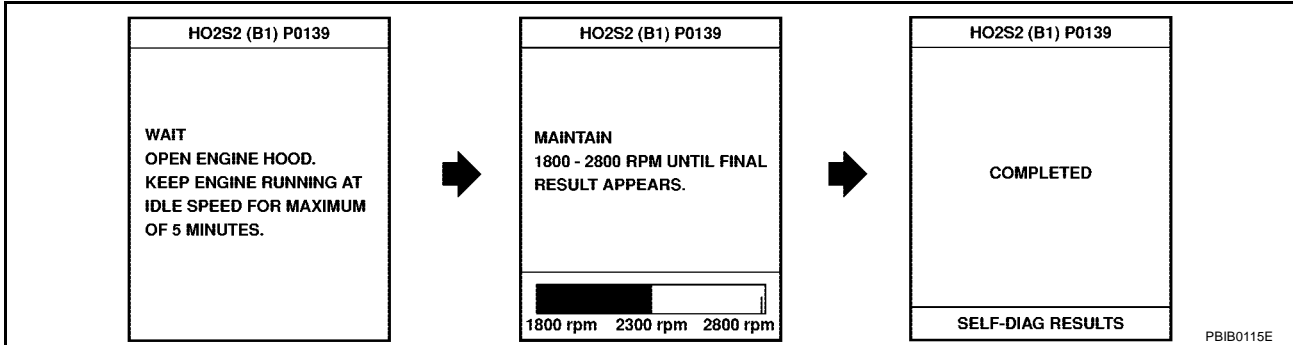
**TESTING CONDITION:**

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 one minute under no load.
4. Let engine idle for one minutes.
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-1426, "Diagnostic Procedure"](#)  
 If "CAN NOT BE DIAGNOSED" is displayed, perform the following.
  - a. Turn ignition switch "OFF" and leave the vehicle in a cool place (soak the vehicle).
  - b. Turn ignition switch "ON" and select "COOLANTEMP/S" in "DATA MONITOR" mode with CONSULT-II.
  - c. Start engine and warm it up while monitoring "COOLANTEMP/S" indication on CONSULT-II.
  - d. When "COOLANTEMP/S" indication reaches to 70°C (158°F), go to step 3.

## Overall Function Check

UBS005ZS

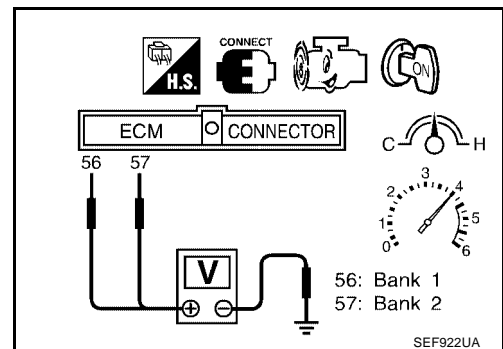
Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

### CAUTION:

**Always drive vehicle at a safe speed.**

### WITH GST

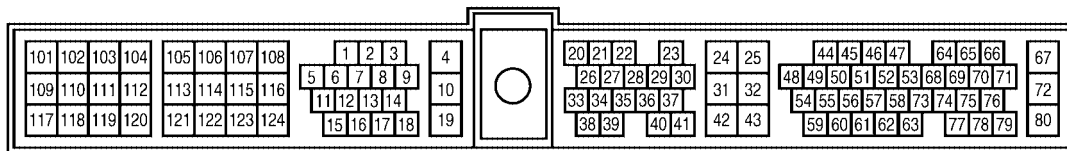
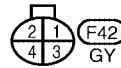
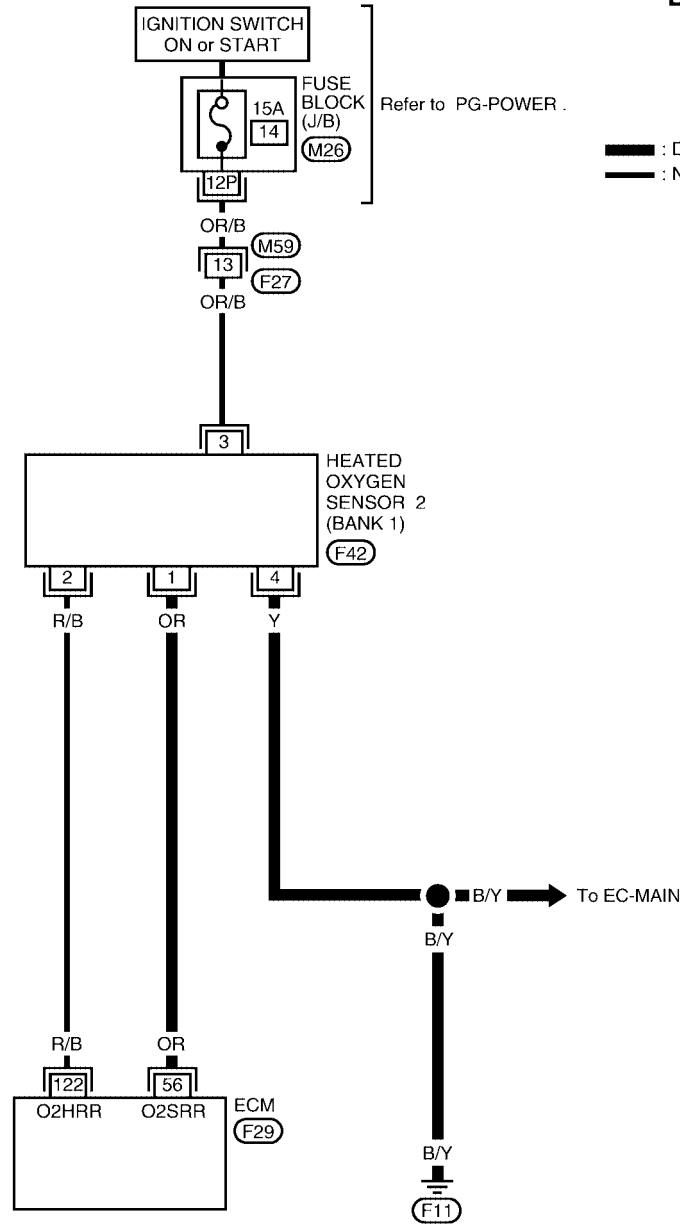
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. Set voltmeter probes between 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 change at more than 0.06V for 1 second during this procedure.**  
**If the voltage can be confirmed in step 6, step 7 is not necessary.**
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in "D" position with "OD" OFF (A/T), 3rd gear position (M/T).  
**The voltage should change at more than 0.06V for 1 second during this procedure.**
8. If NG, go to [EC-1426, "Diagnostic Procedure"](#)



Wiring Diagram  
BANK 1

EC-O2S2B1-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

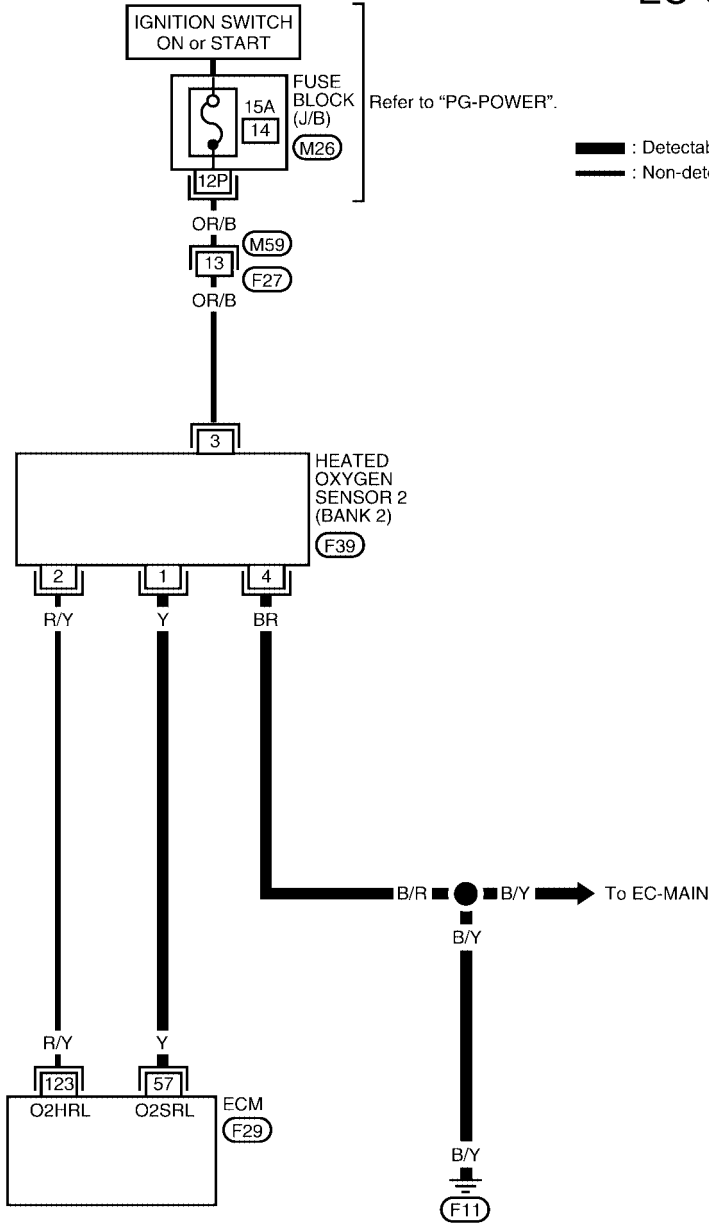
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

| TER-MINAL NO. | WIRE COLOR | ITEM                            | CONDITION  | DATA (DC Voltage)      |
|---------------|------------|---------------------------------|--|------------------------|
| 56            | OR         | Heated oxygen sensor 2 (bank 1) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine speed is below 3.600 rpm after the following conditions are met. <ul style="list-style-type: none"> <li>– Engine after warming up.</li> <li>– Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> </li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V |

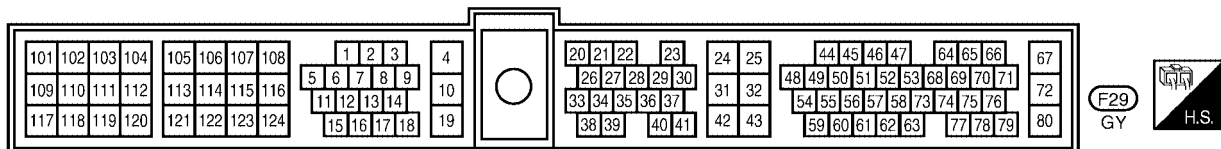
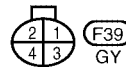
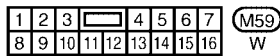


BANK 2

EC-O2S2B2-01



A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

| TER-MINAL NO. | WIRE COLO R | ITEM                            | CONDITION  | DATA (DC Voltage)      |
|---------------|-------------|---------------------------------|--|------------------------|
| 57            | Y           | Heated oxygen sensor 2 (bank 2) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine speed is below 3.600 rpm after the following conditions are met.                             <ul style="list-style-type: none"> <li>- Engine after warming up.</li> <li>- Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> </li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V |

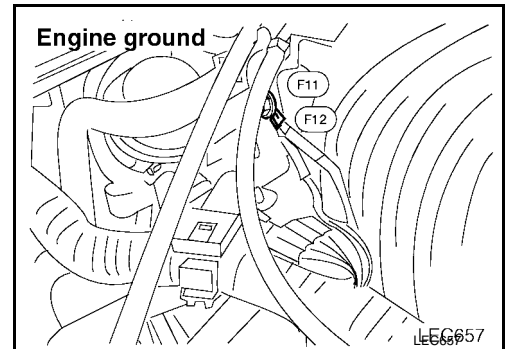
**Diagnostic Procedure**

UBS005ZU

**1. RETIGHTEN GROUND SCREWS**

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

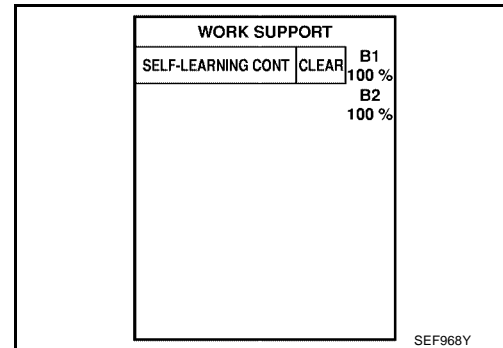
>> GO TO 2.



## 2. CLEAR THE SELF-LEARNING DATA

### WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?  
Is it difficult to start engine?**



### WITHOUT CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to [EC-1237, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#).
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?  
Is it difficult to start engine?**

#### Yes or No

- Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to [EC-1431](#) or [EC-1439](#).
- No >> GO TO 3.

## 3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.  
Refer to Wiring Diagram.

**Continuity should exist.**

#### OK or NG

- OK >> GO TO 5.  
NG >> GO TO 4.

## 4. DETECT MALFUNCTIONING PART

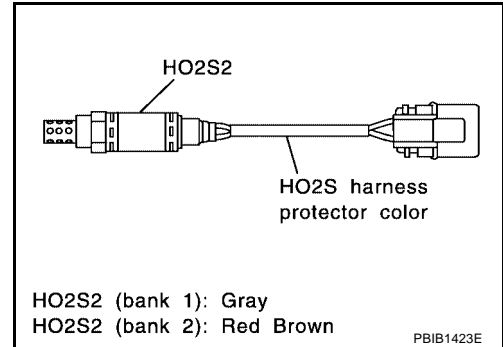
Check the following.

- Harness for open between heated oxygen sensor 2 and engine ground.

>> Repair open circuit or short to power in harness or connectors.

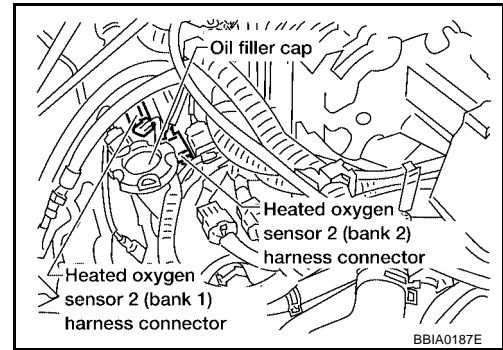
**5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 harness protector color.



3. Disconnect corresponding heated oxygen sensor 2 harness connector.
4. Disconnect ECM harness connector.
5. 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.**

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows.  
Refer to Wiring Diagram.

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P0139 | 56 or 1       | Ground | Bank 1 |
| P0159 | 57 or 1       | Ground | Bank 2 |

**Continuity should not exist.**

7. Also check harness for short to power.

**OK or NG**

OK (With CONSULT-II)>>GO TO 6.

OK (Without CONSULT-II)>>GO TO 7.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 2

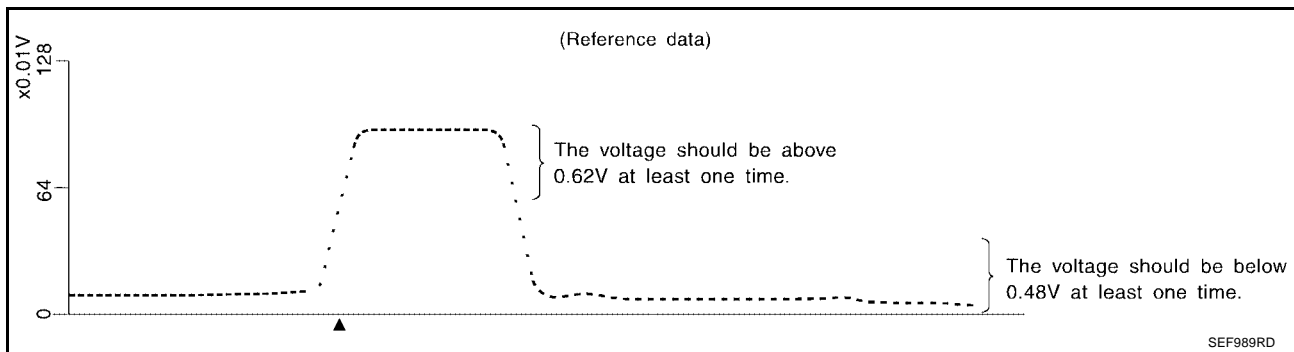
 With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch "OFF" and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
5. Let engine idle for one minutes.
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  $\pm 25\%$ .



"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 8.
- NG >> Replace malfunctioning heated oxygen sensor 2.

## 7. 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 one minute under no load.
4. Let engine idle for one minutes.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
(Depress and release accelerator pedal as soon as possible.)

**The voltage should be above 0.62V 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 8.  
NG >> Replace malfunctioning heated oxygen sensor 2.

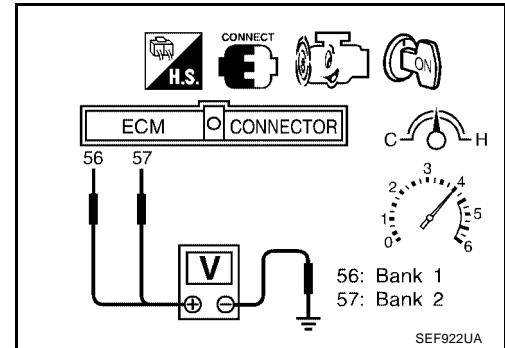
## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 2

Refer to [EX-3, "EXHAUST SYSTEM"](#) .



## DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

PF:16600

### On Board Diagnosis Logic

UBS006X7

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

| Sensor                  | Input signal to ECM  | ECM function           | Actuator       |
|-------------------------|--|------------------------|----------------|
| Heated oxygen sensors 1 | Density of oxygen in exhaust gas (Mixture ratio feedback signal) | Fuel injection control | Fuel injectors |

| DTC No.        | Trouble diagnosis name         | DTC detecting condition   | Possible cause   |
|----------------|--------------------------------|---|--|
| P0171 (Bank 1) | Fuel injection system too lean | <ul style="list-style-type: none"> <li>Fuel injection system does not operate properly.</li> <li>The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)</li> </ul> | <ul style="list-style-type: none"> <li>Intake air leaks</li> <li>Heated oxygen sensor 1</li> <li>Injectors</li> <li>Exhaust gas leaks</li> <li>Incorrect fuel pressure</li> <li>Lack of fuel</li> <li>Mass air flow sensor</li> <li>Incorrect PCV hose connection</li> </ul> |
| P0174 (Bank 2) |                                |   |  |

### DTC Confirmation Procedure

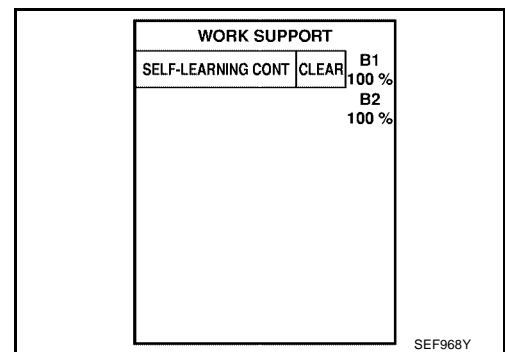
UBS005ZW

#### 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

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch OFF and wait at least 5 seconds.
- Turn ignition switch ON and select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
- Clear the self-learning control coefficient by touching "CLEAR".
- Select "DATA MONITOR" mode with CONSULT-II.
- Start engine again and let it idle for at least 10 minutes. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to [EC-1435, "Diagnostic Procedure"](#).
- If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
- Crank engine while depressing accelerator pedal. If engine starts, go to [EC-1435, "Diagnostic Procedure"](#). If engine does not start, check exhaust and intake air leak visually.



#### WITH GST

- Start engine and warm it up to normal operating temperature.
- Turn ignition switch "OFF" and wait at least 5 seconds.
- Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
- Stop engine and reconnect mass air flow sensor harness connector.
- Select "MODE 3" with GST. Make sure DTC P0102 is detected.
- Select "MODE 4" with GST and erase the DTC P0102.
- Start engine again and let it idle for at least 10 minutes.

## DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

[VG33ER]

- 
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-1435, "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-1435, "Diagnostic Procedure"](#). If engine does not start, check exhaust and intake air leak visually.



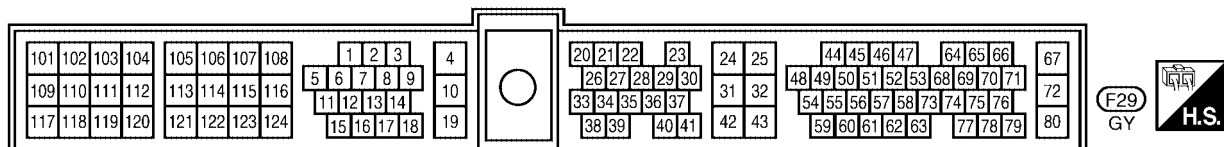
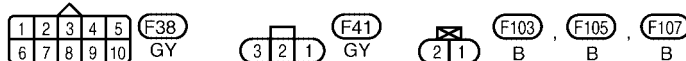
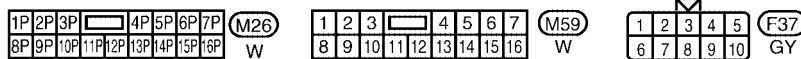
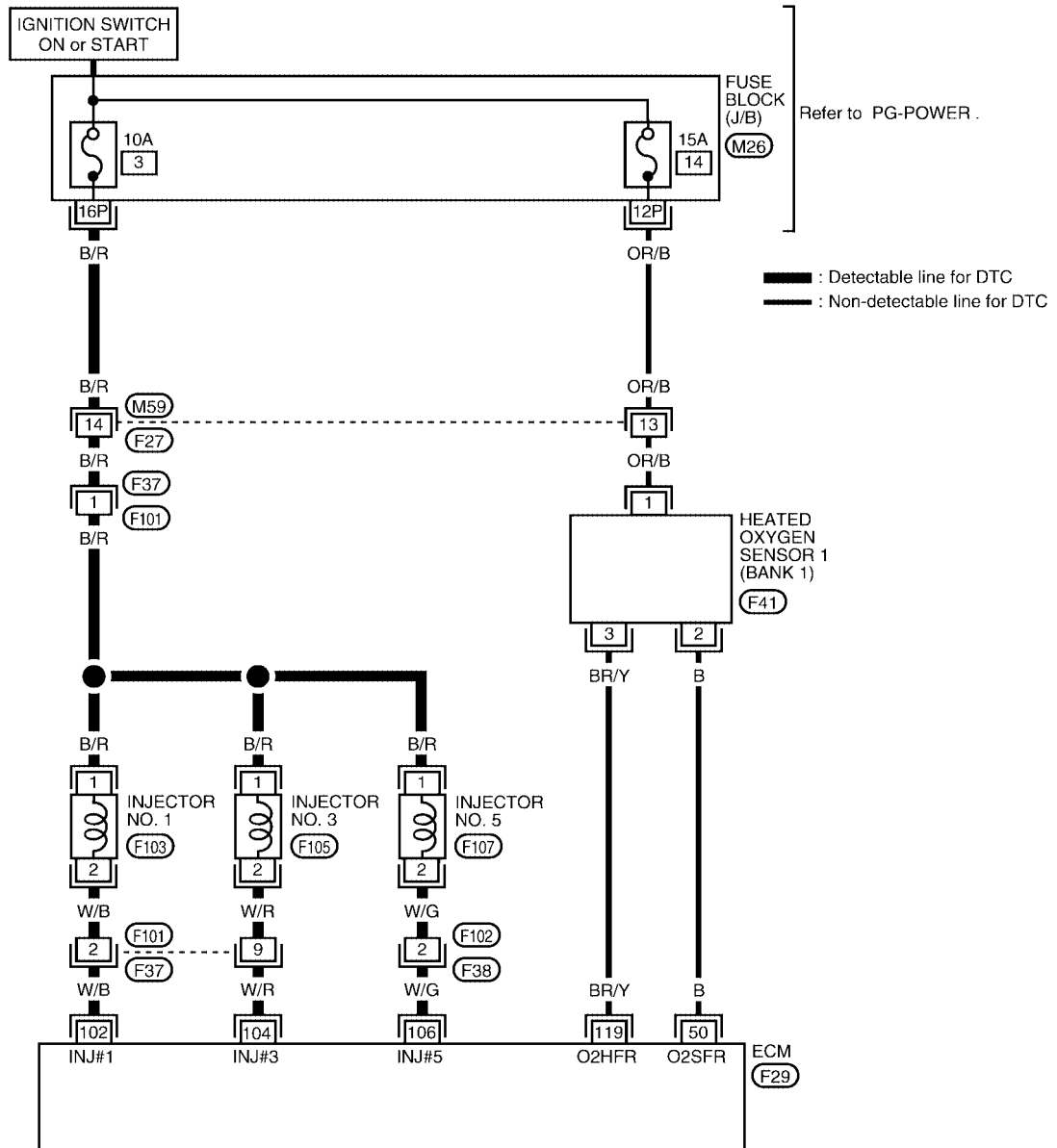
# DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

[VG33ER]

## Wiring Diagram BANK 1

UBS005ZX

### EC-FUELB1-01

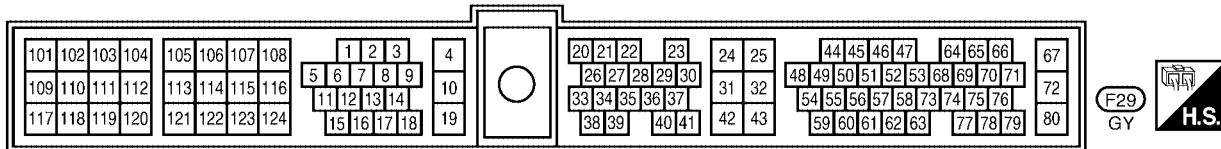
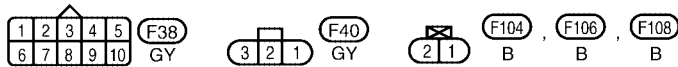
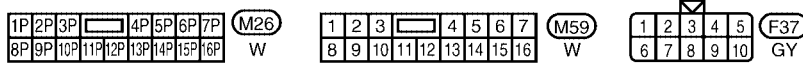
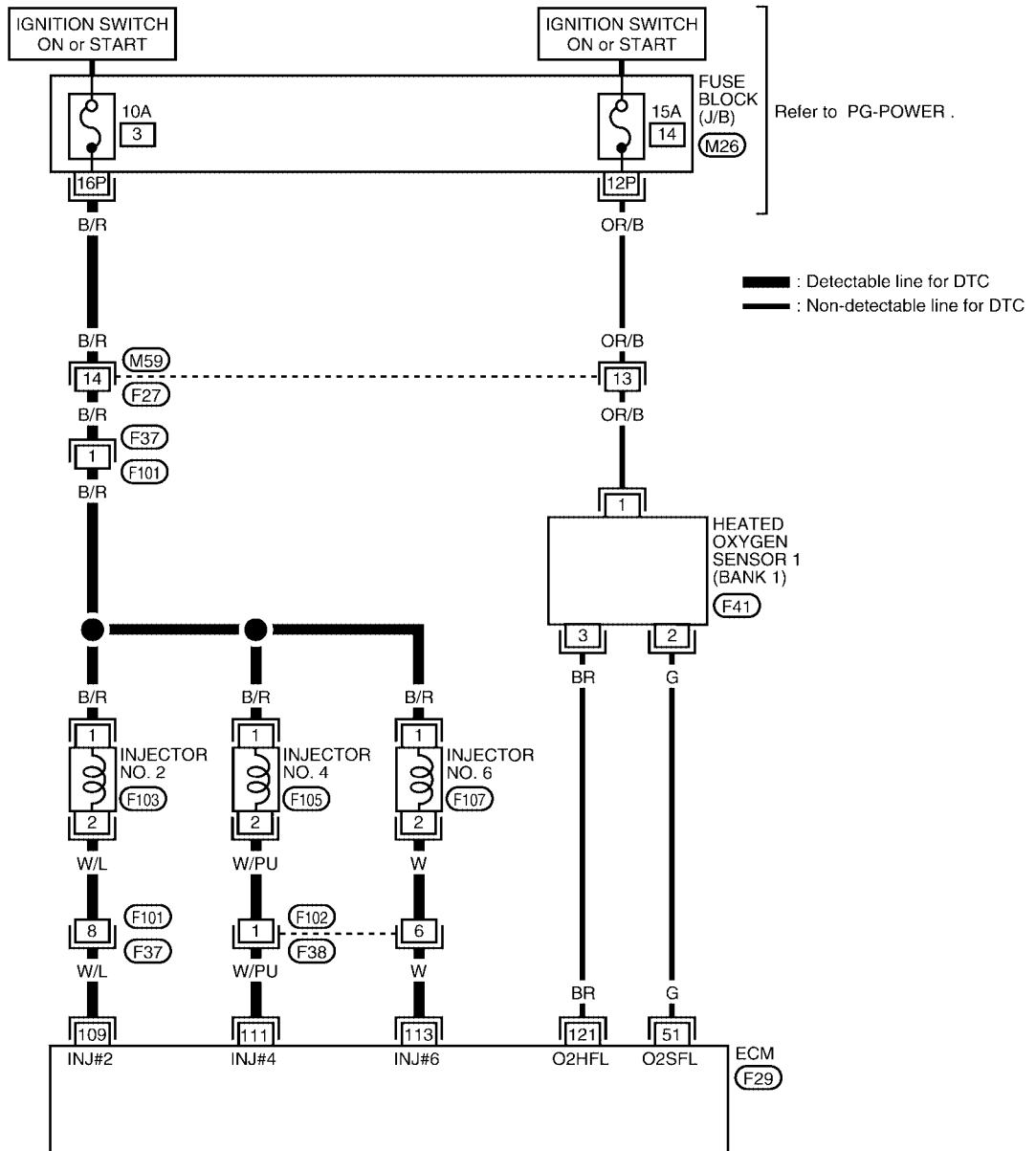


# DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

[VG33ER]

## BANK 2

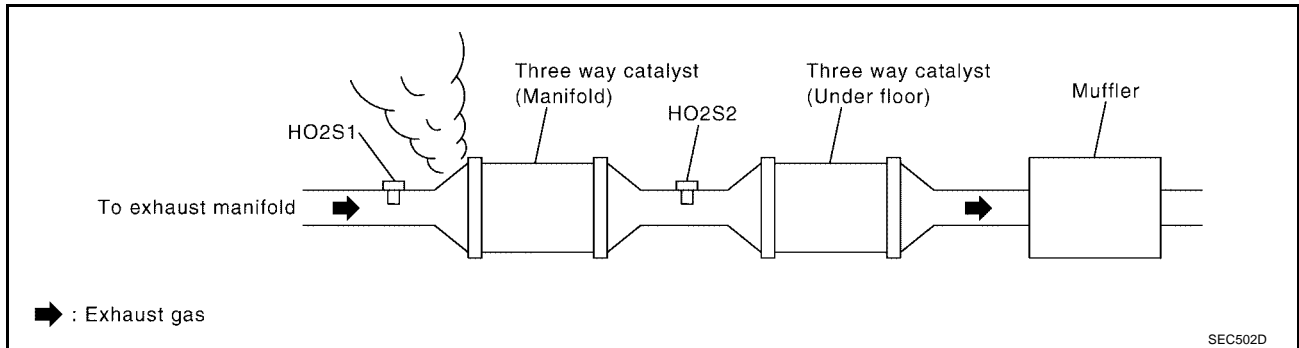
## EC-FUELB2-01



## Diagnostic Procedure

### 1. CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst (manifold).



OK or NG

- OK >> GO TO 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 corresponding 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 ECM terminal or HO2S1 terminal and ground as follows.  
Refer to Wiring Diagram.

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P0171 | 50 or 2       | Ground | Bank 1 |
| P0174 | 51 or 2       | Ground | 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-1222, "FUEL PRESSURE RELEASE"](#) .
2. Install fuel pressure gauge and check fuel pressure. Refer to [EC-1222, "FUEL PRESSURE CHECK"](#) .

**At idling:**

**When fuel pressure regulator valve vacuum hose is connected.                      235 kPa (2.4 kg/cm<sup>2</sup> , 34 psi)**

**When fuel pressure regulator valve vacuum hose is disconnected.                      294 kPa (3.0 kg/cm<sup>2</sup> , 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-1154](#) .)
- Fuel pressure regulator (Refer to [EC-1223](#) .)
- Fuel lines (Refer to [MA-24, "ENGINE MAINTENANCE \(VG33E AND VG33ER\)"](#) .)
- 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 engine grounds. Refer to [EC-723, "DTC P0101 MAF SENSOR"](#) .

**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.

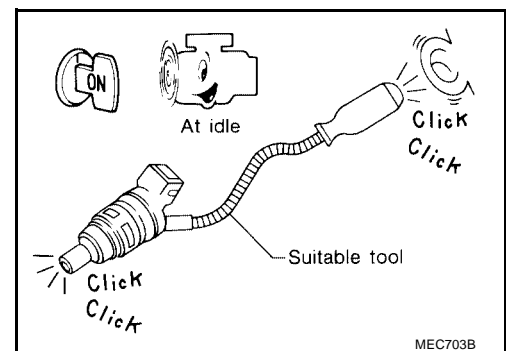
| ACTIVE TEST   |          |
|---------------|----------|
| POWER BALANCE |          |
| MONITOR       |          |
| ENG SPEED     | XXX rpm  |
| MAS AIF SE-B1 | XXX V    |
| IACV-AAC/V    | XXX step |
|               |          |
|               |          |
|               |          |

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 9.  
 NG >> Perform trouble diagnosis for [EC-1145, "INJECTOR CIRCUIT"](#) .

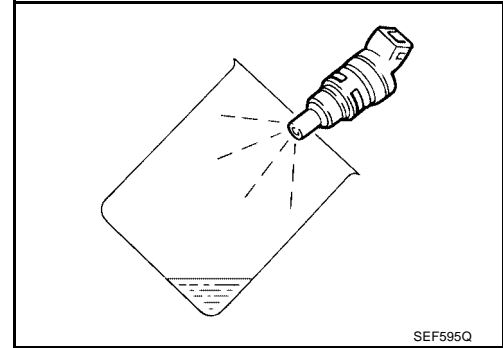
## 9. CHECK INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.
3. Disconnect injector harness connectors on left bank (for DTC P0171), right bank (for DTC P0174).
4. Remove injector gallery assembly. Refer to [EM-80](#) .  
Keep fuel hose and all injectors connected to injector gallery.  
The injector harness connectors on right bank (for DTC P0171), left bank (for DTC P0174) should remain connected.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each injector.
7. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.

**Fuel should be sprayed evenly for each injector.**

### 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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

## DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

### On Board Diagnosis Logic

UBS006X8

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.

In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and light up the MIL (2 trip detection logic).

| Sensor                  | Input signal to ECM  | ECM function           | Actuator       |
|-------------------------|--|------------------------|----------------|
| Heated oxygen sensors 1 | Density of oxygen in exhaust gas (Mixture ratio feedback signal) | Fuel injection control | Fuel injectors |

| DTC No.        | Trouble diagnosis name         | DTC detecting condition   | Possible cause  |
|----------------|--------------------------------|---|---|
| P0172 (Bank 1) | Fuel injection system too rich | <ul style="list-style-type: none"> <li>● Fuel injection system does not operate properly.</li> <li>● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)</li> </ul> | <ul style="list-style-type: none"> <li>● Heated oxygen sensor 1</li> <li>● Injectors</li> <li>● Exhaust gas leaks</li> <li>● Incorrect fuel pressure</li> <li>● Mass air flow sensor</li> </ul> |
| P0175 (Bank 2) |                                |   |   |

### DTC Confirmation Procedure

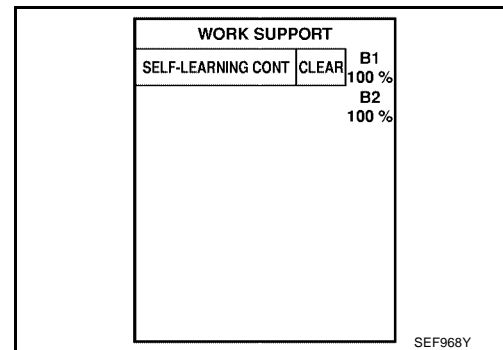
UBS00600

**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-1443, "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-1443, "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-1443, "Diagnostic Procedure"](#) .

## DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

[VG33ER]

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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-1443, "Diagnostic Procedure"](#) . If engine does not start, check exhaust and intake air leak visually.



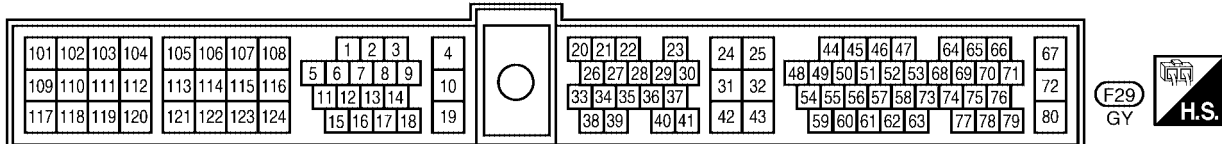
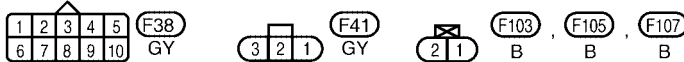
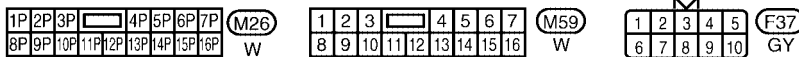
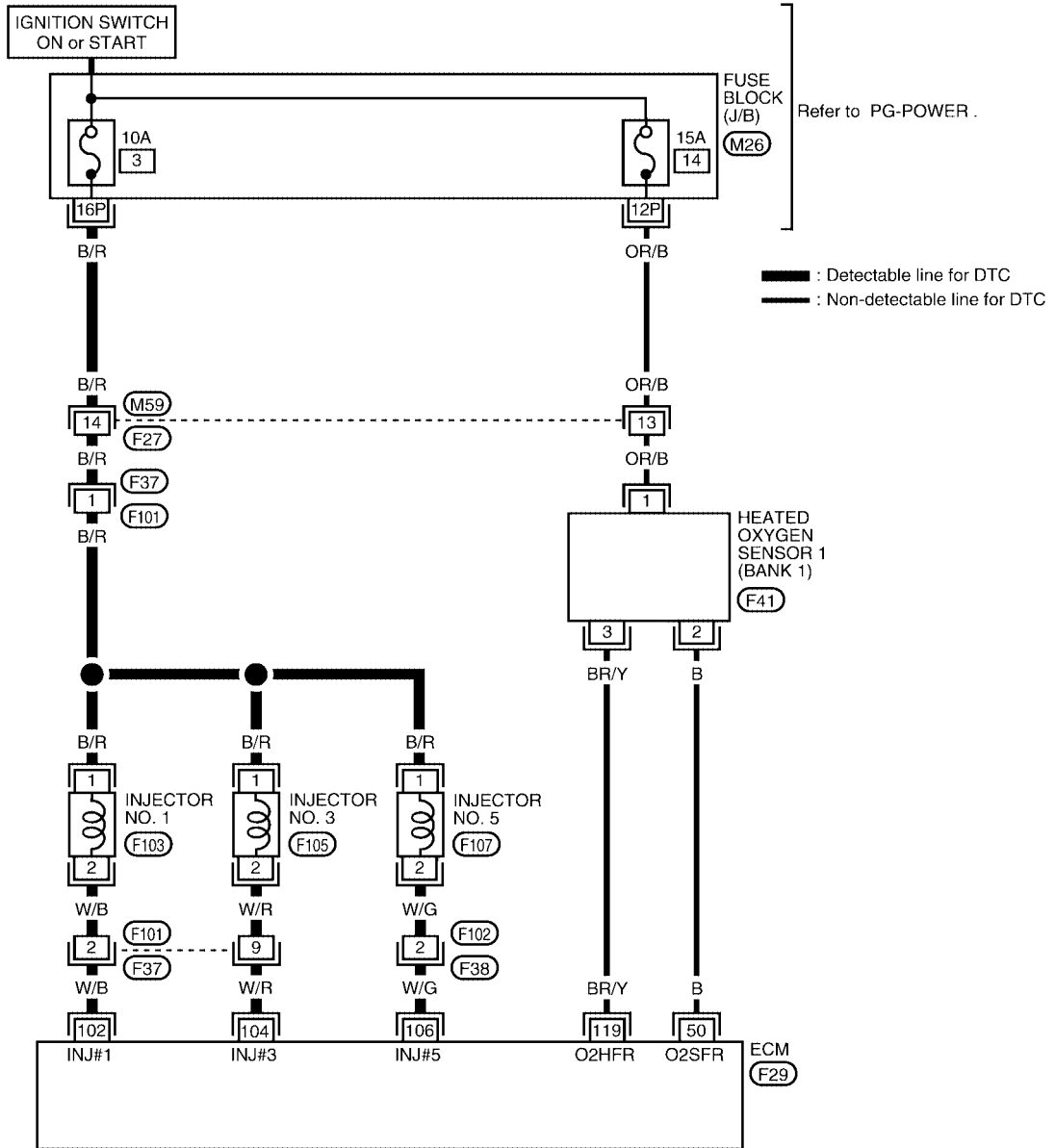
# DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

[VG33ER]

UBS00601

## Wiring Diagram BANK 1

EC-FUELB1-01



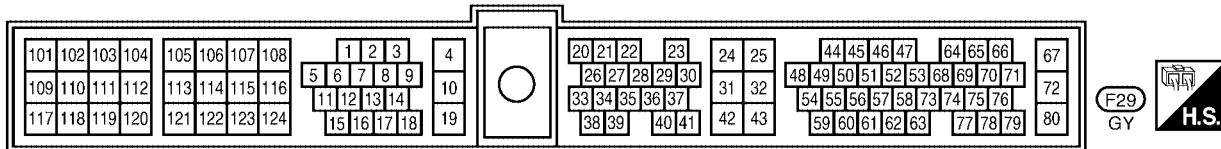
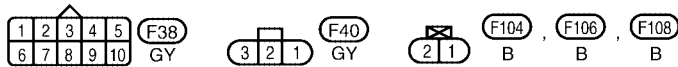
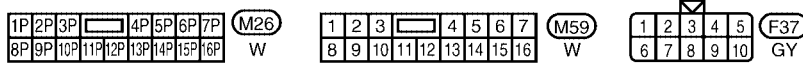
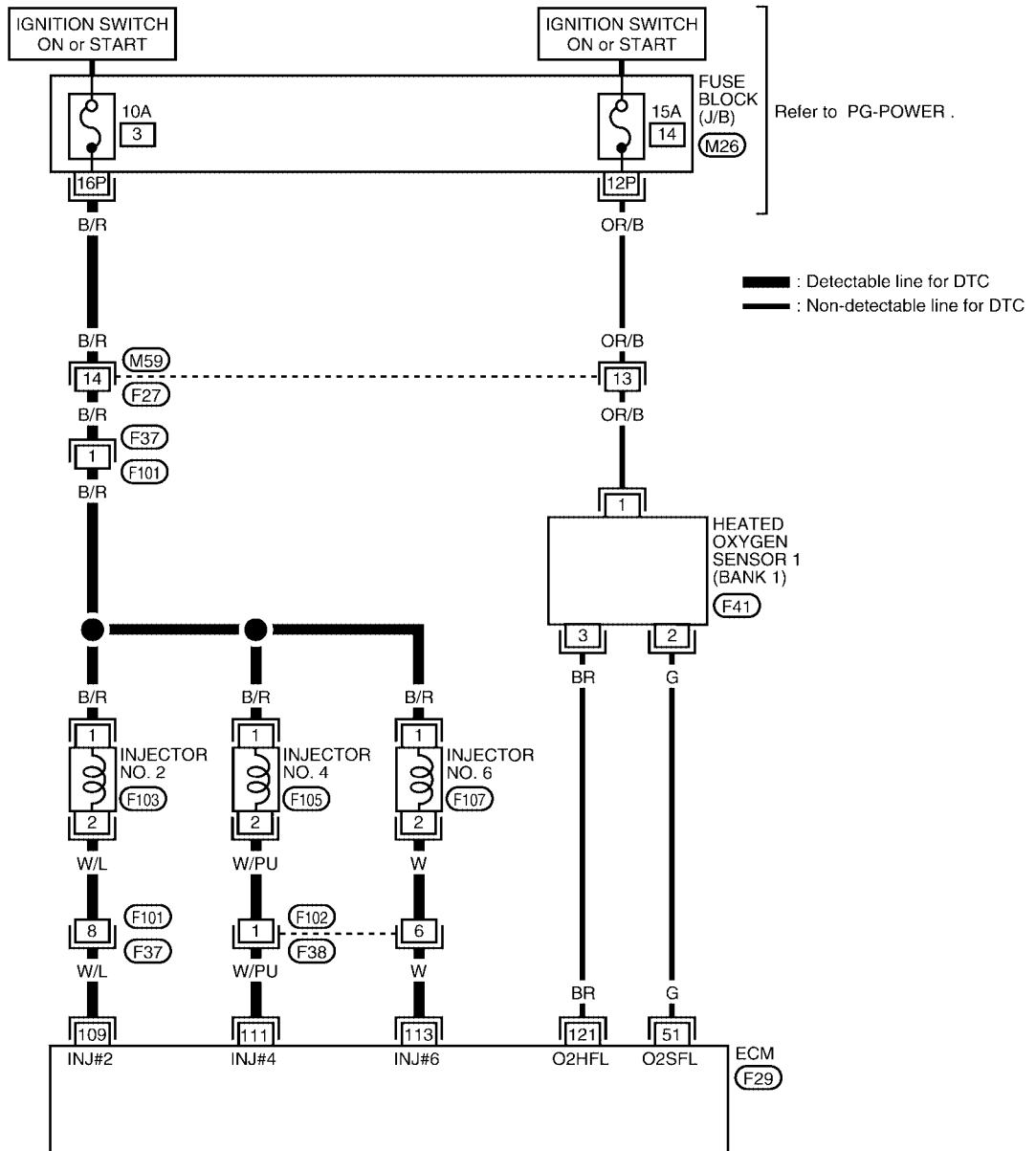
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# DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

[VG33ER]

BANK 2

EC-FUELB2-01

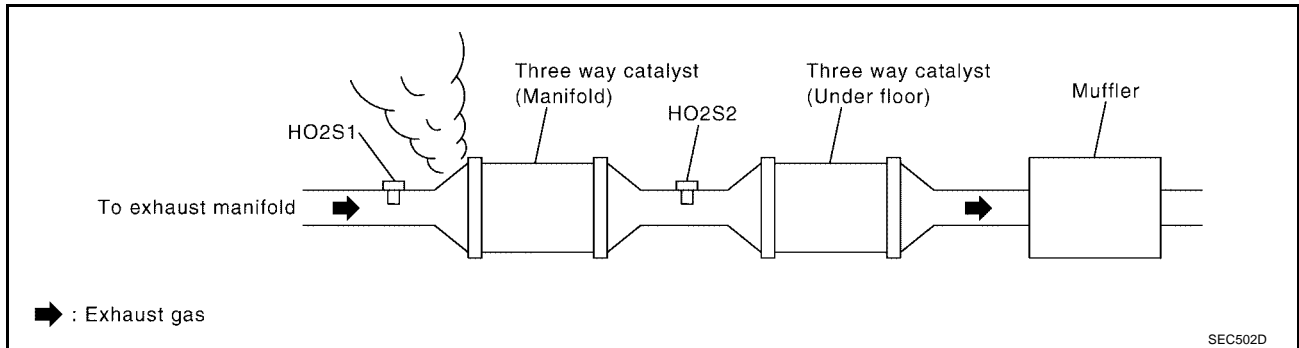


BBWA0510E

## Diagnostic Procedure

### 1. CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst (manifold).



OK or NG

- OK >> GO TO 2.
- NG >> Repair or replace.

### 2. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

- OK >> GO TO 3.
- NG >> Repair or replace.

## 3. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect corresponding heated oxygen sensor 1 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 ECM terminal or HO2S1 terminal and ground as follows.

Refer to Wiring Diagram.

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P0172 | 50 or 2       | Ground | Bank 1 |
| P0175 | 51 or 2       | Ground | 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-1222](#) .
2. Install fuel pressure gauge and check fuel pressure. Refer to [EC-1222](#) .

**At idling:**

**When fuel pressure regulator valve vacuum hose is connected.      235 kPa (2.4 kg/cm<sup>2</sup> , 34 psi)**

**When fuel pressure regulator valve vacuum hose is disconnected.      294 kPa (3.0 kg/cm<sup>2</sup> , 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-1729](#) .)
- Fuel pressure regulator (Refer to [EC-1223](#) .)

>> 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 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 engine grounds. Refer to [EC-1331, "DTC P0101 MAF SENSOR"](#) .

**7. CHECK FUNCTION OF INJECTORS**

**With CONSULT-II**

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

| ACTIVE TEST   |          |
|---------------|----------|
| POWER BALANCE |          |
| MONITOR       |          |
| ENG SPEED     | XXX rpm  |
| MAS AIF SE-B1 | XXX V    |
| IACV-AAC/V    | XXX step |
|               |          |
|               |          |
|               |          |

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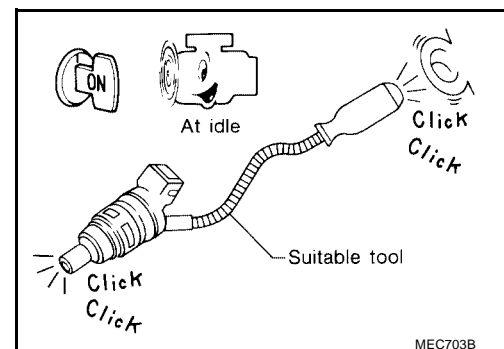
**Without CONSULT-II**

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-1720, "INJECTOR CIRCUIT"](#) .



---

## 8. CHECK INJECTOR

---

1. Remove injector assembly. Refer to [EM-80](#) .  
Keep fuel hose and all injectors connected to injector gallery.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect injector harness connectors bank 2 (for DTC P0172), right bank (for P0175).  
The injector harness connectors on bank 1 (for P0172), left bank (for P0175) should remain connected.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injectors.
6. Crank engine for about 3 seconds.  
Make sure fuel does not drip from injector.

### OK or NG

OK (Does not drip)>>GO TO 9.

NG (Drips)>>Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

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## 9. CHECK INTERMITTENT INCIDENT

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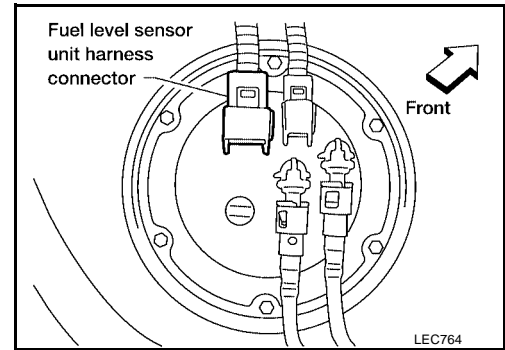
Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## DTC P0181 FTT SENSOR

### Component Description

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.



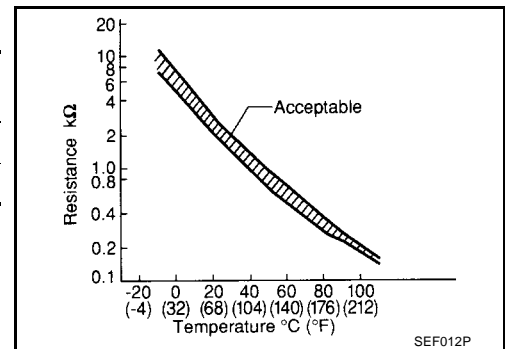
### <Reference data>

| Fluid temperature<br>°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

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Fuel tank temperature sensor</li> </ul> |

### DTC Confirmation Procedure

#### 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-1450, "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-1450, "Diagnostic Procedure"](#).

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |

SEF174Y



**WITH GST**

Follow the procedure "With CONSULT-II".

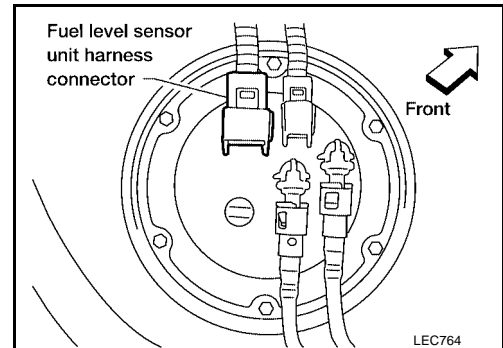




## Diagnostic Procedure

### 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.

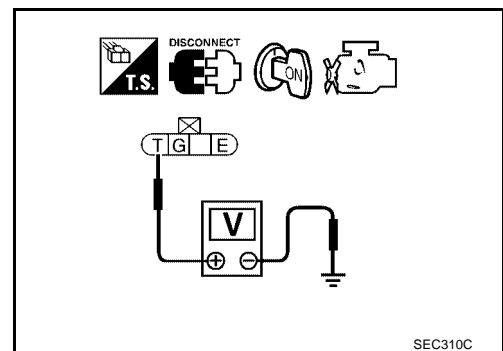


4. Check voltage between fuel level sensor unit terminal T and ground with CONSULT-II or tester.

**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 body 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 body ground.

>> Repair open circuit or short to power in harness or connectors.

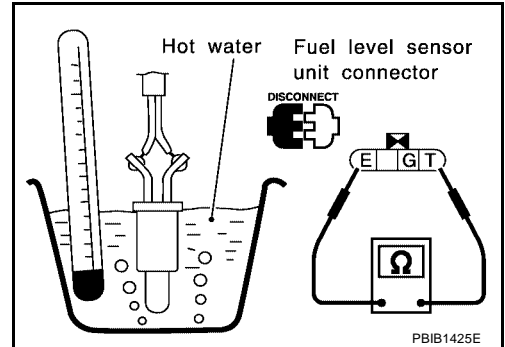
**5. CHECK FUEL TANK TEMPERATURE SENSOR**

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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Removal and Installation  
FUEL TANK TEMPERATURE SENSOR**

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

UBS006XA

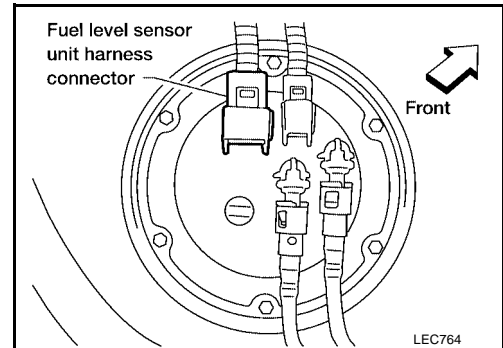
## DTC P0182, P0183 FTT SENSOR

PFP:22630

### Component Description

UBS006RH

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.



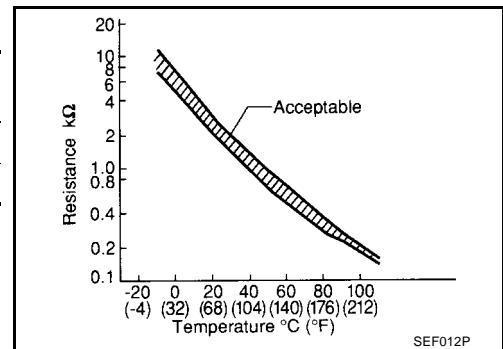
### <Reference data>

| Fluid temperature<br>°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

UBS006XB

| 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.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Fuel tank temperature sensor</li> </ul> |
| P0183   | Fuel tank temperature sensor circuit high input | An excessively high voltage from the sensor is sent to ECM. |  |

### DTC Confirmation Procedure

UBS006RJ

#### 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-1454, "Diagnostic Procedure"](#).

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |

SEF174Y

#### WITH GST

Follow the procedure "WITH CONSULT-II".

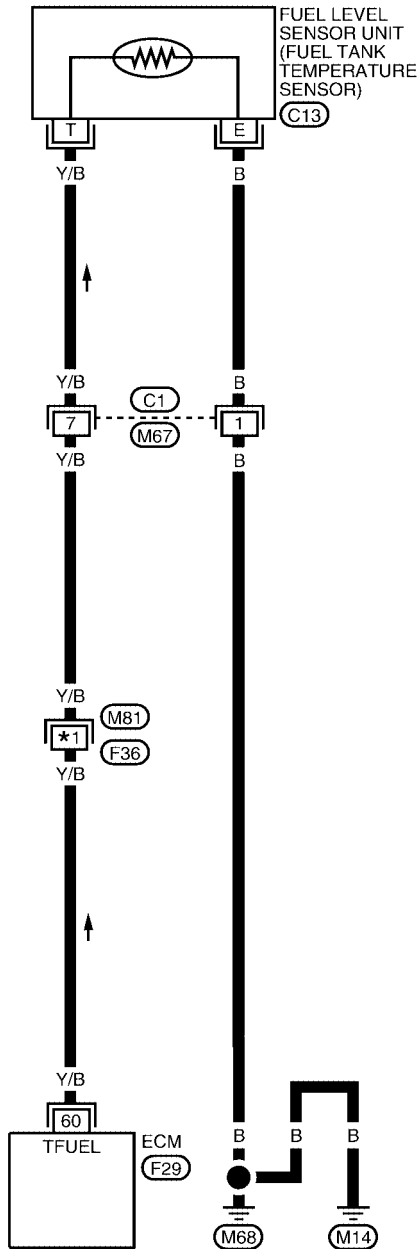
# DTC P0182, P0183 FTT SENSOR

[VG33ER]

UBS006RK

## Wiring Diagram

EC-FTTS-01



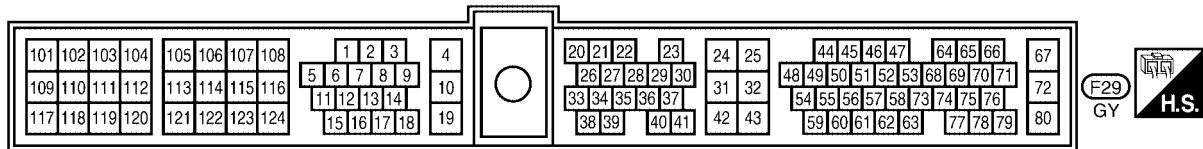
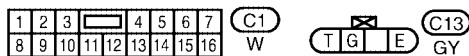
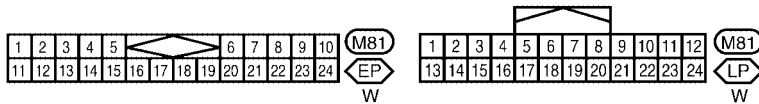
— : Detectable line for DTC  
 — : Non-detectable line for DTC

EP : EARLY PRODUCTION

LP : LATE PRODUCTION

\*1 EP : 7  
 LP : 10

A  
 EC  
 C  
 D  
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 K  
 L  
 M

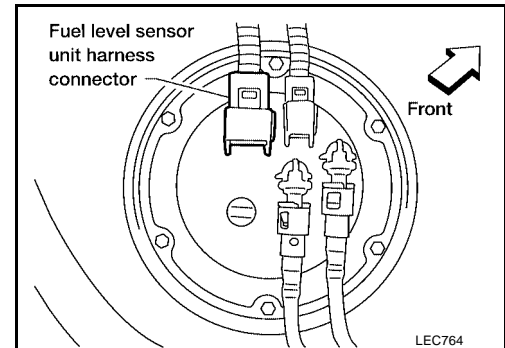


WBWA0059E

## Diagnostic Procedure

### 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.

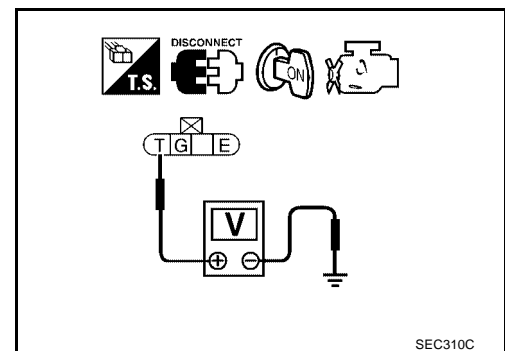


4. Check voltage between fuel level sensor unit terminal T and ground with CONSULT-II or tester.

**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 body 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 body ground.

>> Repair open circuit or short to power in harness or connectors.

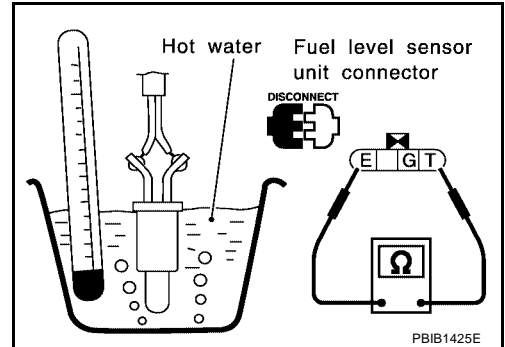
**5. CHECK FUEL TANK TEMPERATURE SENSOR**

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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Removal and Installation  
FUEL TANK TEMPERATURE SENSOR**

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

UBS006XC

# DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

[VG33ER]

## DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

PF0:00019

### On Board Diagnosis Logic

UBS006UZ

This diagnosis checks whether the engine coolant temperature is extraordinary high, even when the load is not heavy.

When malfunction is detected, the malfunction indicator lamp (MIL) will light up even in the first trip.

| 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. | <ul style="list-style-type: none"><li>● Cooling fan (crankshaft driven)</li><li>● Thermostat</li><li>● Improper ignition timing</li><li>● Engine coolant temperature sensor</li><li>● Blocked radiator</li><li>● Blocked front end (Improper fitting of nose mask)</li><li>● Crushed vehicle frontal area (Vehicle frontal is collided but not repaired)</li><li>● Blocked air passage by improper installation of front fog lamp or fog lamps</li><li>● Improper mixture ratio of coolant</li><li>● Damaged bumper</li></ul> For more information, refer to <a href="#">EC-1460</a> .<br><a href="#">"Main 12 Causes of Overheating"</a> . |

#### 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

UBS0060A

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.

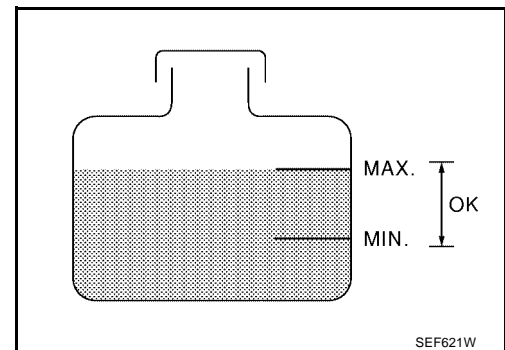
Wrap a thick cloth around the cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

#### Ⓟ 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-1458, "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.

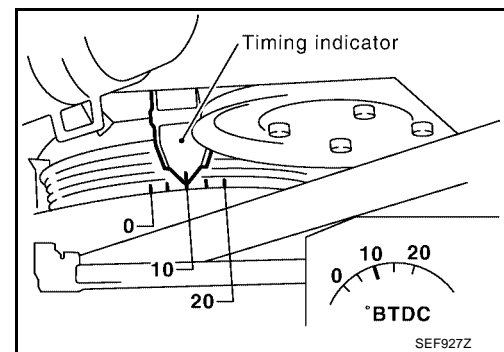




# DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

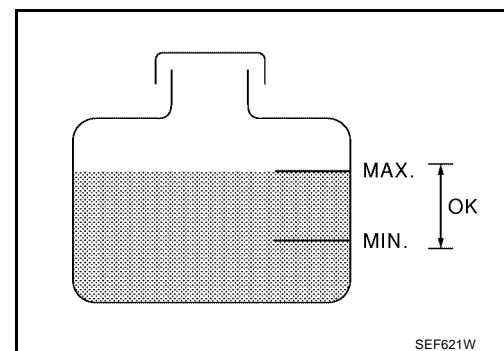
[VG33ER]

- 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-1458, "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-1458, "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-1458, "Diagnostic Procedure"](#) . If NG, replace ECT sensor and go to next step.
- 7. Check ignition timing. Refer to [EC-1251, "Basic Inspection"](#) .  
Make sure that ignition timing is  $10^{\circ} \pm 2^{\circ}$  at  $700 \pm 50$  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-1458, "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-1458, "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-1458, "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-1458, "Diagnostic Procedure"](#) . After repair, go to next step.

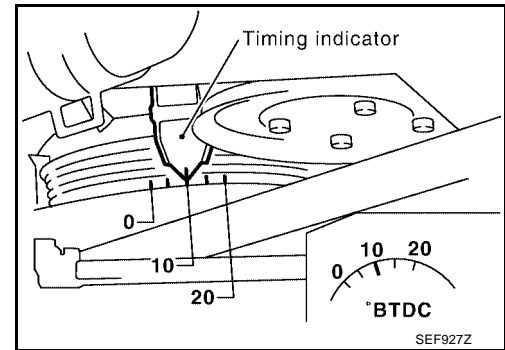


# DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

[VG33ER]

**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 If NG, replace ECT sensor and go to next step.
7. Check ignition timing. Refer to [EC-1251, "Basic Inspection"](#) .  
Make sure that ignition timing is  $10^{\circ} \pm 2^{\circ}$  at  $700 \pm 50$  rpm.  
If NG, adjust ignition timing and then recheck.



UBS0060B

## Diagnostic Procedure

### 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<sup>2</sup> , 23 psi)**

**Pressure should not drop.**

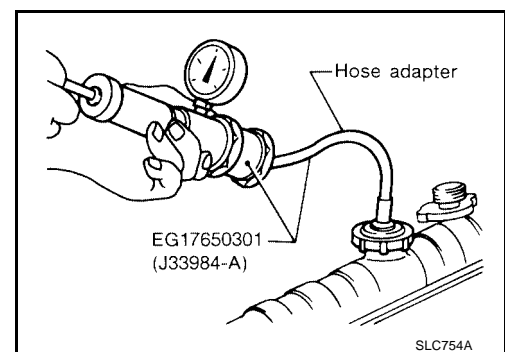
OK or NG

OK >> GO TO 3.

NG >> Check the following for leak:

- Hose
- Radiator
- Water pump

Refer [CO-23, "CHECKING COOLING SYSTEM FOR LEAKS"](#) .



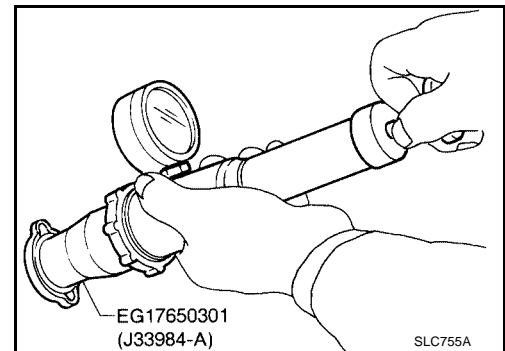
### 3. CHECK RADIATOR CAP

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<sup>2</sup> , 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] ture**

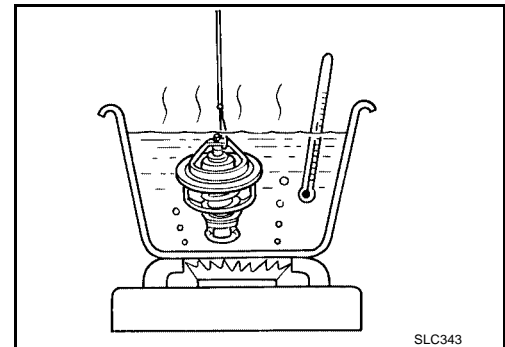
**Valve lift : More than 10 mm/90°C (0.31 in/194°F)**

3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer to [CO-28, "THERMOSTAT"](#) .

OK or NG

- OK >> GO TO 5.
- NG >> Replace thermostat.

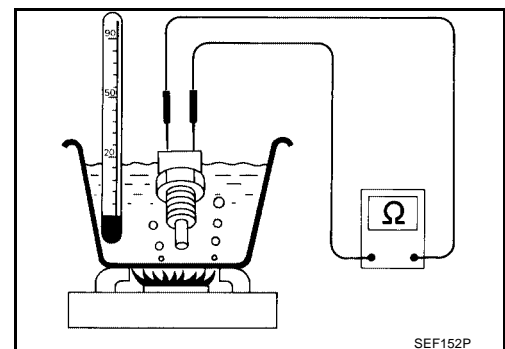


### 5. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

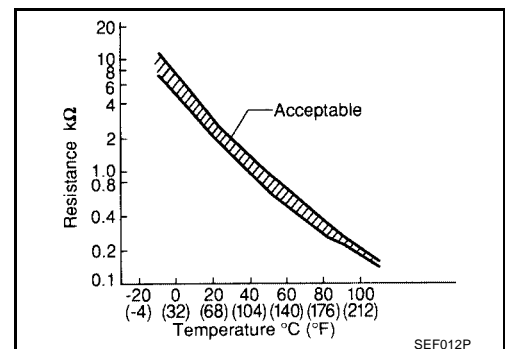
<Reference data>

| 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.



# DTC P0217 COOLANT OVERTEMPERATURE ENRICHMENT PROTECTION

[VG33ER]

## 6. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to [EC-1460, "Main 12 Causes of Overheating"](#) .

>> INSPECTION END.

### Main 12 Causes of Overheating

UBS0060C

| Engine | Step | Inspection item  | Equipment  | Standard   | Reference page   |
|--------|------|--|--|--|--|
| OFF    | 1    | <ul style="list-style-type: none"> <li>Blocked radiator</li> <li>Blocked condenser</li> <li>Blocked radiator grille</li> <li>Blocked bumper</li> </ul> | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | No blocking  | —  |
|        | 2    | <ul style="list-style-type: none"> <li>Coolant mixture</li> </ul>  | <ul style="list-style-type: none"> <li>Coolant tester</li> </ul>                               | 50 - 50% coolant mixture   | See <a href="#">MA-12, "Recommended Fluids and Lubricants"</a> .     |
|        | 3    | <ul style="list-style-type: none"> <li>Coolant level</li> </ul>  | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | Coolant up to MAX level in reservoir tank and radiator filler neck | See <a href="#">MA-26, "Changing Engine Coolant"</a> .               |
|        | 4    | <ul style="list-style-type: none"> <li>Radiator cap</li> </ul>   | <ul style="list-style-type: none"> <li>Pressure tester</li> </ul>                              | 59 - 98 kPa (0.6 - 1.0 kg/cm <sup>2</sup> , 9 - 14 psi) (Limit)    | See <a href="#">CO-23, "CHECKING RADIATOR CAP"</a> .                 |
| ON*1   | 5    | <ul style="list-style-type: none"> <li>Coolant leaks</li> </ul>  | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | No leaks   | See <a href="#">CO-23, "CHECKING COOLING SYSTEM FOR LEAKS"</a> .     |
| ON*1   | 6    | <ul style="list-style-type: none"> <li>Thermostat</li> </ul>   | <ul style="list-style-type: none"> <li>Touch the upper and lower radiator hoses</li> </ul>     | Both hoses should be hot   | See <a href="#">CO-28, "THERMOSTAT"</a> .                            |
| ON*1   | 7    | <ul style="list-style-type: none"> <li>Cooling fan (Crankshaft driven)</li> </ul>  | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | Operating  | See <a href="#">CO-32, "COOLING FAN (CRANKSHAFT DRIVEN)"</a> .       |
| OFF    | 8    | <ul style="list-style-type: none"> <li>Combustion gas leak</li> </ul>  | <ul style="list-style-type: none"> <li>Color checker chemical tester 4 Gas analyzer</li> </ul> | Negative   | —  |
| ON*2   | 9    | <ul style="list-style-type: none"> <li>Coolant temperature gauge</li> </ul>  | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | Gauge less than 3/4 when driving                                   | —  |
|        |      | <ul style="list-style-type: none"> <li>Coolant overflow to reservoir tank</li> </ul>   | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | No overflow during driving and idling                              | See <a href="#">MA-26, "Changing Engine Coolant"</a> .               |
| OFF*3  | 10   | <ul style="list-style-type: none"> <li>Coolant return from reservoir tank to radiator</li> </ul>   | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | Should be initial level in reservoir tank                          | See <a href="#">MA-24, "ENGINE MAINTENANCE (VG33E AND VG33ER)"</a> . |
| OFF    | 11   | <ul style="list-style-type: none"> <li>Cylinder head</li> </ul>  | <ul style="list-style-type: none"> <li>Straight gauge feeler gauge</li> </ul>                  | 0.1 mm (0.004 in) Maximum distortion (warping)                     | See <a href="#">EM-110, "CYLINDER HEAD DISTORTION"</a> .             |
|        | 12   | <ul style="list-style-type: none"> <li>Cylinder block and pistons</li> </ul>   | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | No scuffing on cylinder walls or piston                            | See <a href="#">EM-133, "Inspection"</a> .                           |

\*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

PF:14110

On Board Diagnosis Logic

UBS006VN

| 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. | <ul style="list-style-type: none"> <li>● Supercharger</li> <li>● Supercharger driving belt</li> <li>● Stuck open of supercharger bypass valve</li> <li>● Clogging, cracks or improper connection of vacuum hose</li> </ul> |

DTC Confirmation Procedure

UBS006VO

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.

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEP058Y

|               |  |
|---------------|--|
| ENG SPEED     | Model with A/T: 3,200 - 4,400 rpm (A constant rotation is maintained.)<br>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<br>Model with M/T: More than 2.30V   |

4. If 1st trip DTC is detected, go to [EC-1462, "Diagnostic Procedure"](#).

 WITH GST

Follow the procedure "WITH CONSULT-II" above.

## Diagnostic Procedure

### 1. CHECK SUPERCHARGER BYPASS VALVE CONTROL SOLENOID VALVE

 **With CONSULT-II**

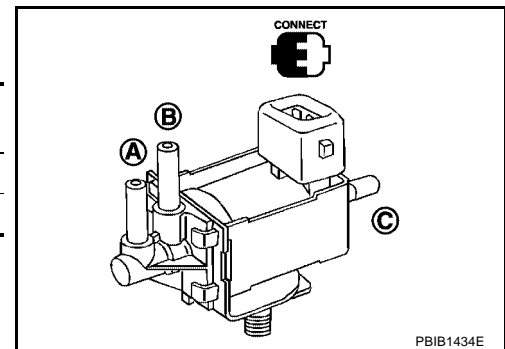
1. Stop the engine and turn ignition switch "ON".
2. Perform "SCB/V CONT SOL/V" in "ACTIVE TEST" mode.

| 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.

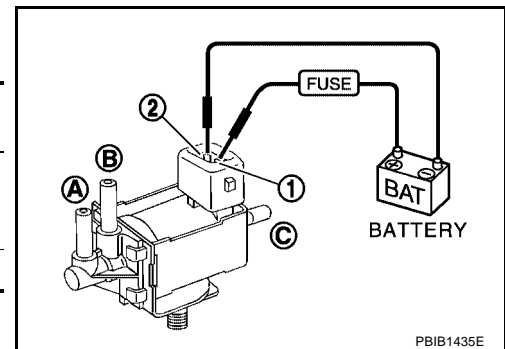
| Conditions | Air passage continuity between A and B | Air passage continuity between A and C |
|------------|--|--|
| ON         | Yes                                    | No                                     |
| OFF        | No                                     | Yes                                    |



 **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                                    |



**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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Removal and Installation  
SUPERCHARGER**

UBS00902

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

A

EC

C

D

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M

# DTC P0300 - P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

[VG33ER]

## DTC P0300 - P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

PFP:00000

### On Board Diagnosis Logic

UBS006V0

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.

- 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.
- 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. | <ul style="list-style-type: none"> <li>● Improper spark plug</li> <li>● Insufficient compression</li> <li>● Incorrect fuel pressure</li> <li>● The injector circuit is open or shorted</li> <li>● Fuel injectors</li> <li>● Intake air leak</li> <li>● The ignition secondary signal circuit is open or shorted</li> <li>● Lack of fuel</li> <li>● Signal plate or flywheel</li> <li>● Heated oxygen sensor 1</li> <li>● Incorrect PCV hose connection</li> </ul> |
| 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

UBS0060L

#### 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. Start engine again and drive at 1,500 to 3,000 rpm for at least 3 minutes.

**Hold the accelerator pedal as steady as possible.**

**NOTE:**

**Refer to the freeze frame data for the test driving conditions.**

5. If 1st trip DTC is detected, go to [EC-1465, "Diagnostic Procedure"](#).

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| COOLAN TEMP/S | XXX °C   |
| VHCL SPEED SE | XXX km/h |
| P/N POSI SW   | OFF      |
| B/FUEL SCHDL  | XXX msec |

SEF213Y

**Ⓜ WITH GST**

Follow the procedure "With CONSULT-II".

## Diagnostic Procedure

UBS0060M

### 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 |
|               |          |
|               |          |
|               |          |
|               |          |

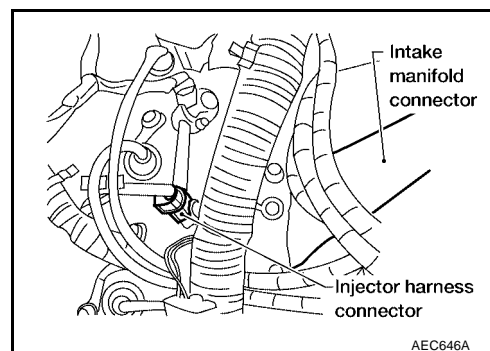
SEF070Y

**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.

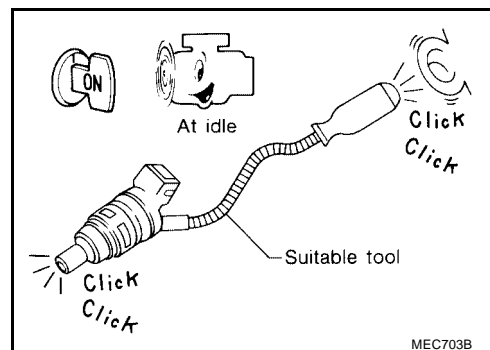


### 4. CHECK INJECTOR

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-1720](#), "[INJECTOR CIRCUIT](#)".

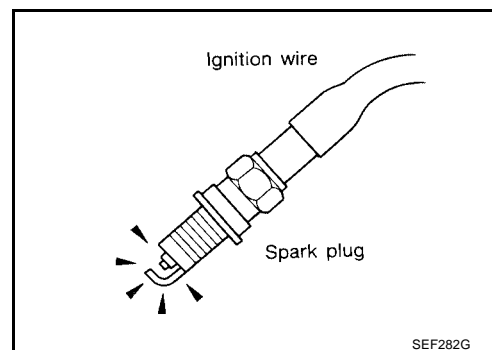


## 5. CHECK IGNITION SPARK

1. Disconnect ignition wire from spark plug.
2. Connect a known good spark plug to the ignition wire.
3. Place end of spark plug against a suitable ground and crank engine.
4. Check for spark.

OK or NG

- OK >> GO TO 7.  
 NG >> GO TO 6.

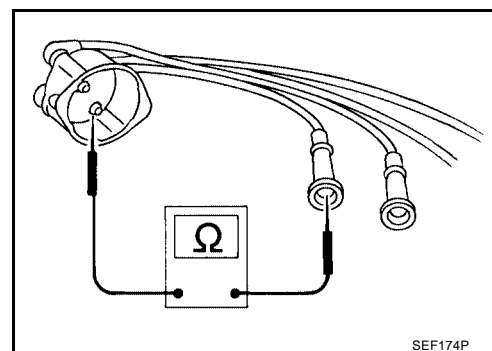


## 6. CHECK IGNITION WIRES

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-1714, "IGNITION SIGNAL"](#).

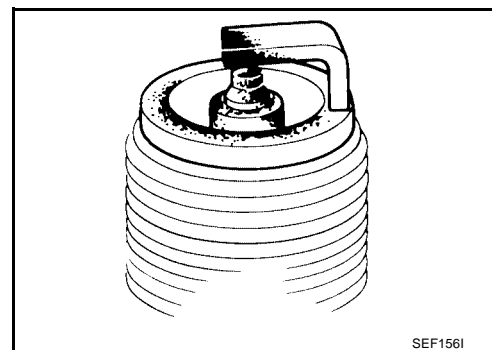
NG >> Replace.

## 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-24, "ENGINE MAINTENANCE \(VG33E AND VG33ER\)"](#).



## **8. CHECK COMPRESSION PRESSURE**

Refer to [EM-102, "Measurement of Compression"](#) .

- Check compression pressure.

|   |   |
|---|---|
| <b>Standard</b>                         | <b>: 1,196 kPa (12.2 kg/cm<sup>2</sup> , 173 psi)/300 rpm</b> |
| <b>Minimum</b>                          | <b>: 883 kPa (9.0 kg/cm<sup>2</sup> , 128 psi)/300 rpm</b>    |
| <b>Difference between each cylinder</b> | <b>: 98 kPa (1.0 kg/cm<sup>2</sup> , 14 psi)/300 rpm</b>      |

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-1222](#) .
3. Install fuel pressure gauge and check fuel pressure. Refer to [EC-1222](#) .

**At idle : Approx. 235 kPa (2.4 kg/cm<sup>2</sup> , 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-1729](#) .)
- Fuel pressure regulator (Refer to [EC-1223](#) .)
- Fuel lines (Refer to [MA-24](#) .)
- Fuel filter for clogging

>> Repair or replace.

## **11. CHECK IGNITION TIMING**

Check the following items. Refer to [EC-1251](#) .

| Items  | Specifications   |
|--|--|
| Ignition timing  | 10° ± 2° BTDC  |
| Base idle speed  | 700 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.3 mm (0.012 in): ON<br>0.4 mm (0.016 in): OFF |
| Target idle speed  | 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 |
| COOLAN TEMP/S | XXX °C  |
| HO2S1 (B1)    | XXX V   |
| HO2S2 (B2)    | XXX V   |

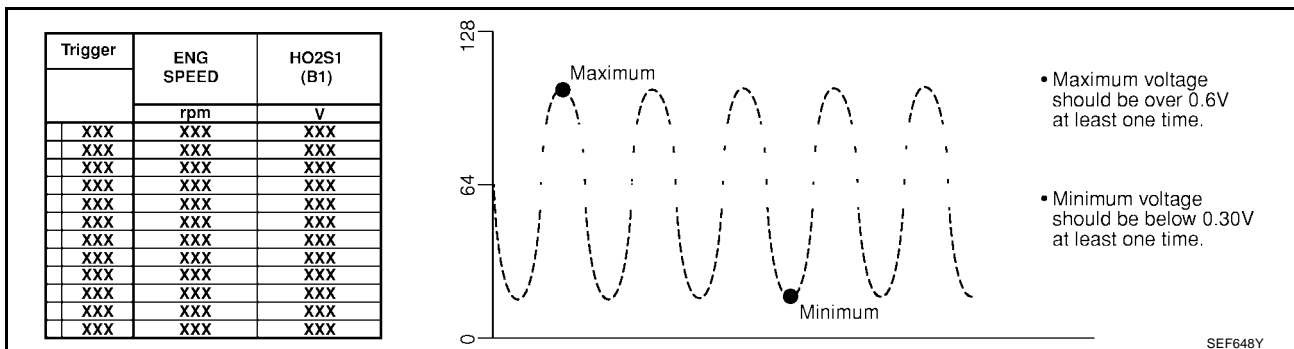
SEF967Y

5. Check the following.
  - "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown 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



**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.

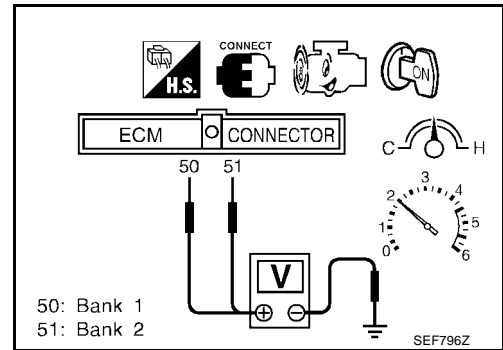
OK or NG

- 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 (bank1 sensor signal) or 51 (bank2 sensor signal) and engine ground.
  3. Check the following with engine speed held at 2,000 rpm constant under no load.
    - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
    - The maximum voltage is over 0.6V at least one time.
    - The minimum voltage is below 0.3V at least one time.
    - The voltage never exceeds 1.0V.
- 1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V  
 2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V



**CAUTION:**

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

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 engine grounds. Refer to [EC-1331, "DTC P0101 MAF SENSOR"](#) .

### 15. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in [EC-1264](#) .

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-1237, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION"](#) .

>> GO TO 17.

---

17. CHECK INTERMITTENT INCIDENT

---

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

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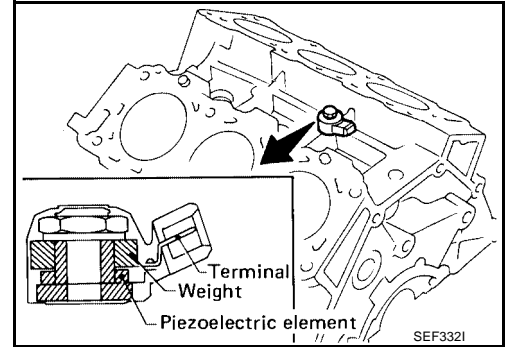
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**DTC P0327, P0328 KS**

**Component Description**

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**

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.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● Knock sensor</li> </ul> |
| P0328   | Knock sensor circuit high input | An excessively high voltage from the sensor is sent to ECM. |  |

**DTC Confirmation Procedure**

**NOTE:**

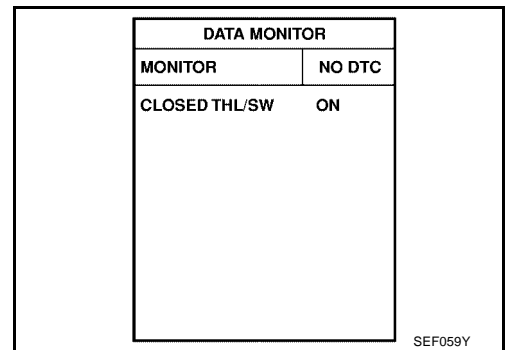
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

**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-1474, "Diagnostic Procedure"](#).



**WITH GST**

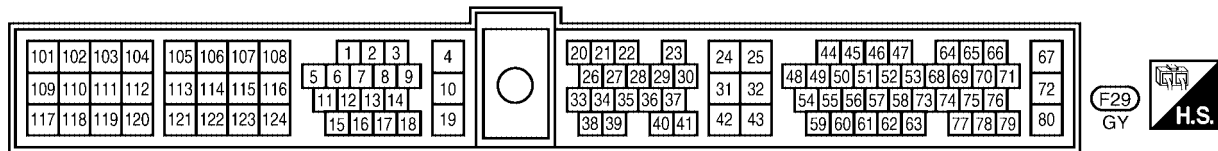
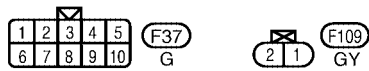
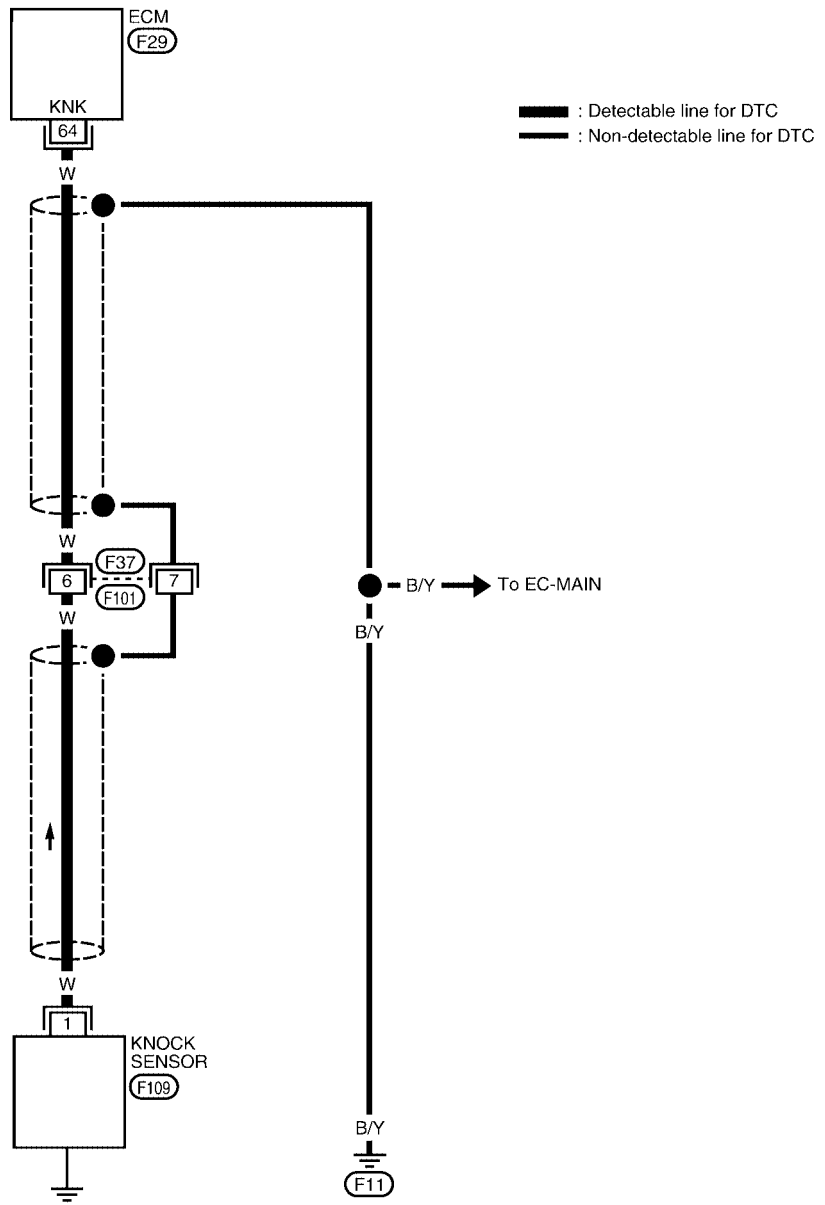
Follow the procedure "With CONSULT-II".



Wiring Diagram

EC-KS-01

A  
EC  
C  
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J  
K  
L  
M



Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

| TER-MINAL NO. | WIRE COLOR | ITEM         | CONDITION                           | DATA (DC Voltage)  |
|---------------|------------|--------------|-------------------------------------|--------------------|
| 64            | W          | Knock sensor | [Engine is running]<br>● Idle speed | Approximately 2.5V |

**Diagnostic Procedure**

UBS006XG

**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 engine 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 4.  
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 M $\Omega$ .

1. Disconnect knock sensor harness connector.
2. Check resistance between terminal 1 and ground.

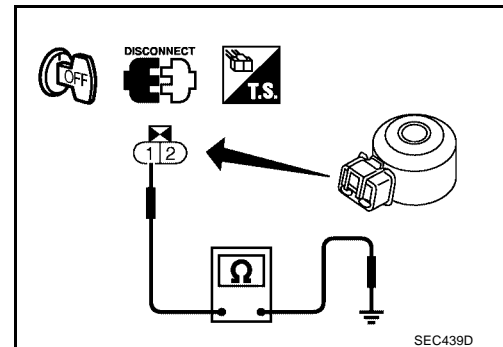
**Resistance: 500 - 620 k $\Omega$  [at 25°C (77°F)]**

### CAUTION:

Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

OK or NG

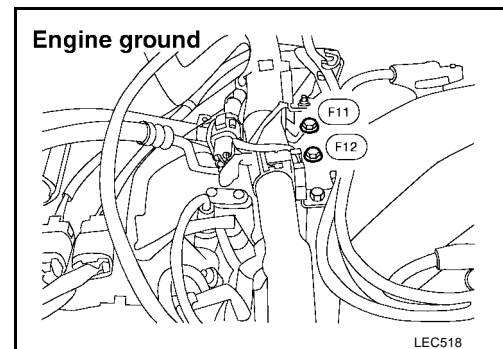
- OK >> GO TO 5.  
NG >> Replace knock sensor.



## 5. RETIGHTEN GROUND SCREWS

Loose and retighten engine ground screws.

>> GO TO 6.



## 6. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END.

## DTC P0335 CKP SENSOR (OBD)

PFP:23731

### Component Description

UBS0060T

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.

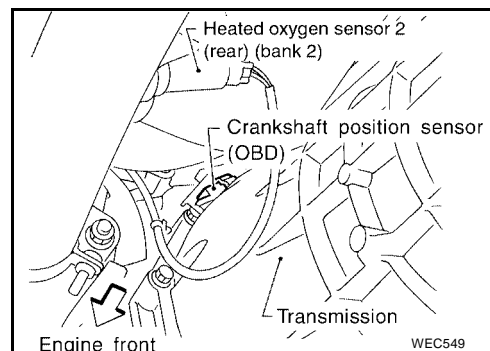
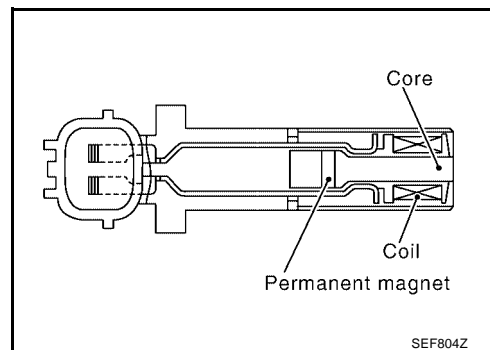
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

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

UBS006XI

Specification data are reference values.

| MONITOR ITEM | CONDITION  | SPECIFICATION                                  |
|--------------|--|--|
| ENG SPEED-   | <ul style="list-style-type: none"> <li>Tachometer: Connect</li> <li>Run engine and compare tachometer indication with the CONSULT-II value.</li> </ul> | Almost the same speed as the CONSULT-II value. |

### On Board Diagnosis Logic

UBS0060V

| DTC No. | Trouble diagnosis name                   | DTC detecting condition   | Possible cause  |
|---------|--|---|---|
| P0335   | Crankshaft position sensor (OBD) circuit | <ul style="list-style-type: none"> <li>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.</li> </ul> | <ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Crankshaft position sensor (OBD)</li> </ul> |

### DTC Confirmation Procedure

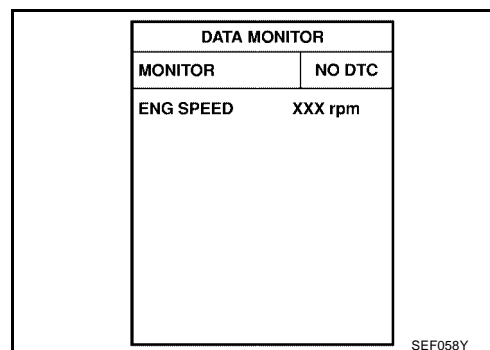
UBS0060W

#### 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

- Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
- Start engine and run it for at least 15 seconds at idle speed.
- If 1st trip DTC is detected, go to [EC-1479, "Diagnostic Procedure"](#).





**WITH GST**

Follow the procedure "With CONSULT-II".

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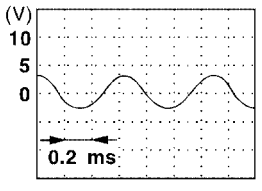
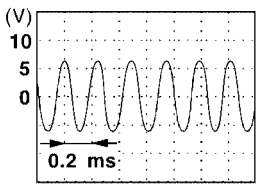
# DTC P0335 CKP SENSOR (OBD)

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use 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 (AC Voltage)   |
|---------------|------------|----------------------------------|--|---|
| 47            | L          | Crankshaft position sensor (OBD) | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul> | <p>1 - 2V★<br/>(AC range)</p>  |
|               |            |                                  | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>               | <p>3 - 4V★<br/>(AC range)</p>  |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

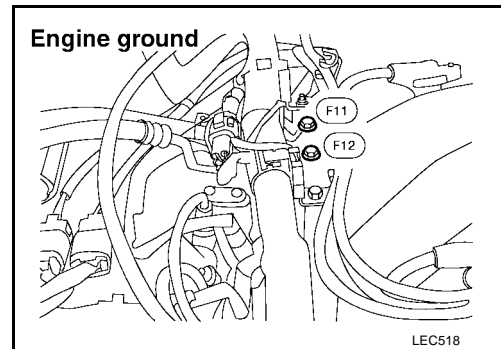
## Diagnostic Procedure

UBS0060Y

### 1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



### 2. CHECK CKP SENSOR (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

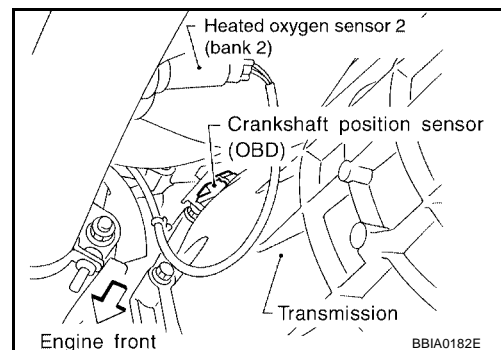
1. Disconnect crankshaft position (CKP) sensor (OBD) and ECM harness connectors.
2. Check continuity between ECM terminal 47 and sensor terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> GO TO 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. Reconnect ECM harness connector.
2. Check harness continuity between sensor terminal 1 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 6.
- NG >> GO TO 5.

### 5. DETECT MALFUNCTIONING PART

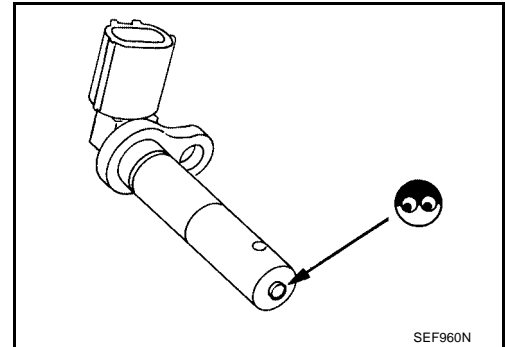
Check the following.

- Harness connectors F38, F102
- Harness for open between crankshaft position sensor (OBD) and ECM

>> Repair open circuit or short to power in harness or connectors.

### 6. 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.

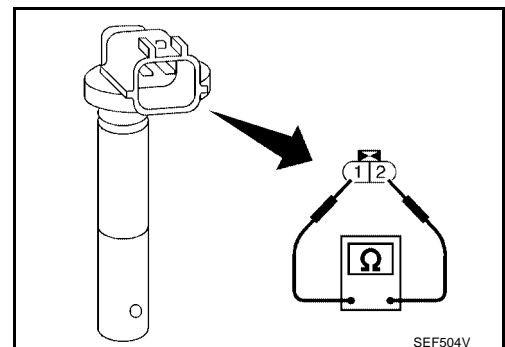


5. Check resistance as shown in the figure.

**Resistance : Approximately 512 - 632Ω [at 20°C (68°F)]**

OK or NG

- OK >> GO TO 7.
- NG >> Replace crankshaft position sensor (OBD).





---

**7. CHECK INTERMITTENT INCIDENT**

---

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

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**DTC P0340 CMP SENSOR**

**Component Description**

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.

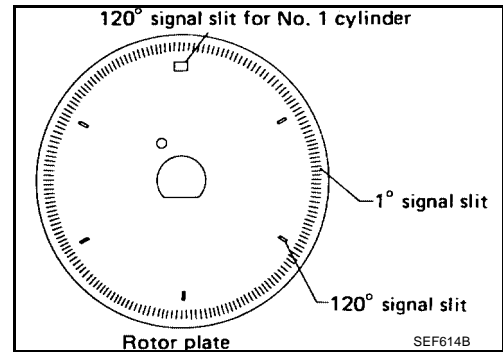
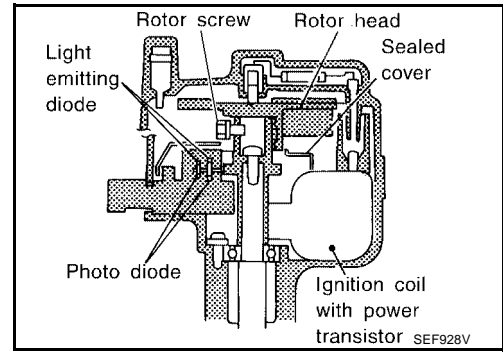
The rotor plate is positioned between the LED and the photo diode. The LED transmits light to the photo diode. As the rotor plate turns, the slits cut the light to generate rough-shaped pulses. These pulses are converted into on-off signals by the wave-forming circuit and sent to the ECM.

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**

| DTC No. | Trouble diagnosis name           | DTC detecting condition |  | Possible cause   |
|---------|----------------------------------|-------------------------|--|--|
| P0340   | Camshaft position sensor circuit | A)                      | <ul style="list-style-type: none"> <li>Either 1° or 120° signal is not sent to ECM for the first few seconds during engine cranking.</li> </ul>                              | <ul style="list-style-type: none"> <li>Harness or connectors (The CMP sensor circuit is open or shorted)</li> <li>Camshaft position sensor</li> <li>Starter motor (Refer to <a href="#">SC-9, "STARTING SYSTEM"</a> .)</li> <li>Starting system circuit (Refer to <a href="#">SC-9, "STARTING SYSTEM"</a> .)</li> <li>Dead (Weak) battery</li> </ul> |
|         |                                  | B)                      | <ul style="list-style-type: none"> <li>Either 1° or 120° signal is not sent to ECM often enough while the engine speed is higher than the specified engine speed.</li> </ul> |  |
|         |                                  | C)                      | <ul style="list-style-type: none"> <li>The relation between 1° and 120° signal is not in the normal range during the specified engine speed.</li> </ul>                      |  |

**DTC Confirmation Procedure**

**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.

# DTC P0340 CMP SENSOR

[VG33ER]

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-1486, "Diagnostic Procedure"](#) .

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

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## WITH GST

Follow the procedure "With CONSULT-II".

## 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-1486, "Diagnostic Procedure"](#) .

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

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## WITH GST

Follow the procedure "With CONSULT-II".

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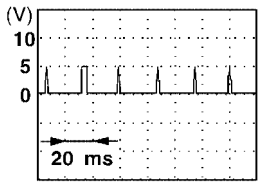
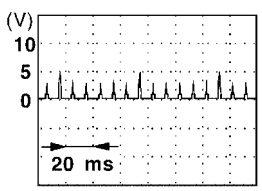
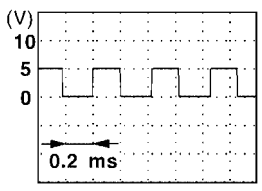
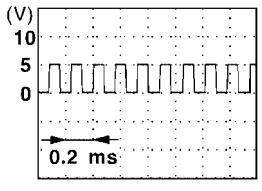
# DTC P0340 CMP SENSOR

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use 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)  |
|---------------|------------|---|---|--|
| 4             | OR/B       | ECM relay (Self shut-off)                   | [Engine is running]<br>[Ignition switch OFF]<br>● For a few seconds after turning ignition switch OFF | 0 - 1.5V   |
|               |            |   | [Ignition switch OFF]<br>● A few seconds passed after turning ignition switch OFF                     | BATTERY VOLTAGE<br>(11 - 14V)  |
| 44            | PU         | Camshaft position sensor (Reference signal) | [Engine is running]<br>● Idle speed   | 0.3 - 0.5V★<br>           |
|               |            |   | [Engine is running]<br>● Engine speed is 2,000 rpm  | 0.3 - 0.5V★<br>          |
| 49            | LG         | Camshaft position sensor (Position signal)  | [Engine is running]<br>● Warm-up condition<br>● Idle speed  | Approximately 2.5V★<br> |
|               |            |   | [Engine is running]<br>● Engine speed is 2,000 rpm  | Approximately 2.5V★<br> |
| 67            | B/P        | Power supply for ECM                        | [Ignition switch ON]  | BATTERY VOLTAGE<br>(11 - 14V)  |
| 72            | B/P        |   | [Ignition switch ON]  | BATTERY VOLTAGE<br>(11 - 14V)  |
| 117           | B/P        | Current return                              | [Engine is running]<br>● Idle speed   | BATTERY VOLTAGE<br>(11 - 14V)  |

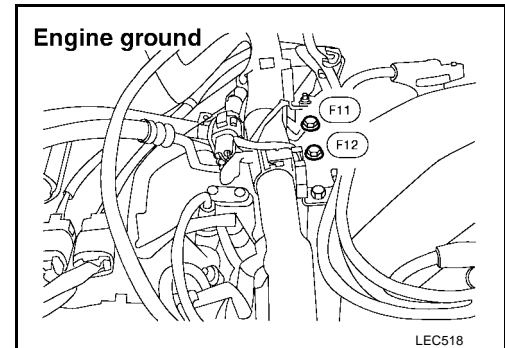
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnostic Procedure

### 1. RETIGHTEN GROUND SCREWS

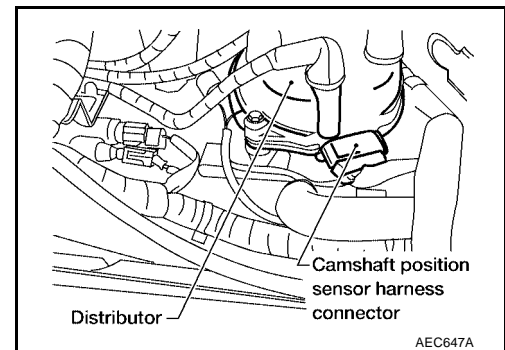
1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



### 2. CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor harness connector.
2. Turn ignition switch ON.

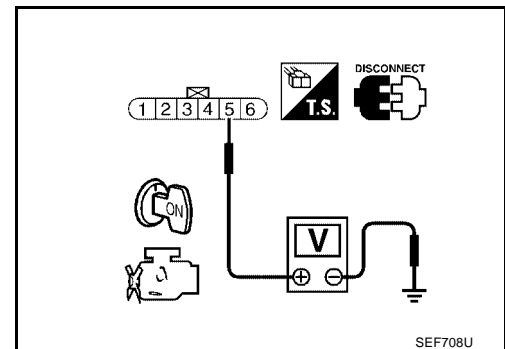


3. Check voltage between CMP sensor terminal 5 and ground with CONSULT-II or tester.

**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. Turn ignition switch OFF.
2. Check harness continuity between CMP sensor terminal 6 and engine ground.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.

NG >> GO TO 6.

---

**6. DETECT MALFUNCTIONING PART**

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Check the following.

- Harness for open between camshaft position sensor and engine ground

>> Repair open circuit or short to power in harness or connector.

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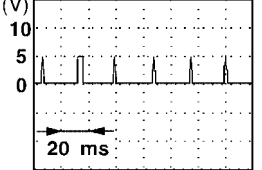
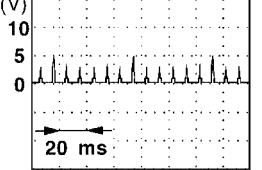
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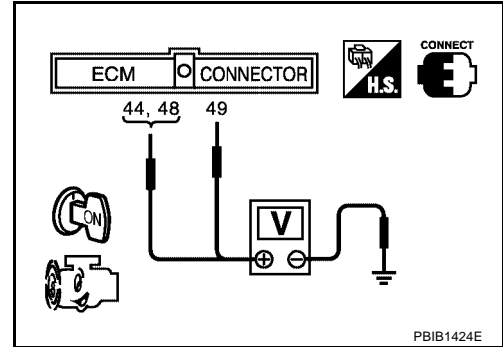
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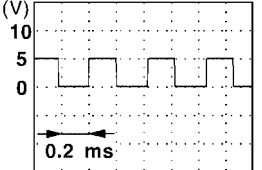
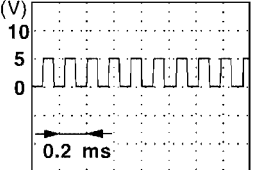
## 7. CHECK CAMSHAFT POSITION SENSOR

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.  
**<Terminal 44 or 48 and engine ground>**

| Condition    | Idle  | 2,000 rpm   |
|--------------|---|---|
| Voltage      | 0.3 - 0.5V  | 0.3 - 0.5V  |
| Pulse signal |  |  |



### <Terminal 49 and engine ground>

| Condition    | Idle   | 2,000 rpm  |
|--------------|--|--|
| Voltage      | Approximately 2.5V   | Approximately 2.5V   |
| Pulse signal |  |  |

### OK or NG

- OK >> GO TO 8.
- NG >> Replace distributor assembly with camshaft position sensor.

## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation DISTRIBUTOR

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

UBS006XK



## DTC P0420, P0430 THREE WAY CATALYST FUNCTION

PFP:20905

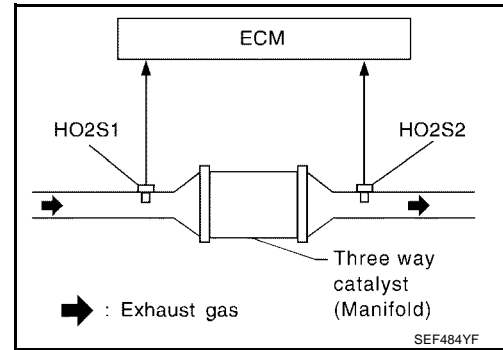
### On Board Diagnosis Logic

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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<br>(Bank 1) | Catalyst system efficiency below threshold | <ul style="list-style-type: none"> <li>● Three way catalyst (Manifold) does not operate properly.</li> <li>● Three way catalyst (Manifold) does not have enough oxygen storage capacity.</li> </ul> | <ul style="list-style-type: none"> <li>● Three way catalyst (Manifold)</li> <li>● Exhaust tube</li> <li>● Intake air leaks</li> <li>● Fuel injectors</li> <li>● Fuel injector leaks</li> <li>● Spark plug</li> <li>● Improper ignition timing</li> </ul> |
| P0430<br>(Bank 2) |  |   |  |

### DTC Confirmation Procedure

UBS00616

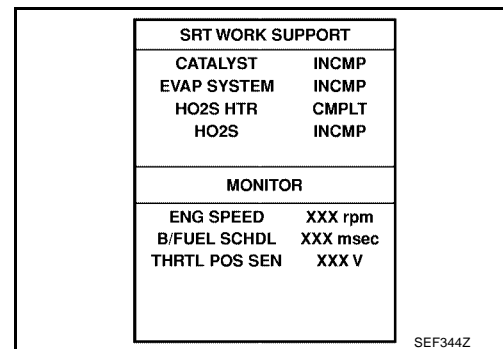
**NOTE:**

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 one minute under no load.
- 4. Let engine idle for one 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.



# DTC P0420, P0430 THREE WAY CATALYST FUNCTION

[VG33ER]

- 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.

| SRT WORK SUPPORT |          |
|------------------|----------|
| CATALYST         | CMPLT    |
| EVAP SYSTEM      | INCMP    |
| HO2S HTR         | CMPLT    |
| HO2S             | INCMP    |
| MONITOR          |          |
| ENG SPEED        | XXX rpm  |
| B/FUEL SCHDL     | XXX msec |
| THRTL POS SEN    | XXX V    |

SEF345Z

- Select "SELF-DIAG RESULTS" mode with CONSULT-II.
- Confirm that the 1st trip DTC is not detected.  
If the 1st trip DTC is detected, go to [EC-901, "Diagnostic Procedure"](#).

| SELF DIAG RESULTS  |      |
|--|------|
| DTC RESULTS  | TIME |
| NO DTC IS DETECTED.<br>FURTHER TESTING<br>MAY BE REQUIRED. |      |
|  |      |
|  |      |

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## Overall Function Check

UBS00617

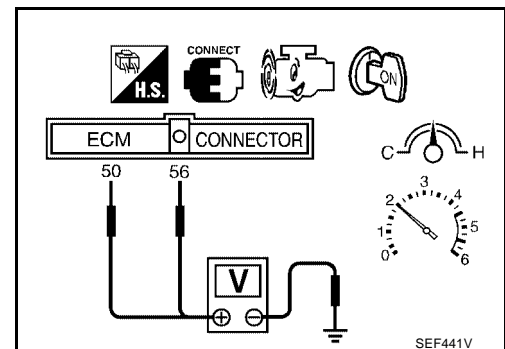
Use this procedure to check the overall function of the three way catalyst (manifold). During this check, a DTC might not be confirmed.

### CAUTION:

Always drive vehicle at a safe speed.

### WITH GST

- Start engine and warm it up to the normal operation temperature.
- Turn ignition switch "OFF" and wait at least 10 seconds.
- Start engine and keep the engine speed at between 3,500 and 4,000 rpm for at least one minute under no load.
- Let engine idle for one minutes.
- Set voltmeters probes between ECM terminals 50 [HO2S1 (bank 1) signal], 51 [HO2S1 (bank 2) signal] and engine ground, and ECM terminals 56 [HO2S2 (bank 1) signal], 57 [HO2S2 (bank 2) signal] and engine ground.
- Keep engine speed at 2,000 rpm constant under no load.



## DTC P0420, P0430 THREE WAY CATALYST FUNCTION

[VG33ER]

7. Make sure that the voltage switching frequency (high & low) between ECM terminals 56 and engine ground, or 57 and engine ground, or 51 and engine ground.

**Switching frequency ratio = A/B**

**A: Heated oxygen sensor 2 voltage switching frequency**

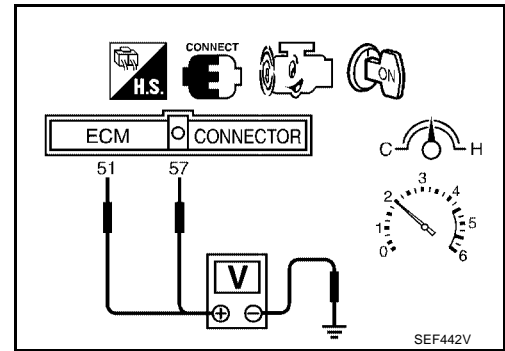
**B: Heated oxygen sensor 1 voltage switching frequency**

**This ratio should be less than 0.75.**

If the ratio is greater than above, it means three way catalyst (manifold) does not operate properly. Go to [EC-1492, "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-1388](#).)



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## Diagnostic Procedure

### 1. CHECK EXHAUST SYSTEM

Visually check exhaust tubes and muffler for dent.

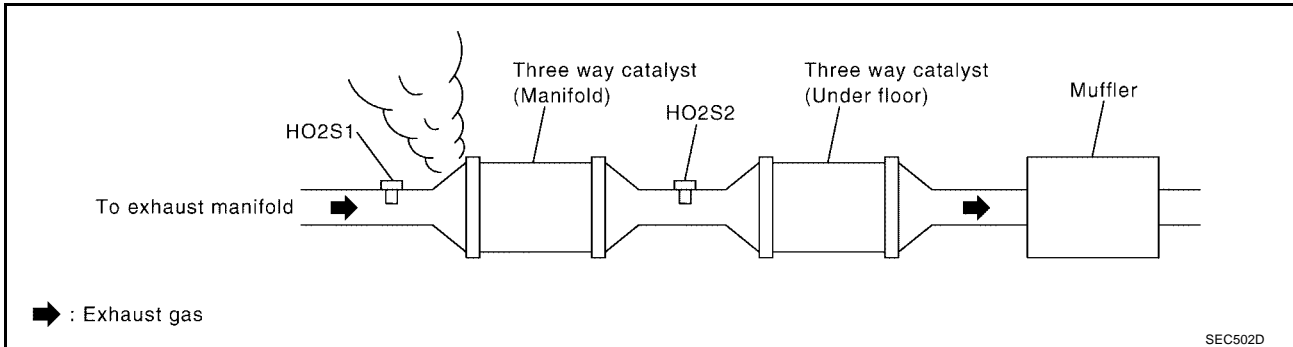
OK or NG

OK >> GO TO 2.

NG >> Repair or replace 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-1251, "Basic Inspection"](#).

| Items  | Specifications   |
|--|--|
| Ignitions timing   | $10^{\circ} \pm 2^{\circ}$ BTDC  |
| Base idle speed  | $700 \pm 50$ rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.3 mm (0.012 in): ON<br>0.4 mm (0.016 in): OFF |
| Target idle speed  | $750 \pm 50$ rpm (in P or N position)  |

OK or NG

OK >> GO TO 5.

NG >> Adjust ignition timing.

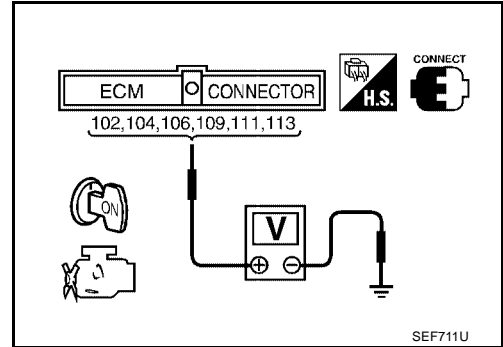
**5. CHECK INJECTORS**

1. Refer to [EC-1721, "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-1720, "INJECTOR CIRCUIT"](#)

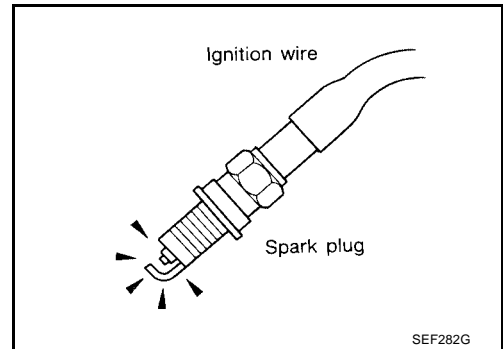


**6. CHECK IGNITION SPARK**

1. Turn ignition switch OFF.
2. Disconnect ignition wire from spark plug.
3. Connect a known good spark plug to the ignition wire.
4. Place end of spark plug against a suitable ground and crank engine.
5. Check for spark.

OK or NG

- OK >> GO TO 8.
- NG >> GO TO 7.

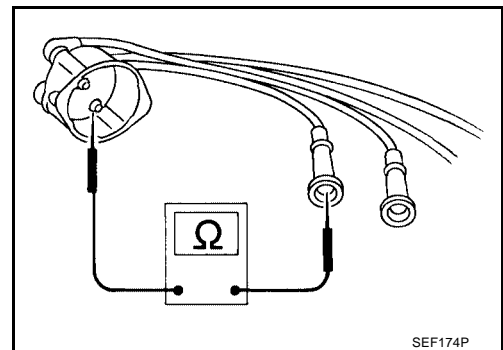


**7. CHECK IGNITION WIRES**

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-1714, "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. Disconnect all ignition coil harness connectors.
4. Turn ignition switch ON.  
Make sure fuel does not drip from injector.

### OK or NG

OK (Does not drip)>>GO TO 9.

NG (Drips)>>Replace the injector(s) from which fuel is dripping.

---

## 9. CHECK INTERMITTENT INCIDENT

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Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

Trouble is fixed>>**INSPECTION END.**

Trouble is not fixed>>Replace three way catalyst (manifold).

DTC P0441 EVAP CONTROL SYSTEM

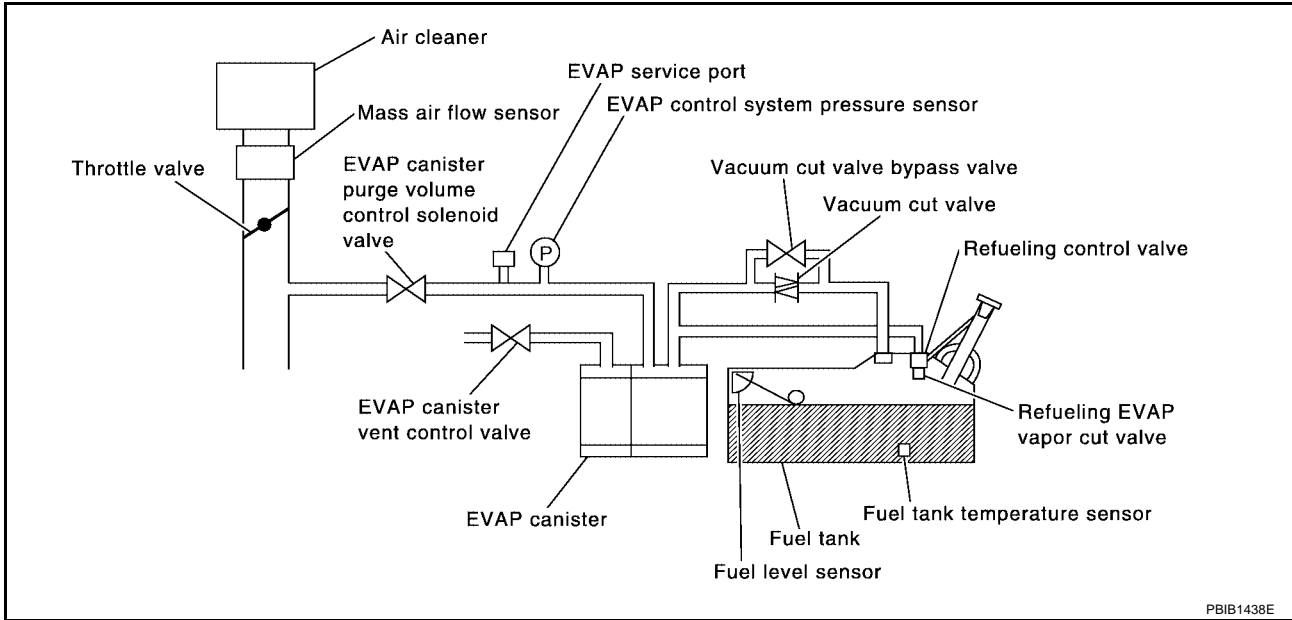
PFP:14950

System Description

UBS00619

NOTE:

If DTC P0441 is displayed with P0510, perform trouble diagnosis for DTC P0510 first. (See [EC-1584](#).)



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

UBS006V2

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. | <ul style="list-style-type: none"> <li>● EVAP canister purge volume control solenoid valve stuck closed</li> <li>● EVAP control system pressure sensor and the circuit</li> <li>● Loose, disconnected or improper connection of rubber tube</li> <li>● Blocked rubber tube</li> <li>● Blocked or bent rubber tube to MAP/BARO switch solenoid valve</li> <li>● Cracked EVAP canister</li> <li>● EVAP canister purge volume control solenoid valve circuit</li> <li>● Closed throttle position switch</li> <li>● Blocked purge port</li> <li>● EVAP canister vent control valve</li> </ul> |

DTC Confirmation Procedure

UBS0061B

**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.

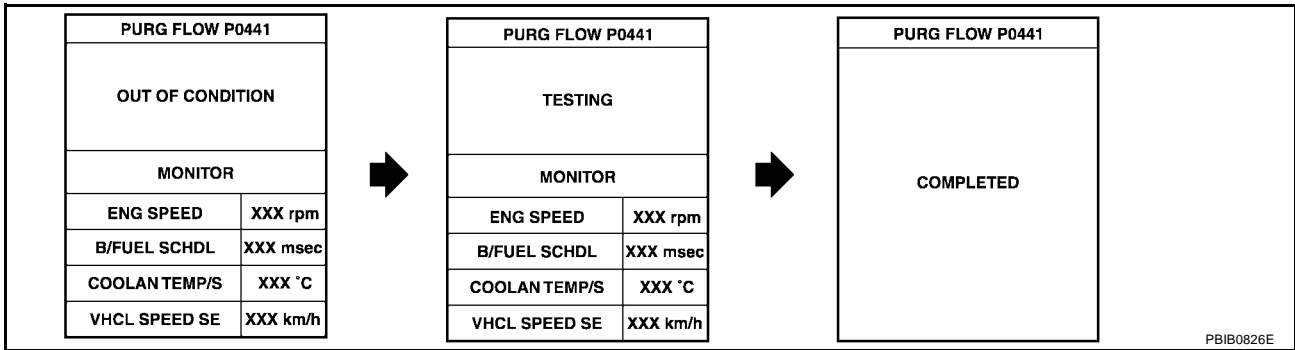
**TESTING CONDITION:**

**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 P0442" 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           |
| Vehicle speed              | 32 - 120 km/h (20 - 75 MPH) |
| ENG SPEED                  | 500 - 3,400 rpm             |
| B/FUEL SCHDL               | 1.0 - 11.0 msec             |
| Engine coolant temperature | 70 - 100°C (158 - 212°F)    |



**If "TESTING" is not changed for a long time, retry from step 2.**

7. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS". If "NG" is displayed, refer to [EC-1497, "Diagnostic Procedure"](#).

## Overall Function Check

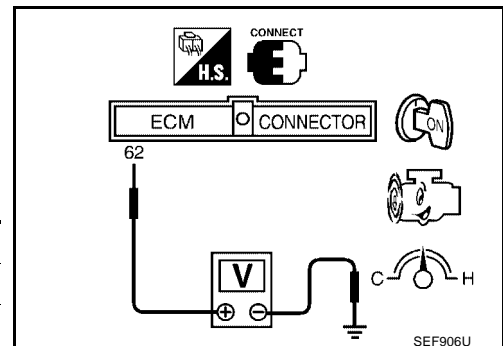
UBS0061C

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, 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-1497, "Diagnostic Procedure"](#) .

**Diagnostic Procedure**

UBS0061D

**1. CHECK EVAP CANISTER**

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

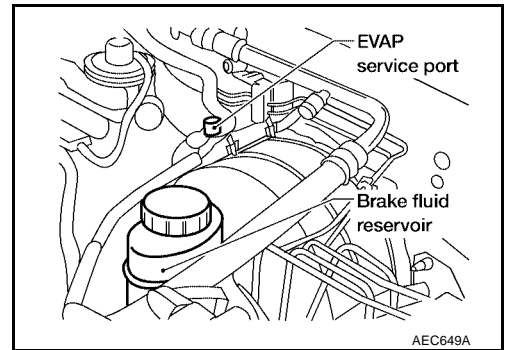
OK or NG

- 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           |
|-----------------|------------------|
| 100.0%          | Should exist     |
| 0.0%            | Should not exist |

OK or NG

- OK >> GO TO 7.
- NG >> GO TO 4.

| 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

### 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.

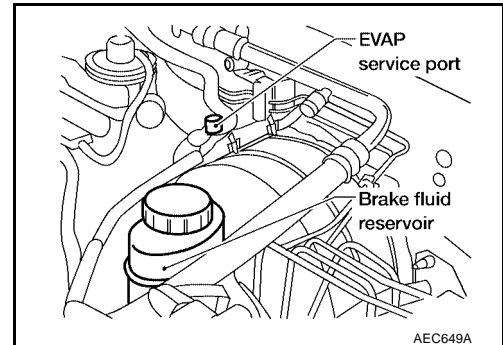
**Vacuum should exist.**

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

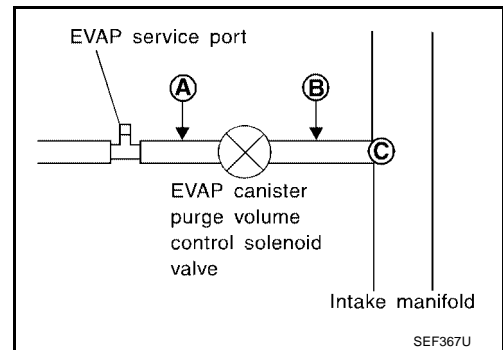
1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection. Refer to [EC-1745, "EVAPORATIVE EMISSION LINE DRAWING"](#).

OK or NG

- OK >> GO TO 5.  
 NG >> Repair it.

### 5. CHECK EVAP PURGE HOSE AND PURGE PORT

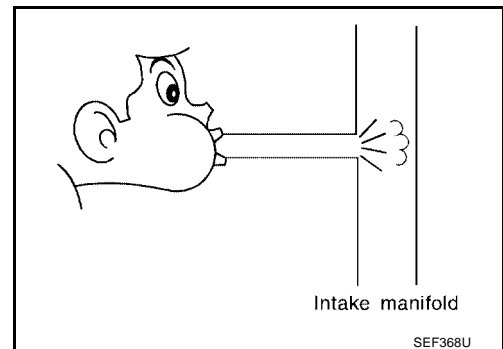
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.
2. Blow air into each hose and EVAP purge port **C**.



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   |

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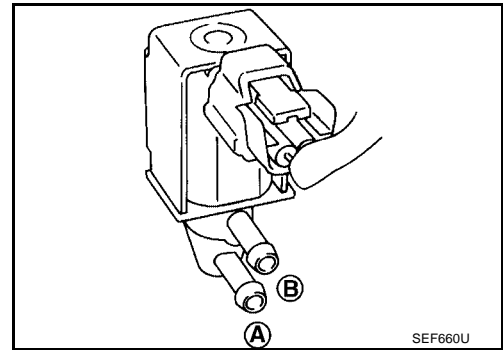
3. Check air passage continuity.

| Condition<br>PURG VOL CONT/V value | Air passage continuity between A<br>and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |

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**

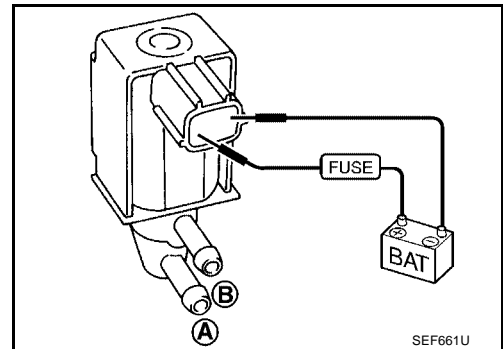
Check air passage continuity.

| Condition  | Air passage continuity between A<br>and B |
|--|---|
| 12V direct current supply<br>between terminals 1 and 2 | Yes                                       |
| No supply  | No  |

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**

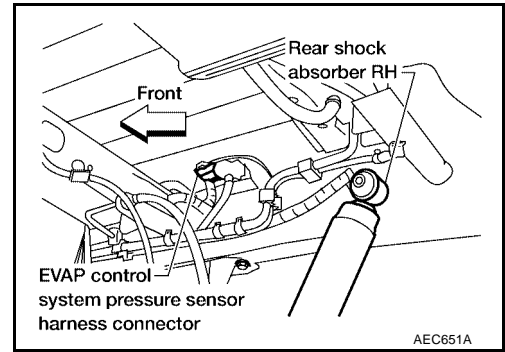
1. Turn ignition switch OFF.
2. Check disconnection or improper connection of hose connected to EVAP control system pressure sensor.

**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-1528](#) or P0453, [EC-1534](#) .

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   |

Diagram showing the vent control valve assembly. Labels include: CONNECT O-ring, A, B, and SEF013Z.

**⊗ 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.**

Diagram showing the vent control valve assembly with electrical connections. Labels include: FUSE, BAT, BATTERY, O-ring, and torque specifications: 3.2 – 4.8 N·m, 0.33 – 0.49 kg·m, 29 – 43 in·lb. Reference code: BBIA0309E.

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-1251, "Basic Inspection"](#) .

| Items  | Specifications   |
|--|--|
| Ignitions timing   | 10° ± 2° BTDC  |
| Base idle speed  | 700 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.3 mm (0.012 in): ON<br>0.4 mm (0.016 in): OFF |
| Target idle speed  | 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.

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

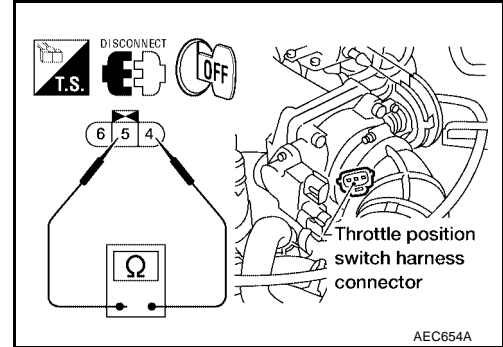
### 13. CHECK CLOSED THROTTLE POSITION SWITCH

**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 open | No         |

If NG, adjust closed throttle position switch.  
Check the following items. Refer to [EC-1251, "Basic Inspection"](#)



| Items  | Specifications   |
|--|--|
| Ignitions timing   | 10° ± 2° BTDC  |
| Base idle speed  | 700 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.3 mm (0.012 in): ON<br>0.4 mm (0.016 in): OFF |
| Target idle speed  | 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-1745, "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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#).

>> INSPECTION END.

DTC P0442 EVAP CONTROL SYSTEM

PF:14950

On Board Diagnosis Logic

UBS0061E

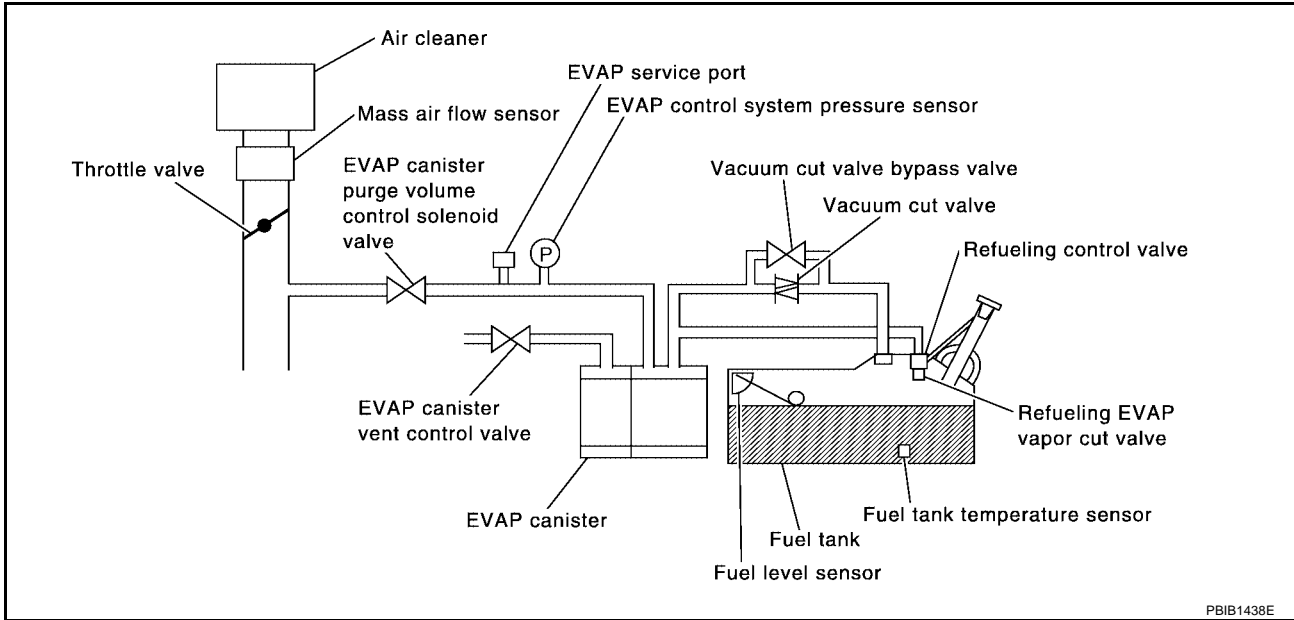
NOTE:

If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (EC-1663.)

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.



PBIB1438E

| 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. | <ul style="list-style-type: none"> <li>● Incorrect fuel tank vacuum relief valve</li> <li>● Incorrect fuel filler cap used</li> <li>● Fuel filler cap remains open or fails to close.</li> <li>● Foreign matter caught in fuel filler cap.</li> <li>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>● Foreign matter caught in EVAP canister vent control valve.</li> <li>● EVAP canister or fuel tank leaks</li> <li>● EVAP purge line (pipe and rubber tube) leaks</li> <li>● EVAP purge line rubber tube bent</li> <li>● Blocked or bent rubber tube to EVAP control system pressure sensor</li> <li>● Loose or disconnected rubber tube</li> <li>● EVAP canister vent control valve and the circuit</li> <li>● EVAP canister purge volume control solenoid valve and the circuit</li> <li>● Fuel tank temperature sensor</li> <li>● O-ring of EVAP canister vent control valve is missing or damaged</li> <li>● water separator</li> <li>● EVAP canister is saturated with water</li> <li>● EVAP control system pressure sensor</li> <li>● Fuel level sensor and the circuit</li> <li>● Refueling EVAP vapor cut</li> <li>● ORVR system leaks</li> </ul> |

**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

UBS0061F

**NOTE:**

- If DTC P0442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. ([EC-1663](#) .)
- 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:**

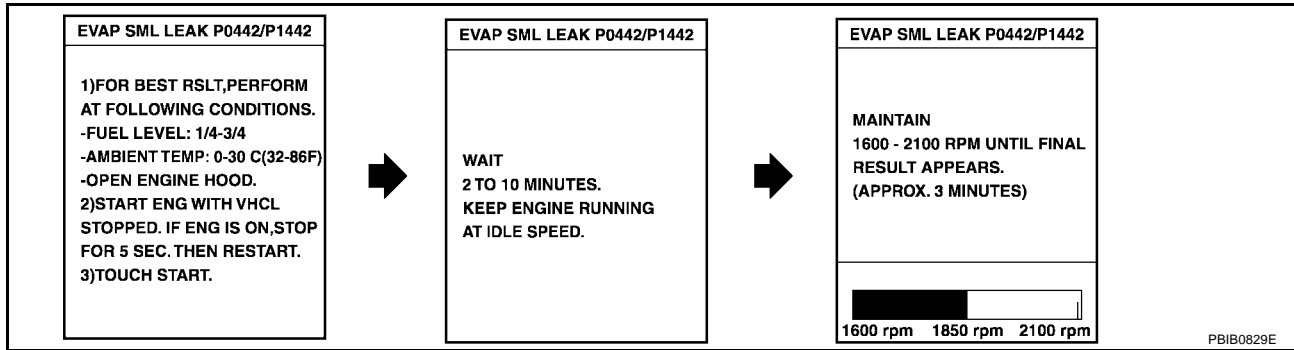
- Perform “DTC WORK SUPPORT” when the fuel level is between 1/4 to 3/4 full and vehicle is placed on flat level surface.
- Open engine hood before conducting the following procedure.

**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” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.



Follow the instruction displayed.



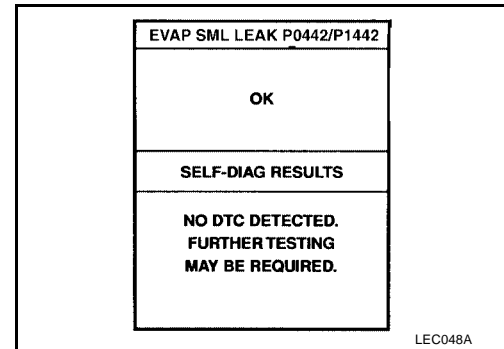
**NOTE:**

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to [EC-1251, "Basic Inspection"](#) .

- Make sure that "OK" is displayed.  
If "NG" is displayed, refer to [EC-1506, "Diagnostic Procedure"](#) .

**NOTE:**

**Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**



**WITH GST**

**NOTE:**

Be sure to read the explanation of "Driving Pattern" on [EC-1234, "Driving Pattern"](#) before driving vehicle.

- Start engine.
- Drive vehicle according to "Driving Pattern", [EC-1234, "Driving Pattern"](#) .
- Stop vehicle.
- 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.
- Turn ignition switch OFF and wait at least 5 seconds.
- Start engine.
 

**It is not necessary to cool engine down before driving.**
- Drive vehicle again according to the "Driving Pattern", [EC-1234, "Driving Pattern"](#) .
- Stop vehicle.
- Select "MODE 3" with GST.
  - If P0442 is displayed on the screen, go to [EC-1506, "Diagnostic Procedure"](#) .
  - If P0441 is displayed on the screen, go to [EC-1497, "Diagnostic Procedure"](#) .
  - If P0442 and P0441 are not displayed on the screen, go to the following step.
- 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.

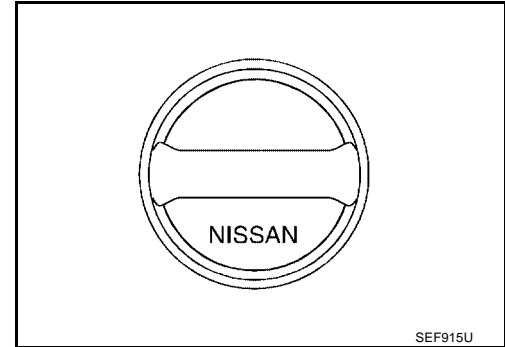
## Diagnostic Procedure

### 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

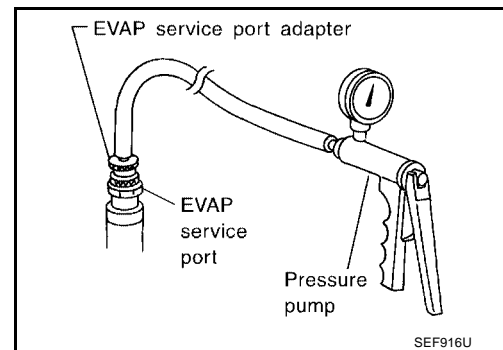
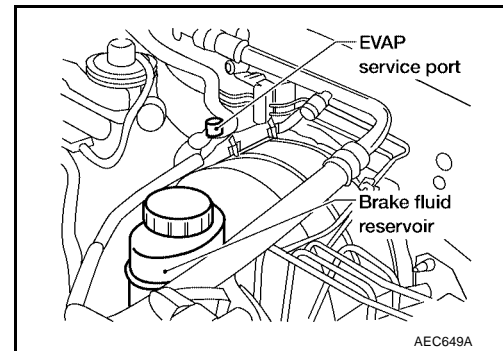
Refer to [EC-1747, "FUEL TANK VACUUM RELIEF VALVE \(BUILT INTO FUEL FULLER CAP\)"](#).

OK or NG

- OK >> GO TO 5.  
NG >> Replace fuel filler cap with a genuine one.

## 5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



**NOTE:**

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II>>GO TO 6.

Models without CONSULT-II>>GO TO 7.

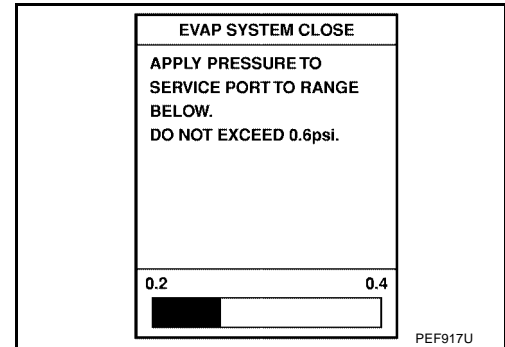
## 6. CHECK FOR EVAP LEAK

### With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

#### NOTE:

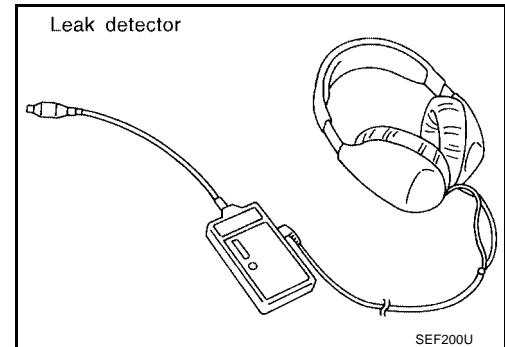
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-1745, "EVAPORATIVE EMISSION LINE DRAWING"](#).

#### OK or NG

- OK >> GO TO 8.  
 NG >> Repair or replace.



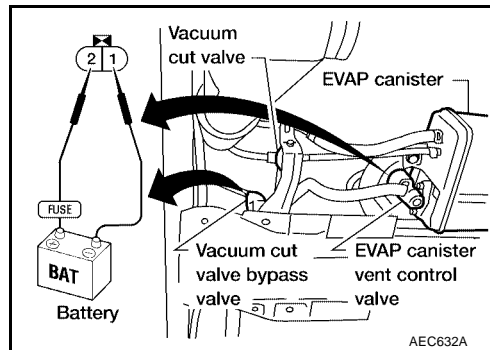
**7. CHECK FOR EVAP LEAK**

⊗ **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:**

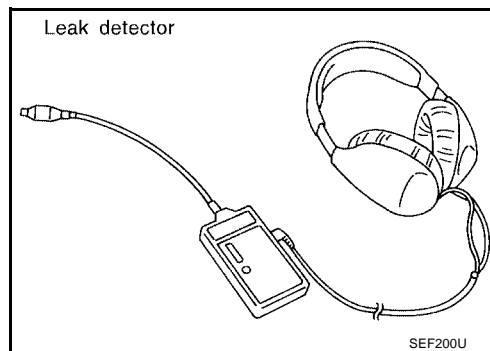
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-1745, "EVAPORATIVE EMISSION LINE DRAWING"](#) .

OK or NG

- OK >> GO TO 8.  
 NG >> Repair or replace.



**8. CHECK WATER SEPARATOR**

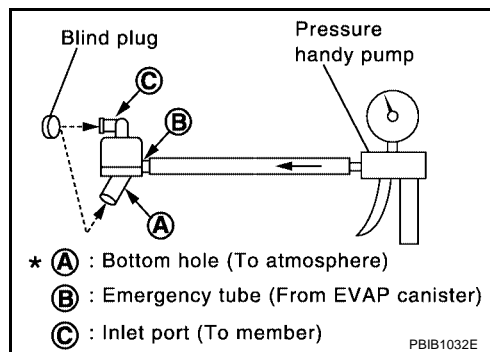
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG 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-1660, "Diagnostic Procedure"](#) .

OK or NG

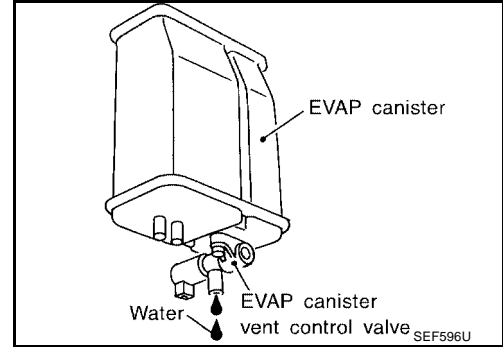
- OK >> GO TO 10.  
 NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

**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 100.0%.
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.

| 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

**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-1204, "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.

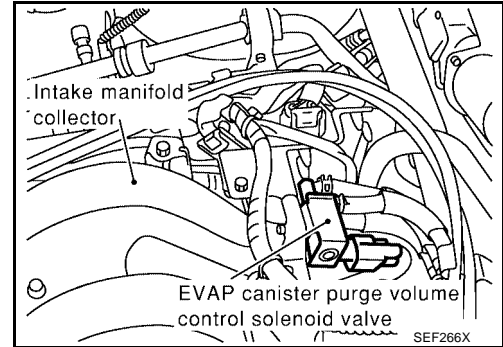
| ACTIVE TEST     |         |
|-----------------|---------|
| PURG VOL CONT/V | XXX %   |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XX %    |
| A/F ALPHA-B2    | XX %    |
| HO2S1 MNTR (B1) | LEAN    |
| HO2S1 MNTR (B2) | LEAN    |
| THRTL POS SEN   | X. XX V |
|                 |         |

SEF677Y

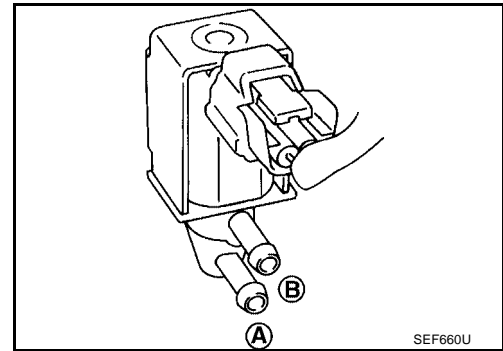
## 17. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

**Ⓜ With CONSULT-II**

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

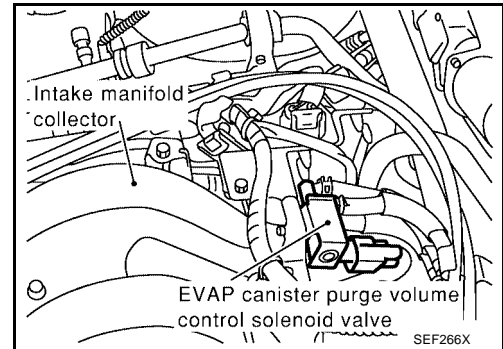


| Condition PURG VOL CONT/V value | Air passage continuity between A or B |
|---------------------------------|---------------------------------------|
| 100.0%                          | Yes                                   |
| 0.0%                            | No                                    |

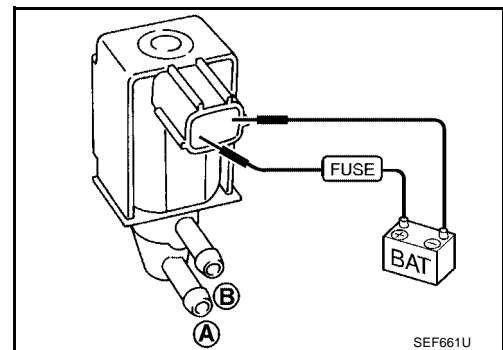


**⊗ Without CONSULT-II**

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



| Condition                                   | Air passage continuity between A 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.



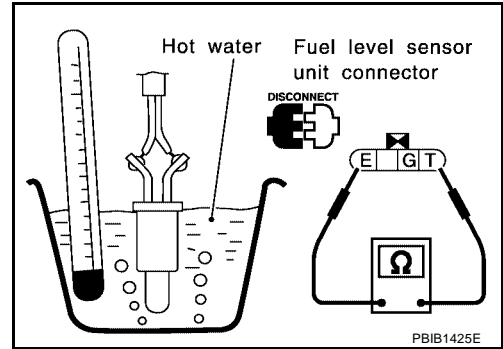
**18. CHECK FUEL TANK TEMPERATURE SENSOR**

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.

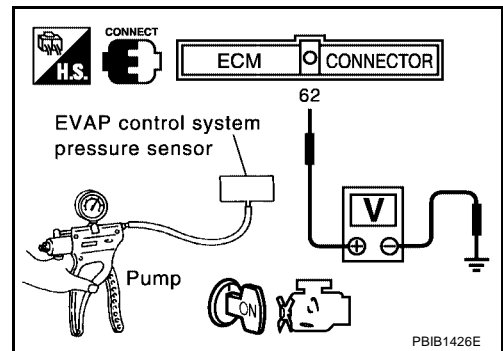
| Applied vacuum                    | Voltage V                          |
|-----------------------------------|------------------------------------|
| Not applied                       | 1.8 - 4.8                          |
| -26.7 kpa (-200 mmHg, -7.87 inHg) | 2.1 to 2.5V lower than above value |

**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-1745, "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-1752, "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-1752, "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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VG33ER]

## DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

### Description SYSTEM DESCRIPTION

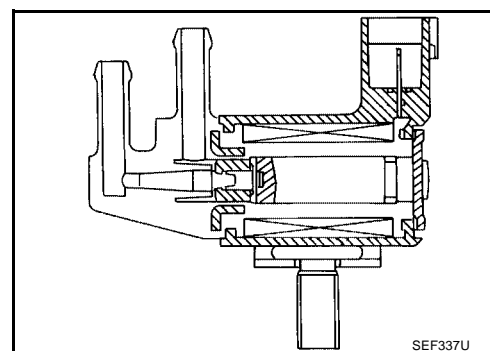
UBS0061H

| 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 sensors 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

UBS0061I

Specification data are reference values.

| MONITOR ITEM | CONDITION   |                        | SPECIFICATION |
|--------------|---|------------------------|---------------|
| PURG VOL C/V | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch OFF</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle (Vehicle stopped) | 0%            |
|              |   | 2,000 rpm              | —             |

# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VG33ER]

UBS006XM

## On Board Diagnosis Logic

| 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  | <ul style="list-style-type: none"> <li>● Harness or connectors (The solenoid valve circuit is open or shorted.)</li> <li>● EVAP canister purge volume control solenoid valve</li> </ul> |
| P0445   | EVAP canister purge volume control solenoid valve circuit shorted | An excessively high voltage signal is sent to ECM through the valve | <ul style="list-style-type: none"> <li>● Harness or connectors (The solenoid valve circuit is shorted.)</li> <li>● EVAP canister purge volume control solenoid valve</li> </ul>         |

## DTC Confirmation Procedure

UBS006XM

### 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-1519, "Diagnostic Procedure"](#).

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

#### WITH GST

Follow the procedure "With CONSULT-II".

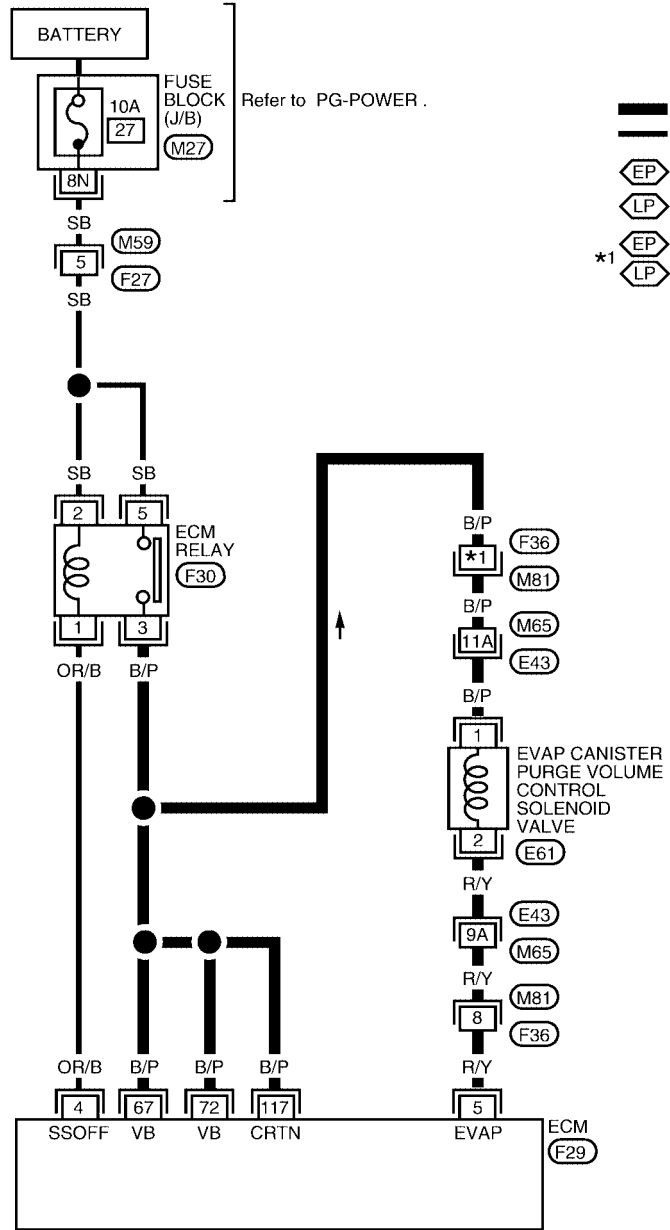
# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VG33ER]

## Wiring Diagram

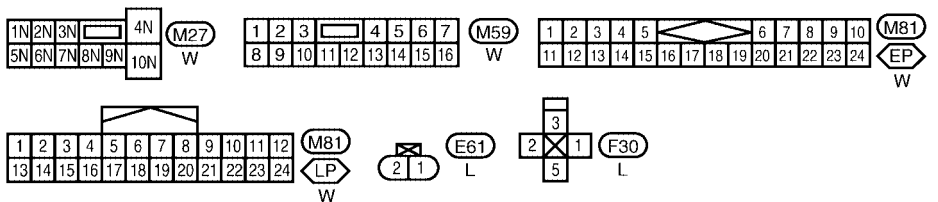
UBS006XO

EC-PGC/V-01

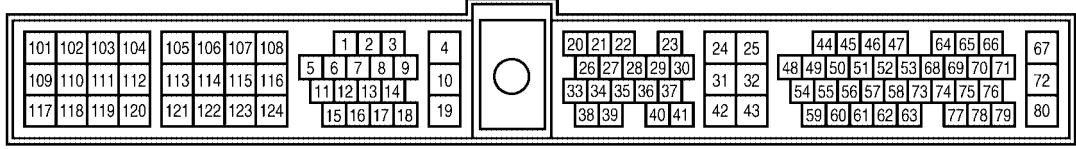


- : Detectable line for DTC
- : Non-detectable line for DTC
- ⬡EP⬢ : EARLY PRODUCTION
- ⬡LP⬢ : LATE PRODUCTION
- \*1 ⬡EP⬢ : 13
- \*1 ⬡LP⬢ : 15

A  
EC  
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M



Refer to the following.  
⬡E43⬢ - SUPER MULTIPLE JUNCTION (SMJ)



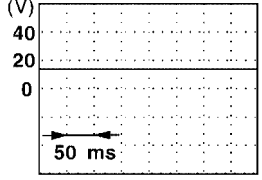
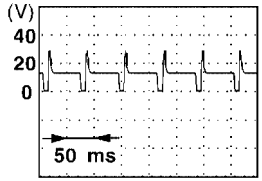
# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use 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.**

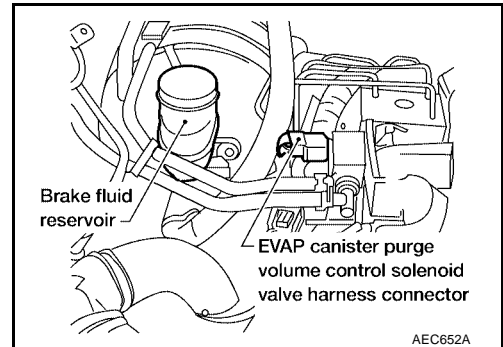
| TER-MINAL NO. | WIRE COLOR | ITEM  | CONDITION   | DATA (DC Voltage)   |
|---------------|------------|---|---|---|
| 4             | OR/B       | ECM relay (Self shut-off)                         | <b>[Engine is running]</b><br><b>[Ignition switch OFF]</b><br><ul style="list-style-type: none"> <li>For a few seconds after turning ignition switch OFF</li> </ul> | 0 - 1.5V  |
|               |            |   | <b>[Ignition switch OFF]</b><br><ul style="list-style-type: none"> <li>A few seconds passed after turning ignition switch OFF</li> </ul>                            | BATTERY VOLTAGE (11 - 14V)  |
| 5             | R/Y        | EVAP canister purge volume control solenoid valve | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>Idle speed</li> </ul>  | BATTERY VOLTAGE (11 - 14V)★<br><br><small>SEF994U</small>  |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>Engine speed is 2,000 rpm (More than 100 seconds after starting engine)</li> </ul>             | BATTERY VOLTAGE (11 - 14V)★<br><br><small>SEF995U</small> |
| 67            | B/P        | Power supply for ECM                              | <b>[Ignition switch ON]</b>   | BATTERY VOLTAGE (11 - 14V)  |
| 72            | B/P        | Power supply for ECM                              | <b>[Ignition switch ON]</b>   | BATTERY VOLTAGE (11 - 14V)  |
| 117           | B/P        | Current return                                    | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>Idle speed</li> </ul>  | BATTERY VOLTAGE (11 - 14V)  |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnostic Procedure

### 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".

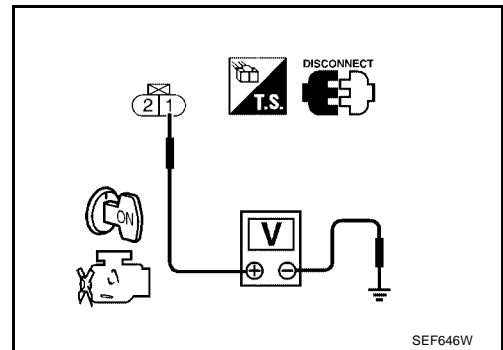


4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.

**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

>> 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 solenoid 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 |
|                 |         |

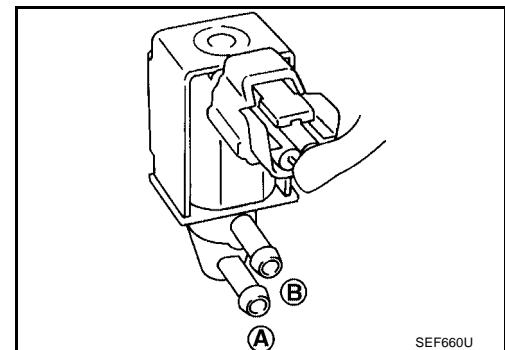
SEF677Y

## 6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Ⓟ **With CONSULT-II**

1. Check air passage continuity under the following conditions.

| Condition<br>PURG VOL CONT/V value | Air passage continuity<br>between A and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |



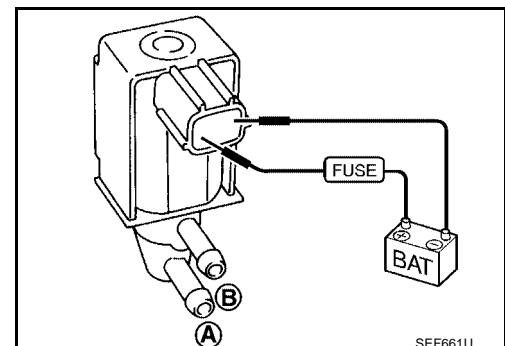
⊗ **Without CONSULT-II**

1. Check air passage continuity under the following conditions.

| Condition   | Air passage continuity<br>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.





# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

[VG33ER]

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## 7. CHECK INTERMITTENT INCIDENT

---

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

A

EC

C

D

E

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I

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K

L

M

## DTC P0447 EVAP CANISTER VENT CONTROL VALVE

PFP:14935

### Component Description

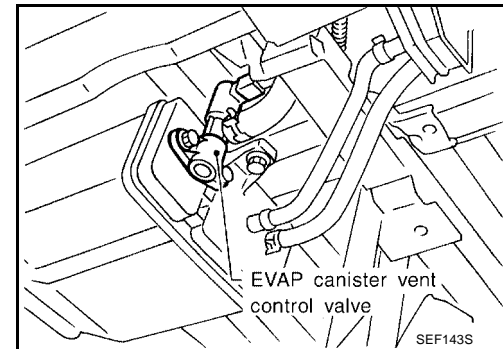
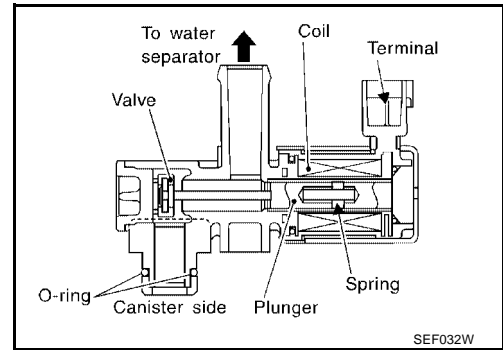
UBS0061O

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

UBS0061P

Specification data are reference values.

| MONITOR ITEM | CONDITION             | SPECIFICATION |
|--------------|-----------------------|---------------|
| VENT CONT/V  | ● Ignition switch: ON | OFF           |

### On Board Diagnosis Logic

UBS006XR

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The valve circuit is open or shorted.)</li> <li>● EVAP canister vent control valve</li> </ul> |

### DTC Confirmation Procedure

UBS006XS

#### 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".

# DTC P0447 EVAP CANISTER VENT CONTROL VALVE

[VG33ER]

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-1525, "Diagnostic Procedure"](#).

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

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M

## WITH GST

Follow the procedure "With CONSULT-II".

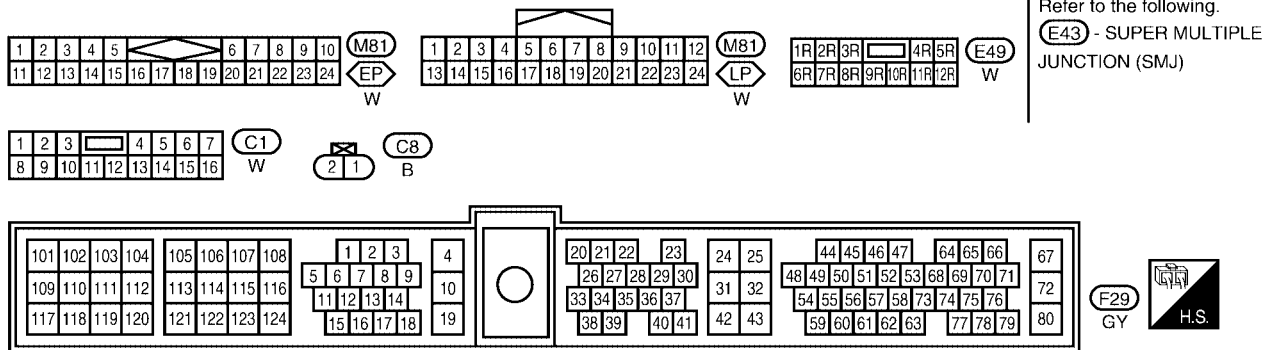
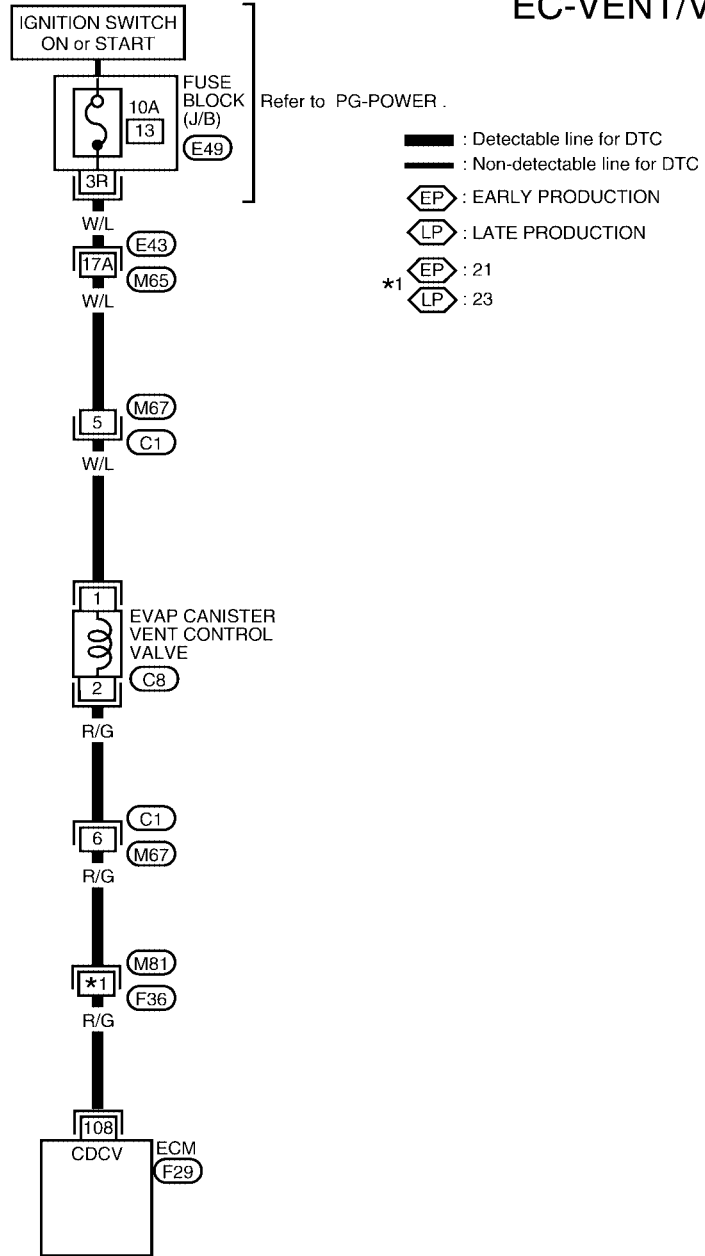
# DTC P0447 EVAP CANISTER VENT CONTROL VALVE

[VG33ER]

UBS006XT

## Wiring Diagram

EC-VENT/V-01



WBWA0060E

# DTC P0447 EVAP CANISTER VENT CONTROL VALVE

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use 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 COLO R | ITEM                             | CONDITION            | DATA (DC Voltage)          |
|---------------|-------------|----------------------------------|----------------------|----------------------------|
| 108           | R/G         | EVAP canister vent control valve | [Ignition switch ON] | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

UBS006XU

### 1. INSPECTION START

Do you have CONSULT-II?

Yes or No

- Yes >> GO TO 2.
- No >> GO TO 3.

### 2. CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

 **With CONSULT-II**

1. Turn ignition switch "OFF" and then turn "ON".
2. Select "VENT CONTROL/V" in "ACTIVE TEST" mode with CONSULT-II.
3. Touch "ON/OFF" on CONSULT-II screen.
4. Check for operating sound of the valve.  
**Clicking noise should be heard.**

| ACTIVE TEST    |         |
|----------------|---------|
| VENT CONTROL/V | OFF     |
| MONITOR        |         |
| ENG SPEED      | XXX rpm |
| A/F ALPHA-B1   | XXX %   |
| A/F ALPHA-B2   | XXX %   |
| HO2S1 (B1)     | XXX V   |
| HO2S1 (B2)     | XXX V   |
| THRTL POS SEN  | XXX V   |
|                |         |

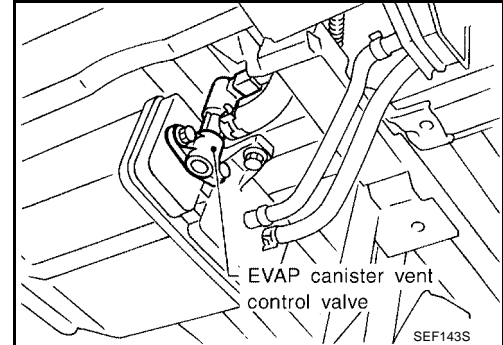
SEF989Y

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".

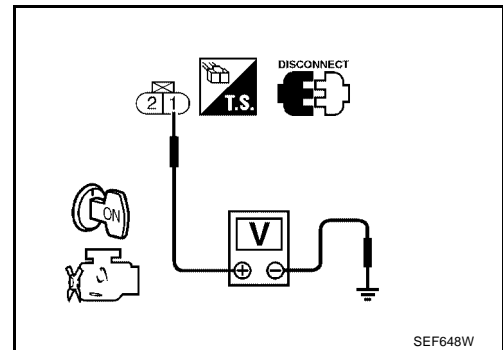


4. Check voltage between terminal 1 and ground with CONSULT-II or tester.

**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.

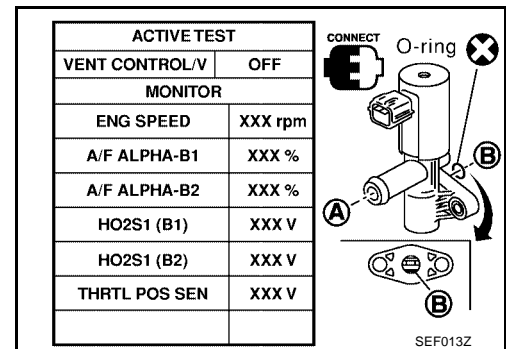
## 7. CHECK EVAP CANISTER VENT CONTROL VALVE

### 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.

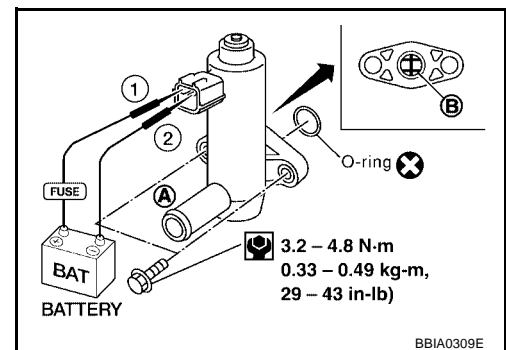
If portion **B** is rusted, replace control valve.

**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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

[VG33ER]

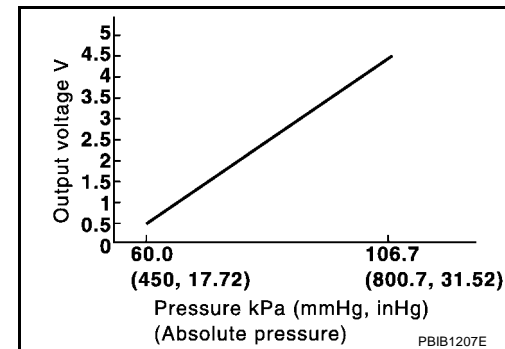
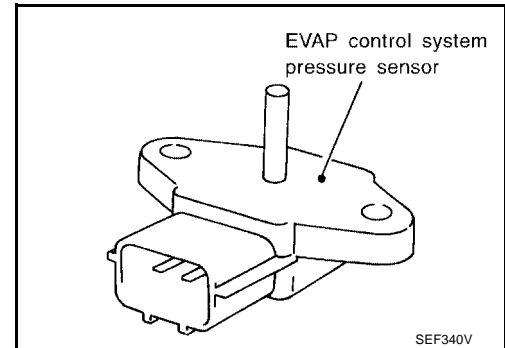
## DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

PFV:25085

### Component Description

UBS0061V

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

UBS0061W

Specification data are reference values.

| MONITOR ITEM  | CONDITION             | SPECIFICATION |
|---------------|-----------------------|---------------|
| EVAP SYS PRES | ● Ignition switch: ON | 1.8 - 4.8V    |

### On Board Diagnosis Logic

UBS006XX

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● EVAP control system pressure sensor</li> </ul> |

### DTC Confirmation Procedure

UBS006XY

#### 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".



# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

[VG33ER]

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-1531, "Diagnostic Procedure"](#).

| DATA MONITOR   |         |
|----------------|---------|
| MONITOR        | NO DTC  |
| ENG SPEED      | XXX rpm |
| COOLANT TEMP/S | XXX °C  |
| FUEL T/TMP SE  | XXX °C  |

SEF194Y

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EC

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D

## 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-1531, "Diagnostic Procedure"](#).

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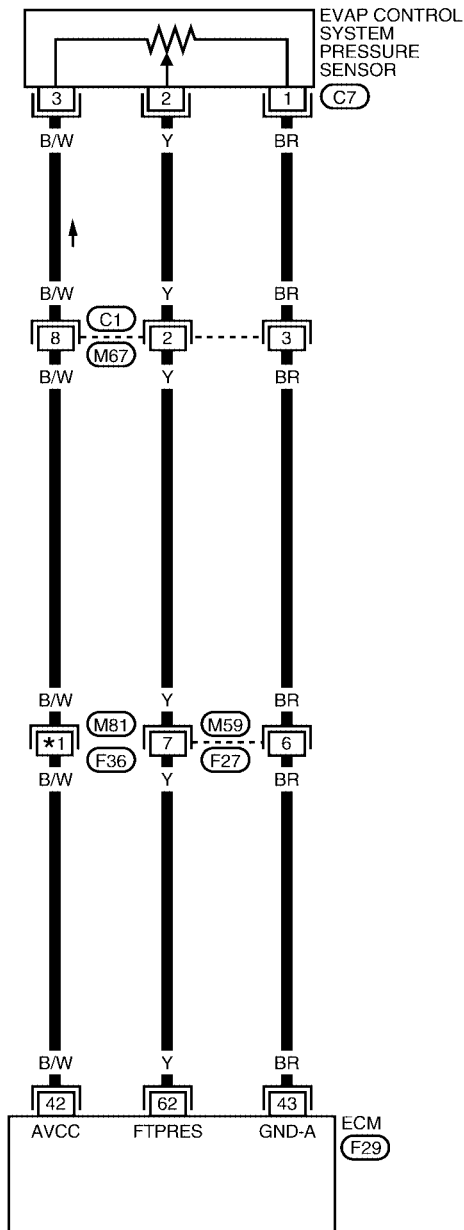
# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

[VG33ER]

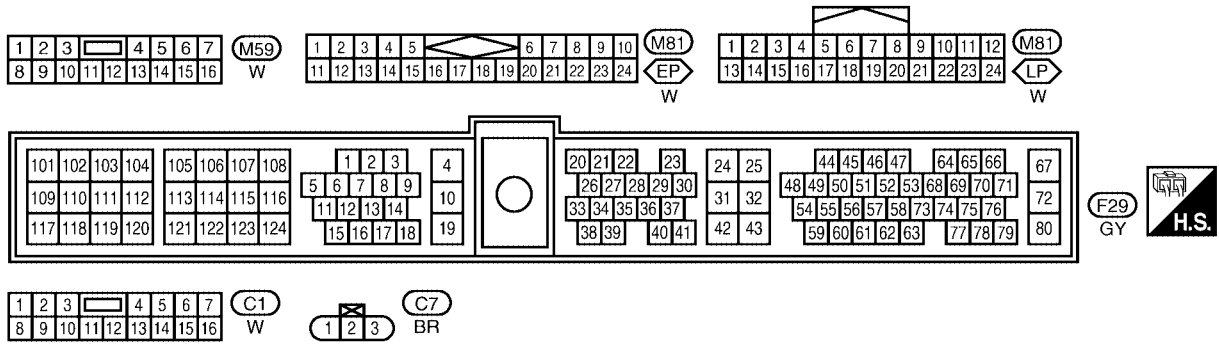
UBS006XZ

## Wiring Diagram

EC-PRE/SE-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 19
- : 21



WBWA0061E

# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use 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 COLO R | ITEM                                     | CONDITION  | DATA (DC Voltage) |
|---------------|-------------|--|--|-------------------|
| 42            | B/W         | Sensors' power supply                    | [Ignition switch ON]                                       | Approximately 5V  |
| 43            | BR          | Sensors' ground                          | [Engine is running]<br>● Warm-up condition<br>● Idle speed | Approximately 0V  |
| 62            | Y           | EVAP control system pres-<br>sure sensor | [Ignition switch ON]                                       | 1.8 - 4.8V        |

## Diagnostic Procedure

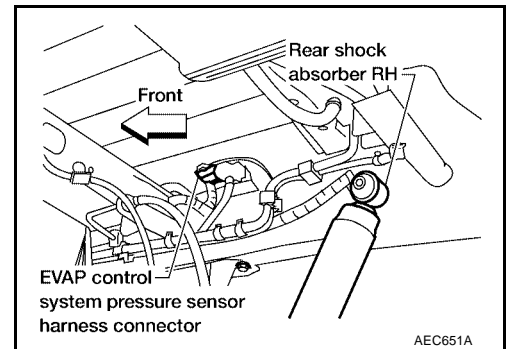
UBS006Y0

### 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

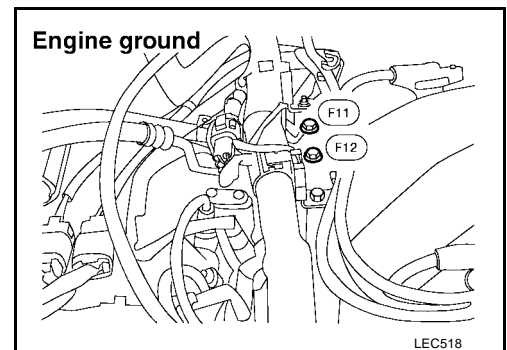
- OK >> GO TO 2.
- NG >> Reconnect, repair or replace.



### 2. RETIGHTEN GROUND SCREWS

1. Loosen and retighten engine ground screws.

>> GO TO 3.



### 3. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.  
**Water should not exist.**

OK or NG

- OK >> GO TO 4.
- NG >> Repair or replace harness connector.

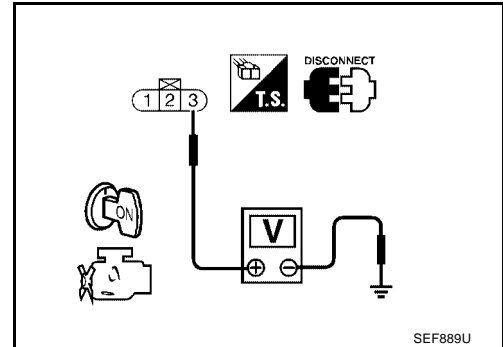
## 4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "ON".
2. Check voltage between 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. Check harness continuity between EVAP control system pressure sensor terminal 1 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 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 power in harness or connectors.

**8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 62 and EVAP control system pressure sensor terminal 2.  
Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> 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.

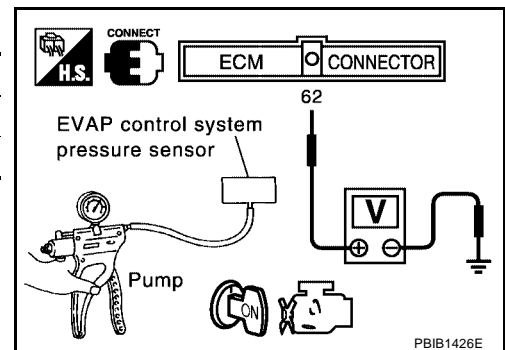
| Applied vacuum                    | Voltage V                           |
|-----------------------------------|-------------------------------------|
| Not applied                       | 1.8 - 4.8                           |
| -26.7 kpa (-200 mmHg, -7.87 inHg) | 2.1 to 2.5 V lower than above value |

**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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

# DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

[VG33ER]

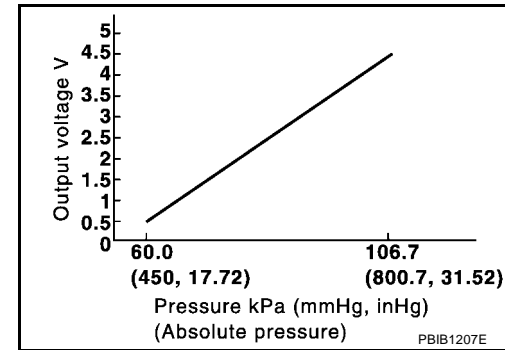
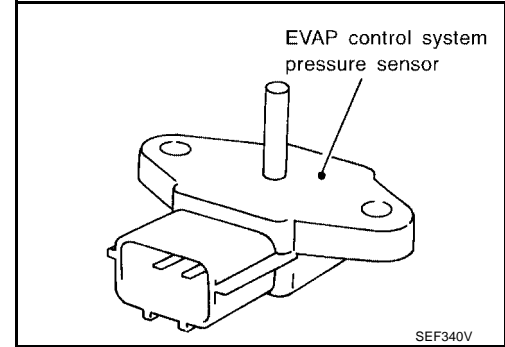
## DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

PFV:25085

### Component Description

UBS006RM

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

UBS006RN

Specification data are reference values.

| MONITOR ITEM  | CONDITION             | SPECIFICATION |
|---------------|-----------------------|---------------|
| EVAP SYS PRES | ● Ignition switch: ON | 1.8 - 4.8V    |

### On Board Diagnosis Logic

UBS006Y4

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted.)</li> <li>● EVAP control system pressure sensor</li> <li>● EVAP canister vent control valve</li> <li>● EVAP canister</li> <li>● Water separator</li> <li>● Rubber hose from EVAP canister vent control valve to water separator</li> </ul> |

### DTC Confirmation Procedure

UBS006Y5

#### 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".

# DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

[VG33ER]

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-1537, "Diagnostic Procedure"](#).

| DATA MONITOR   |         |
|----------------|---------|
| MONITOR        | NO DTC  |
| ENG SPEED      | XXX rpm |
| COOLANT TEMP/S | XXX °C  |
| FUEL T/TMP SE  | XXX °C  |

SEF194Y

## 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-1531, "Diagnostic Procedure"](#).

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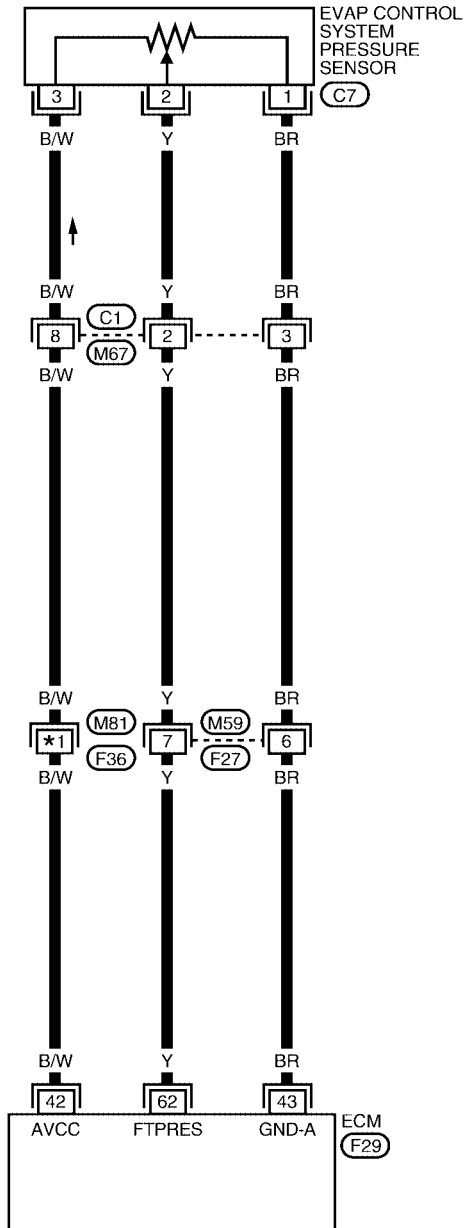
# DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

[VG33ER]

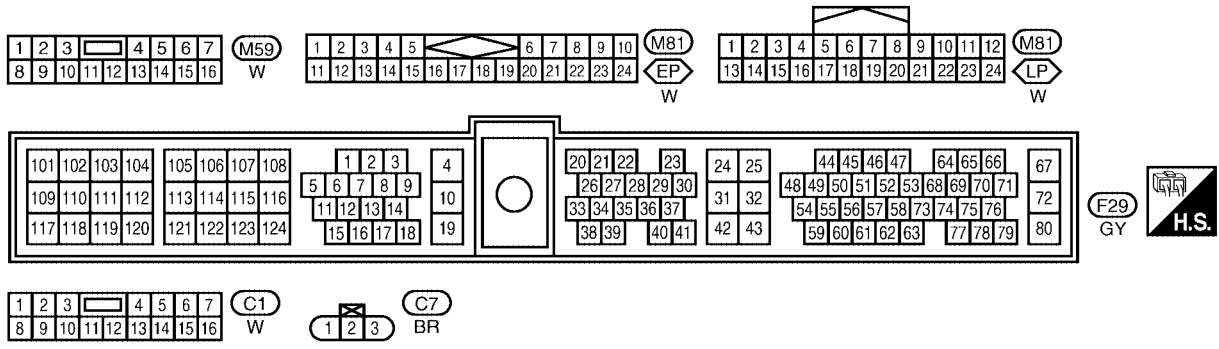
UBS006Y6

## Wiring Diagram

EC-PRE/SE-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 19
- : 21



WBWA0061E



# DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use 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 COLO R | ITEM                                     | CONDITION  | DATA (DC Voltage) |
|---------------|-------------|--|--|-------------------|
| 42            | B/W         | Sensors' power supply                    | [Ignition switch ON]                                       | Approximately 5V  |
| 43            | BR          | Sensors' ground                          | [Engine is running]<br>● Warm-up condition<br>● Idle speed | Approximately 0V  |
| 62            | Y           | EVAP control system pres-<br>sure sensor | [Ignition switch ON]                                       | 1.8 - 4.8V        |

## Diagnostic Procedure

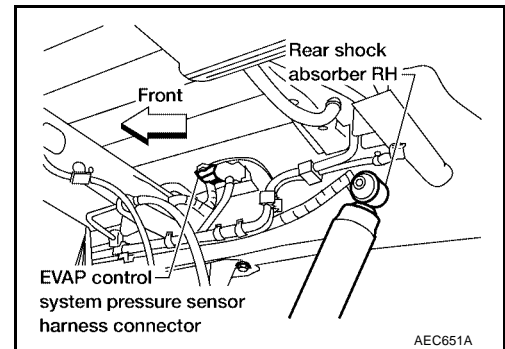
UBS006Y7

### 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

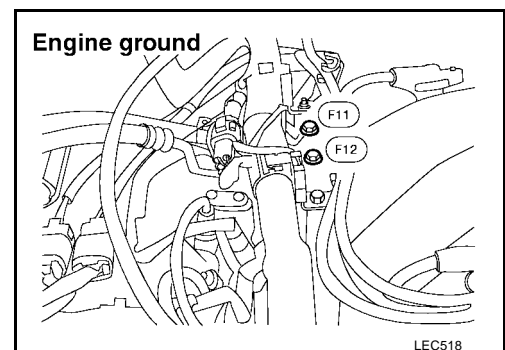
- OK >> GO TO 2.
- NG >> Reconnect, repair or replace.



### 2. RETIGHTEN GROUND SCREWS

1. Loosen and retighten engine ground screws.

>> GO TO 3.



### 3. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.  
**Water should not exist.**

OK or NG

- OK >> GO TO 4.
- NG >> Repair or replace harness connector.

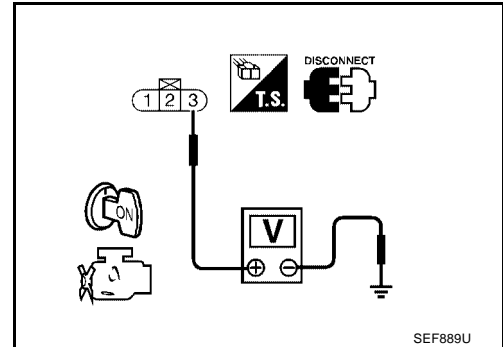
## 4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch "ON".
2. Check voltage between 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. Check harness continuity between EVAP control system pressure sensor terminal 1 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

- OK >> GO TO 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 power in harness or connectors.

**8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 62 and EVAP control system pressure sensor terminal 2.  
Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to ground and short to power.

OK or NG

- OK >> 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.

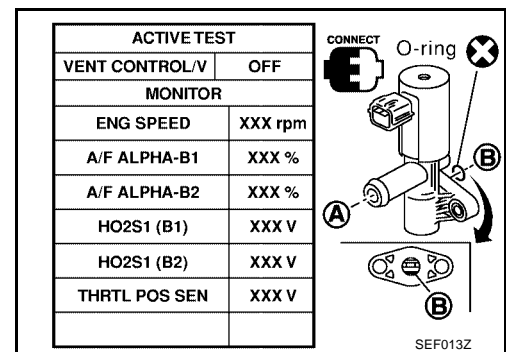
**10. CHECK EVAP CANISTER VENT CONTROL VALVE**

**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.**

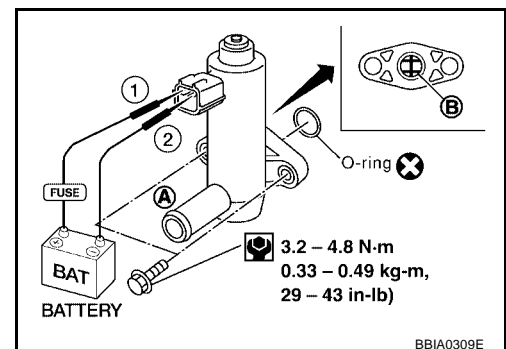
If NG or operation takes more than 1 second, clean valve using air blower or replace as necessary.

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.

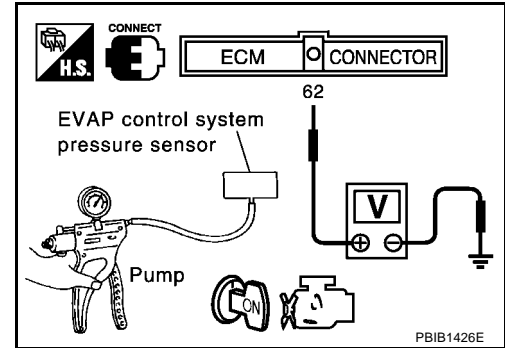
| Applied vacuum                    | Voltage V                           |
|-----------------------------------|-------------------------------------|
| Not applied                       | 1.8 - 4.8                           |
| -26.7 kpa (-200 mmHg, -7.87 inHg) | 2.1 to 2.5 V lower than above value |

**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

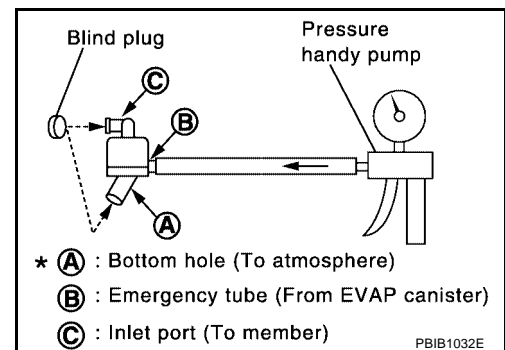
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

**NOTE:**

- Do not disassemble water separator.

OK or NG

- OK >> GO TO 14.
- NG >> Replace water separator.

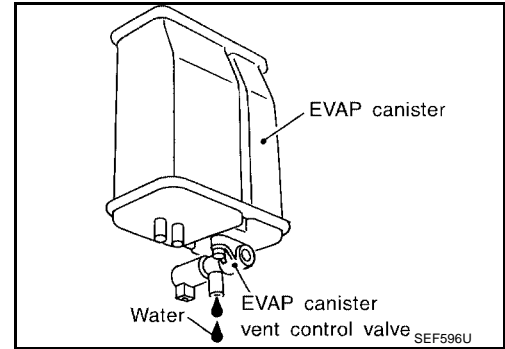


**14. CHECK IF EVAP CANISTER SATURATED WITH WATER**

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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

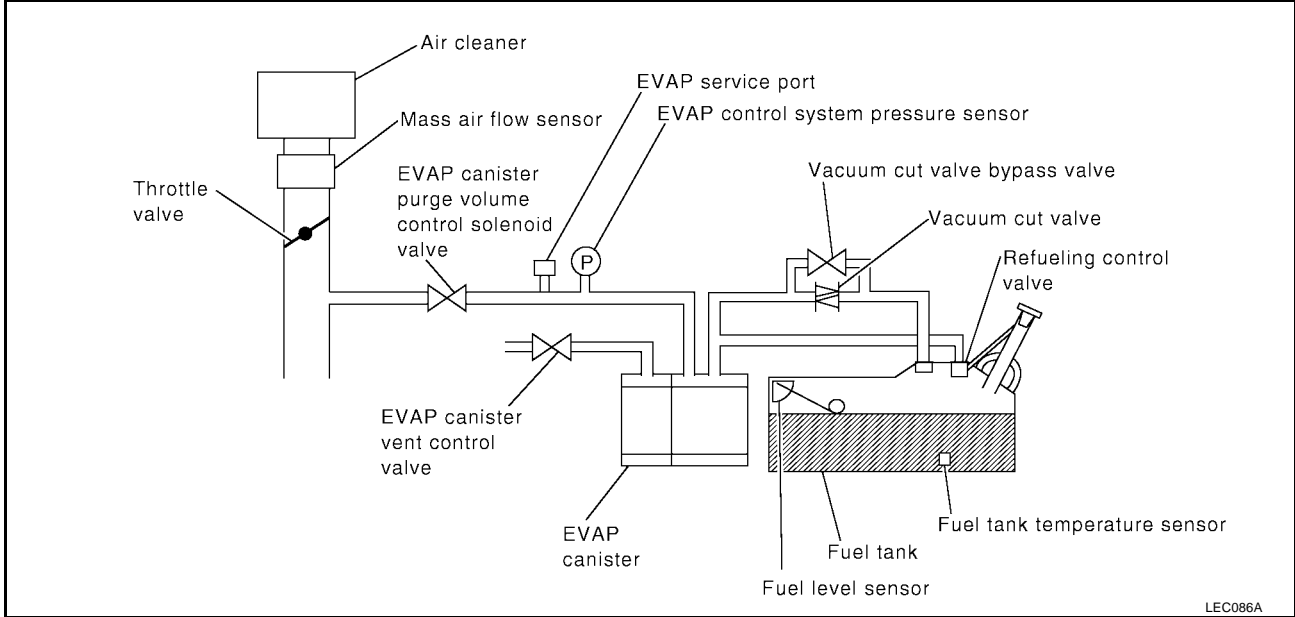
DTC P0455 EVAP CONTROL SYSTEM

On Board Diagnosis Logic

NOTE:

If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (EC-1663.)

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. | <ul style="list-style-type: none"> <li>● Fuel filler cap remains open or fails to close.</li> <li>● Incorrect fuel tank vacuum relief valve</li> <li>● Incorrect fuel filler cap used</li> <li>● Foreign matter caught in fuel filler cap.</li> <li>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>● Foreign matter caught in EVAP canister vent control valve.</li> <li>● EVAP canister or fuel tank leaks</li> <li>● EVAP purge line (pipe and rubber tube) leaks</li> <li>● EVAP purge line rubber tube bent.</li> <li>● Blocked or bent rubber tube to EVAP control system pressure sensor</li> <li>● Loose or disconnected rubber tube</li> <li>● EVAP canister vent control valve and the circuit</li> <li>● EVAP canister purge volume control solenoid valve and the circuit</li> <li>● Fuel tank temperature sensor</li> <li>● O-ring of EVAP canister vent control valve is missing or damaged.</li> <li>● EVAP control system pressure sensor</li> <li>● Refueling control valve</li> <li>● ORVR system leaks</li> </ul> |

**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

UBS00623

**CAUTION:**

Never remove fuel filter cap during the DTC confirmation procedure.

**NOTE:**

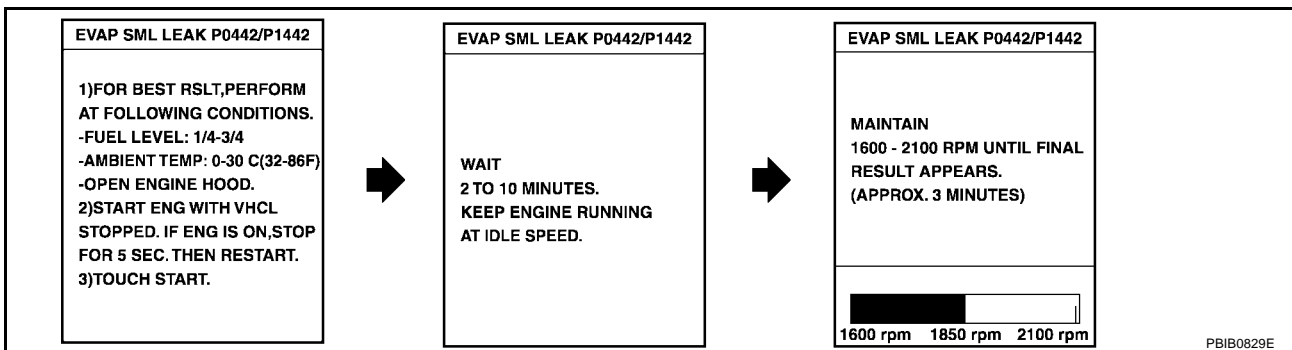
- If DTC P0455 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See [EC-1663](#).)
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch 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**

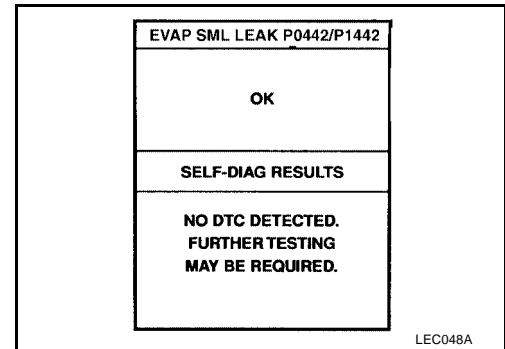
1. Tighten fuel filler cap securely until ratcheting sound is heard.
2. Turn ignition switch "ON".
3. Turn ignition switch "OFF" and wait at least 5 seconds.
4. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
5. Make sure that the following conditions are met.  
**COOLAN TEMP/S: 0 - 32°C (32 - 90°F)**  
**INT/A TEMP SE: More than 0°C (32°F)**
6. Select "EVAP SML LEAK P0442" 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-1251, "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-1544, "Diagnostic Procedure"](#) .  
If P0442 is displayed, perform "Diagnostic Procedure" for DTC P0442 [EC-1503](#) .



## WITH GST

### NOTE:

Be sure to read the explanation to [EC-1234, "Driving Pattern"](#) before driving vehicle.

1. Start engine.
2. Drive vehicle according to [EC-1234, "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-1234, "Driving Pattern"](#) [EC-1234](#) .
8. Stop vehicle.
9. Select "MODE 3" with GST.
  - If P0455 is displayed on the screen, go to [EC-1544, "Diagnostic Procedure"](#) .
  - If P0442 or P1442 is displayed on the screen, go to DTC P0442 [EC-1506, "Diagnostic Procedure"](#) or for DTC P1442 [EC-1647, "Diagnostic Procedure"](#) .
  - If P0441 is displayed on the screen, go to [EC-1497, "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

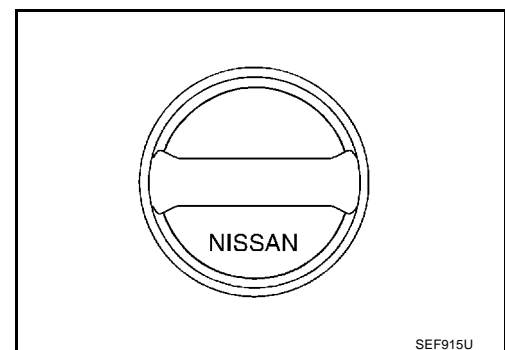
UBS00624

### 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-1747, "FUEL TANK VACUUM RELIEF VALVE \(BUILT INTO FUEL FULLER CAP\)"](#) .

OK or NG

OK >> GO TO 5.

NG >> Replace fuel filler cap with a genuine one.

---

## 5. 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-1745, "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-1663, "DTC Confirmation Procedure"](#) .

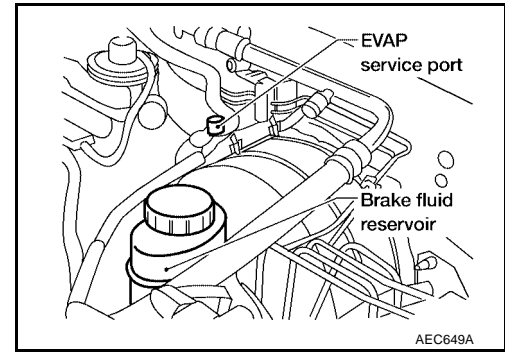
OK or NG

OK >> GO TO 8.

NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

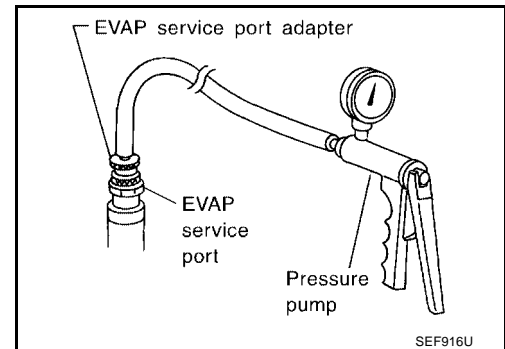
## 8. INSTALL THE PRESSURE PUMP

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.



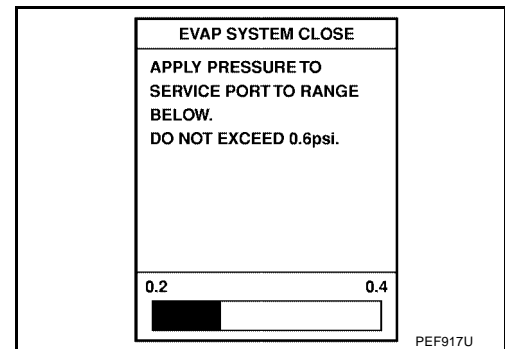
## 9. CHECK FOR EVAP LEAK

### 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:**

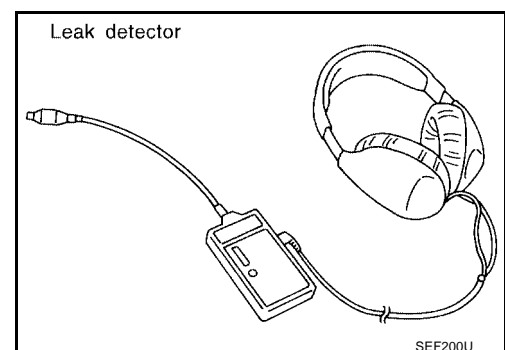
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in the system.



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-1745, "EVAPORATIVE EMISSION LINE DRAWING"](#).

**OK or NG**

- OK >> GO TO 11.  
NG >> Repair or replace.



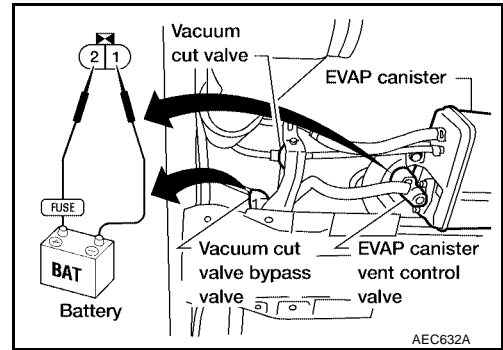
10. CHECK FOR EVAP LEAK

⊗ 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:**

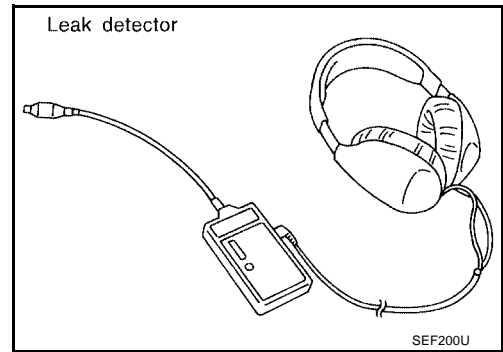
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-1745. "EVAPORATIVE EMISSION LINE DRAWING"](#).

OK or NG

- OK >> GO TO 12.  
 NG >> Repair or replace.



11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Ⓜ With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform "PURG VOL CONT/V" in "ACTIVE TEST" mode.
4. Touch "Qu" on CONSULT-II screen to increase "PURG VOL CONT/V" opening to 100.0%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

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-1204, "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   |

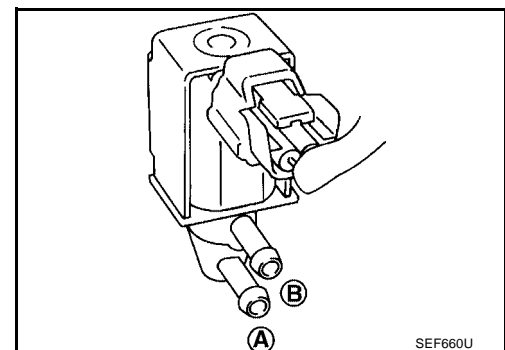
SEF985Y

3. Check air passage continuity.

| Condition<br>PURG VOL CONT/V value | Air passage continuity between A<br>and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |

OK or NG

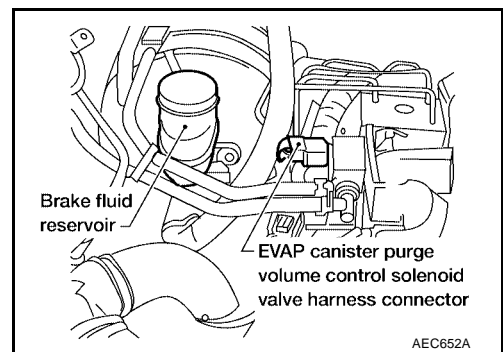
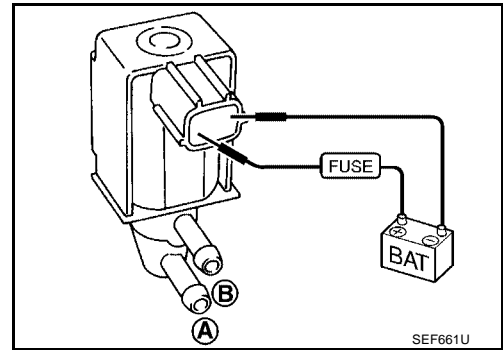
- OK >> GO TO 16.
- NG >> Replace EVAP canister purge volume control solenoid valve.



## 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                                     |

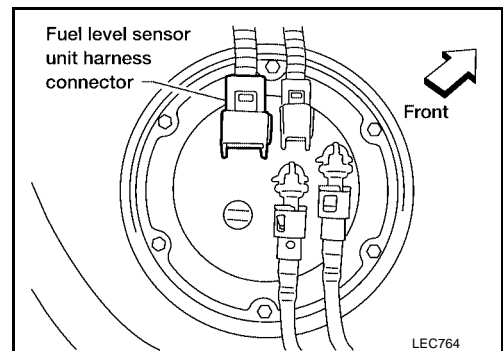


OK or NG

- 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.

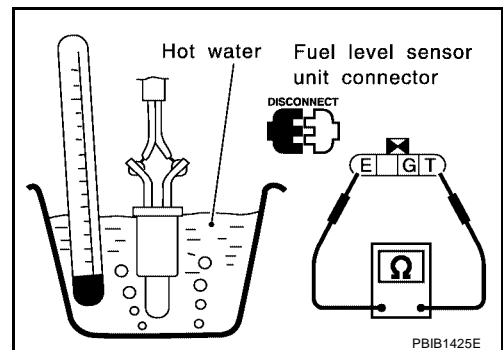


2. Check resistance between fuel level sensor unit terminals T and E by heating with hot water or heat gun as shown in the figure.

| Temperature °C | Resistance kΩ |
|----------------|---------------|
| 20 (68)        | 2.3 - 2.7     |
| 50 (122)       | 0.78 - 0.90   |

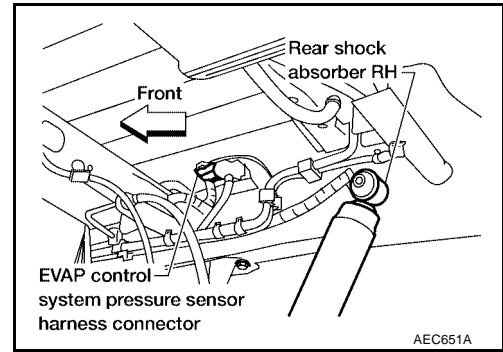
OK or NG

- 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.

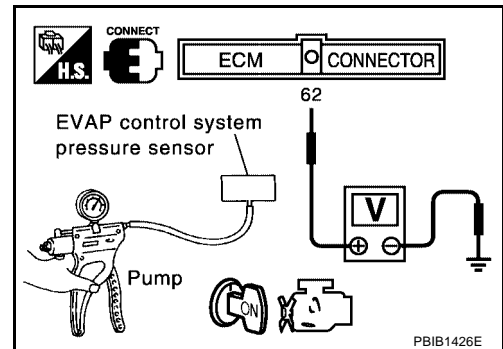
| Applied vacuum                    | Voltage V                          |
|-----------------------------------|------------------------------------|
| Not applied                       | 1.8 - 4.8                          |
| -26.7 kpa (-200 mmHg, -7.87 inHg) | 2.1 to 2.5V lower than above value |

**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 INTERMITTENT INCIDENT**

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

DTC P0456 EVAP CONTROL SYSTEM

PF:14950

UBS006V4

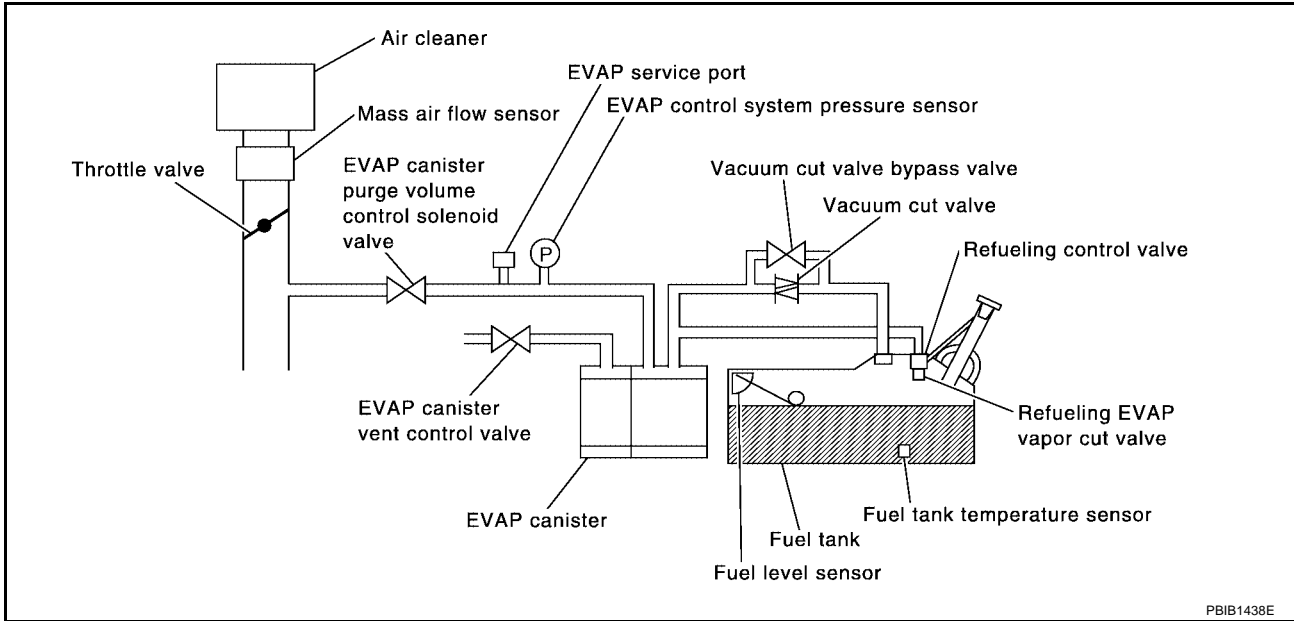
On Board Diagnosis Logic

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.



PBIB1438E

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

# DTC P0456 EVAP CONTROL SYSTEM

[VG33ER]

| DTC No. | Trouble diagnosis name  | DTC detecting condition  | Possible cause  |
|---------|---|--|---|
| P0456   | Evaporative emission control system very small leak (negative pressure check) | <ul style="list-style-type: none"> <li>● EVAP system has a very small leak.</li> <li>● EVAP system does not operate properly.</li> </ul> | <ul style="list-style-type: none"> <li>● Incorrect fuel tank vacuum relief valve</li> <li>● Incorrect fuel filler cap used</li> <li>● Fuel filler cap remains open or fails to close.</li> <li>● Foreign matter caught in fuel filler cap.</li> <li>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>● Foreign matter caught in EVAP canister vent control valve.</li> <li>● EVAP canister or fuel tank leaks</li> <li>● EVAP purge line (pipe and rubber tube) leaks</li> <li>● EVAP purge line rubber tube bent</li> <li>● Blocked or bent rubber tube to EVAP control system pressure sensor</li> <li>● Loose or disconnected rubber tube</li> <li>● EVAP canister vent control valve and the circuit</li> <li>● EVAP canister purge volume control solenoid valve and the circuit</li> <li>● Fuel tank temperature sensor</li> <li>● O-ring of EVAP canister vent control valve is missing or damaged</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water</li> <li>● EVAP control system pressure sensor</li> <li>● Refueling control valve</li> <li>● ORVR system leaks</li> <li>● Fuel level sensor and the circuit</li> <li>● Foreign matter caught in EVAP canister purge volume control solenoid valve</li> </ul> |

**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

UBS00626

**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.

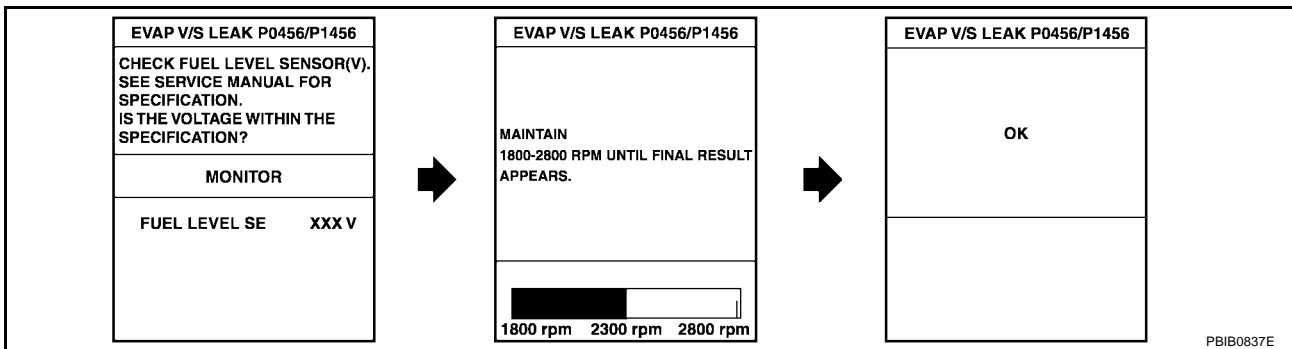
**TESTING CONDITION:**

- 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-1554, "Diagnostic Procedure"](#).

**NOTE:**

- If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to [EC-1251, "Basic Inspection"](#).
- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

**Overall Function Check**

UBS00627

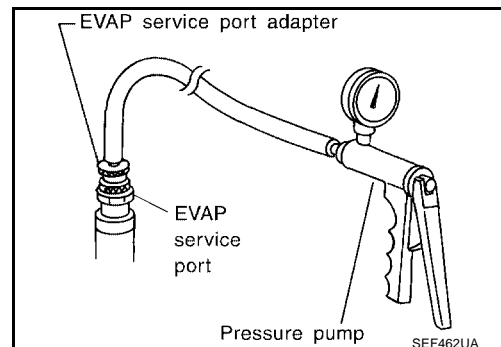
**WITH GST**

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<sup>2</sup>, 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-1554, "Diagnostic Procedure"](#) .

**NOTE:**

For more information, refer to GST instruction manual.

## Diagnostic Procedure

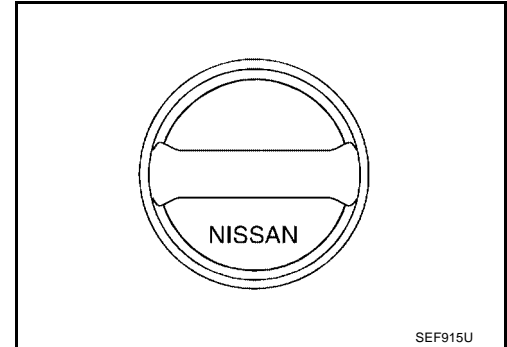
UBS00628

### 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

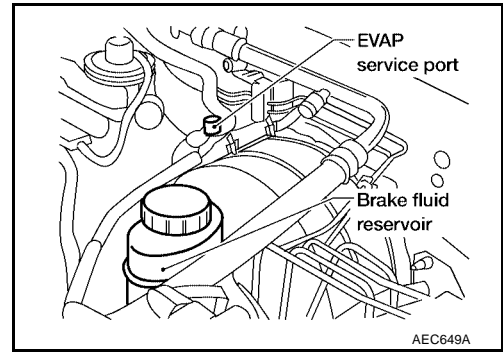
Refer to [EC-1747, "FUEL TANK VACUUM RELIEF VALVE \(BUILT INTO FUEL FULLER CAP\)"](#) .

OK or NG

- OK >> GO TO 5.  
NG >> Replace fuel filler cap with a genuine one.

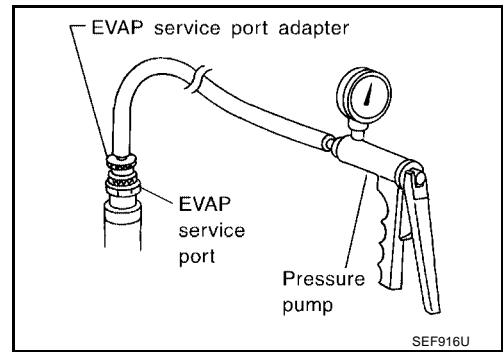
**5. INSTALL THE PRESSURE PUMP**

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



**NOTE:**  
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

Models with CONSULT-II >> GO TO 6.  
Models without CONSULT-II >> GO TO 7.



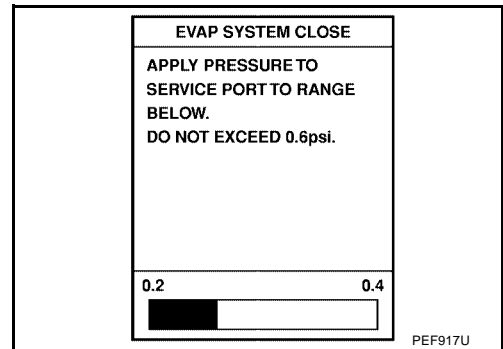
**6. CHECK FOR EVAP LEAK**

**With CONSULT-II**

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

**NOTE:**

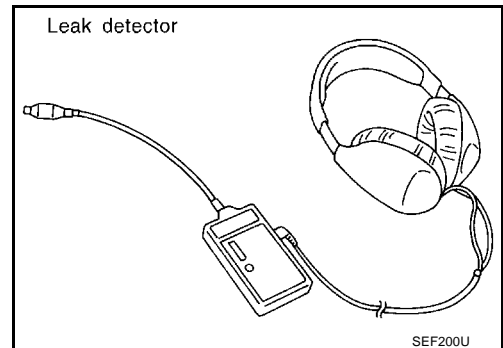
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-1745, "EVAPORATIVE EMISSION LINE DRAWING"](#).

**OK or NG**

- OK >> GO TO 8.
- NG >> Repair or replace.



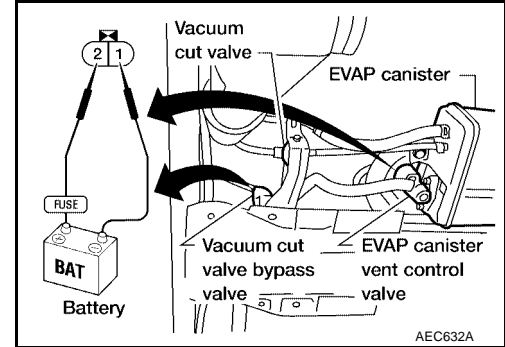
## 7. CHECK FOR EVAP LEAK

⊗ **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:**

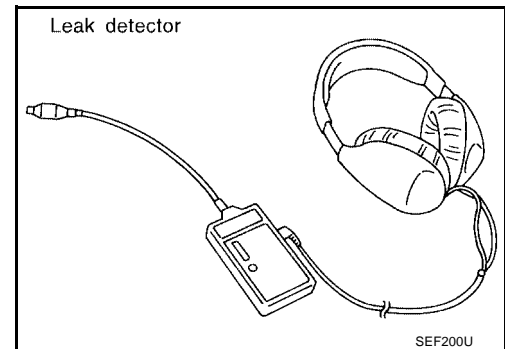
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-1745, "EVAPORATIVE EMISSION LINE DRAWING"](#) .

OK or NG

- OK    >> GO TO 8.  
 NG    >> Repair or replace.



## 8. CHECK WATER SEPARATOR

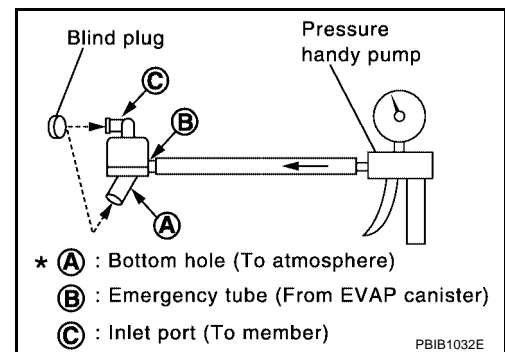
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

**NOTE:**

Do not disassemble water separator.

OK or NG

- OK    >> GO TO 9.  
 NG    >> Replace water separator.



- \* **(A)** : Bottom hole (To atmosphere)
- (B)** : Emergency tube (From EVAP canister)
- (C)** : Inlet port (To member)

## 9. CHECK EVAP CANISTER VENT CONTROL VALVE, O-RING AND CIRCUIT

Refer to [EC-1657, "DTC Confirmation Procedure"](#) .

OK or NG

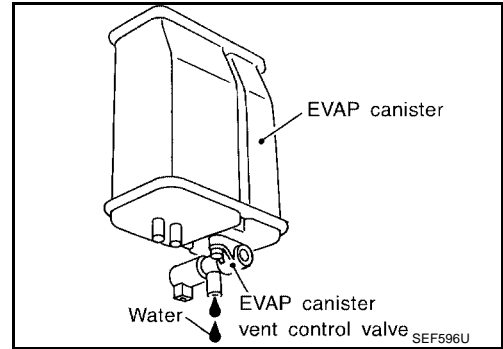
- OK    >> GO TO 10.  
 NG    >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

**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 100.0%.
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-1204, "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.

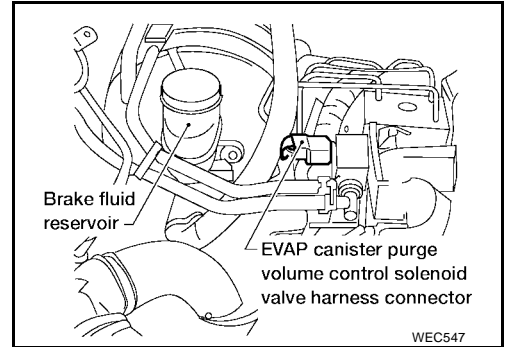
| ACTIVE TEST     |         |
|-----------------|---------|
| PURG VOL CONT/V | 0.0%    |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| A/F ALPHA-B2    | XXX %   |
| HO2S1 MNTR (B1) | RICH    |
| HO2S1 MNTR (B2) | RICH    |
| THRTL POS SEN   | XXX V   |
|                 |         |

SEF985Y

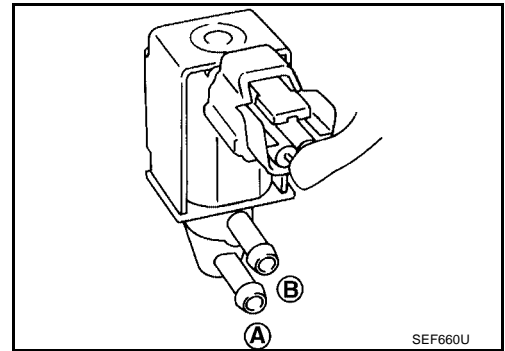
17. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

 With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

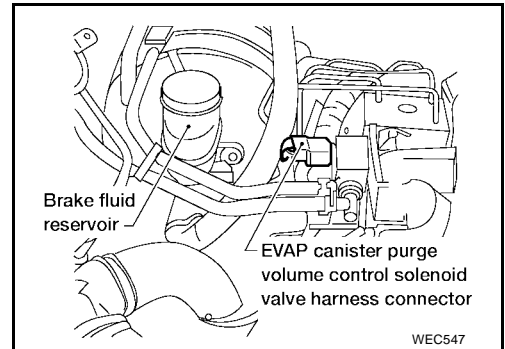


| Condition<br>PURG VOL CONT/V value | Air passage continuity between A and B |
|------------------------------------|--|
| 100 %                              | Yes                                    |
| 0.0%                               | No                                     |



 Without CONSULT-II

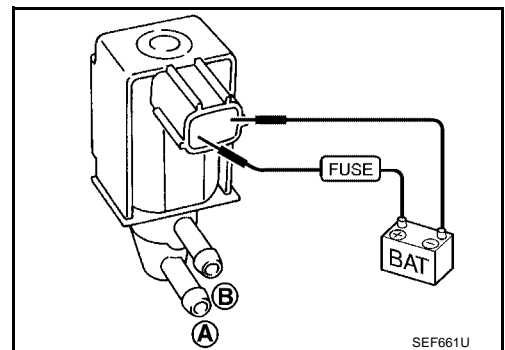
Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



| Condition   | Air passage continuity between A and B |
|---|--|
| 12V direct current supply between terminals 1 and 2 | Yes                                    |
| No supply   | No                                     |

OK or NG

- OK >> GO TO 18.
- NG >> Replace EVAP canister purge volume control solenoid valve.



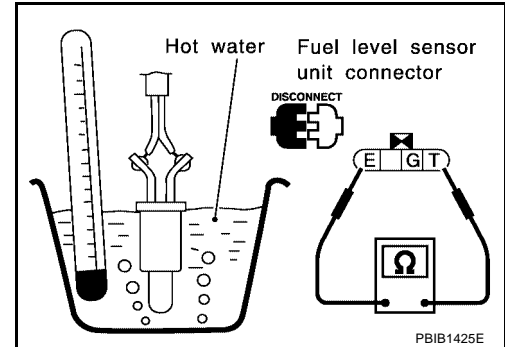
## 18. CHECK FUEL TANK TEMPERATURE SENSOR

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.

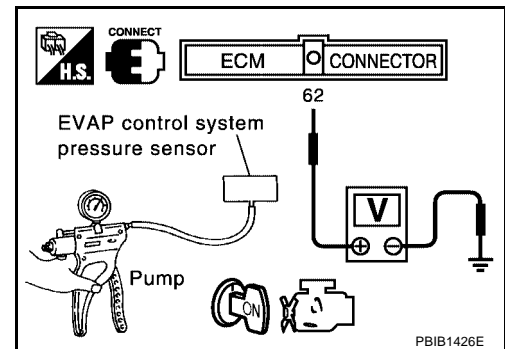
| Applied vacuum                    | Voltage V                          |
|-----------------------------------|------------------------------------|
| Not applied                       | 1.8 - 4.8                          |
| -26.7 kpa (-200 mmHg, -7.87 inHg) | 2.1 to 2.5V lower than above value |

**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-1745. "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 FUEL LEVEL SENSOR

Refer to [DI-18. "FUEL LEVEL SENSOR UNIT CHECK"](#).

OK or NG

- OK >> GO TO 23.  
 NG >> Replace fuel level sensor unit.



---

**23. CHECK INTERMITTENT INCIDENT**

---

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

A

EC

C

D

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H

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J

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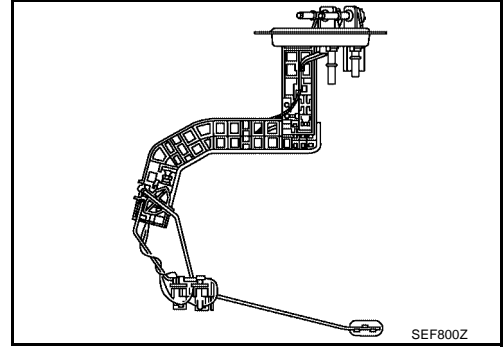
## DTC P0460 FUEL LEVEL SENSOR

UBS00629

### Component Description

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



UBS006Y9

### On Board Diagnosis Logic

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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Fuel level sensor</li> </ul> |

UBS006YA

### DTC Confirmation Procedure

**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-1564, "Diagnostic Procedure"](#) .

| DATA MONITOR  |        |
|---------------|--------|
| MONITOR       | NO DTC |
| FUEL T/TMP SE | XXX °C |
| FUEL LEVEL SE | XXX V  |

SEF195Y

**WITH GST**

Follow the procedure “WITH CONSULT-II” above.

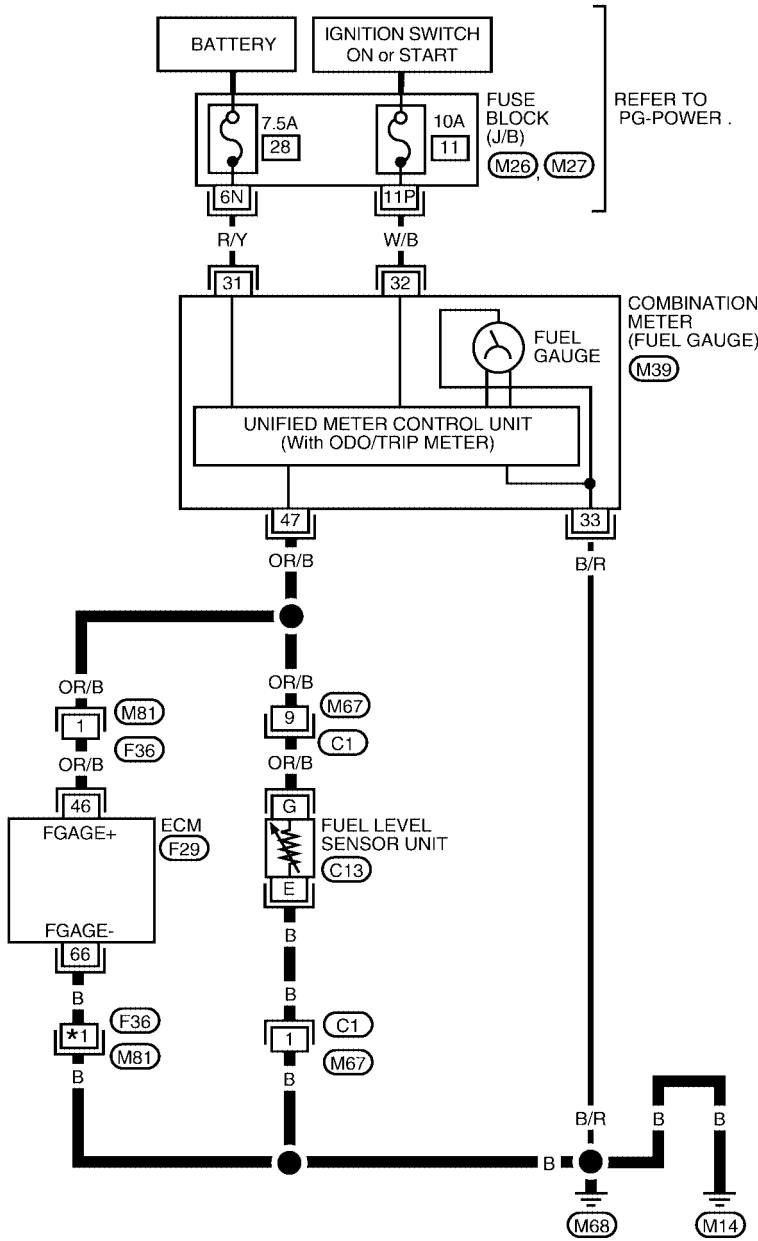
# DTC P0460 FUEL LEVEL SENSOR

[VG33ER]

UBS006YB

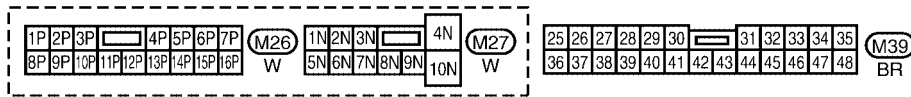
## Wiring Diagram

EC-FLS1-01

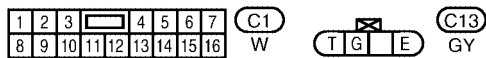
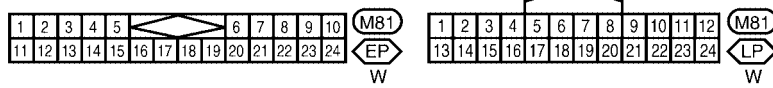


- : DETECTABLE LINE FOR DTC
- - - : NON-DETECTABLE LINE FOR DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- \*1 EP : 11
- LP : 13

A  
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Refer to the following.  
F29 - ELECTRICAL UNITS



WBWA0062E

# DTC P0460 FUEL LEVEL SENSOR

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

## CAUTION:

Do not use ECM ground terminals when measuring input/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)  |
|---------------|------------|--------------------------|-------------------------------------|--|
| 46            | G          | Fuel level sensor        | [Ignition switch ON]                | Approximately 0 - 4.8V<br>Output voltage varies with fuel level. |
| 66            | B          | Fuel level sensor ground | [Engine is running]<br>● Idle speed | Approximately 0V   |

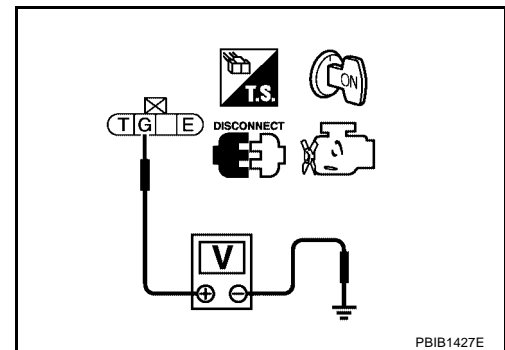
## Diagnostic Procedure

UBS006YC

### 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: Approximately 12V**



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 body 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 fuel level sensor unit terminal E. 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

>> 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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

## Removal and Installation

### FUEL LEVEL SENSOR

UBS006YD

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

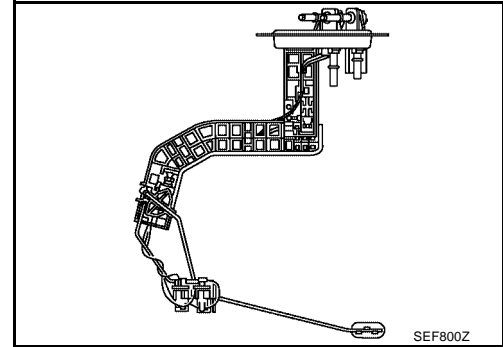
## DTC P0461 FUEL LEVEL SENSOR

UBS0062F

### Component Description

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



### On Board Diagnosis Logic

UBS006YE

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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Fuel level sensor</li> </ul> |

### Overall Function Check

UBS0062H

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-1222, "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. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
11. Check "FUEL LEVEL SE" output voltage and note it.
12. Check "FUEL LEVEL SE" output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 11.

If NG, check the fuel level sensor, refer to [DI-18, "FUEL LEVEL SENSOR UNIT CHECK"](#).

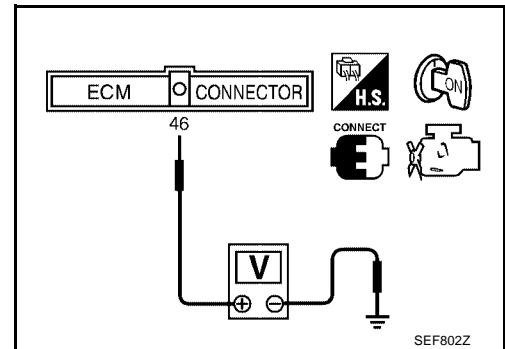
| DATA MONITOR  |        |
|---------------|--------|
| MONITOR       | NO DTC |
| FUEL T/TMP SE | XXX °C |
| FUEL LEVEL SE | XXX V  |

SEF195Y

 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-1222, "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"](#).

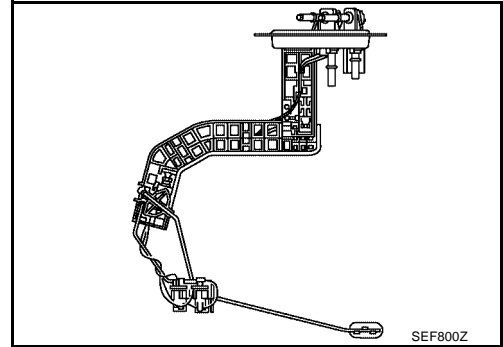


DTC P0462, P0463 FUEL LEVEL SENSOR

Component Description

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



UBS006YF

On Board Diagnosis Logic

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.  | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Fuel level sensor</li> </ul> |
| P0463   | Fuel level sensor circuit high input | An excessively high voltage is sent from the sensor is sent to ECM. |  |

DTC Confirmation Procedure

UBS006YG

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-1570. "Diagnostic Procedure"](#).

| DATA MONITOR  |        |
|---------------|--------|
| MONITOR       | NO DTC |
| FUEL T/TMP SE | XXX °C |
| FUEL LEVEL SE | XXX V  |

SEF195Y

WITH GST

Follow the procedure "WITH CONSULT-II" above.



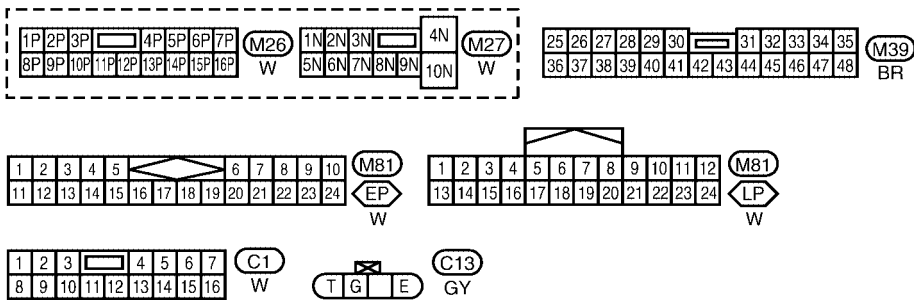
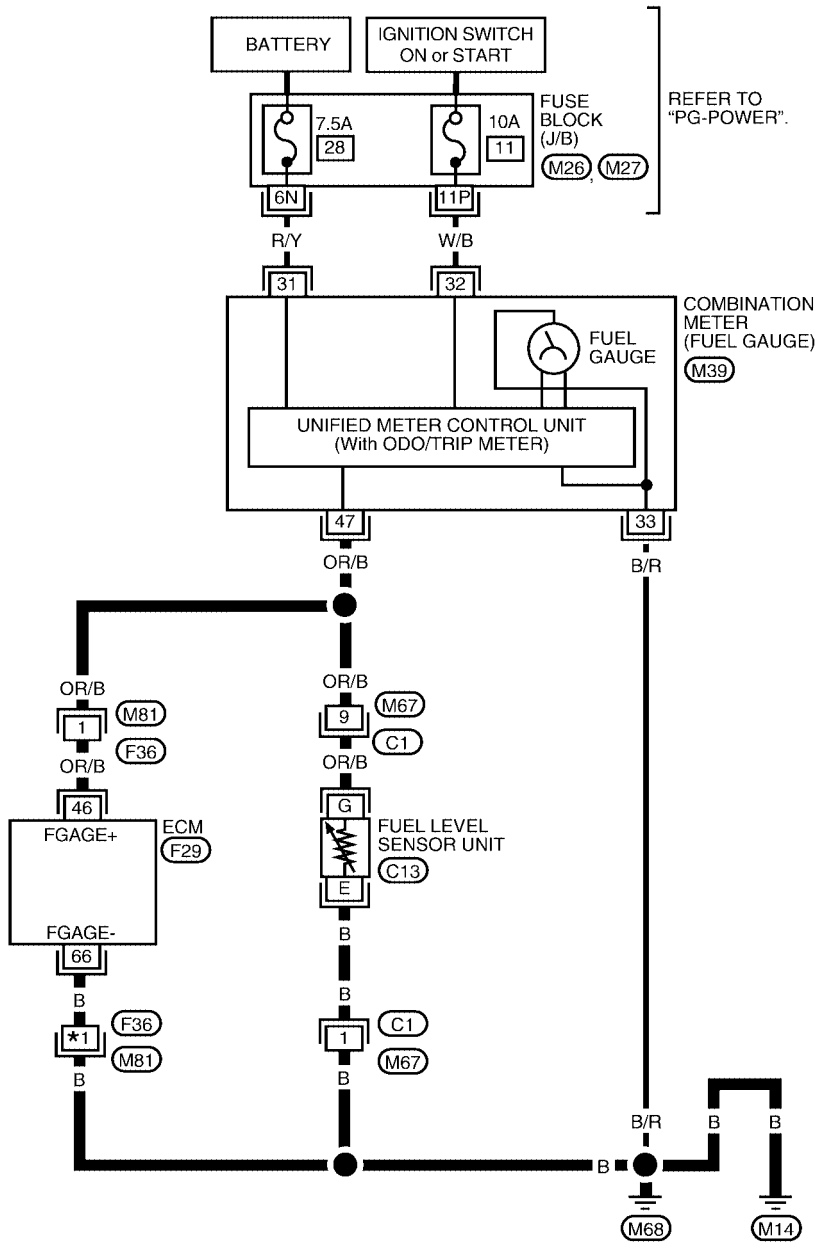
# DTC P0462, P0463 FUEL LEVEL SENSOR

[VG33ER]

UBS006YH

## Wiring Diagram

EC-FLS2-01



Refer to the following.  
 (F29) - ELECTRICAL UNITS

WBWA0063E

# DTC P0462, P0463 FUEL LEVEL SENSOR

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

## CAUTION:

Do not use ECM ground terminals when measuring input/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)  |
|---------------|------------|--------------------------|-------------------------------------|--|
| 46            | G          | Fuel level sensor        | [Ignition switch "ON"]              | Approximately 0 - 4.8V<br>Output voltage varies with fuel level. |
| 66            | B          | Fuel level sensor ground | [Engine is running]<br>● Idle speed | Approximately 0V   |

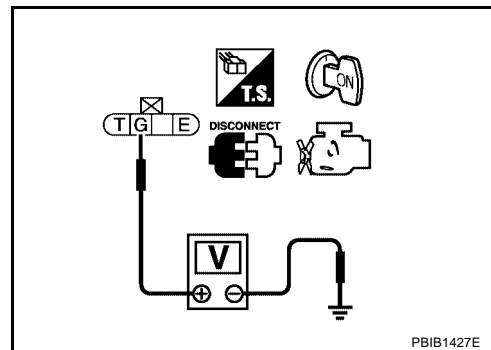
## Diagnostic Procedure

UBS006Y1

### 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: Approximately 12V**



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 body 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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

**Removal and Installation  
FUEL LEVEL SENSOR**

UBS0070G

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

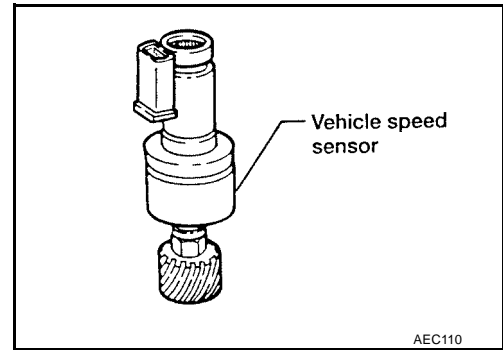
DTC P0500 VSS

PF3:32702

Component Description

UBS00620

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

UBS006VJ

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The vehicle speed sensor circuit is open or shorted.)</li> <li>● Vehicle speed sensor</li> </ul> |

DTC Confirmation Procedure

UBS0062R

**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-1575, "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      | More than 1,800 rpm (A/T models)<br>More than 1,900 rpm (M/T models) |
| COOLAN TEMP/S  | More than 70°C (158°F)   |
| B/FUEL SCHDL   | 5.5 - 16.0 msec  |
| Selector lever | Suitable position  |
| PW/ST SIGNAL   | OFF  |

| DATA MONITOR   |          |
|----------------|----------|
| MONITOR        | NO DTC   |
| ENG SPEED      | XXX rpm  |
| COOLANT TEMP/S | XXX °C   |
| B/FUEL SCHDL   | XXX msec |
| PW/ST SIGNAL   | OFF      |
| VHCL SPEED SE  | XXX km/h |

SEP196Y

6. If 1st trip DTC is detected, go to [EC-1575, "Diagnostic Procedure"](#).

Overall Function Check

UBS0062S

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.



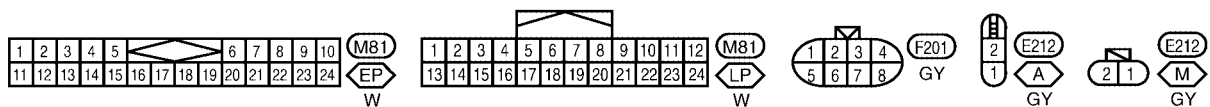
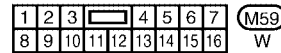
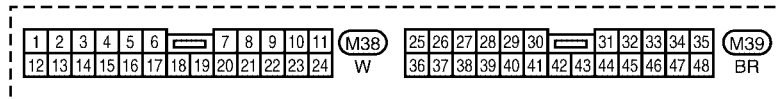
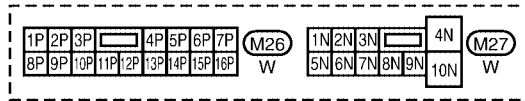
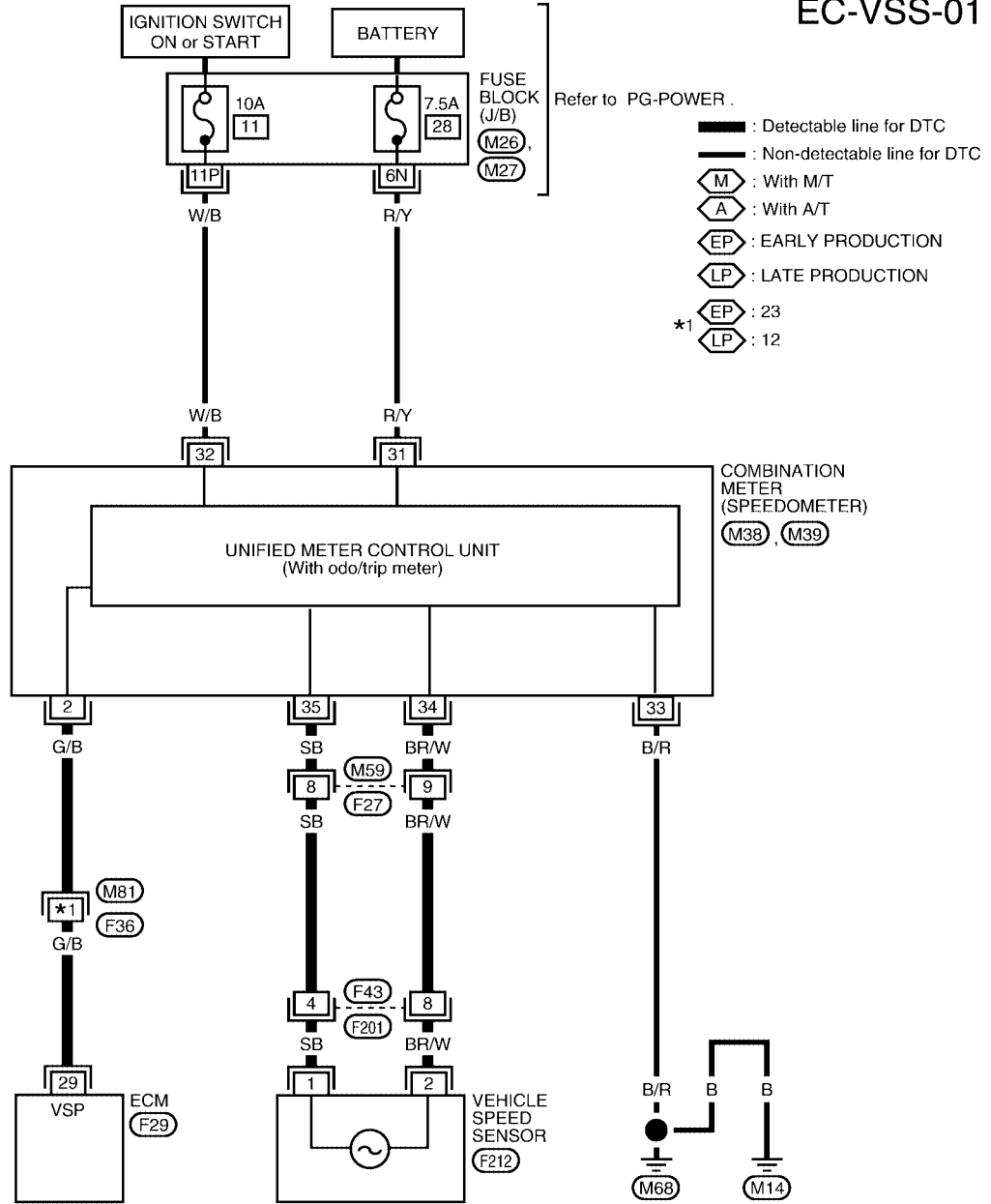
**WITH GST**

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-1575, "Diagnostic Procedure"](#) .

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Wiring Diagram

EC-VSS-01



Refer to the following.  
 (F29) - ELECTRICAL UNITS

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use 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) |
|---------------|------------|----------------------|---|-------------------|
| 29            | G/B        | Vehicle speed sensor | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Lift up the vehicle.</li> <li>● In 2nd gear position</li> <li>● Vehicle speed is 40 km/h (25 MPH)</li> </ul> | <p>2 - 3V★</p>    |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

**Diagnostic Procedure**

UBS0062U

**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**

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Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.



**DTC P0505 ISC SYSTEM**

**Description  
SYSTEM DESCRIPTION**

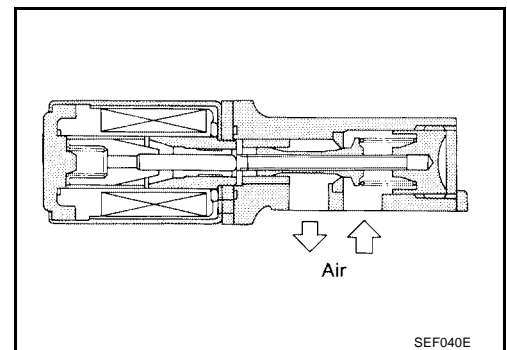
| Sensor                             | Input Signal to ECM        | ECM function     | Actuator       |
|------------------------------------|----------------------------|------------------|----------------|
| Camshaft position sensor           | Engine speed               | Idle air control | IACV-AAC 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**

Specification data are reference values.

| MONITOR ITEM | CONDITION  |           | SPECIFICATION |
|--------------|--|-----------|---------------|
| IACV-AAC/V   | <ul style="list-style-type: none"> <li>● Engine: After warming up</li> <li>● Air conditioner switch: "OFF"</li> <li>● Shift lever: "N"</li> <li>● No-load</li> </ul> | Idle      | 10 - 20%      |
|              |  | 2,000 rpm | —             |

**On Board Diagnosis Logic**

| 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 | <ul style="list-style-type: none"> <li>● Harness or connectors (The IACV-AAC valve circuit is open)</li> <li>● IACV-AAC valve</li> </ul> |
|         | B)                     | Idle speed control system RPM lower than expected  | The IACV-AAC valve does not operate properly | <ul style="list-style-type: none"> <li>● Harness or connectors (The IACV-AAC valve circuit is open)</li> <li>● IACV-AAC valve</li> </ul> |
|         | C)                     | Idle speed control system RPM higher than expected | The IACV-AAC valve does not operate properly | <ul style="list-style-type: none"> <li>● Harness or connectors (The IACV-AAC valve circuit is open)</li> <li>● IACV-AAC valve</li> </ul> |

**DTC Confirmation Procedure**

**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-1581, "Diagnostic Procedure"](#) .

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLANTTEMP/S | XXX °C  |

SEF174Y

**With GST**

Follow the procedure “With CONSULT-II”.

**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-1581, "Diagnostic Procedure"](#).

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

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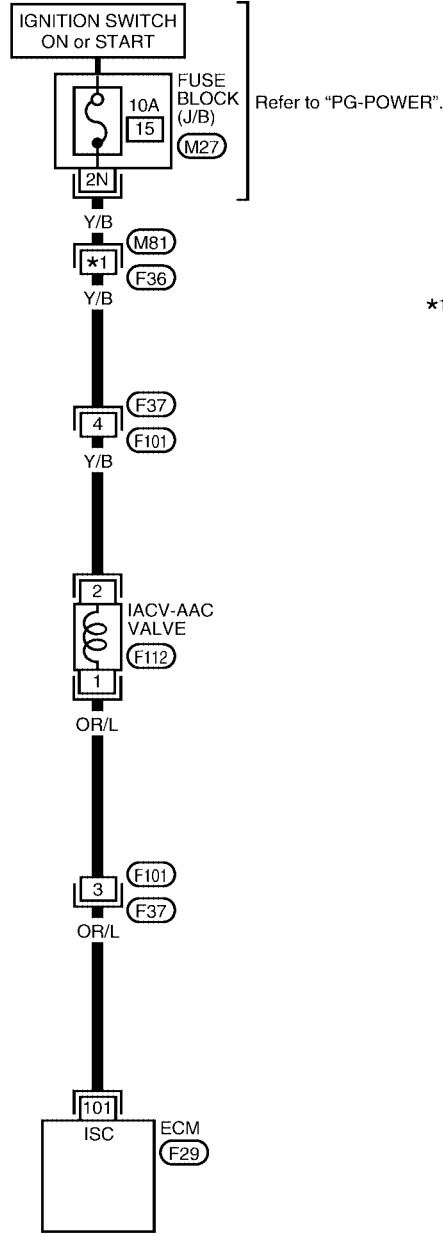


### With GST

Follow the procedure "With CONSULT-II".

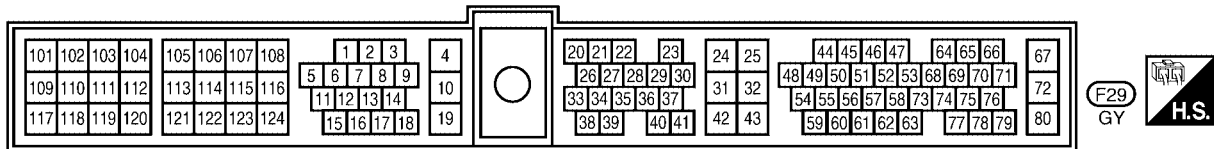
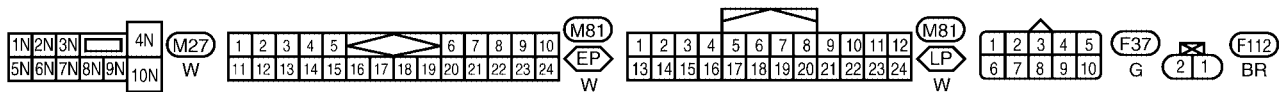
Wiring Diagram

EC-AAC/V-01



Refer to "PG-POWER".

: Detectable line for DTC  
 : Non-detectable line for DTC  
EP : EARLY PRODUCTION  
LP : LATE PRODUCTION  
EP : 14  
LP : 16  
 \*1



Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.

| TER-MINAL NO. | WIRE COLOR | ITEM           | CONDITION   | DATA (DC Voltage) |
|---------------|------------|----------------|---|-------------------|
| 101           | OR/L       | IACV-AAC valve | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>                | <p>8 - 11V★</p>   |
|               |            |                | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 3,000 rpm</li> </ul> | <p>7 - 10V★</p>   |

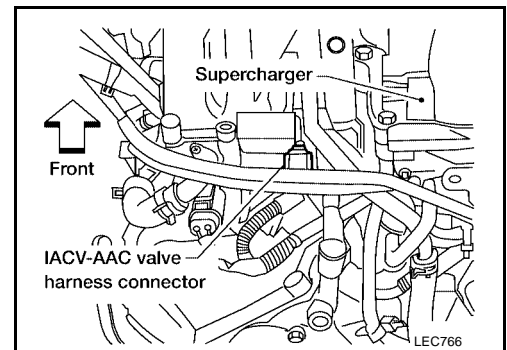
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

### Diagnostic Procedure

UBS00631

#### 1. CHECK IACV-AAC VALVE POWER SUPPLY CIRCUIT

1. Stop engine.
2. Disconnect IACV-AAC valve harness connector.
3. Turn ignition switch "ON".

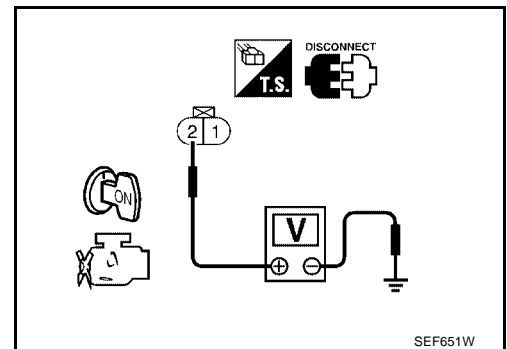


4. Check voltage between terminal 2 and ground with CONSULT-II or tester.

**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. Disconnect IACV-AAC valve harness connector.
2. Remove IACV-AAC valve.
  - Check IACV-AAC valve resistance.

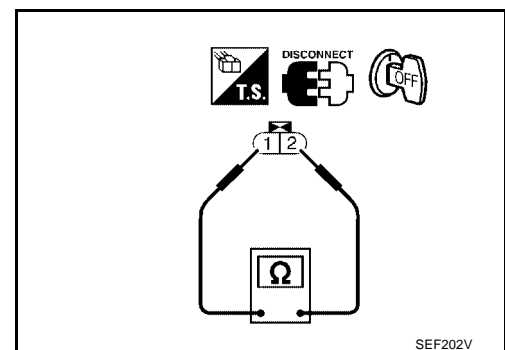
**Resistance : Approximately 10Ω [at 20°C (68°F)]**

- Check plunger for seizing or sticking.
  - Check for broken spring.
3. 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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**Removal and Installation**  
**IACV-AAC VALVE**

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

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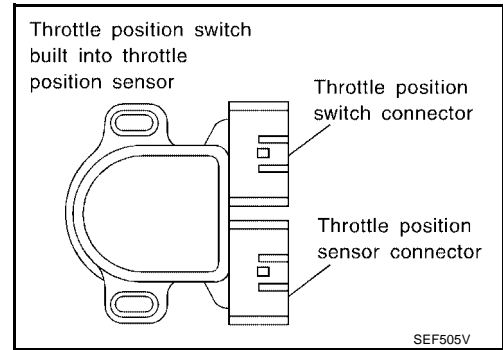
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**DTC P0510 CLOSED TP SWITCH**

UBS00632

**Component Description**

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**

UBS00633

Specification data are reference values.

| MONITOR ITEM  | CONDITION                                   | SPECIFICATION                        |
|---------------|---|--------------------------------------|
| CLSD THL/P SW | ● Engine: After warming up, idle the engine | Throttle valve: Idle position<br>ON  |
|               |   | Throttle valve: Slightly open<br>OFF |

**On Board Diagnosis Logic**

UBS006V8

| 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 | <ul style="list-style-type: none"> <li>● Harness or connectors (The closed throttle position switch circuit is open or shorted)</li> <li>● Closed throttle position switch</li> <li>● Throttle position sensor</li> </ul> |

**DTC Confirmation Procedure**

UBS00636

**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-1587, "Diagnostic Procedure"](#) .  
If OK, go to following step.

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |
| CLSD THL/P SW | ON      |

SEF197Y

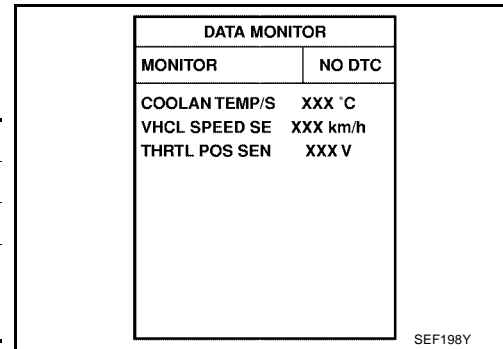


# DTC P0510 CLOSED TP SWITCH

[VG33ER]

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-1587, "Diagnostic Procedure"](#).

## Overall Function Check

UBS00637

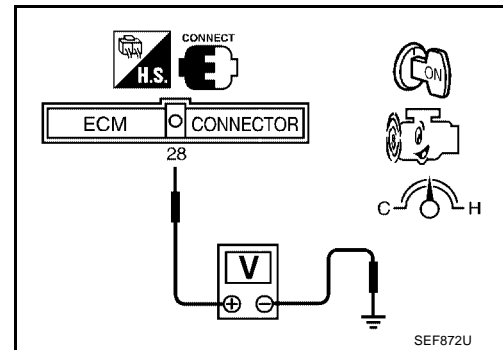
Use this procedure to check the overall function of the closed throttle position switch circuit. During this check, a 1st trip DTC might not be confirmed.

### 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-1587, "Diagnostic Procedure"](#).



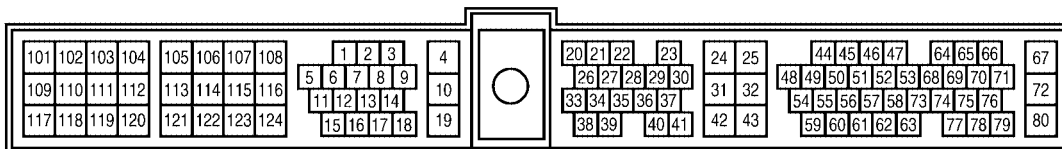
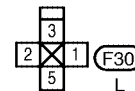
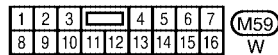
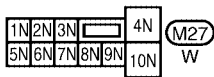
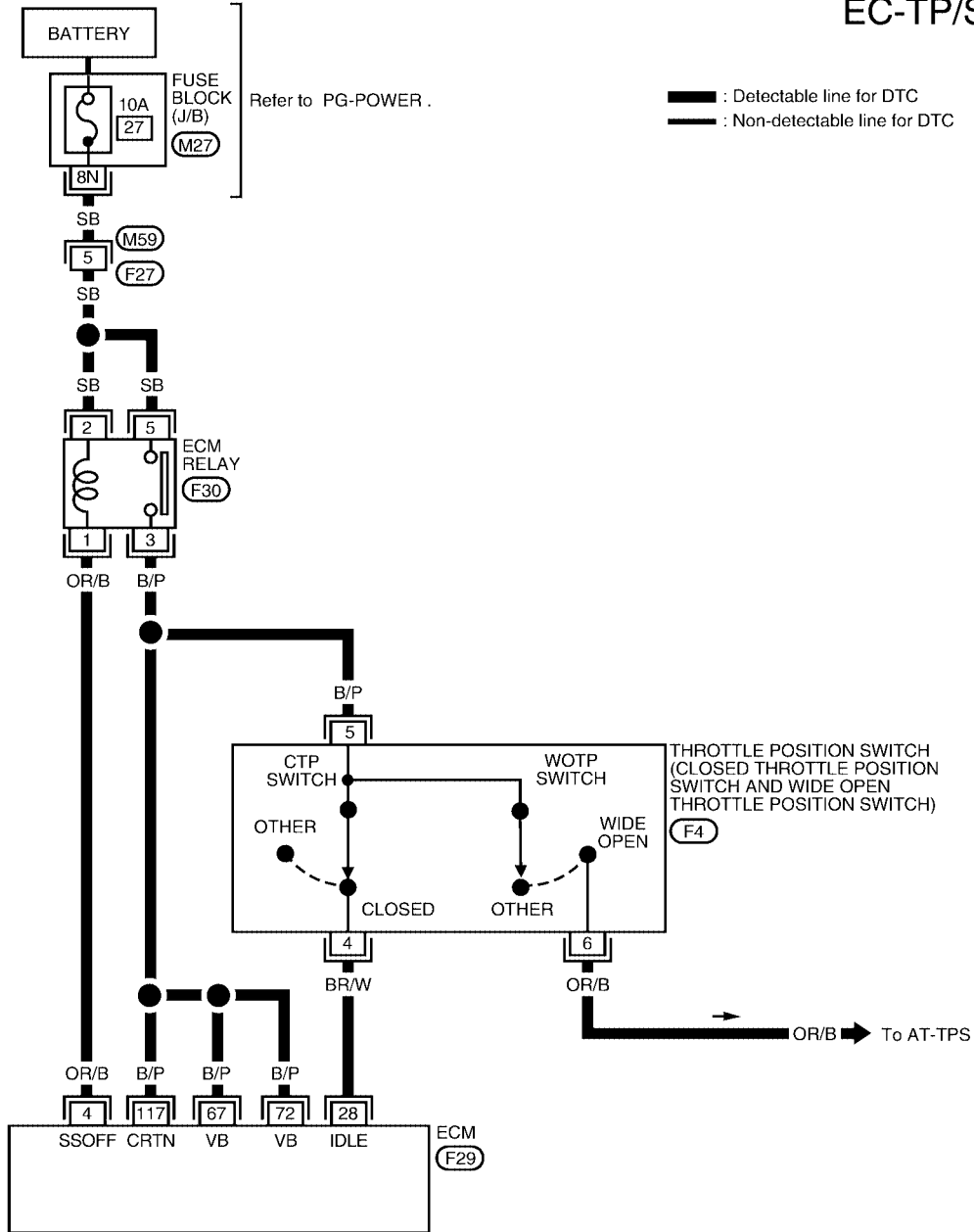
# DTC P0510 CLOSED TP SWITCH

[VG33ER]

UBS00638

## Wiring Diagram

EC-TP/SW-01



BBWA0490E

# DTC P0510 CLOSED TP SWITCH

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use 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.

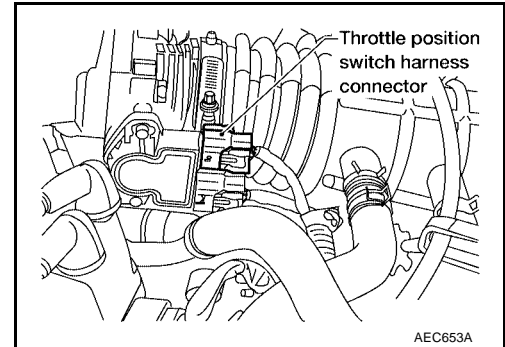
| TER-MINAL NO. | WIRE COLO R | ITEM                                       | CONDITION  | DATA (DC Voltage)          |
|---------------|-------------|--|--|----------------------------|
| 28            | BR/W        | Throttle position switch (Closed position) | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> <li>● Accelerator pedal fully released</li> </ul> | BATTERY VOLTAGE (11 - 14V) |
|               |             |  | <b>[Ignition switch "ON"]</b> <ul style="list-style-type: none"> <li>● Engine stopped</li> <li>● Accelerator pedal depressed</li> </ul>                            | Approximately 0V           |

## Diagnostic Procedure

UBS00639

### 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".

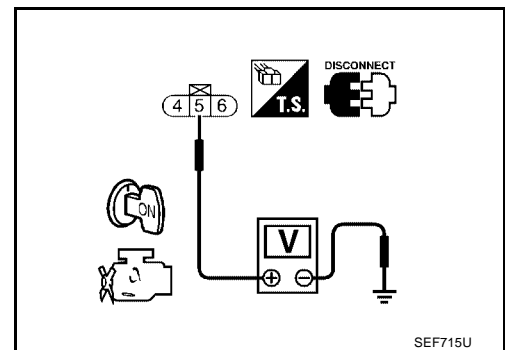


4. Check voltage between terminal 5 and engine ground with CONSULT-II or tester.

**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-1251, "Basic Inspection"](#) .

| Items             | Specifications                    |
|-------------------|-----------------------------------|
| Ignition timing   | 10° ± 2° BTDC                     |
| Base idle speed   | 700 ± 50 rpm (in P or N position) |
| Target idle speed | 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**

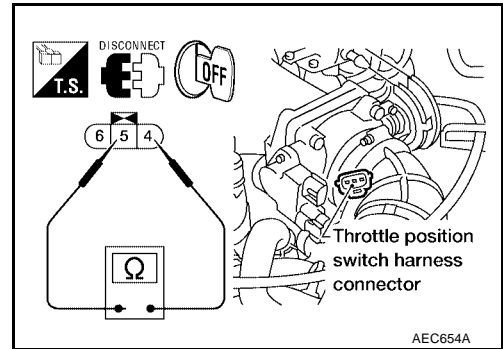
**Without CONSULT-II**

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-1251, "Basic Inspection"](#).

| Items  | Specifications   |
|--|--|
| Ignitions timing   | 10° ± 2° BTDC  |
| Base idle speed  | 700 ± 50 rpm (in P or N position)  |
| Closed throttle position switch idle position adjustment | Feeler gauge thickness and switch condition<br>0.3 mm (0.012 in): ON<br>0.4 mm (0.016 in): OFF |
| Target idle speed  | 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 (a)     |
| Partially open            | Between (a) and (b) |
| Completely open           | 3.5 - 4.7 (b)       |

**Voltage measurement must be made with throttle position sensor installed in vehicle.**

If NG, adjust closed throttle position switch. Refer to [EC-1251, "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 (a)     |
| Partially open            | Between (a) and (b) |
| Completely open           | 3.5 - 4.7 (b)       |

If NG, adjust closed throttle position switch. Refer to [EC-1251, "Basic Inspection"](#) .

#### OK or NG

- OK >> GO TO 10.  
 NG >> Replace throttle position sensor.

## 10. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

DTC P0600 A/T COMMUNICATION LINE

PF0:23710

System Description

EBS00GMY

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

EBS00GMZ

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors<br/>[The circuit between ECM and TCM (Transmission Control Module) is open or shorted.]</li> </ul> |

\*: This DTC can be detected only by "DATA MONITOR (AUTO TRIG)" with CONSULT-II.

DTC Confirmation Procedure

EBS00GN0

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-1006, "Diagnostic Procedure"](#).

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

WITH GST

Follow the procedure "With CONSULT-II".

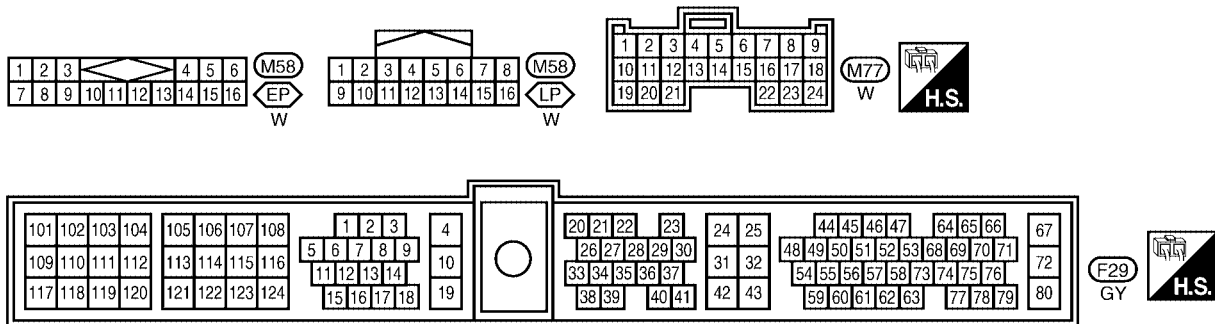
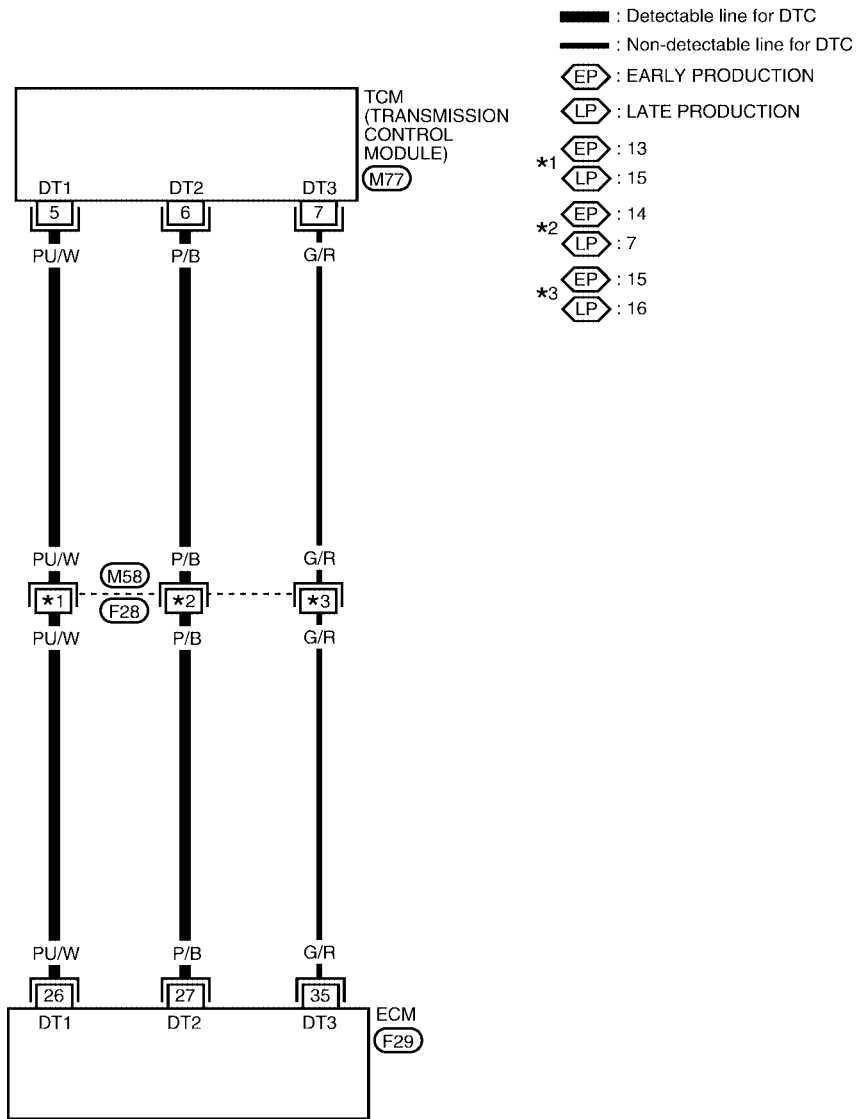
# DTC P0600 A/T COMMUNICATION LINE

[VG33ER]

EBS00GN1

## Wiring Diagram WITHOUT VDC

EC-AT/C-01



WBWA0037E



# DTC P0600 A/T COMMUNICATION LINE

**[VG33ER]**

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use 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 COLO R | ITEM             | CONDITION                                  | DATA (DC Voltage)      |
|---------------|-------------|------------------|--|------------------------|
| 26            | PU/W        | A/T signal No. 1 | <b>[Engine is running]</b><br>● Idle speed | Approximately 0 - 1.0V |
| 27            | P/B         | A/T signal No. 2 | <b>[Engine is running]</b><br>● Idle speed | Approximately 0 - 1.0V |
| 35            | G/R         | A/T signal No. 3 | <b>[Engine is running]</b><br>● Idle speed | Approximately 0 - 1.0V |




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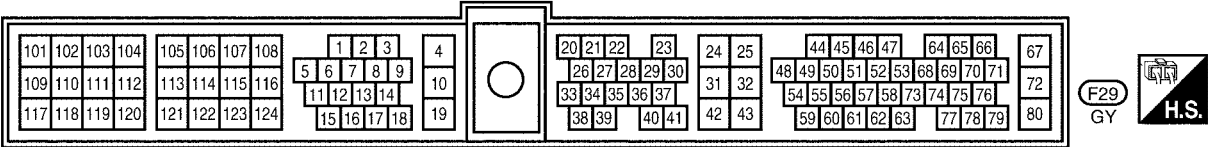
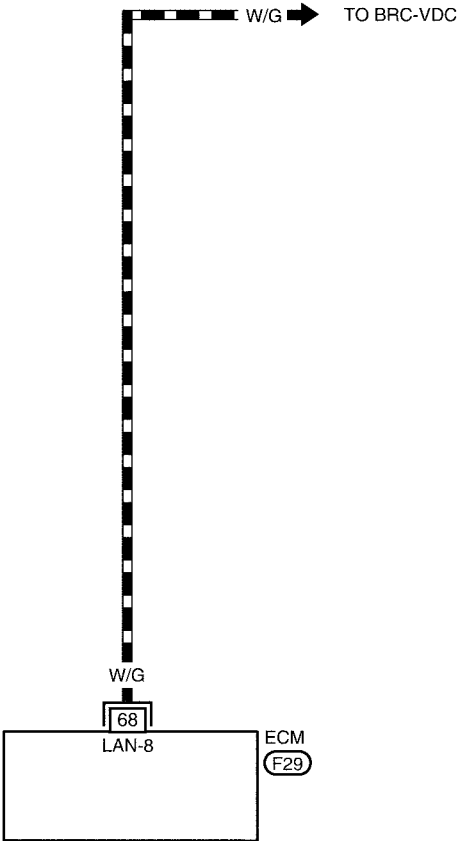
# DTC P0600 A/T COMMUNICATION LINE

[VG33ER]

WITH VDC

EC-CAN-01

-  : DETECTABLE LINE FOR DTC
-  : NON-DETECTABLE LINE FOR DTC
-  : DATA LINE



BBWA0503E

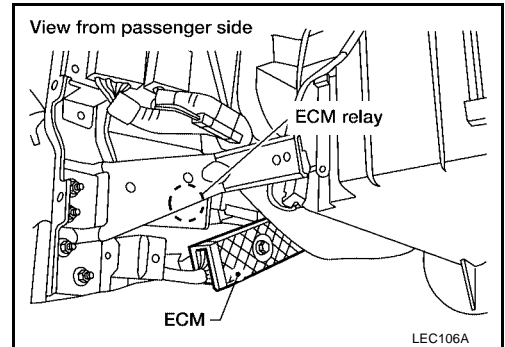
| TER-MINAL NO. | WIRE COLO R | ITEM       | CONDITION                                  | DATA (DC Voltage)      |
|---------------|-------------|------------|--|------------------------|
| 68            | W/G         | A/T signal | <b>[Engine is running]</b><br>● Idle speed | Approximately 0 - 5.0V |

## Diagnostic Procedure

EBS00GN2

### 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.

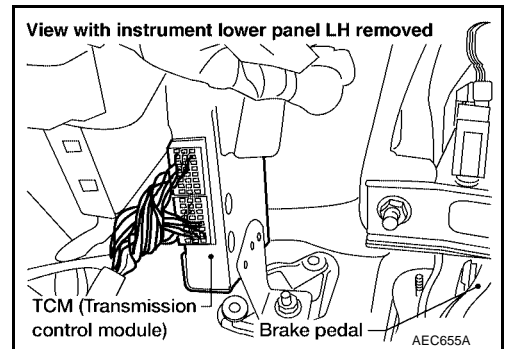


3. Check harness continuity between ECM terminal 26 and TCM terminal 5, ECM terminal 27 and TCM terminal 6, ECM terminal 35 and TCM terminal 7. Refer to Wiring Diagram.

**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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

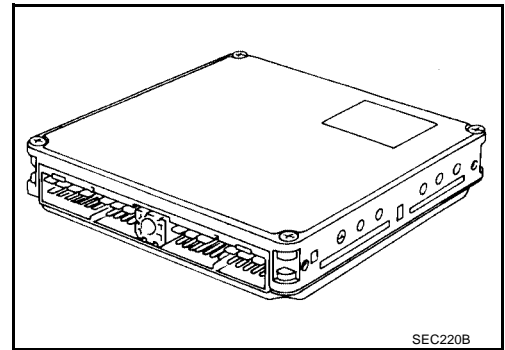
**DTC P0605 ECM**

PF2:23710

**Component Description**

UBS0063G

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the engine.



**On Board Diagnosis Logic**

UBS006VA

| DTC No. | Trouble diagnosis name | DTC detecting condition                     | Possible cause |
|---------|------------------------|---|----------------|
| P0605   | Engine control module  | ECM calculation function is malfunctioning. | ● ECM          |

**DTC Confirmation Procedure**

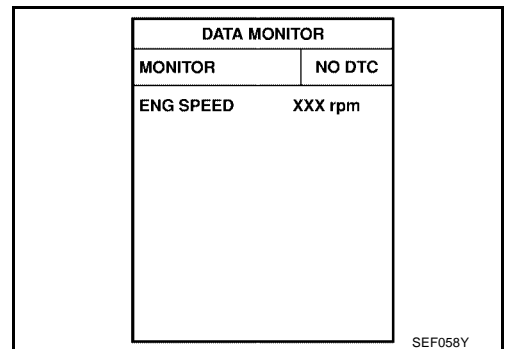
UBS0063I

**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-1598, "Diagnostic Procedure"](#).



**WITH GST**

Follow the procedure "With CONSULT-II".

## Diagnostic Procedure

### 1. INSPECTION START

---

#### With CONSULT-II

1. Turn ignition switch ON.
2. Select "SELF DIAG RESULTS" mode with CONSULT-II.
3. Touch "ERASE".
4. **Perform "DTC Confirmation Procedure".**  
See [EC-1597, "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-1597, "DTC Confirmation Procedure"](#) .
5. Is the 1st trip DTC P0605 displayed again?

#### Yes or No

- Yes >> Replace ECM.  
No >> **INSPECTION END.**

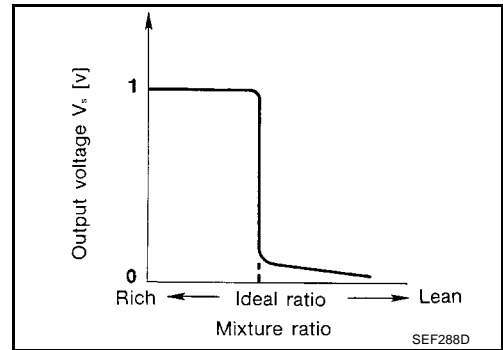
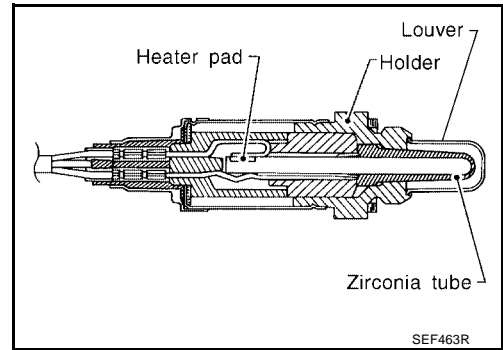
DTC P1143, P1163 HO2S1

PFP:22690

UBS0063K

Component Description

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

UBS0063L

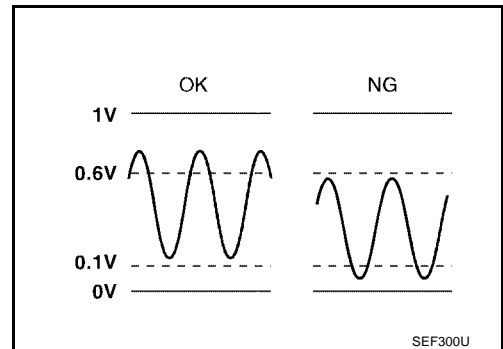
Specification data are reference values.

| MONITOR ITEM                       | CONDITION                  |                                       | SPECIFICATION   |
|------------------------------------|----------------------------|---------------------------------------|---|
| HO2S1 (B1)<br>HO2S1 (B2)           |                            |                                       | 0 - 0.3V ↔ Approx. 0.6 - 1.0V                               |
| HO2S1 MNTR (B1)<br>HO2S1 MNTR (B2) | ● Engine: After warming up | Maintaining engine speed at 2,000 rpm | LEAN ↔ RICH<br>Changes more than 5 times during 10 seconds. |

On Board Diagnosis Logic

UBS0063N

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<br>(Bank 1) | Heated oxygen sensor<br>1 lean shift monitoring | The maximum and minimum voltage from the sensor are not reached to the specified voltages. | <ul style="list-style-type: none"> <li>● Heated oxygen sensor 1</li> <li>● Heated oxygen sensor 1 heater</li> <li>● Fuel pressure</li> <li>● Injectors</li> <li>● Intake air leaks</li> </ul> |
| P1163<br>(Bank 2) |   |  |   |

## DTC Confirmation Procedure

UBS00630

### 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  $-10^{\circ}\text{C}$  ( $14^{\circ}\text{F}$ ).
- 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".

|                  |          |
|------------------|----------|
| HO2S1 (B1) P1143 |          |
| TESTING          |          |
| MONITOR          |          |
| ENG SPEED        | XXX rpm  |
| B/FUEL SCHDL     | XXX msec |
| COOLAN TEMP/S    | XXX °C   |
| VHCL SPEED SEN   | XXX km/h |

LEC072A

5. Start engine and let it idle for at least 3.5 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           |

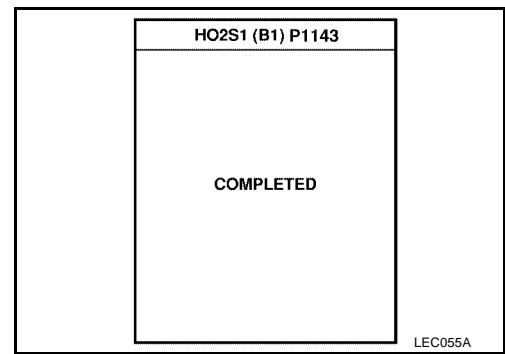
|                  |          |
|------------------|----------|
| HO2S1 (B1) P1143 |          |
| TESTING          |          |
| MONITOR          |          |
| ENG SPEED        | XXX rpm  |
| B/FUEL SCHDL     | XXX msec |
| COOLAN TEMP/S    | XXX °C   |
| VHCL SPEED SE    | XXX km/h |

LEC073A

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-1601, "Diagnostic Procedure"](#).



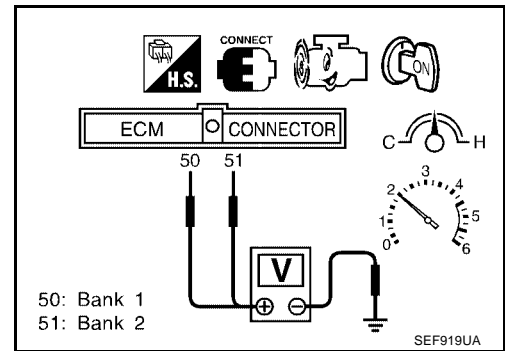
UBS0063P

## Overall Function Check

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

### ⊗ 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 engine ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.
  - The maximum voltage is over 0.6V at least one time.
  - The minimum voltage is over 0.1V at least one time.
4. If NG, go to [EC-1601, "Diagnostic Procedure"](#).



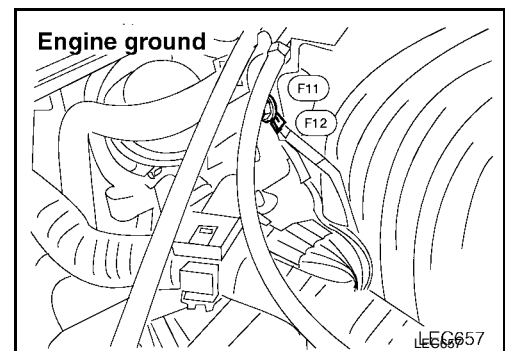
UBS0063Q

## Diagnostic Procedure

### 1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.



### 2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten corresponding heated oxygen sensor 1.

**Tightening torque : 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)**

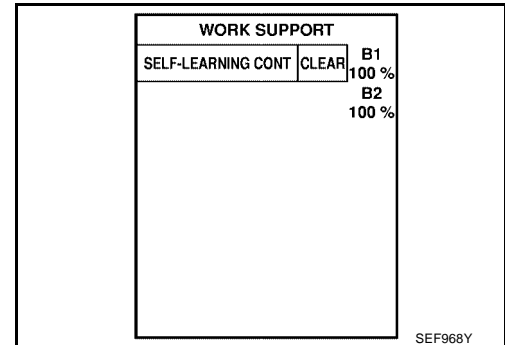
>> GO TO 3.

### 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

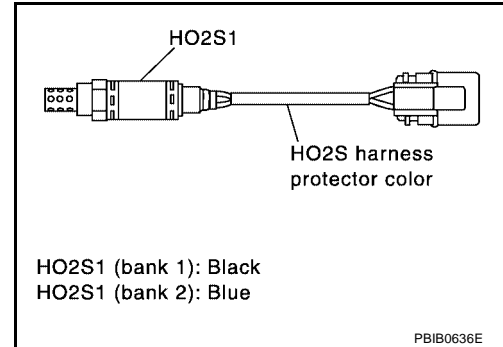
1. Start engine and warm it up to normal operating temperature.
  2. Turn ignition switch "OFF".
  3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
  4. Stop engine and reconnect mass air flow sensor harness connector.
  5. Make sure DTC P0102 is displayed.
  6. Erase the DTC memory. Refer to [EC-1237, "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-1431](#).
- No >> GO TO 4.

#### 4. CHECK HEATED OXYGEN SENSOR 1 HEATER

1. Stop engine.
2. Check heated oxygen sensor 1 harness protector color.



3. Check resistance between HO2S1 terminals 3 and 1.

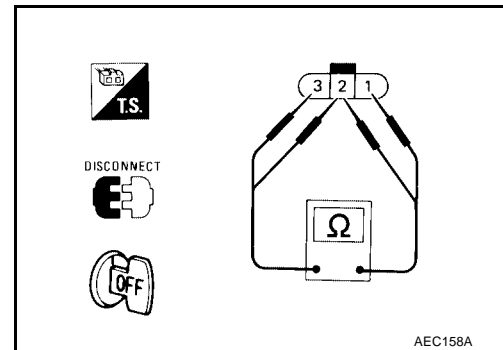
**Resistance : 2.3 - 4.3Ω at 25°C (77°F)**

4. 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 |
| COOLAN TEMP/S | XXX °C  |
| HO2S1 (B1)    | XXX V   |
| HO2S2 (B2)    | XXX V   |

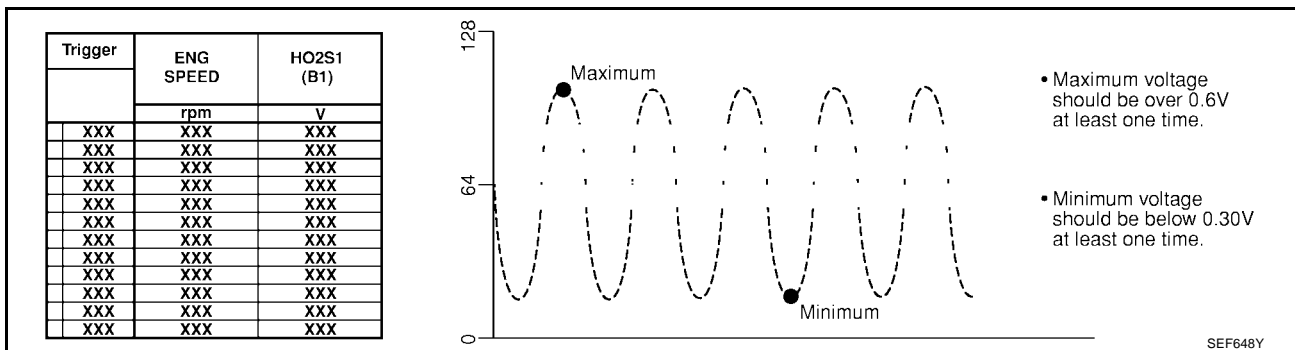
SEF967Y

5. Check the following.
  - "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown 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 |
| Bank 2 | cycle           | 1 | 2 | 3 | 4 | 5 |   |
|        | HO2S1 MNTR (B2) | R | L | R | L | R | L |

R means HO2S1  
 MNTR (B1)/(B2) indicates RICH  
 L means HO2S1  
 MNTR (B1)/(B2) indicates LEAN

SEF647Y



**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

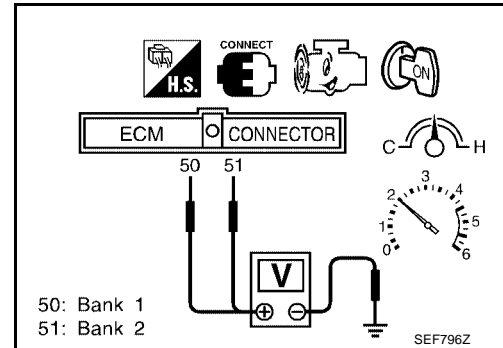
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [NO2S1 (B2) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
  - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
  - The maximum voltage is over 0.6V at least one time.
  - The minimum voltage is below 0.3V at least one time.
  - The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V

### CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new 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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

For circuit, refer to [EC-1404](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 1

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

UBS006XV

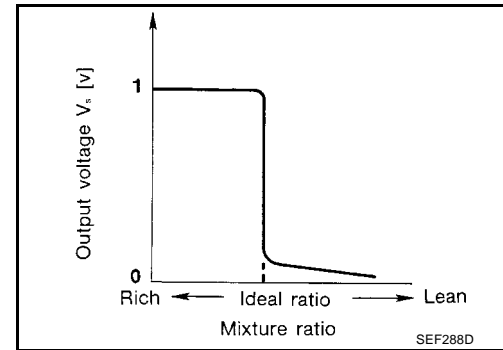
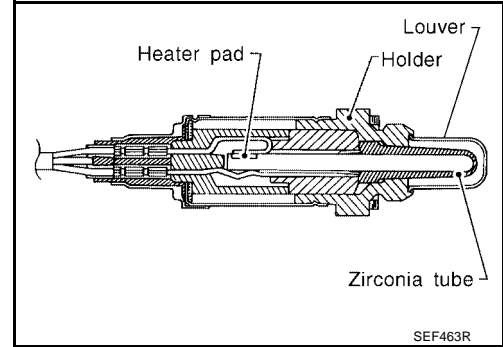
DTC P1144, P1164 HO2S1

PFP:22690

Component Description

UBS0063R

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

UBS0063S

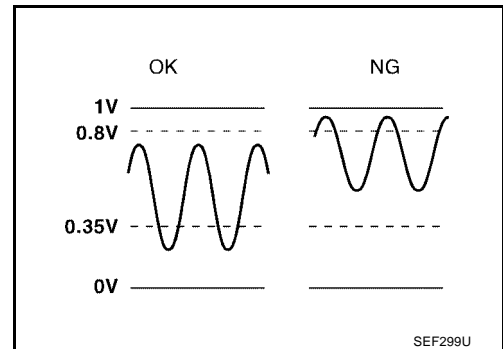
Specification data are reference values.

| MONITOR ITEM                       | CONDITION                  |                                       | SPECIFICATION   |
|------------------------------------|----------------------------|---------------------------------------|---|
| HO2S1 (B1)<br>HO2S1 (B2)           |                            |                                       | 0 - 0.3V ↔ Approx. 0.6 - 1.0V                               |
| HO2S1 MNTR (B1)<br>HO2S1 MNTR (B2) | ● Engine: After warming up | Maintaining engine speed at 2,000 rpm | LEAN ↔ RICH<br>Changes more than 5 times during 10 seconds. |

On Board Diagnosis Logic

UBS0063U

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) | Heated oxygen sensor 1 rich shift monitoring | The maximum and minimum voltages from the sensor are beyond the specified voltages. | <ul style="list-style-type: none"> <li>● Heated oxygen sensor 1</li> <li>● Heated oxygen sensor 1 heater</li> <li>● Fuel pressure</li> <li>● Injectors</li> </ul> |
| P1164 (Bank 2) |  |   |   |

**DTC Confirmation Procedure**

**CAUTION:**

Always drive vehicle at a safe speed.

**NOTE:**

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

**TESTING CONDITION:**

- Always perform at a temperature above  $-10^{\circ}\text{C}$  ( $14^{\circ}\text{F}$ ).
- 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”.

|                  |          |
|------------------|----------|
| 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

5. Start engine and let it idle for at least 3.5 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.)

|                |                             |
|----------------|-----------------------------|
| 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-1608, "Diagnostic Procedure"](#).

|                  |  |
|------------------|--|
| HO2S1 (B1) P1144 |  |
| COMPLETED        |  |

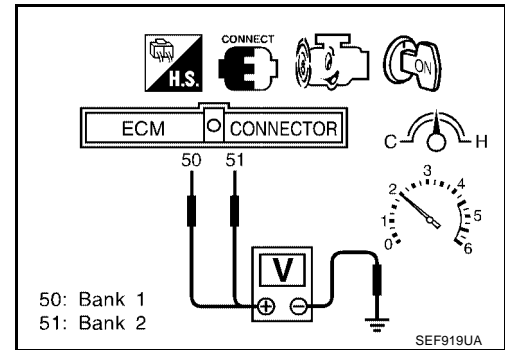
LEC058A

**Overall Function Check**

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a DTC might not be confirmed.

**WITH GST**

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and engine ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.
  - The maximum voltage is below 0.8V at least one time.
  - The minimum voltage is below 0.35V at least one time.
4. If NG, go to [EC-1608, "Diagnostic Procedure"](#).

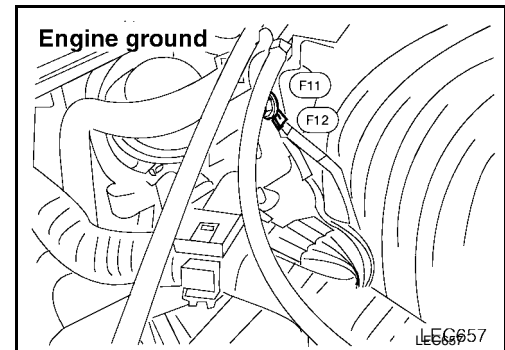


UBS0063X

**Diagnostic Procedure****1. RETIGHTEN GROUND SCREWS**

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

&gt;&gt; GO TO 2.

**2. RETIGHTEN HEATED OXYGEN SENSOR 1**

Loosen and retighten corresponding heated oxygen sensor 1.

**Tightening torque : 40 - 60 N·m (4.1 - 6.1 kg·m, 30 - 44 ft·lb)**

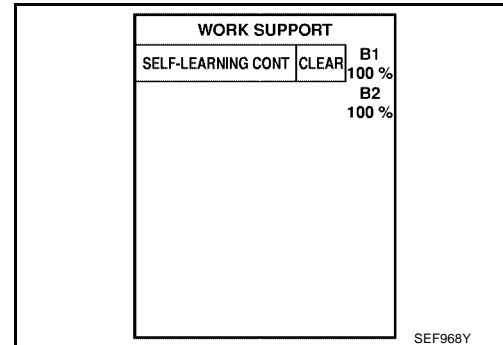
&gt;&gt; GO TO 3.



### 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-1237, "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-1439](#).  
No >> GO TO 4.

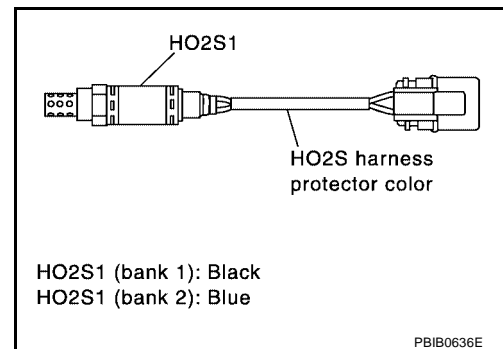
### 4. CHECK HO2S 1 CONNECTOR FOR WATER

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 1 harness protector color.
3. Disconnect heated oxygen sensor 1 harness connector.
4. 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 : 2.3 - 4.3Ω at 25°C (77°F)**

Check continuity between HO2S1 terminals 2 and 1, 3 and 2.

**Continuity should not exist.**

**CAUTION:**

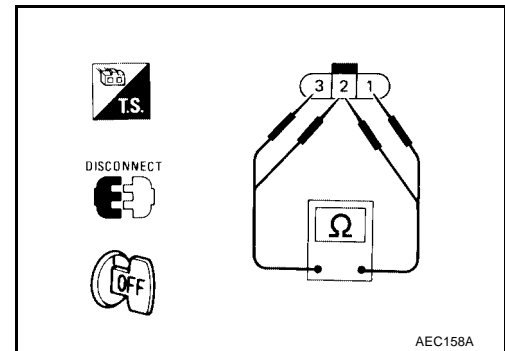
- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved 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 |
| COOLAN TEMP/S | XXX °C  |
| HO2S1 (B1)    | XXX V   |
| HO2S2 (B2)    | XXX V   |

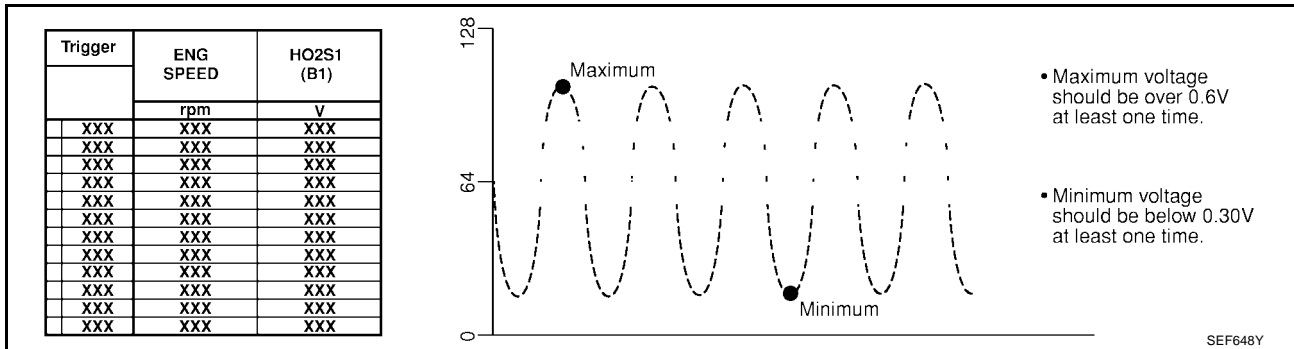
SEF967Y

5. Check the following.
  - "HO2S1 MNTR (B1)/(B2)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" 5 times in 10 seconds. 5 times (cycles) are counted as shown 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 |
| Bank 2 | cycle           | 1 | 2 | 3 | 4 | 5 |   |
|        | HO2S1 MNTR (B2) | R | L | R | L | R | L |

R means HO2S1  
 MNTR (B1)/(B2) indicates RICH  
 L means HO2S1  
 MNTR (B1)/(B2) indicates LEAN

SEF647Y



**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 engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
  - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
  - The maximum voltage is over 0.6V at least one time.
  - The minimum voltage is below 0.3V at least one time.
  - The voltage never exceeds 1.0V.

1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V

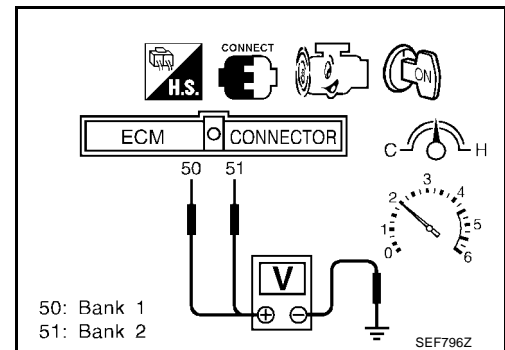
### CAUTION:

- Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.
- Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.

### OK or NG

OK >> GO TO 8.

NG >> Replace malfunctioning heated oxygen sensor 1.



## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

For circuit, refer to [EC-1404](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 1

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

UBS006XW

**DTC P1146, P1166 HO2S2**

PF2:226A0

**Component Description**

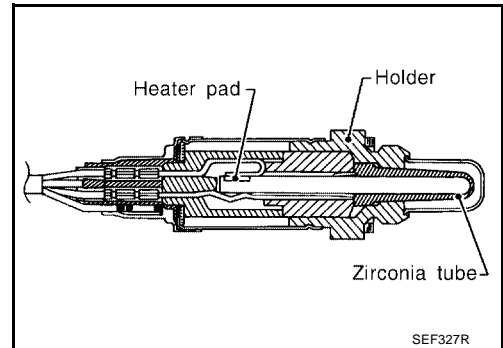
UBS0063Y

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**

UBS0063Z

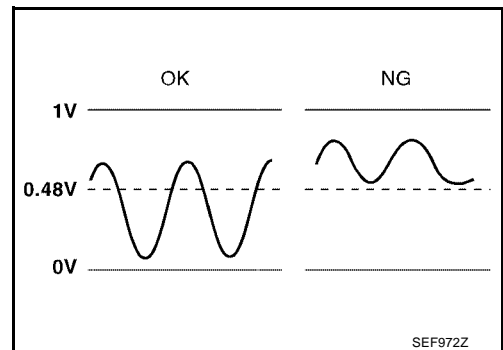
Specification data are reference values.

| MONITOR ITEM                       | CONDITION  |  | SPECIFICATION                 |
|------------------------------------|--|--|-------------------------------|
| HO2S2 (B1)<br>HO2S2 (B2)           | <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● After keeping engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> | Revving engine from idle up to 3,000 rpm quickly | 0 - 0.3V ↔ Approx. 0.6 - 1.0V |
| HO2S2 MNTR (B1)<br>HO2S2 MNTR (B2) |  |  | LEAN ↔ RICH                   |

**On Board Diagnosis Logic**

UBS00641

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) | Heated oxygen sensor 2 minimum voltage monitoring | The minimum voltage from the sensor is not reached to the specified voltage. | <ul style="list-style-type: none"> <li>● Harness or connectors (The sensor circuit is open or shorted)</li> <li>● Heated oxygen sensor 2</li> <li>● Fuel pressure</li> <li>● Injectors</li> </ul> |
| P1166 (Bank 2) |   |  |   |

**DTC Confirmation Procedure**

UBS00642

**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.

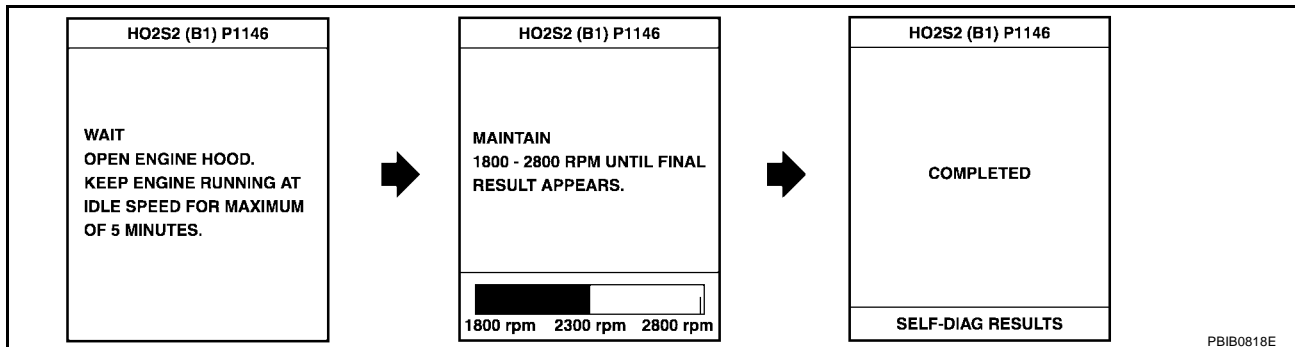
**TESTING CONDITION:**

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 one minute under no load.
4. Let engine idle for one minutes.
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-1619, "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

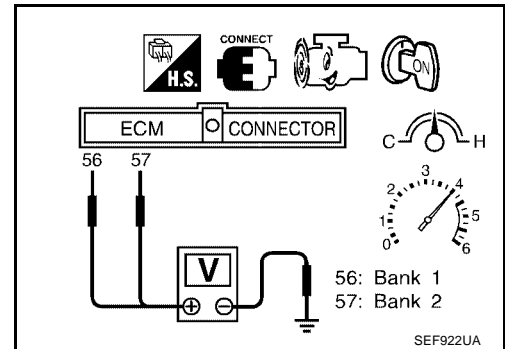
Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

### CAUTION:

Always drive vehicle at a safe speed.

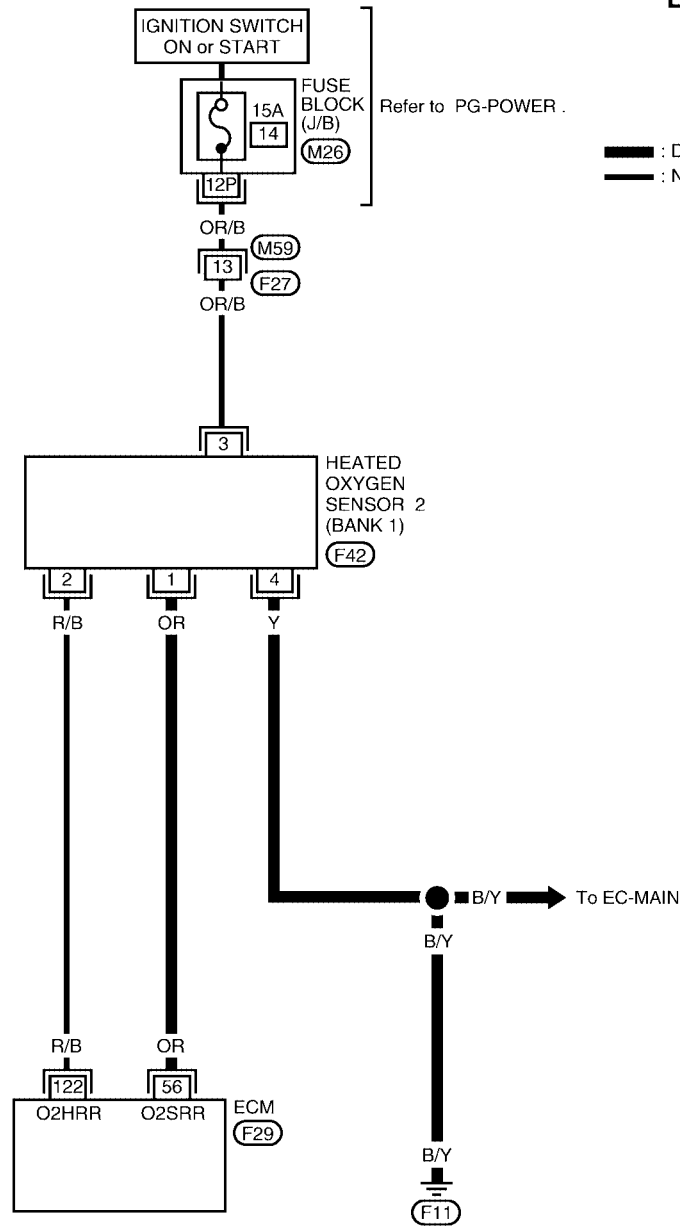
### WITH GST

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 one minute under no load.
4. Let engine idle for one minutes.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
(Depress and release accelerator pedal as soon as possible.)  
**The voltage should be below 0.48V 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-1619, "Diagnostic Procedure"](#) .

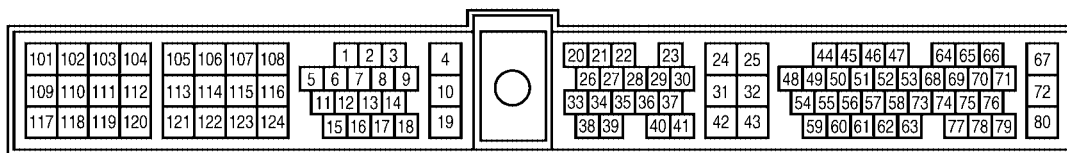
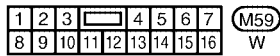
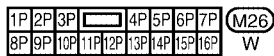


Wiring Diagram  
BANK 1

EC-O2S2B1-01



— : Detectable line for DTC  
— : Non-detectable line for DTC





# DTC P1146, P1166 HO2S2

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

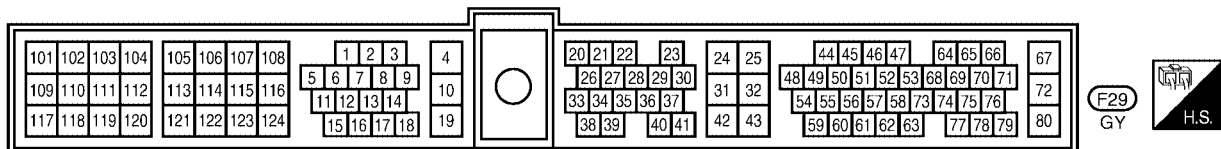
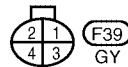
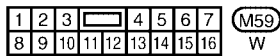
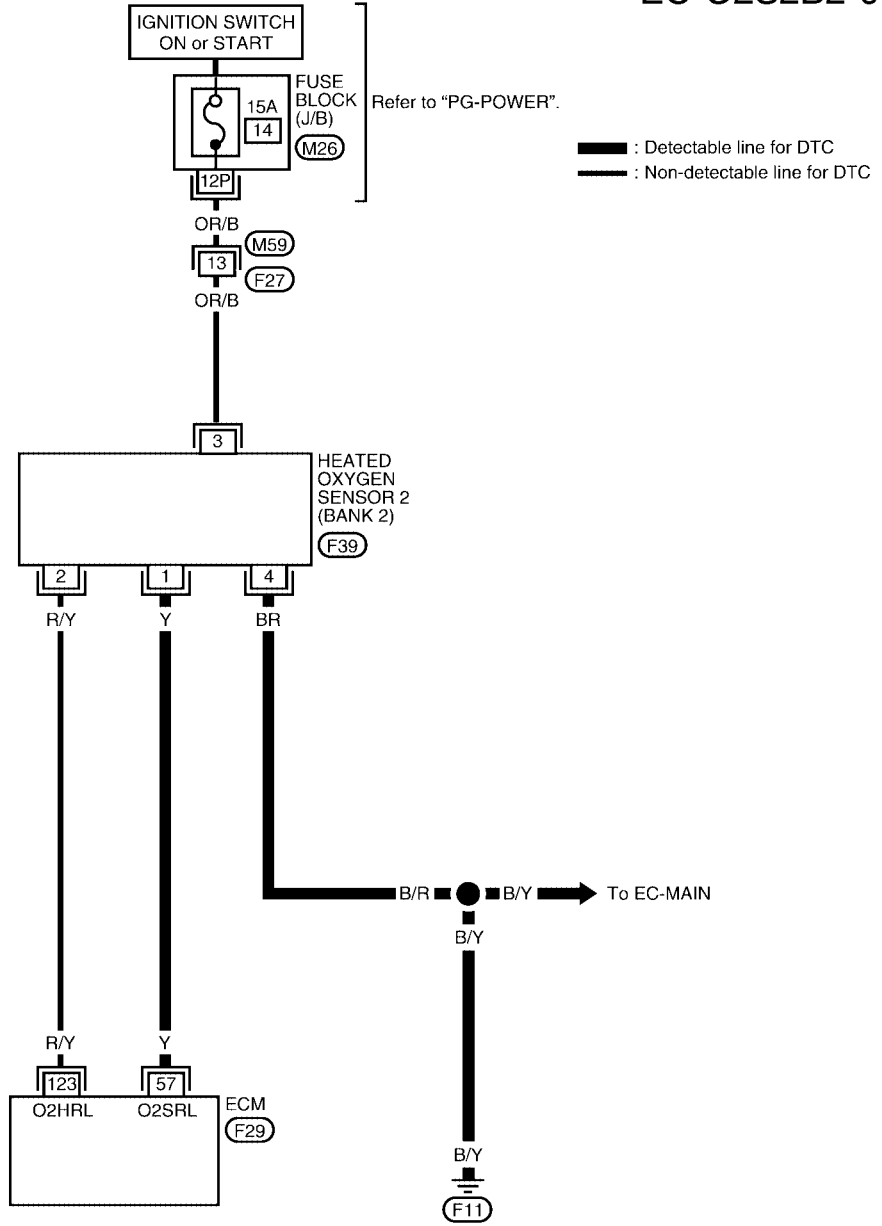
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

| TER-MINAL NO. | WIRE COLO R | ITEM                            | CONDITION   | DATA (DC Voltage)      |
|---------------|-------------|---------------------------------|---|------------------------|
| 56            | OR          | Heated oxygen sensor 2 (bank 1) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine after warming up.</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V |

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

BANK 2

EC-O2S2B2-01



Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

| TER-MINAL NO. | WIRE COLO R | ITEM                            | CONDITION   | DATA (DC Voltage)      |
|---------------|-------------|---------------------------------|---|------------------------|
| 57            | Y           | Heated oxygen sensor 2 (bank 2) | <p><b>[Engine is running]</b></p> <ul style="list-style-type: none"> <li>● Engine after warming up.</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V |

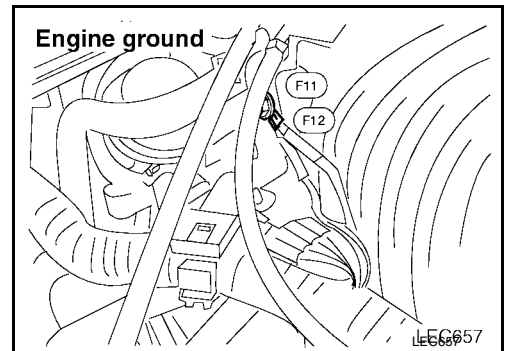
**Diagnostic Procedure**

UBS00645

**1. RETIGHTEN GROUND SCREWS**

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

>> GO TO 2.

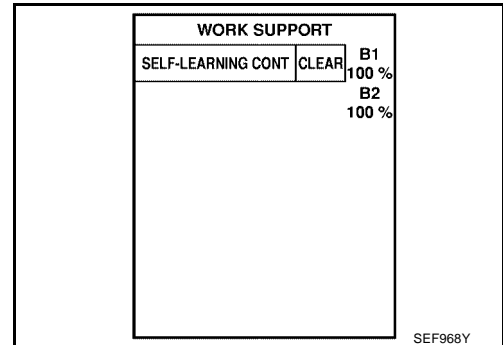


## 2. CLEAR THE SELF-LEARNING DATA

### With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.

**Is the 1st trip DTC P0172 or P0175 detected?  
Is it difficult to start engine?**



### Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
  2. Turn ignition switch "OFF".
  3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
  4. Stop engine and reconnect mass air flow sensor harness connector.
  5. Make sure DTC P0102 is displayed.
  6. Erase the DTC memory. Refer to [EC-1237, "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-1439](#) .  
No >> GO TO 3.

## 3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.  
Refer to Wiring Diagram.

**Continuity should exist.**

2. Also check harness for short to power.

OK or NG

- OK >> GO TO 5.  
NG >> GO TO 4.

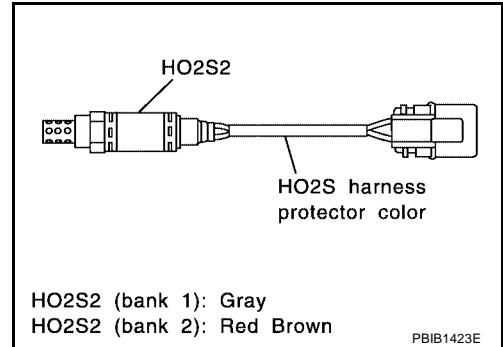
## 4. DETECT MALFUNCTIONING PART

Check harness for open between heated oxygen sensor 2 and engine ground.

>> Repair open circuit or short to power in harness or connectors.

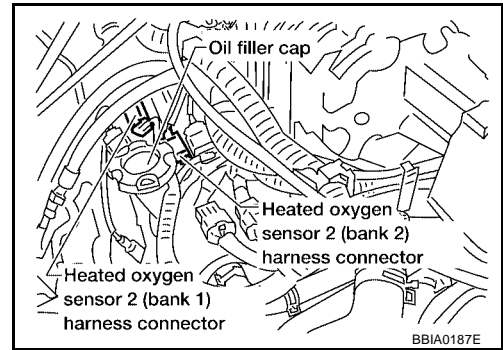
**5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 harness protector color.



3. Disconnect corresponding heated oxygen sensor 2 harness connector.
4. Disconnect ECM harness connector.
5. 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.**

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows.  
Refer to Wiring Diagram.

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P1146 | 56 or 1       | Ground | Bank 1 |
| P1166 | 57 or 1       | Ground | Bank 2 |

**Continuity should not exist.**

7. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 6.

OK (Without CONSULT-II)>>GO TO 7.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 6. CHECK HEATED OXYGEN SENSOR 2

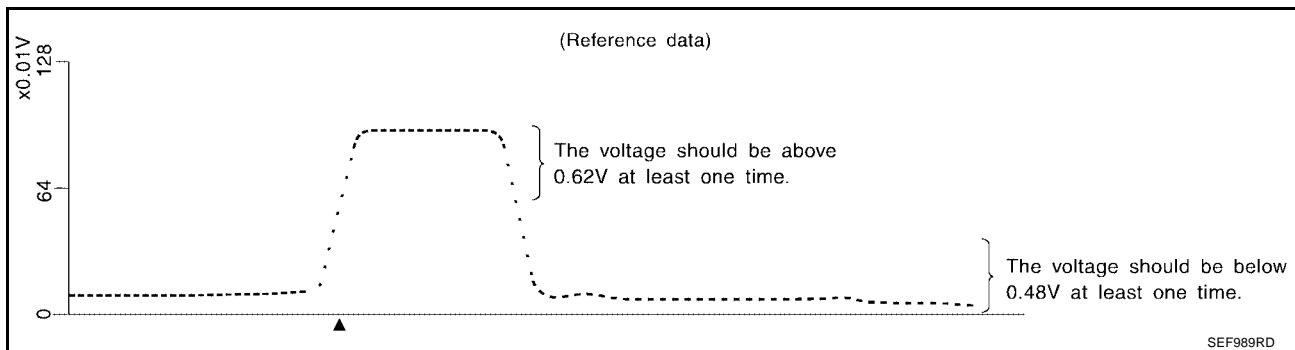
### With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch "OFF" and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
5. Let engine idle for one minutes.
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  $\pm 25\%$ .



"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.

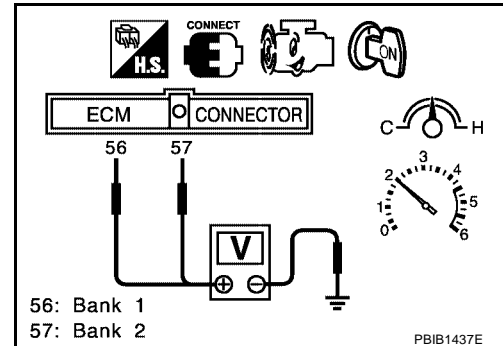
### OK or NG

- OK >> GO TO 8.  
 NG >> Replace malfunctioning heated oxygen sensor 2.

## 7. 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 one minute under no load.
4. Let engine idle for one minutes.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
(Depress and release accelerator pedal as soon as possible.)  
**The voltage should be above 0.62V 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 8.  
NG >> Replace malfunctioning heated oxygen sensor 2.

## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 2

Refer to [EX-3, "EXHAUST SYSTEM"](#) .

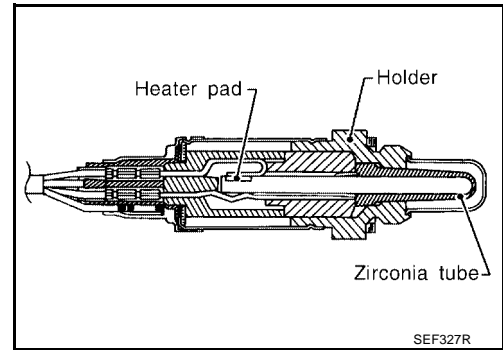
UBS006Y2

**DTC P1147, P1167 HO2S2**

**Component Description**

UBS00646

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**

UBS00647

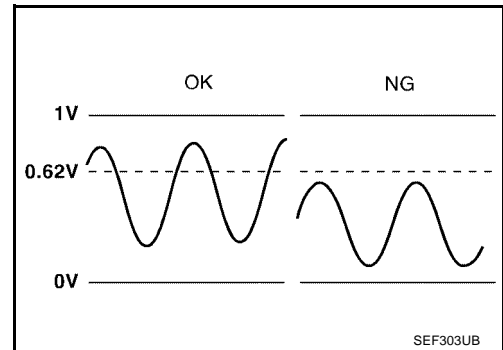
Specification data are reference values.

| MONITOR ITEM                       | CONDITION  |  | SPECIFICATION                 |
|------------------------------------|--|--|-------------------------------|
| HO2S2 (B1)<br>HO2S2 (B2)           | <ul style="list-style-type: none"> <li>Warm-up condition</li> <li>After keeping engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> </ul> | Revving engine from idle up to 3,000 rpm quickly | 0 - 0.3V ↔ Approx. 0.6 - 1.0V |
| HO2S2 MNTR (B1)<br>HO2S2 MNTR (B2) |  |  | LEAN ↔ RICH                   |

**On Board Diagnosis Logic**

UBS00649

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) | Heated oxygen sensor 2 maximum voltage monitoring | The maximum voltage from the sensor is not reached to the specified voltage. | <ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted)</li> <li>Heated oxygen sensor 2</li> <li>Fuel pressure</li> <li>Injectors</li> <li>Intake air leaks</li> </ul> |
| P1167 (Bank 2) |   |  |   |

**DTC Confirmation Procedure**

UBS0064A

**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

④ **WITH CONSULT-II**

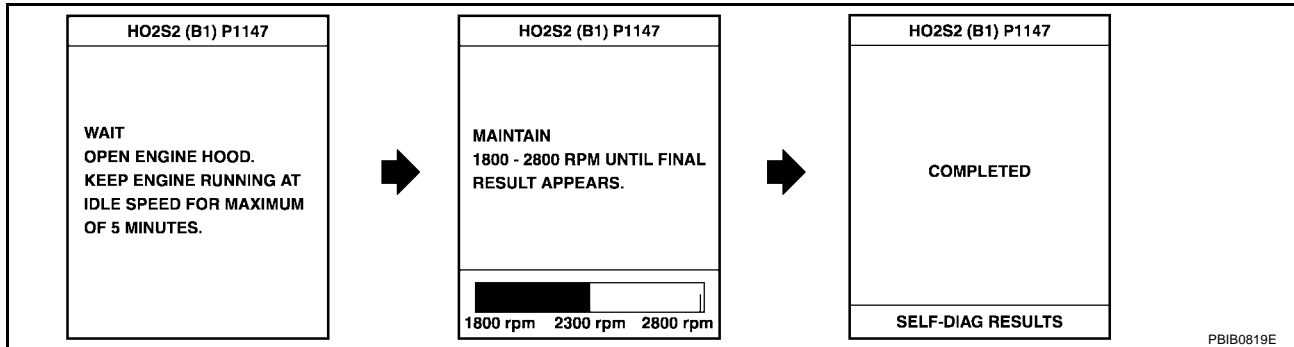
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch "OFF" and wait at least 10 seconds.



# DTC P1147, P1167 HO2S2

[VG33ER]

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minute.
5. 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-1630, "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

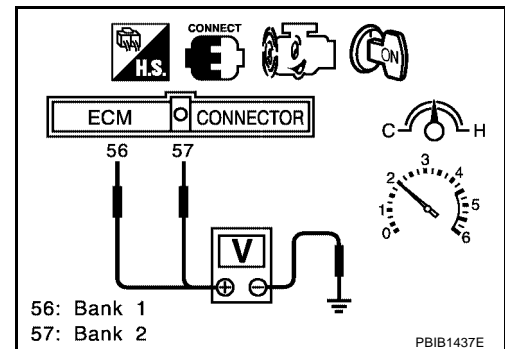
Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a DTC might not be confirmed.

### CAUTION:

Always drive vehicle at a safe speed.

### WITH GST

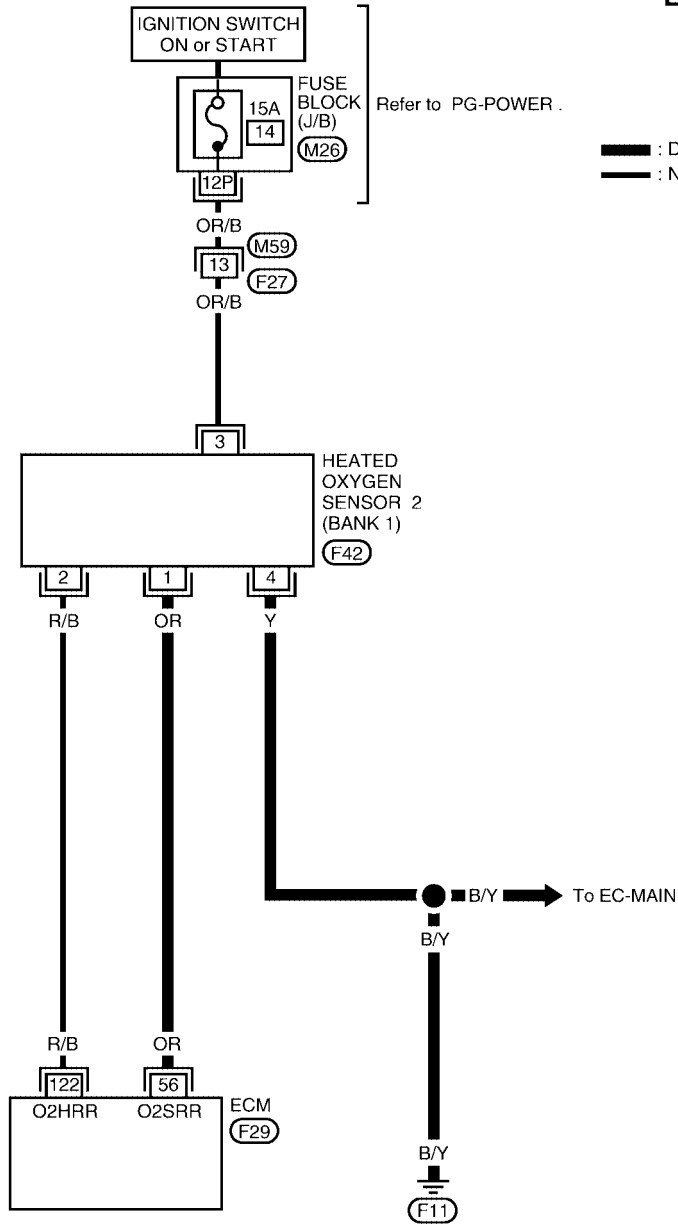
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch "OFF" and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
4. Let engine idle for one minutes.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
(Depress and release accelerator pedal as soon as possible.)  
**The voltage should be above 0.62V 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-1630, "Diagnostic Procedure"](#) .



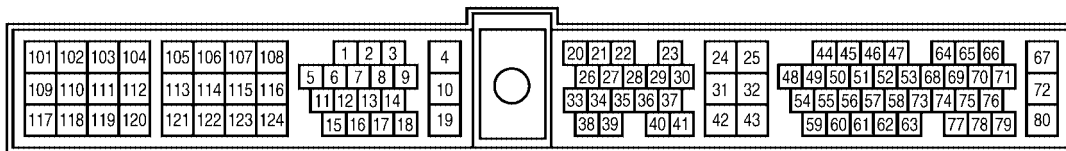
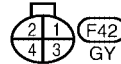
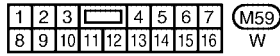
Wiring Diagram  
BANK 1

EC-O2S2B1-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



— : Detectable line for DTC  
— : Non-detectable line for DTC



# DTC P1147, P1167 HO2S2

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

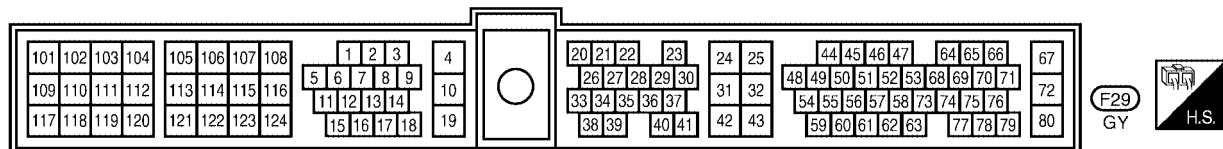
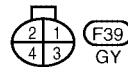
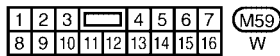
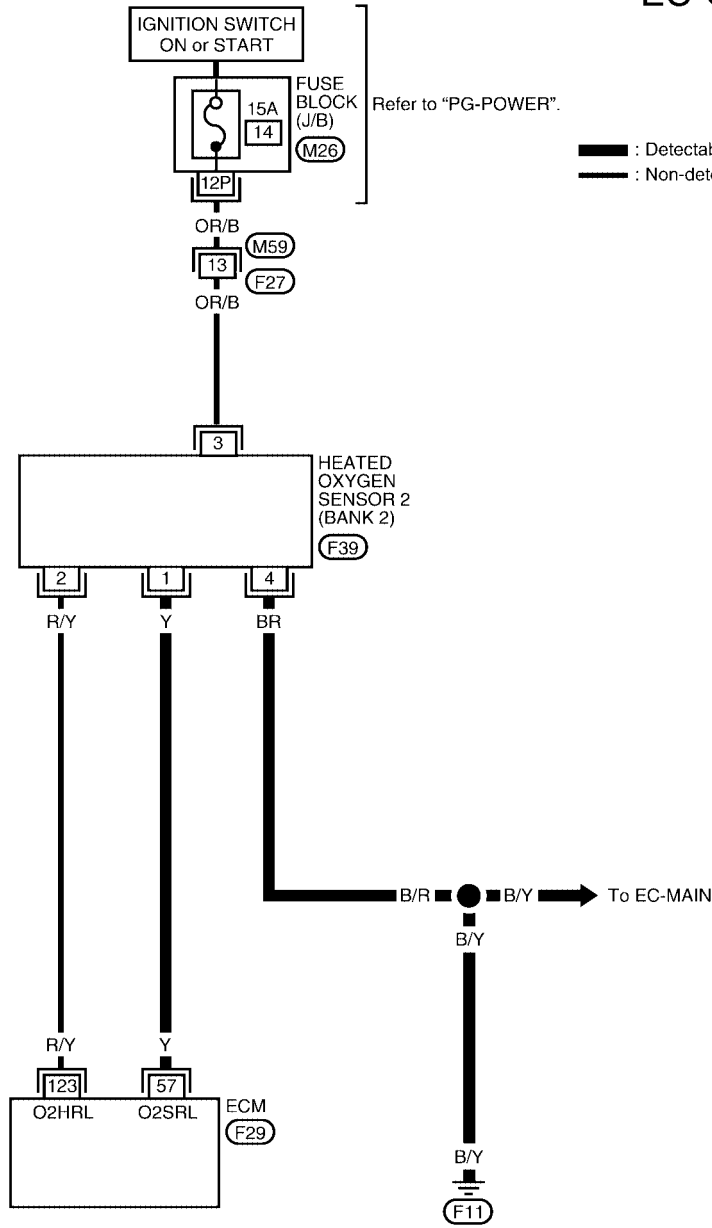
**CAUTION:**

**Do not use 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)      |
|---------------|------------|---------------------------------|--|------------------------|
| 56            | OR         | Heated oxygen sensor 2 (bank 1) | <b>[Engine is running]</b> <ul style="list-style-type: none"><li>● Engine after warming up.</li><li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li><li>● Revving engine from idle to 3,000 rpm quickly.</li></ul> | 0 - Approximately 1.0V |

BANK 2

EC-O2S2B2-01



Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than the ECM terminals, such as the ground.**

| TER-MINAL NO. | WIRE COLOR | ITEM                            | CONDITION  | DATA (DC Voltage)      |
|---------------|------------|---------------------------------|--|------------------------|
| 57            | Y          | Heated oxygen sensor 2 (bank 2) | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Engine after warming up.</li> <li>● Keeping the engine speed between 3,500 and 4,000 rpm for one minute and at idle for one minute under no load.</li> <li>● Revving engine from idle to 3,000 rpm quickly.</li> </ul> | 0 - Approximately 1.0V |

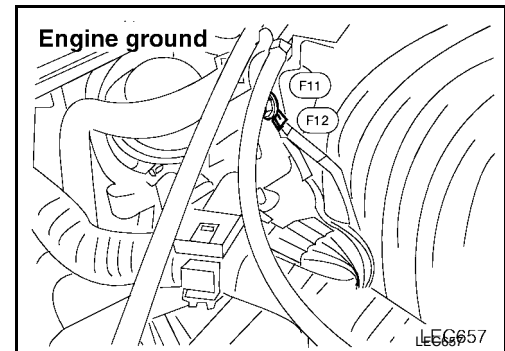
**Diagnostic Procedure**

UBS0064D

**1. RETIGHTEN GROUND SCREWS**

1. Turn ignition switch "OFF".
2. Loosen and retighten engine ground screws.

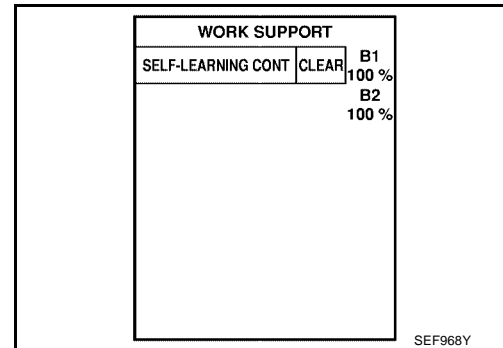
>> GO TO 2.



## 2. CLEAR THE SELF-LEARNING DATA

### With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select "SELF-LEARNING CONT" in "WORK SUPPORT" mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching "CLEAR".
4. Run engine for at least 10 minutes at idle speed.  
**Is the 1st trip DTC 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-1237, "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-1431](#).  
No >> GO TO 3.

## 3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and engine ground.  
Refer to Wiring Diagram.

**Continuity should exist.**

2. Also check harness for short to power.

#### OK or NG

- OK >> GO TO 5.  
NG >> GO TO 4.

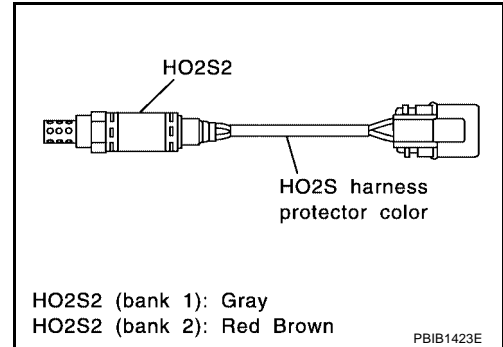
## 4. DETECT MALFUNCTIONING PART

Check Harness for open between heated oxygen sensor 2 and engine ground.

>> Repair open circuit or short to power in harness or connectors.

**5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Turn ignition switch "OFF".
2. Check heated oxygen sensor 2 harness protector color.
3. Disconnect corresponding heated oxygen sensor 2 harness connector.
4. Disconnect ECM harness connector.
5. 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.**

6. Check harness continuity between ECM terminal or HO2S2 terminal and ground as follows.

Refer to Wiring Diagram.

| DTC   | Terminals     |        | Bank   |
|-------|---------------|--------|--------|
|       | ECM or sensor | Ground |        |
| P1147 | 56 or 1       | Ground | Bank 1 |
| P1167 | 57 or 1       | Ground | Bank 2 |

**Continuity should not exist.**

7. Also check harness for short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 6.

OK (Without CONSULT-II)>>GO TO 7.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.



6. CHECK HEATED OXYGEN SENSOR 2

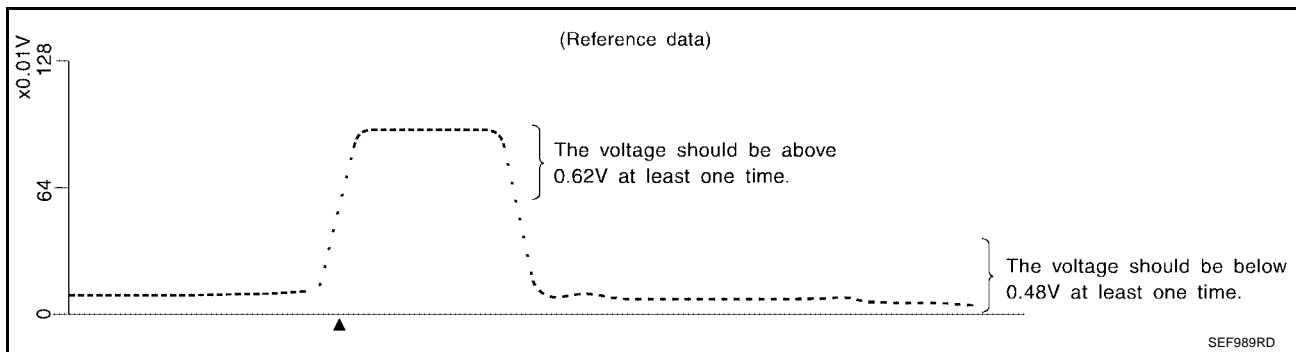
 With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch "OFF" and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least one minute under no load.
5. Let engine idle for one minutes.
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  $\pm 25\%$ .



"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.

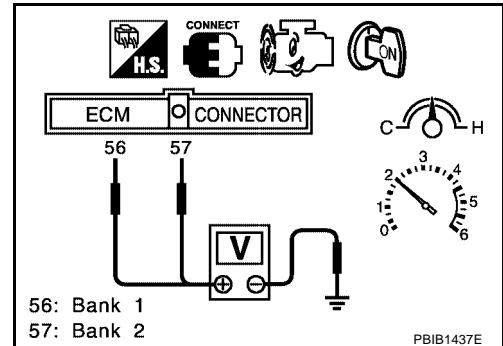
OK or NG

- OK >> GO TO 8.  
 NG >> Replace malfunctioning heated oxygen sensor 2.

## 7. 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 one minute under no load.
4. Let engine idle for one minutes.
5. Set voltmeter probes between ECM terminal 56 [HO2S2 (B1) signal] or 57 [HO2S2 (B2) signal] and engine ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.  
(Depress and release accelerator pedal as soon as possible.)  
**The voltage should be above 0.62V 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 8.  
NG >> Replace malfunctioning heated oxygen sensor 2.

## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### Removal and Installation HEATED OXYGEN SENSOR 2

Refer to [EX-3, "EXHAUST SYSTEM"](#) .

UBS006Y3

## DTC P1148, P1168 CLOSED LOOP CONTROL

PFP:22690

### On Board Diagnosis Logic

UBS006YN

These self-diagnoses have the one trip detection logic.

| DTC No.           | Trouble diagnosis name       | DTC detecting condition   | Possible cause  |
|-------------------|------------------------------|---|---|
| P1148<br>(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. | <ul style="list-style-type: none"> <li>● The heated oxygen sensor 1 circuit is open or shorted.</li> </ul>        |
| P1168<br>(Bank 2) |                              | The closed loop control function for bank 2 does not operate even when vehicle is driving in the specified condition. | <ul style="list-style-type: none"> <li>● Heated oxygen sensor 1</li> <li>● Heated oxygen sensor heater</li> </ul> |

### DTC Confirmation Procedure

UBS0064F

**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-1636, "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.

| DATA MONITOR  |         |
|---------------|---------|
| MONITOR       | NO DTC  |
| ENG SPEED     | XXX rpm |
| COOLAN TEMP/S | XXX °C  |
| HO2S1 (B1)    | XXX V   |
| HO2S2 (B2)    | XXX V   |

SEF967Y

|                |                            |
|----------------|----------------------------|
| B/FUEL SCHDL   | 2.0 msec or more           |
| ENG SPEED      | 1,500 rpm or more          |
| Selector lever | Suitable position          |
| VHCL SPEED SE  | More than 71 km/h (44 MPH) |

During this test, P0134 and/or P0154 may be displayed on CONSULT-II screen.

6. If DTC is detected, go to [EC-1636, "Diagnostic Procedure"](#).

### Overall Function Check

UBS0064G

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

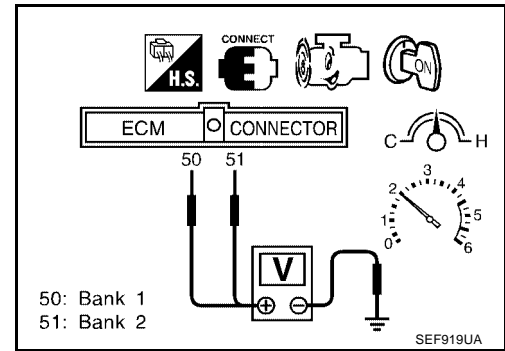
**WITH GST**

1. Start engine and warm it up to normal operating temperature.

## DTC P1148, P1168 CLOSED LOOP CONTROL

[VG33ER]

2. Set voltmeter probes between ECM terminal 50 [HO2S1 (B1) signal] or 51 [HO2S1 (B2) signal] and engine ground.
3. Check the following with engine speed held at 2,000 rpm constant under no-load.
  - The voltage should go above 0.70V at least once.
  - The voltage should go below 0.21V at least once.
4. If NG, go to [EC-1636, "Diagnostic Procedure"](#) .



UBS0064H

### Diagnostic Procedure

Perform trouble diagnosis for “DTC P0133, P0153”, [EC-1394](#) .

# DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

[VG33ER]

## DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

PF0:00021

### On Board Diagnosis Logic

UBS0064I

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) | Engine coolant temperature reaches an abnormally high temperature. | <ul style="list-style-type: none"><li>● Cooling fan (crankshaft driven)</li><li>● Radiator hose</li><li>● Radiator</li><li>● Radiator cap</li><li>● Water pump</li><li>● Thermostat</li></ul> For more information, refer to <a href="#">EC-1639</a> , " <a href="#">Main 12 Causes of Overheating</a> ". |

#### 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](#), "[ANTI-FREEZE COOLANT MIXTURE RATIO](#)".
2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

### Overall Function Check

UBS0064J

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

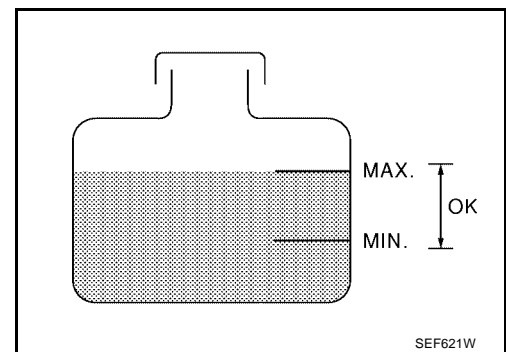
#### WARNING:

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-1638](#), "[Diagnostic Procedure](#)".
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-1638](#), "[Diagnostic Procedure](#)".
3. Start engine.
4. Make sure that cooling fan (crankshaft driven) operates.
5. If NG, go to [EC-1638](#), "[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-1638](#), "[Diagnostic Procedure](#)".
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to [EC-1638](#), "[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-1638](#), "[Diagnostic Procedure](#)".

## Diagnostic Procedure

### 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<sup>2</sup> , 23 psi)**

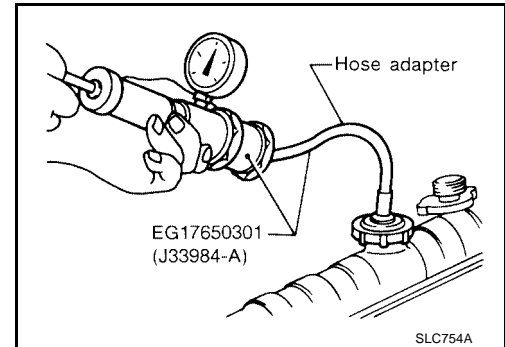
Pressure should not drop.

OK or NG

OK >> GO TO 3.

NG >> Check the following for leak

- Hose
  - Radiator
  - Water pump
- Refer to [CO-23. "CHECKING COOLING SYSTEM FOR LEAKS"](#).



### 3. CHECK RADIATOR CAP

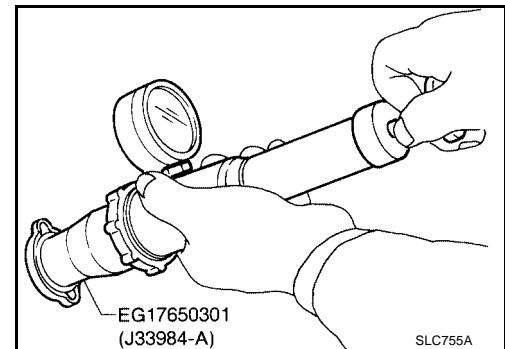
Apply pressure to cap with a tester and check radiator cap relief pressure.

**Radiator cap relief pressure : 59 - 98 kPa (0.6 - 1.0 kg/cm<sup>2</sup> , 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)**

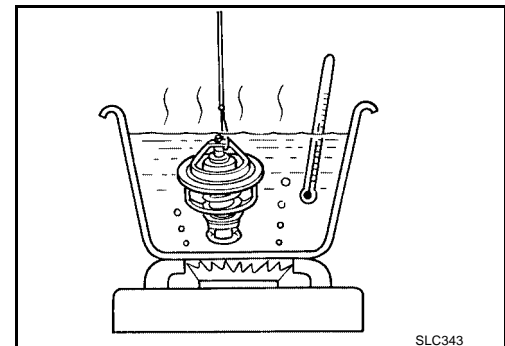
3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer to [CO-28. "THERMOSTAT"](#).

OK or NG

OK >> GO TO 5.

NG >> Replace thermostat



# DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

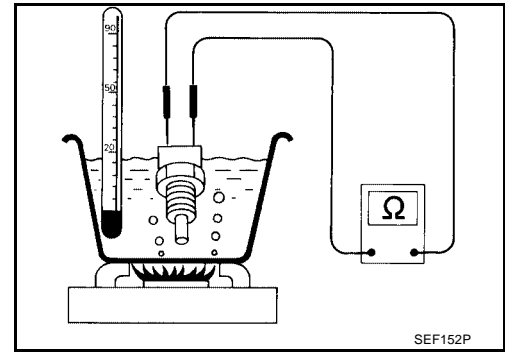
[VG33ER]

## 5. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.

<Reference data>

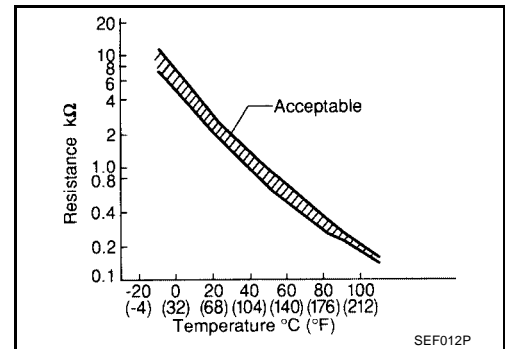
| Temperature °C (°F) | Resistance kΩ |
|---------------------|---------------|
| 20 (68)             | 2.1 - 2.9     |
| 50 (122)            | 0.68 - 1.00   |
| 90 (194)            | 0.236 - 0.260 |



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-1639, "Main 12 Causes of Overheating"](#) .

>> INSPECTION END.

### Main 12 Causes of Overheating

UBS0064L

| Engine | Step | Inspection item  | Equipment  | Standard   | Reference page   |
|--------|------|--|--|--|--|
| OFF    | 1    | <ul style="list-style-type: none"> <li>Blocked radiator</li> <li>Blocked condenser</li> <li>Blocked radiator grille</li> <li>Blocked bumper</li> </ul> | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | No blocking  | —  |
|        | 2    | <ul style="list-style-type: none"> <li>Coolant mixture</li> </ul>  | <ul style="list-style-type: none"> <li>Coolant tester</li> </ul>                               | 50 - 50% coolant mixture   | See <a href="#">MA-12, "Recommended Fluids and Lubricants"</a> . |
|        | 3    | <ul style="list-style-type: none"> <li>Coolant level</li> </ul>  | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | Coolant up to MAX level in reservoir tank and radiator filler neck | See <a href="#">MA-26, "Changing Engine Coolant"</a> .           |
|        | 4    | <ul style="list-style-type: none"> <li>Radiator cap</li> </ul>   | <ul style="list-style-type: none"> <li>Pressure tester</li> </ul>                              | 59 - 98 kPa (0.6 - 1.0 kg/cm <sup>2</sup> , 9 - 14 psi) (Limit)    | See <a href="#">CO-23, "CHECKING RADIATOR CAP"</a> .             |
| ON*1   | 5    | <ul style="list-style-type: none"> <li>Coolant leaks</li> </ul>  | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | No leaks   | See <a href="#">CO-23, "CHECKING COOLING SYSTEM FOR LEAKS"</a> . |
| ON*1   | 6    | <ul style="list-style-type: none"> <li>Thermostat</li> </ul>   | <ul style="list-style-type: none"> <li>Touch the upper and lower radiator hoses</li> </ul>     | Both hoses should be hot   | See <a href="#">CO-28, "THERMOSTAT"</a> .                        |
| ON*1   | 7    | <ul style="list-style-type: none"> <li>Cooling fan (crankshaft driven)</li> </ul>  | <ul style="list-style-type: none"> <li>Visual</li> </ul>                                       | Operating  | See <a href="#">CO-32, "Inspection"</a> .                        |
| OFF    | 8    | <ul style="list-style-type: none"> <li>Combustion gas leak</li> </ul>  | <ul style="list-style-type: none"> <li>Color checker chemical tester 4 Gas analyzer</li> </ul> | Negative   | —  |

# DTC P1217 ENGINE OVER TEMPERATURE (OVERHEAT)

[VG33ER]

| 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 <a href="#">MA-26, "Changing Engine Coolant"</a> .               |
| OFF*3  | 10   | ● Coolant return from reservoir tank to radiator | ● Visual                      | Should be initial level in reservoir tank      | See <a href="#">MA-24, "ENGINE MAINTENANCE (VG33E AND VG33ER)"</a> . |
| OFF    | 11   | ● Cylinder head                                  | ● Straight gauge feeler gauge | 0.1 mm (0.004 in) Maximum distortion (warping) | See <a href="#">EM-110, "Inspection"</a> .                           |
|        | 12   | ● Cylinder block and pistons                     | ● Visual                      | No scuffing on cylinder walls or piston        | See <a href="#">EM-133, "Inspection"</a> .                           |

\*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

UBS0064M

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.

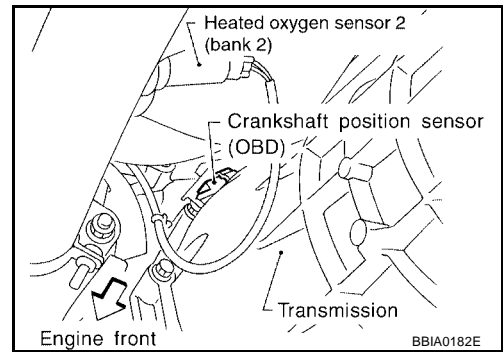
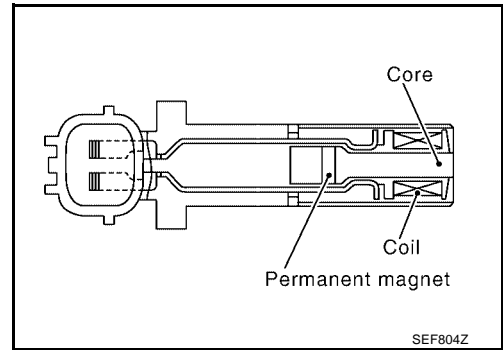
The changing gap causes the magnetic field near the sensor to change.

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

UBS0064O

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors<br/>(The sensor circuit is open or shorted.)</li> <li>● Crankshaft position sensor (OBD)</li> <li>● Drive plate/Flywheel</li> </ul> |

### DTC Confirmation Procedure

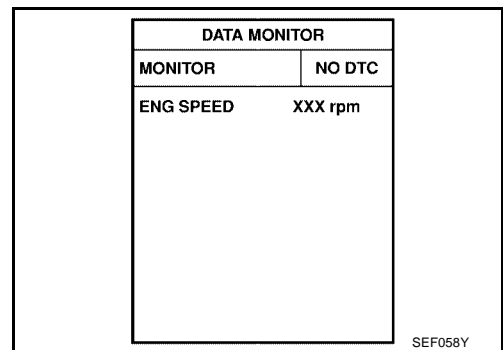
UBS0064P

**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-1643, "Diagnostic Procedure"](#).



**WITH GST**

Follow the procedure "With CONSULT-II".

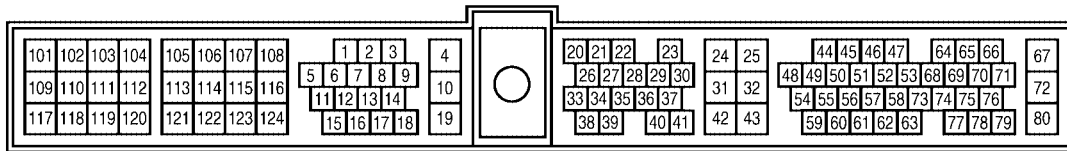
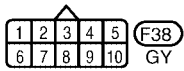
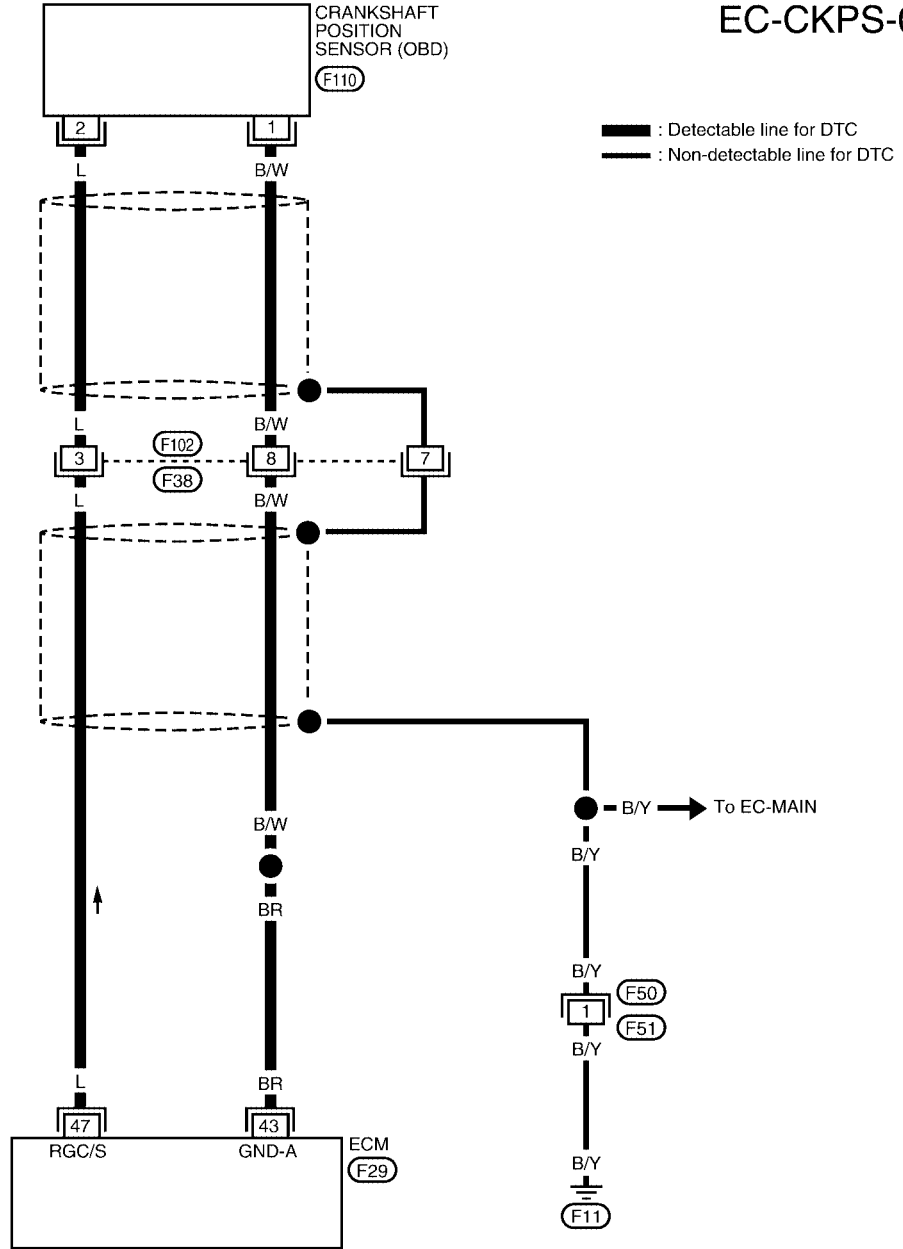
# DTC P1336 CKP SENSOR (OBD)

[VG33ER]

UBS0064Q

## Wiring Diagram

EC-CKPS-01



BBWA0513E

# DTC P1336 CKP SENSOR (OBD)

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use 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 (AC Voltage)             |
|---------------|------------|----------------------------------|--|-------------------------------|
| 47            | L          | Crankshaft position sensor (OBD) | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul> | <p>1 - 2V★<br/>(AC range)</p> |
|               |            |                                  | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Engine speed is 2,000 rpm</li> </ul>               | <p>3 - 4V★<br/>(AC range)</p> |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

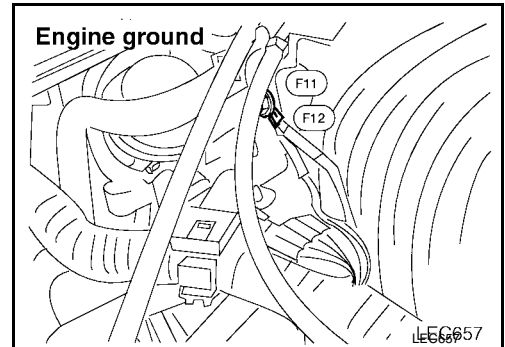
## Diagnostic Procedure

UBS0064R

### 1. RETIGHTEN GROUND SCREWS

1. Turn ignition switch OFF.
2. Loosen and retighten engine ground screws.

>> GO TO 2.



### 2. CHECK CKP SENSOR (OBD) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

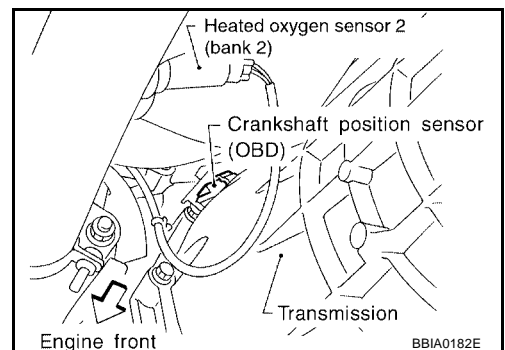
1. Disconnect crankshaft position sensor (OBD) and ECM harness connectors.
2. Check continuity between ECM terminal 47 and CKP sensor (OBD) terminal 2.

**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. Reconnect ECM harness connectors.
2. Check harness continuity between CKP sensor (OBD) terminal 1 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

OK >> GO TO 6.  
NG >> GO TO 5.

---

### 5. DETECT MALFUNCTIONING PART

---

Check the following.

- Harness connectors 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 IMPROPER INSTALLATION

---

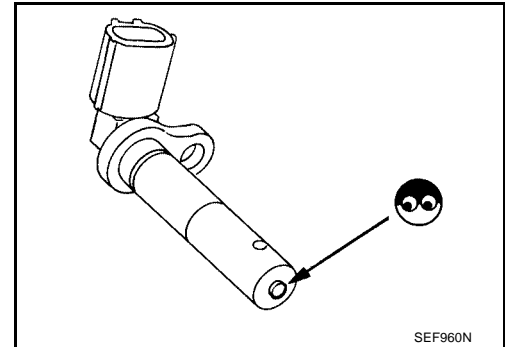
1. Loosen and retighten the fixing bolt of the crankshaft position sensor (OBD).
2. Perform [EC-1641, "DTC Confirmation Procedure"](#) .

Is a 1st trip DTC P1336 detected?

Yes >> GO TO 7.  
No >> **INSPECTION END.**

## 7. 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.

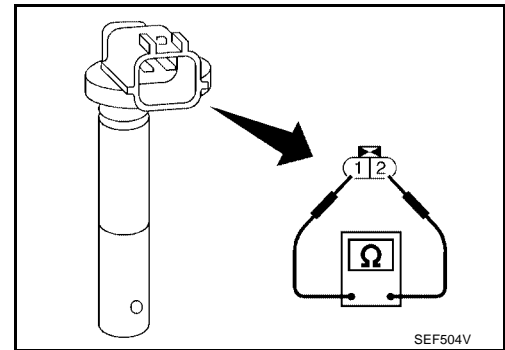


5. Check resistance as shown in the figure.

**Resistance** : Approximately 512 - 632Ω  
[at 20°C (68°F)]

OK or NG

- OK >> GO TO 8.  
NG >> Replace crankshaft position sensor (OBD).



## 8. CHECK GEAR TOOTH

Visually check for chipping flywheel or drive plate gear tooth (cog).

OK or NG

- OK >> GO TO 9.  
NG >> Replace the flywheel or drive plate.

## 9. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## DTC P1442 EVAP CONTROL SYSTEM

PFP:14950

### On Board Diagnosis Logic

UBS006VB

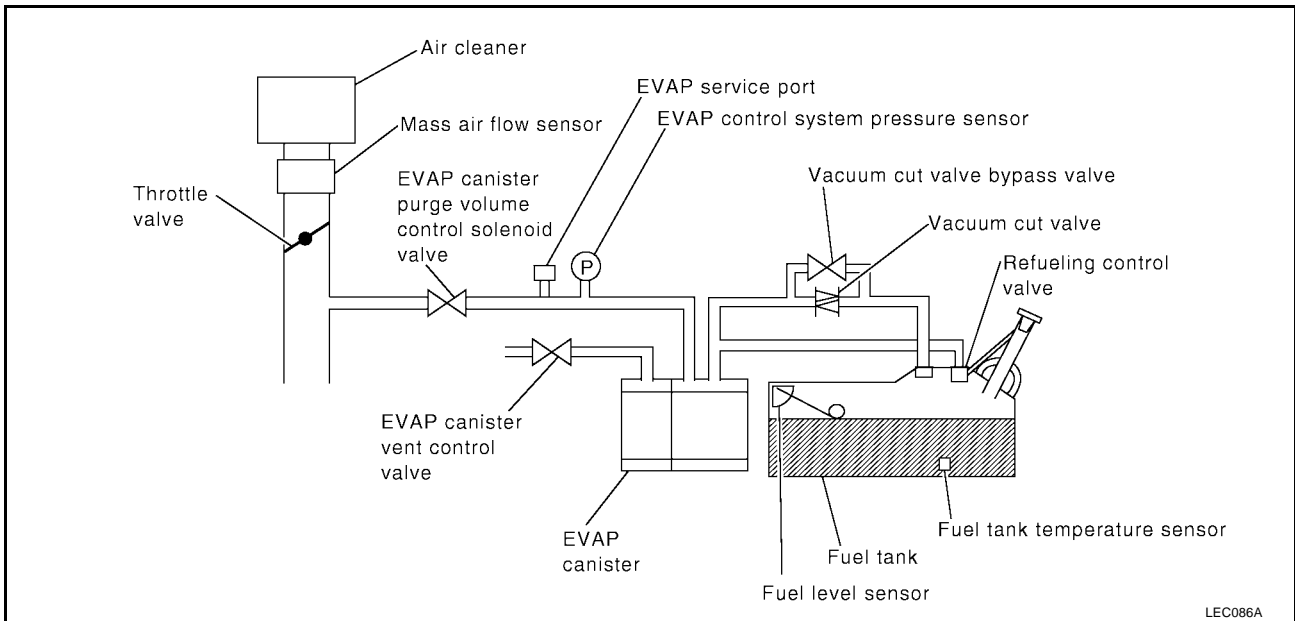
**NOTE:**

If DTC P1442 is displayed with P1448, perform trouble diagnosis for DTC P1448 first. (See [EC-1663](#).)

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 P1442 EVAP CONTROL SYSTEM

[VG33ER]

| 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. | <ul style="list-style-type: none"> <li>● Incorrect fuel tank vacuum relief valve</li> <li>● Incorrect fuel filler cap used</li> <li>● Fuel filler cap remains open or fails to close.</li> <li>● Foreign matter caught in fuel filler cap.</li> <li>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>● Foreign matter caught in EVAP canister vent control valve.</li> <li>● EVAP canister</li> <li>● EVAP purge line (pipe and rubber tube) leaks</li> <li>● EVAP purge line rubber tube bent</li> <li>● Blocked or bent rubber tube to EVAP control system pressure sensor</li> <li>● Loose or disconnected rubber tube</li> <li>● EVAP canister vent control valve and the circuit</li> <li>● EVAP canister purge volume control solenoid valve</li> <li>● Fuel tank temperature sensor</li> <li>● O-ring of EVAP canister vent control valve is missing or damaged.</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water</li> <li>● Fuel level sensor and the circuit</li> <li>● EVAP control system pressure sensor</li> <li>● Refueling control valve</li> <li>● ORVR system leaks</li> <li>● Foreign matter caught in EVAP canister purge volume control solenoid valve</li> </ul> |

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K

**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**

*UBS0064T*

Refer to [EC-1551](#) or [EC-1671](#) .

**Diagnostic Procedure**

*UBS0064U*

Refer to [EC-1551](#) or [EC-1671](#) .

# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VG33ER]

## DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

### Description SYSTEM DESCRIPTION

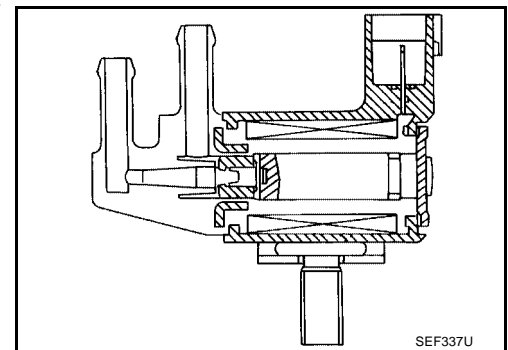
UBS0064V

| 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 sensors 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

UBS0064W

Specification data are reference values.

| MONITOR ITEM | CONDITION   | SPECIFICATION                |
|--------------|---|------------------------------|
| PURG VOL C/V | ● Engine: After warming up<br>● Air conditioner switch OFF<br>● Shift lever: "N"<br>● No-load | Idle (Vehicle stopped)<br>0% |
|              | 2,000 rpm   | —                            |



# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VG33ER]

UBS006YP

## On Board Diagnosis Logic

| 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. | <ul style="list-style-type: none"> <li>● EVAP control system pressure sensor</li> <li>● EVAP canister purge volume control solenoid valve<br/>(The valve is stuck open.)</li> <li>● EVAP canister vent control valve</li> <li>● EVAP canister</li> <li>● Hoses<br/>(Hoses are connected incorrectly or clogged.)</li> </ul> |

## DTC Confirmation Procedure

UBS0064Z

### NOTE:

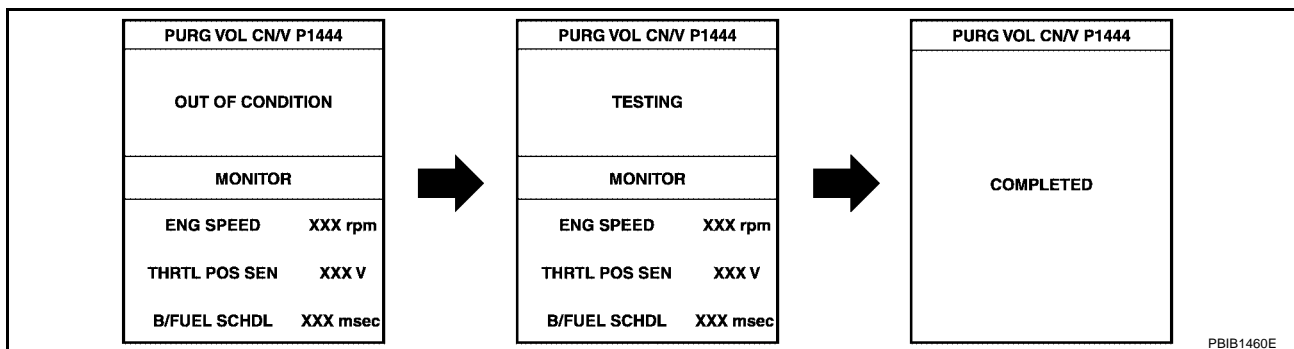
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

### 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-1652, "Diagnostic Procedure"](#).

### WITH GST

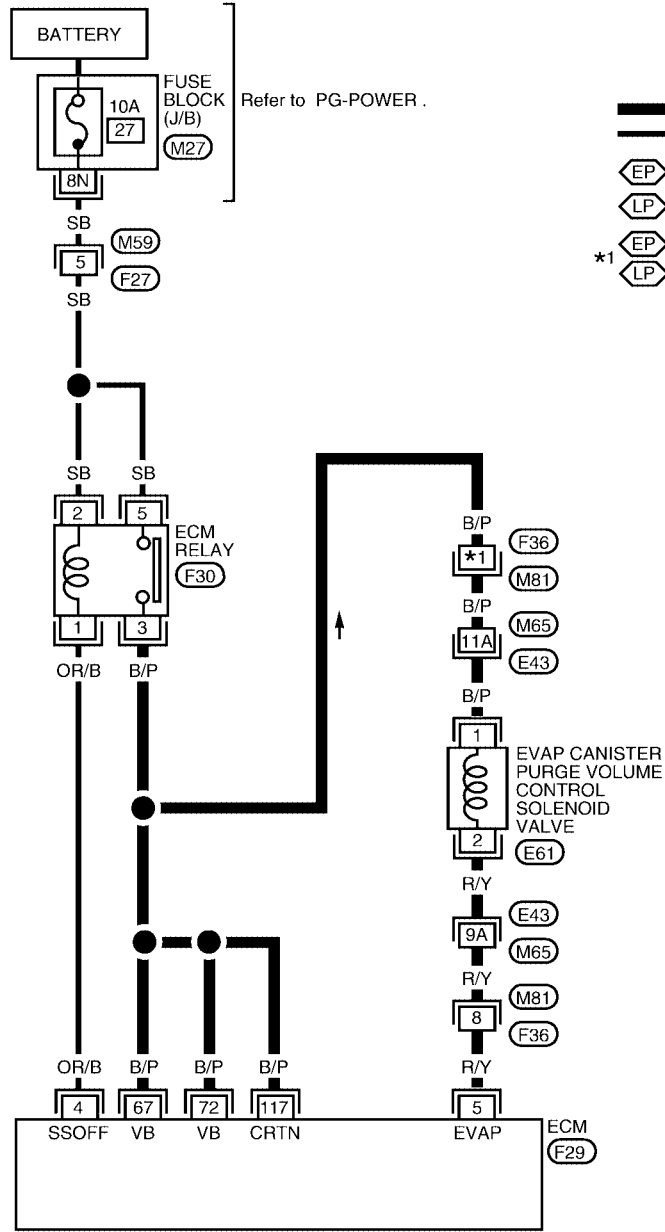
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 5 seconds.
3. Start engine and let it idle for at least 20 seconds.
4. Select “MODE 7” with GST.
5. If 1st trip DTC is detected, go to [EC-1652, "Diagnostic Procedure"](#).

# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VG33ER]

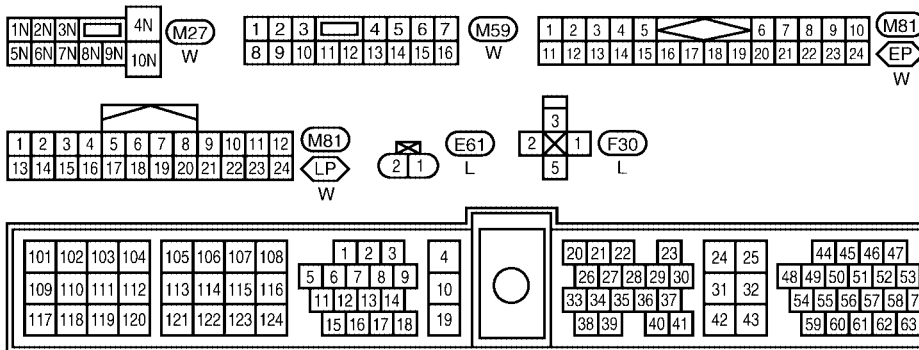
UBS00650

## Wiring Diagram

EC-PGC/V-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- ⬡ EP : EARLY PRODUCTION
- ⬡ LP : LATE PRODUCTION
- \*1 ⬡ EP : 13
- \*1 ⬡ LP : 15



Refer to the following.  
 (E43) - SUPER MULTIPLE JUNCTION (SMJ)



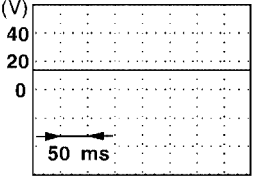
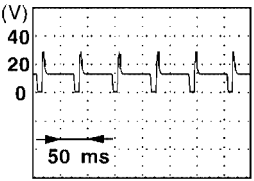
WBWA0030E

# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use 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)   |
|---------------|------------|---|---|---|
| 4             | OR/B       | ECM relay (Self shut-off)                         | <b>[Engine is running]</b><br><b>[Ignition switch OFF]</b><br><ul style="list-style-type: none"> <li>For a few seconds after turning ignition switch OFF</li> </ul> | 0 - 1.5V  |
|               |            |   | <b>[Ignition switch OFF]</b><br><ul style="list-style-type: none"> <li>A few seconds passed after turning ignition switch OFF</li> </ul>                            | BATTERY VOLTAGE (11 - 14V)  |
| 5             | R/Y        | EVAP canister purge volume control solenoid valve | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>Idle speed</li> </ul>  | BATTERY VOLTAGE (11 - 14V)★<br><br><small>SEF994U</small>  |
|               |            |   | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>Engine speed is 2,000 rpm</li> </ul>   | BATTERY VOLTAGE (11 - 14V)★<br><br><small>SEF995U</small> |
| 67            | B/P        | Power supply for ECM                              | <b>[Ignition switch ON]</b>   | BATTERY VOLTAGE (11 - 14V)  |
| 72            | B/P        |   |   |   |
| 117           | B/P        | Current return                                    | <b>[Engine is running]</b><br><ul style="list-style-type: none"> <li>Idle speed</li> </ul>  | BATTERY VOLTAGE (11 - 14V)  |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

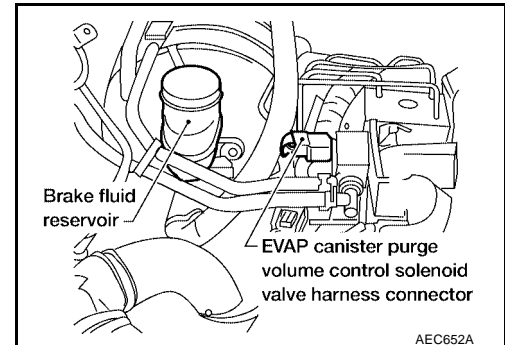
# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VG33ER]

UBS00651

## Diagnostic Procedure

### 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".

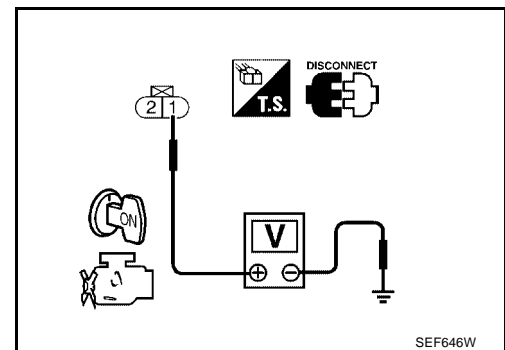


4. Check voltage between terminal 1 and engine ground with CONSULT-II or tester.

**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.

# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VG33ER]

## 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

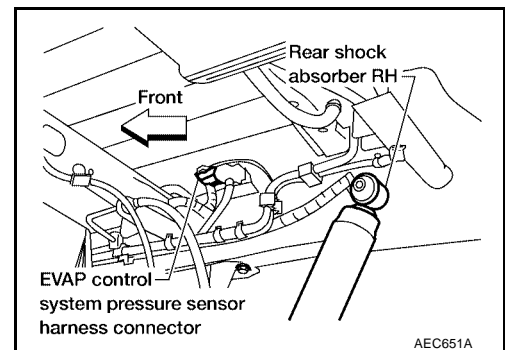
- OK >> GO TO 6.  
 NG >> Repair it.

## 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.

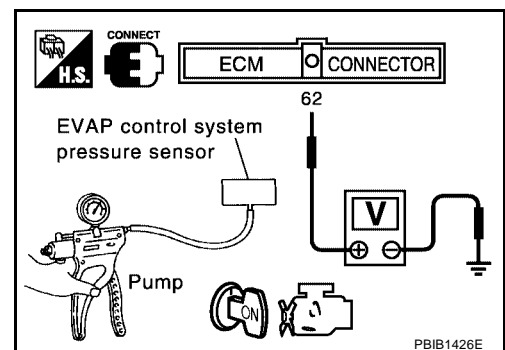
| Applied vacuum                    | Voltage V                          |
|-----------------------------------|------------------------------------|
| Not applied                       | 1.4 - 4.8                          |
| -26.7 kPa (-200 mmHg, -7.87 inHg) | 2.1 to 2.5V lower than above value |

### 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.



# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VG33ER]

## 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

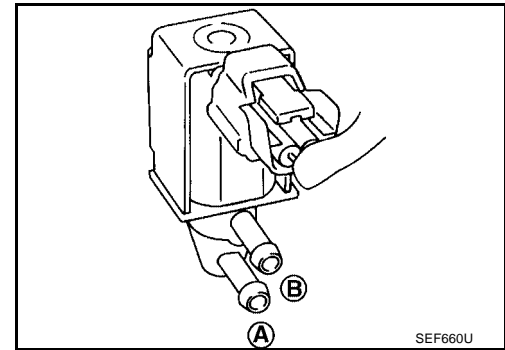
3. Check air passage continuity.

| Condition<br>PURG VOL CONT/V value | Air passage continuity<br>between A and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |

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

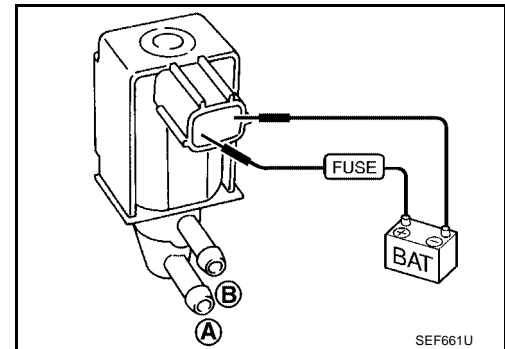
Check air passage continuity.

| Condition   | Air passage continuity<br>between A and B |
|---|---|
| 12V direct current supply between terminals 1 and 2 | Yes                                       |
| No supply   | No  |

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.



# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VG33ER]

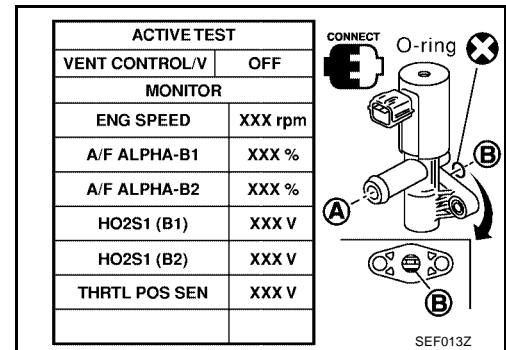
## 10. CHECK EVAP CANISTER VENT CONTROL VALVE

### With CONSULT-II

- Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
- 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

- 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.

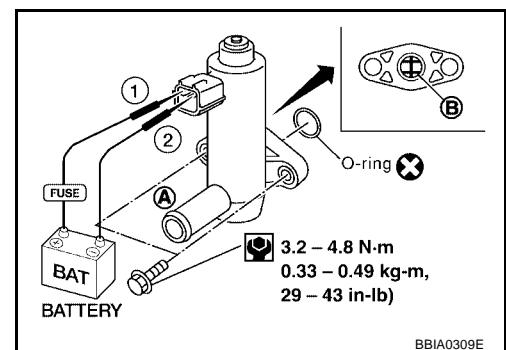
If portion **B** is rusted, replace control valve.

**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

- 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.

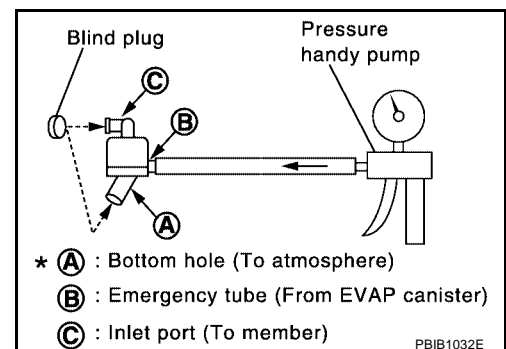
**NOTE:**

- Do not disassemble water separator.

OK or NG

OK >> GO TO 13.

NG >> Replace water separator.



- \* **(A)** : Bottom hole (To atmosphere)
- (B)** : Emergency tube (From EVAP canister)
- (C)** : Inlet port (To member)

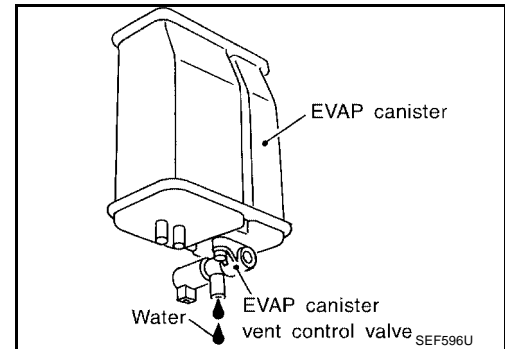
# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE [VG33ER]

## 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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**



## DTC P1446 EVAP CANISTER VENT CONTROL VALVE

PF14935

### Component Description

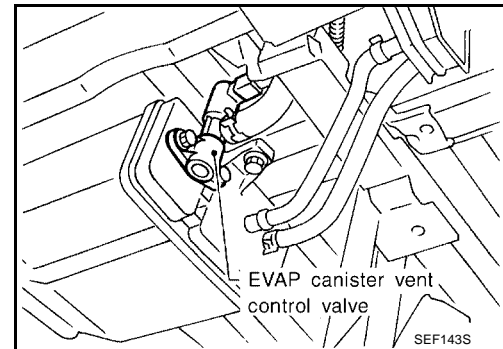
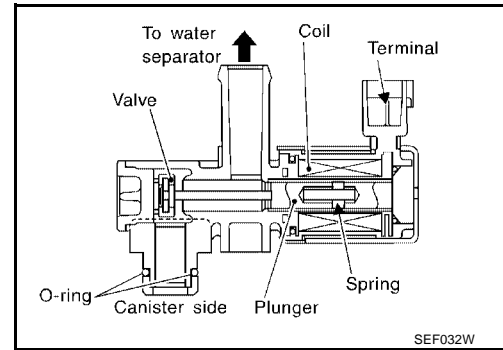
UBS00652

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

UBS00653

Specification data are reference values.

| MONITOR ITEM | CONDITION             | SPECIFICATION |
|--------------|-----------------------|---------------|
| VENT CONT/V  | ● Ignition switch: ON | OFF           |

### On Board Diagnosis Logic

UBS006YR

| 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. | <ul style="list-style-type: none"> <li>● EVAP canister vent control valve</li> <li>● EVAP control system pressure sensor and the circuit</li> <li>● Blocked rubber tube to EVAP canister vent control valve</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water</li> </ul> |

### DTC Confirmation Procedure

UBS006YS

**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.

# DTC P1446 EVAP CANISTER VENT CONTROL VALVE

[VG33ER]

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-1660, "Diagnostic Procedure"](#).

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| COOLAN TEMP/S | XXX °C   |
| VHCL SPEED SE | XXX km/h |
| THRTL POS SEN | XXX V    |
| B/FUEL SCHDL  | XXX msec |

SEF201Y



**WITH GST**

Follow the procedure "With CONSULT-II".

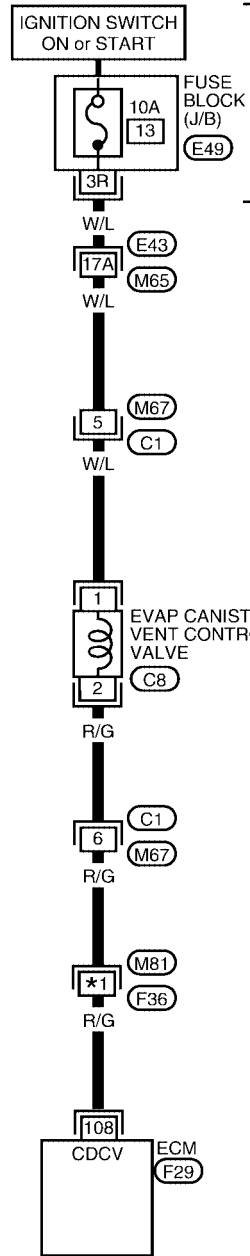
# DTC P1446 EVAP CANISTER VENT CONTROL VALVE

[VG33ER]

UBS006YT

## Wiring Diagram

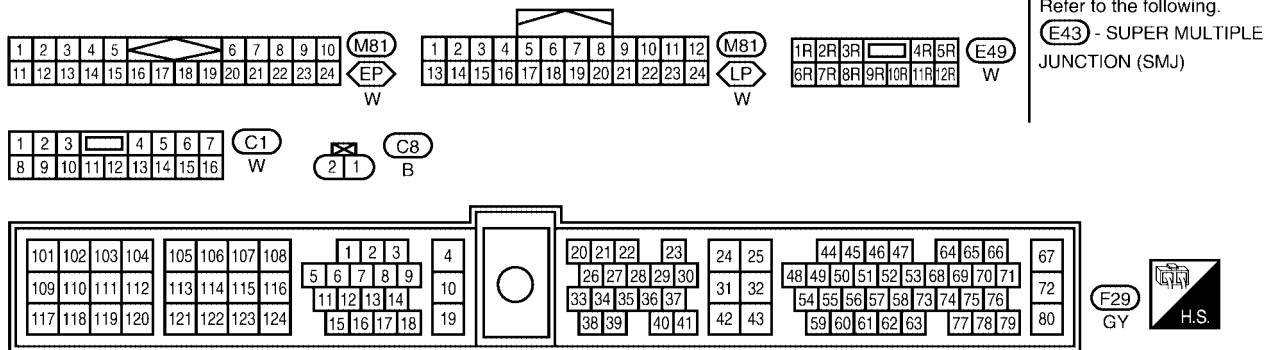
EC-VENT/V-01



Refer to PG-POWER .

- : Detectable line for DTC
- : Non-detectable line for DTC
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 21
- \*1 : 23

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



WBWA0060E

# DTC P1446 EVAP CANISTER VENT CONTROL VALVE

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use 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 COLO R | ITEM                             | CONDITION            | DATA (DC Voltage)          |
|---------------|-------------|----------------------------------|----------------------|----------------------------|
| 108           | R/G         | EVAP canister vent control valve | [Ignition switch ON] | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

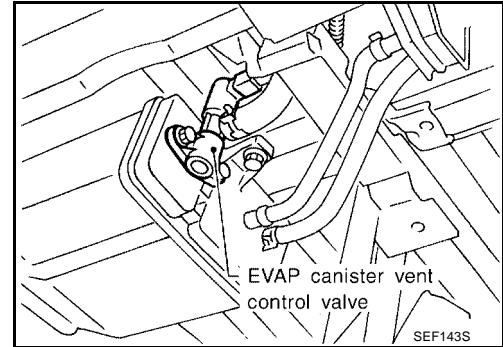
UBS006YU

### 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

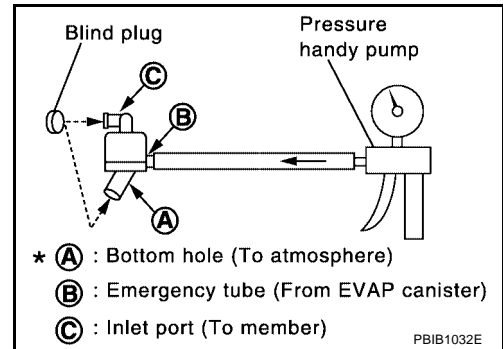
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

**NOTE:**

- Do not disassemble water separator.

OK or NG

- OK >> GO TO 3.
- NG >> Replace water separator.



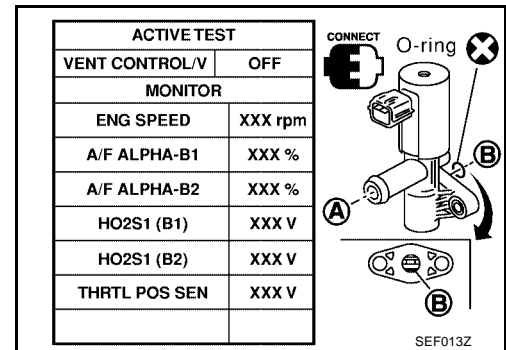
## 3. CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

### 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.

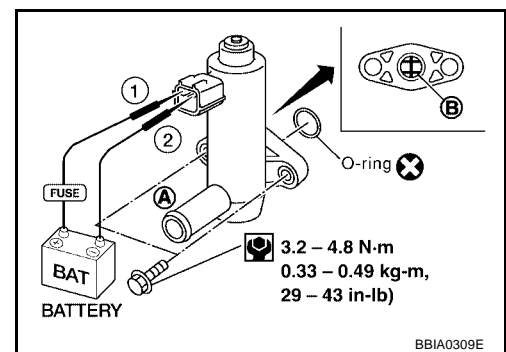
If portion **B** is rusted, replace control valve.

**Make sure new O-ring is installed properly.**

OK or NG

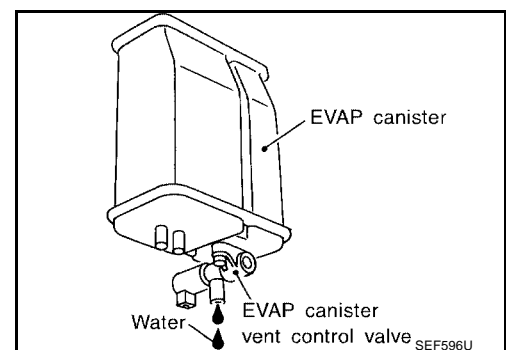
OK >> GO TO 4.

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

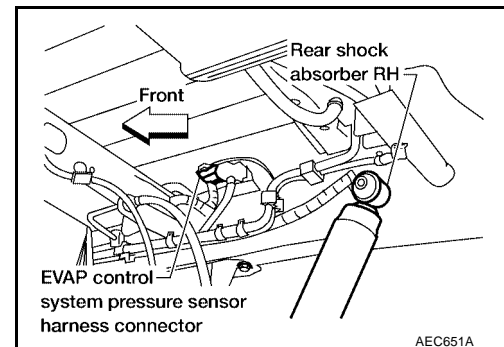
- OK >> GO TO 8.
- NG >> Repair it.

## 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-1528](#) or P0453 [EC-1534](#) .

OK or NG

- OK >> GO TO 10.
- NG >> Replace EVAP control system pressure sensor.

## 10. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

## DTC P1448 EVAP CANISTER VENT CONTROL VALVE

PF0:14935

### Component Description

UBS00659

**NOTE:**

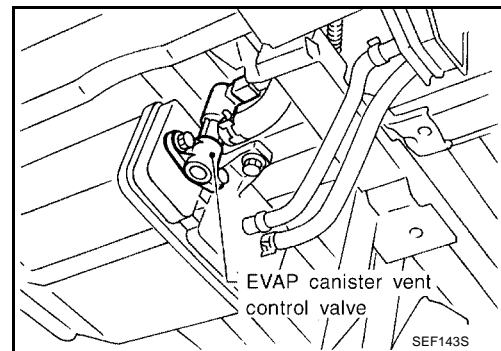
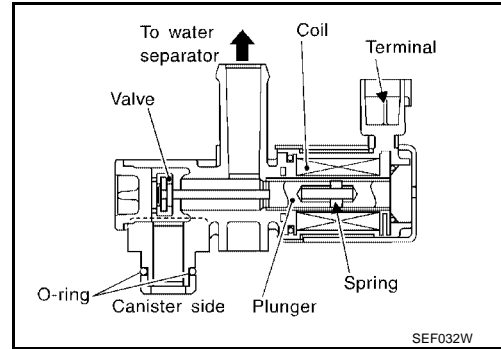
If DTC P1448 is displayed with P0442, perform trouble diagnosis for DTC P1448 first.

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

UBS0065A

Specification data are reference values.

| MONITOR ITEM | CONDITION             | SPECIFICATION |
|--------------|-----------------------|---------------|
| VENT CONT/V  | ● Ignition switch: ON | OFF           |

### On Board Diagnosis Logic

UBS006YV

| 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. | <ul style="list-style-type: none"> <li>● EVAP canister vent control valve</li> <li>● EVAP control system pressure sensor and the circuit</li> <li>● Blocked rubber tube to EVAP canister vent control valve</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water</li> <li>● Vacuum cut valve</li> </ul> |

### DTC Confirmation Procedure

UBS006YW

**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.

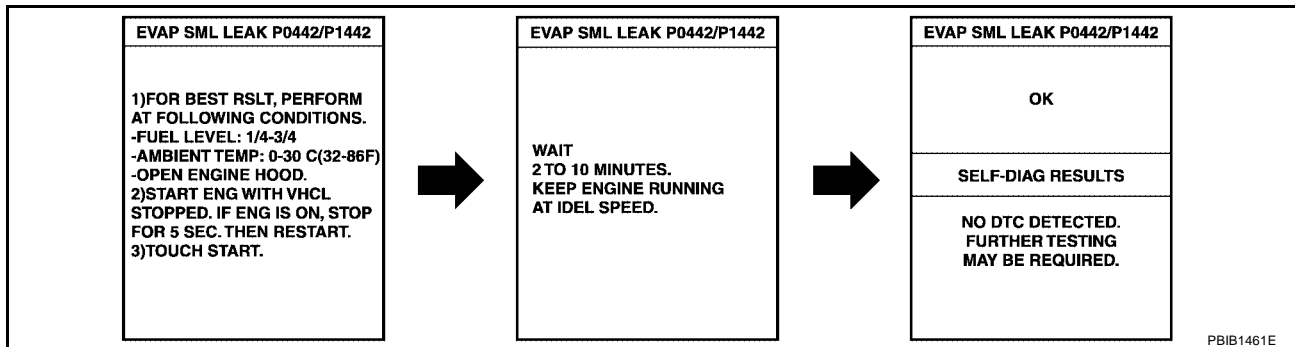
# DTC P1448 EVAP CANISTER VENT CONTROL VALVE

[VG33ER]

- 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" 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-1251, "Basic Inspection"](#).

6. Make sure that "OK" is displayed.  
If "NG" is displayed, go to the following step.

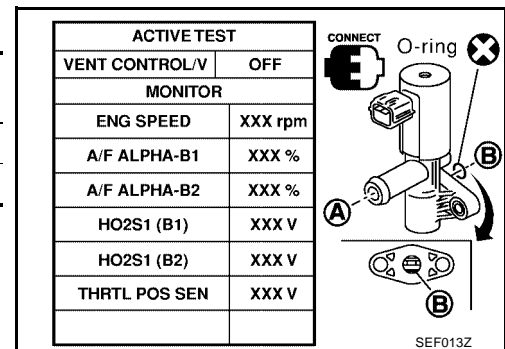
**NOTE:**

**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<br>VENT CONTROL/V | Air passage continuity between A and B |
|-----------------------------|--|
| ON                          | No                                     |
| OFF                         | Yes                                    |

If the result is NG, go to [EC-1667, "Diagnostic Procedure"](#).  
If the result is OK, go to [EC-1506, "Diagnostic Procedure"](#).



## Overall Function Check

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.



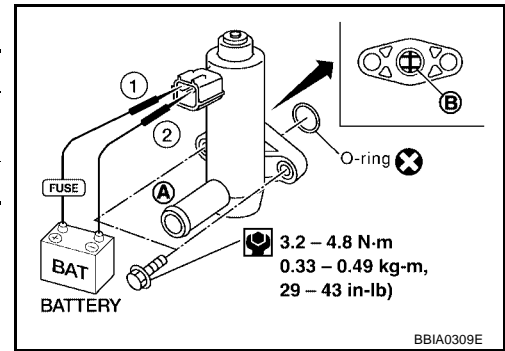
# DTC P1448 EVAP CANISTER VENT CONTROL VALVE

[VG33ER]

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-1667, "Diagnostic Procedure"](#) .  
 If the result is OK, go to [EC-1506, "Diagnostic Procedure"](#) .



A  
 EC  
 C  
 D  
 E  
 F  
 G  
 H  
 I  
 J  
 K  
 L  
 M

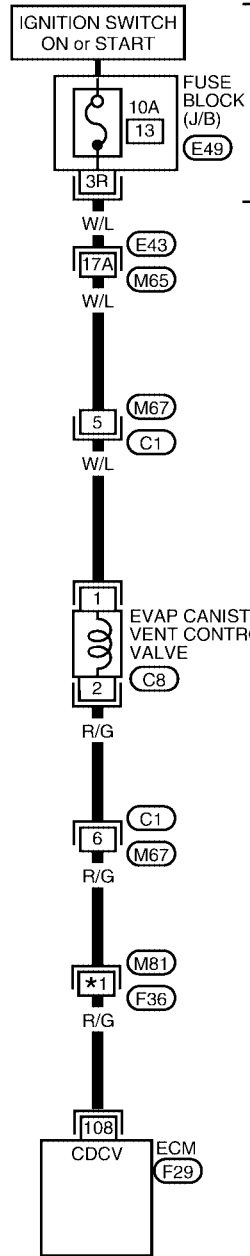
# DTC P1448 EVAP CANISTER VENT CONTROL VALVE

[VG33ER]

UBS006YY

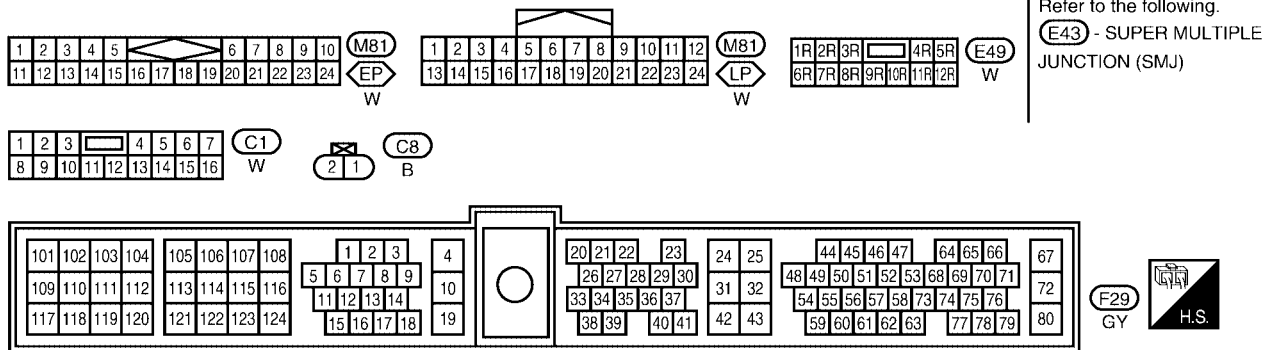
## Wiring Diagram

EC-VENT/V-01



Refer to PG-POWER .

- : Detectable line for DTC
- : Non-detectable line for DTC
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 21
- \*1 : 23



Refer to the following.  
 - SUPER MULTIPLE JUNCTION (SMJ)

# DTC P1448 EVAP CANISTER VENT CONTROL VALVE

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use 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 COLO R | ITEM                             | CONDITION            | DATA (DC Voltage)          |
|---------------|-------------|----------------------------------|----------------------|----------------------------|
| 108           | R/G         | EVAP canister vent control valve | [Ignition switch ON] | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

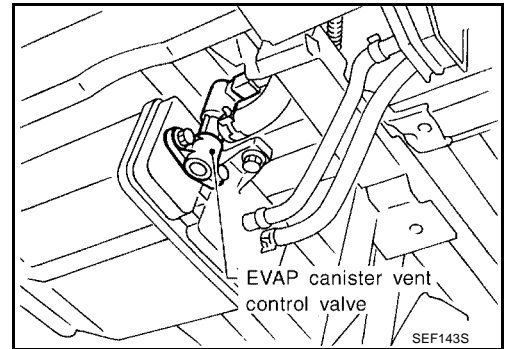
UBS006YZ

### 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

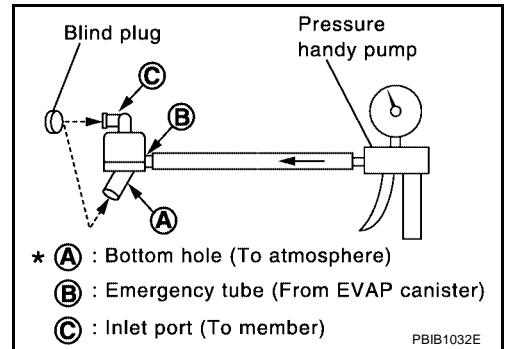
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

**NOTE:**

- Do not disassemble water separator.

OK or NG

- OK >> GO TO 3.
- NG >> Replace water separator.



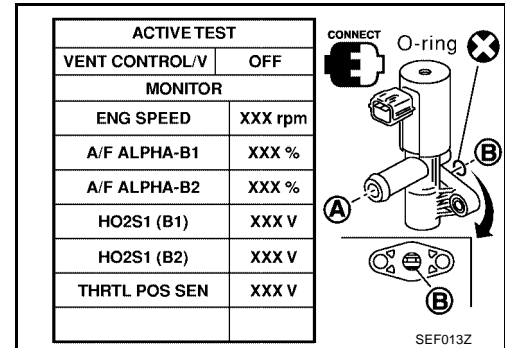
## 3. CHECK EVAP CANISTER VENT CONTROL VALVE AND O-RING

### 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.

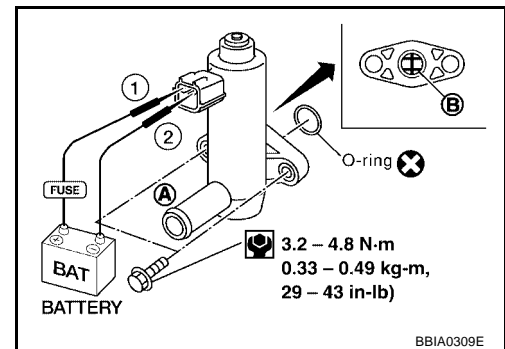


### Without CONSULT-II

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.

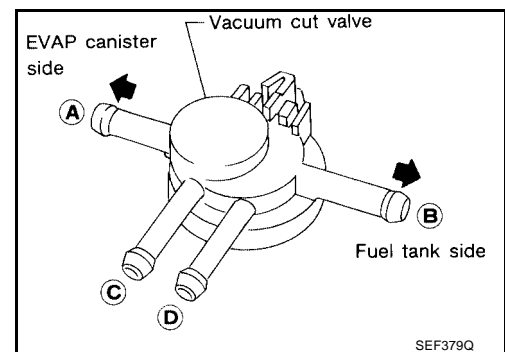
## 4. CHECK VACUUM CUT VALVE

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.

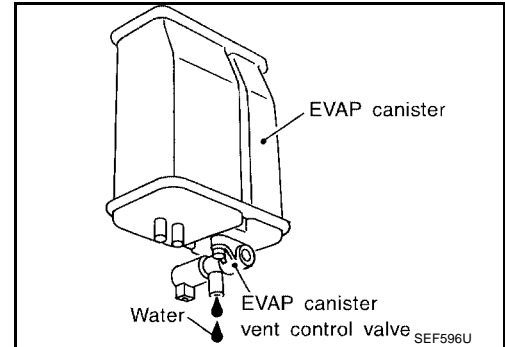


## 5. CHECK IF EVAP CANISTER SATURATED WITH WATER

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

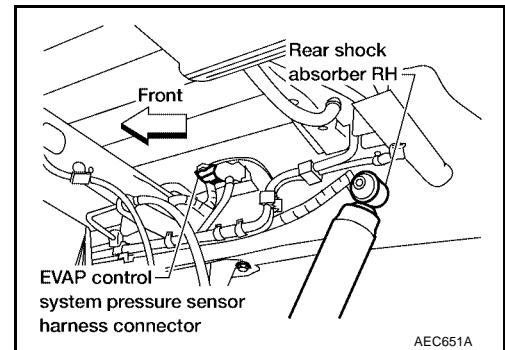
- OK >> GO TO 9.
- NG >> Repair it.

## 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 Confirmation procedure” for DTC P0452 [EC-1528](#) or DTC P0453 [EC-1534](#) .

OK or NG

- OK >> GO TO 11.
- NG >> Replace EVAP control system pressure sensor.

---

**11. CHECK INTERMITTENT INCIDENT**

---

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

DTC P1456 EVAP CONTROL SYSTEM

PFP:14710

On Board Diagnosis Logic

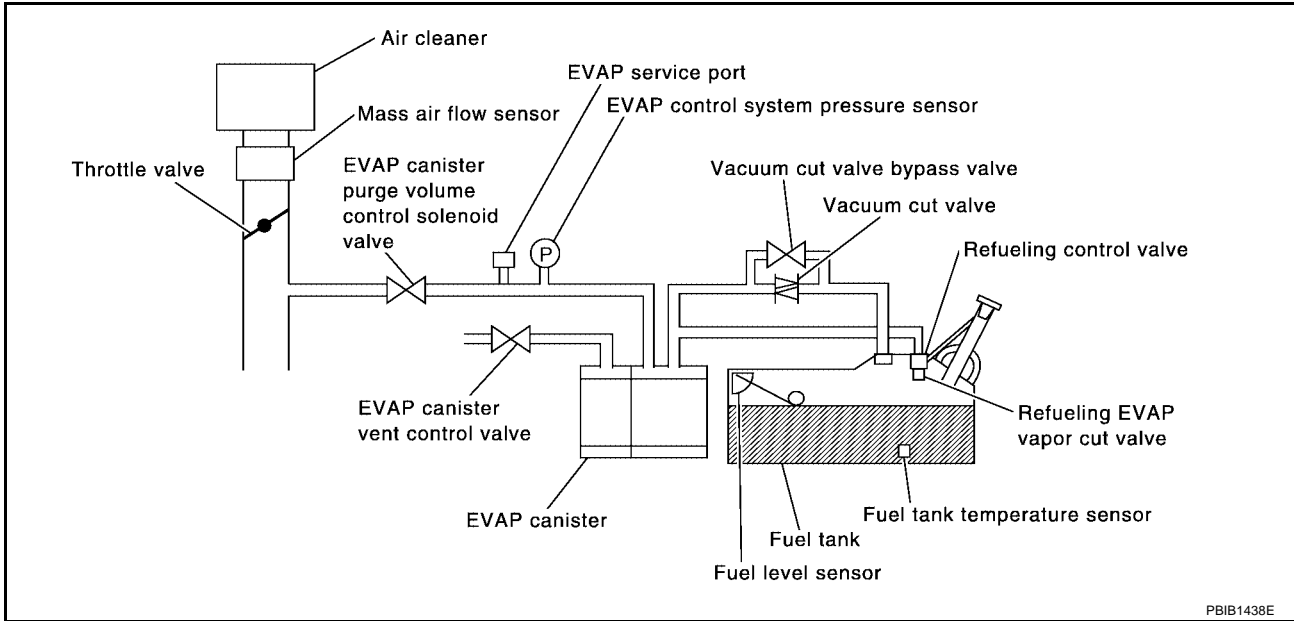
UBS006VC

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.



PBIB1438E

| DTC No. | Trouble diagnosis name  | DTC detecting condition  | Possible cause  |
|---------|---|--|---|
| P1456   | Evaporative emission control system very small leak (positive pressure check) | <ul style="list-style-type: none"> <li>● EVAP system has a very small leak.</li> <li>● EVAP system does not operate properly.</li> </ul> | <ul style="list-style-type: none"> <li>● Incorrect fuel tank vacuum relief valve</li> <li>● Incorrect fuel filler cap used</li> <li>● Fuel filler cap remains open or fails to close.</li> <li>● Foreign matter caught in fuel filler cap.</li> <li>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.</li> <li>● Foreign matter caught in EVAP canister vent control valve.</li> <li>● EVAP canister or fuel tank leaks</li> <li>● EVAP purge line (pipe and rubber tube) leaks</li> <li>● EVAP purge line rubber tube bent</li> <li>● Blocked or bent rubber tube to EVAP control system pressure sensor</li> <li>● Loose or disconnected rubber tube</li> <li>● EVAP canister vent control valve and the circuit</li> <li>● EVAP canister purge volume control solenoid valve</li> <li>● Fuel tank temperature sensor</li> <li>● O-ring of EVAP canister vent control valve is missing or damaged</li> <li>● Water separator</li> <li>● EVAP canister is saturated with water</li> <li>● Fuel level sensor and the circuit</li> <li>● EVAP control system pressure sensor</li> <li>● Refueling control valve</li> <li>● ORVR system leaks</li> </ul> |

**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

UBS006SE

**CAUTION:**

Never remove fuel filler cap during the DTC confirmation procedure.

**NOTE:**

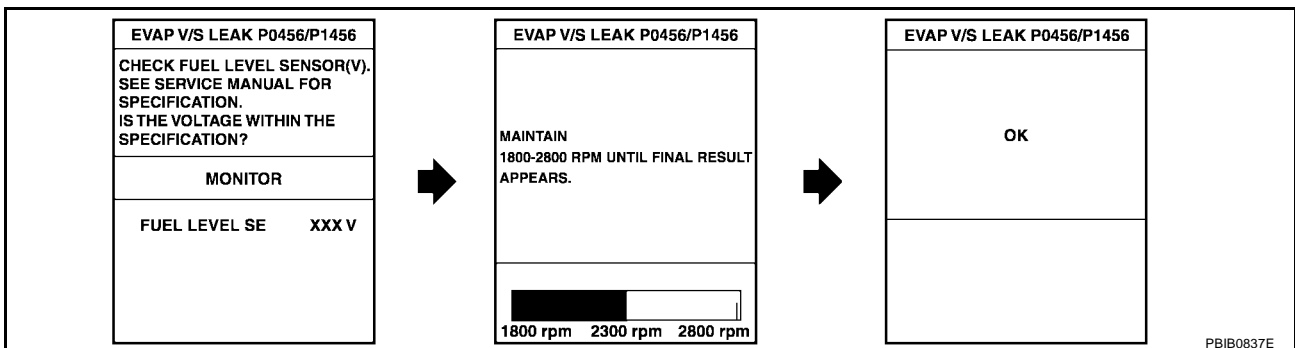
- If DTC P0456 or P1456 is displayed with P0442 or P1442, perform TROUBLE DIAGNOSIS FOR DTC P0456 or P1456 first.
- After repair, make sure that the hoses and clips are installed properly.
- If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch "OFF" and wait at least 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-1673, "Diagnostic Procedure"](#) .

**NOTE:**

- If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to [EC-1251, "Basic Inspection"](#) .



- Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

### Overall Function Check

UBS006SF

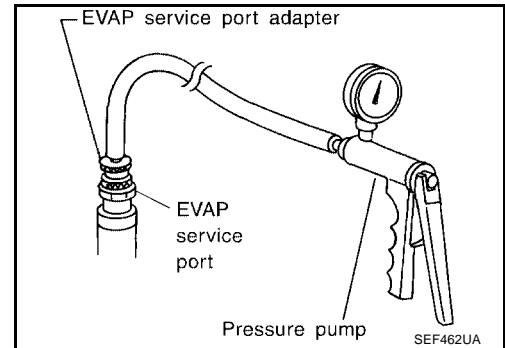
#### WITH GST

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<sup>2</sup> , 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-1673, "Diagnostic Procedure"](#) .

#### NOTE:

For more information, refer to GST instruction manual.

### Diagnostic Procedure

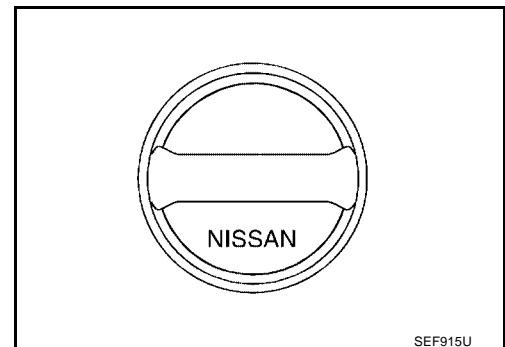
UBS006SG

#### 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

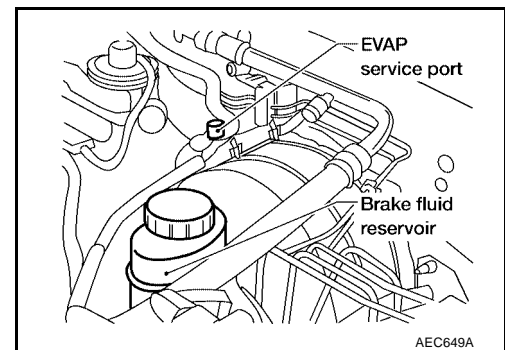
Refer to [EC-1747, "FUEL TANK VACUUM RELIEF VALVE \(BUILT INTO FUEL FULLER CAP\)"](#)

OK or NG

- OK >> GO TO 5.
- NG >> Replace fuel filler cap with a genuine one.

### 5. INSTALL THE PRESSURE PUMP

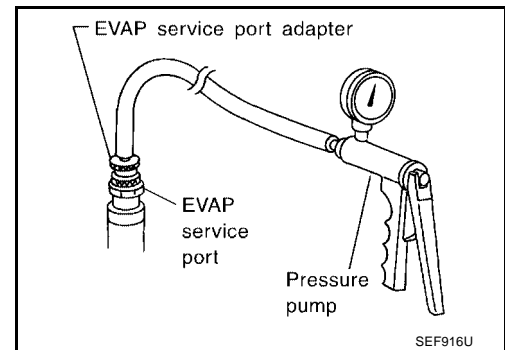
To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.



**NOTE:**

Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

- Models with CONSULT-II>>GO TO 6.
- Models without CONSULT-II>>GO TO 7.



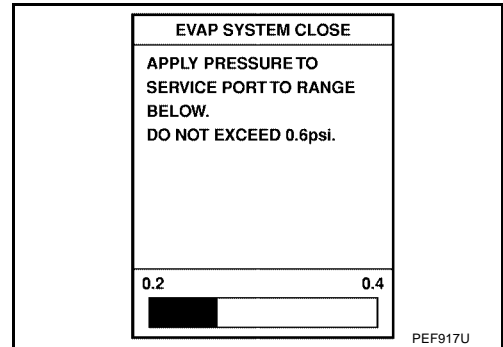
6. CHECK FOR EVAP LEAK

 With CONSULT-II

1. Turn ignition switch "ON".
2. Select "EVAP SYSTEM CLOSE" of "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START" and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

**NOTE:**

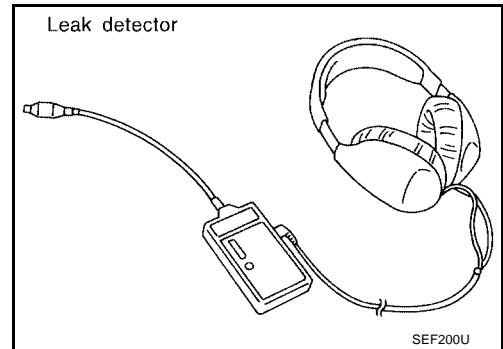
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-1745, "EVAPORATIVE EMISSION LINE DRAWING"](#).

OK or NG

- OK >> GO TO 8.
- NG >> Repair or replace.



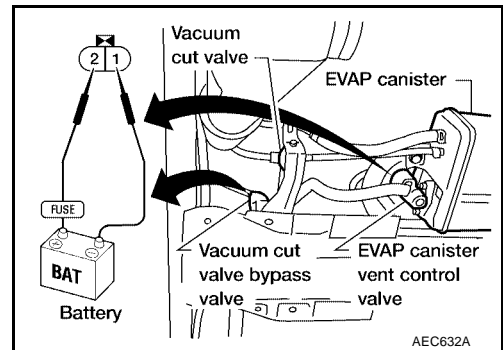
7. CHECK FOR EVAP LEAK

 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:**

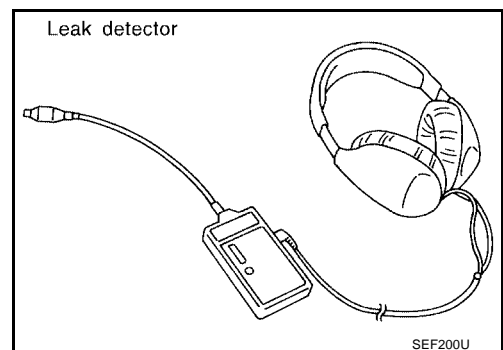
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup> , 0.6 psi) of pressure in the system.



5. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to [EC-1745, "EVAPORATIVE EMISSION LINE DRAWING"](#).

OK or NG

- OK >> GO TO 8.
- NG >> Repair or replace.



## 8. CHECK WATER SEPARATOR

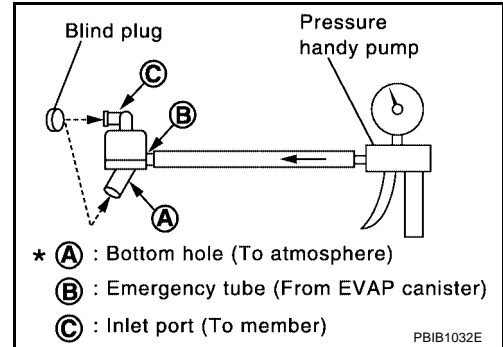
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG 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-1663, "DTC Confirmation Procedure"](#).

OK or NG

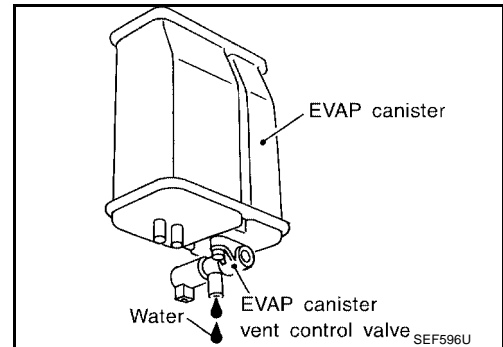
- OK >> GO TO 10.  
 NG >> Repair or replace EVAP canister vent control valve and O-ring or harness/connector.

## 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 100.0%.
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.

| 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

**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-1204, "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.

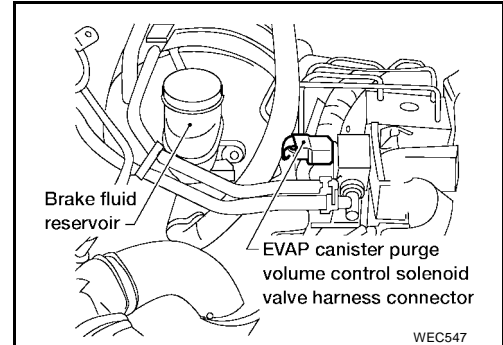
| ACTIVE TEST     |         |
|-----------------|---------|
| PURG VOL CONT/V | 0.0%    |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| A/F ALPHA-B2    | XXX %   |
| HO2S1 MNTR (B1) | RICH    |
| HO2S1 MNTR (B2) | RICH    |
| THRTL POS SEN   | XXX V   |
|                 |         |

SEF985Y

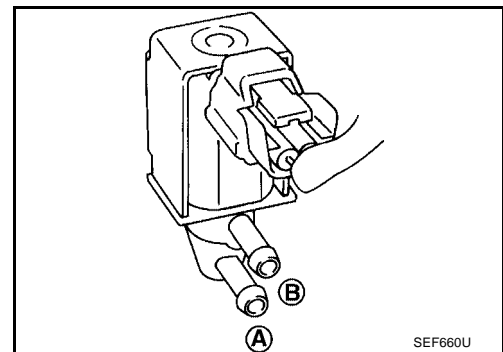
## 17. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

### With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

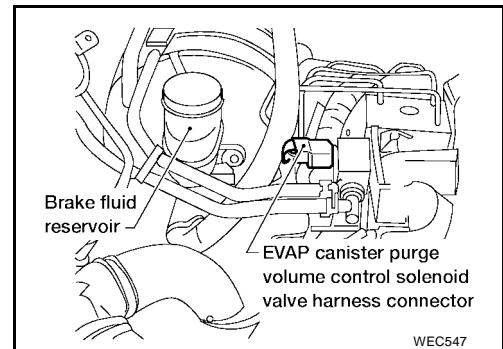


| Condition<br>PURG VOL CONT/V value | Air passage continuity between<br>A and B |
|------------------------------------|---|
| 100.0 %                            | Yes                                       |
| 0.0%                               | No  |

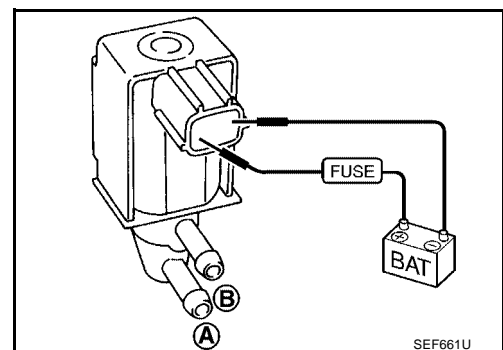


### Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



| Condition  | Air passage continuity between<br>A and B |
|--|---|
| 12V direct current supply between terminals<br>1 and 2 | Yes                                       |
| No supply  | No  |



### OK or NG

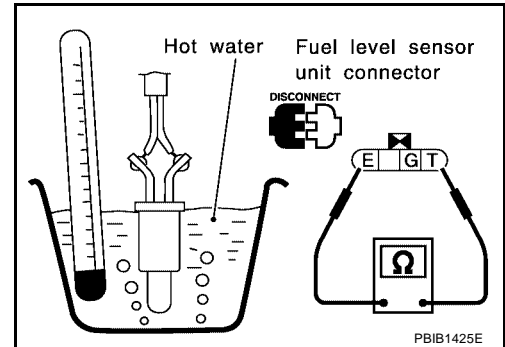
OK >> GO TO 18.

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.

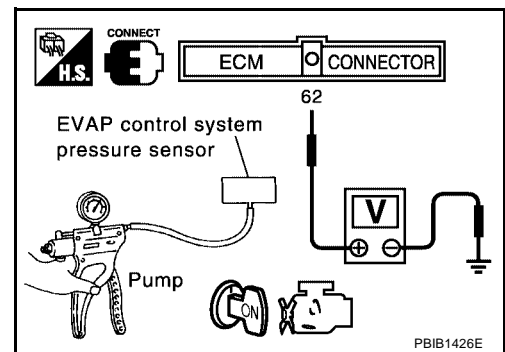
**19. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR**

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-1745, "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 FUEL LEVEL SENSOR**

---

Refer to [DI-18, "FUEL LEVEL SENSOR UNIT CHECK"](#) .

OK or NG

OK >> GO TO 23.

NG >> Replace fuel level sensor unit.

---

**23. CHECK INTERMITTENT INCIDENT**

---

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**



DTC P1464 FUEL LEVEL SENSOR

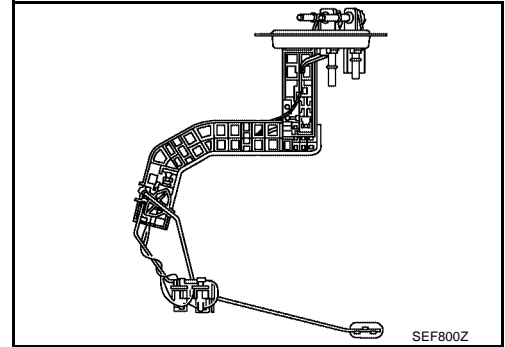
PFP:25060

Component Description

UBS0065H

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the ECM.

It consists of two parts, one is mechanical float and the other side is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



SEF800Z

UBS006Z0

On Board Diagnosis Logic

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. | <ul style="list-style-type: none"> <li>Harness or connectors (The sensor circuit is open or shorted)</li> </ul> |

DTC Confirmation Procedure

UBS006Z1

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

- Turn ignition switch "ON".
- Select "DATA MONITOR" mode with CONSULT-II.
- Wait at least 5 seconds.
- If 1st trip DTC is detected, go to [EC-1683, "Diagnostic Procedure"](#).

| DATA MONITOR  |        |
|---------------|--------|
| MONITOR       | NO DTC |
| FUEL T/TMP SE | XXX °C |
| FUEL LEVEL SE | XXX V  |

SEF195Y

WITH GST

Follow the procedure "WITH CONSULT-II" above.

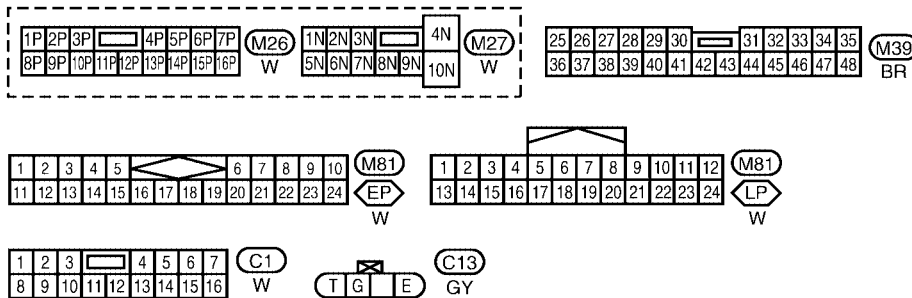
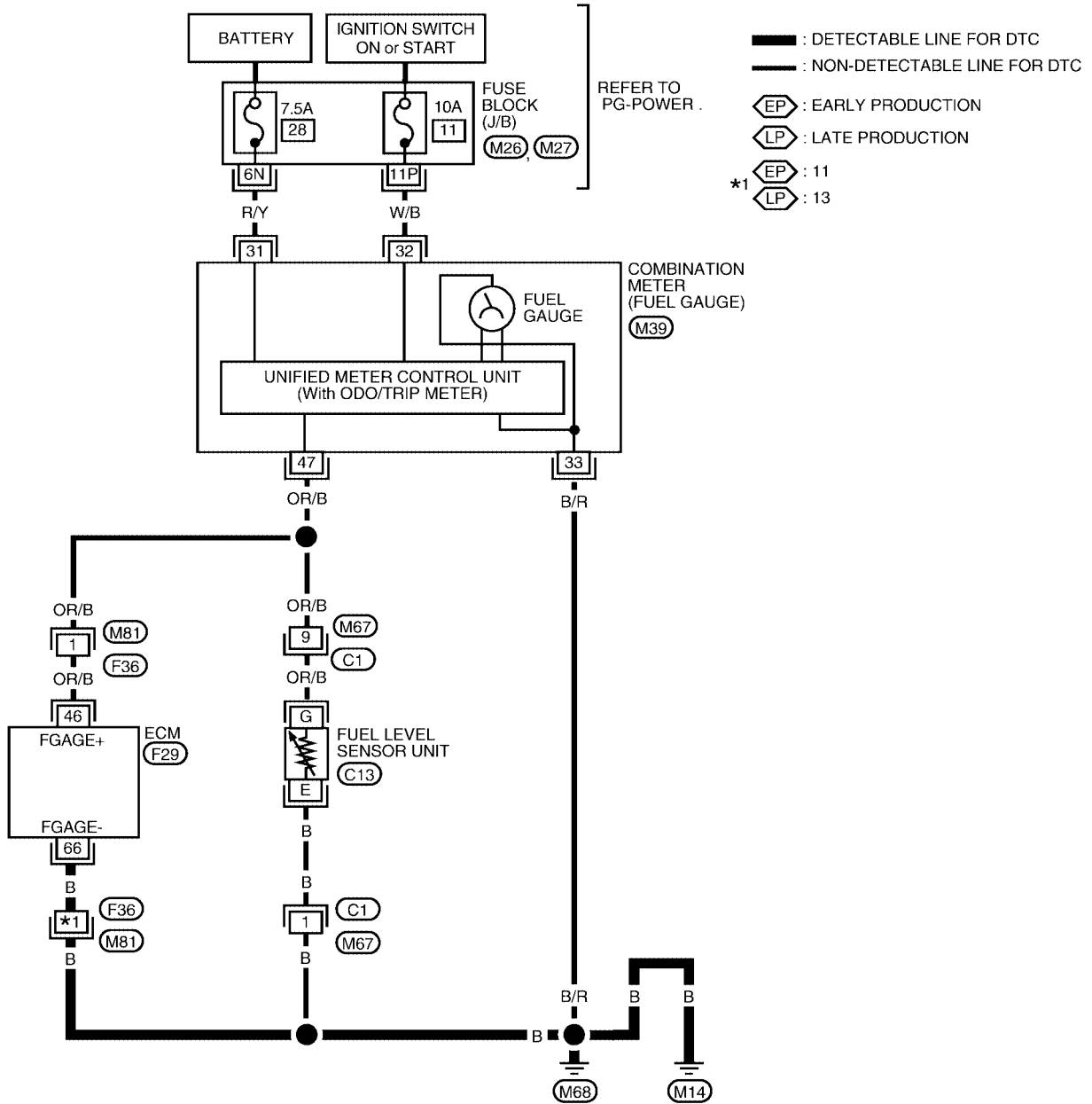
# DTC P1464 FUEL LEVEL SENSOR

[VG33ER]

UBS006Z2

## Wiring Diagram

EC-FLS3-01



Refer to the following.  
 (F29) - ELECTRICAL UNITS

WBWA0064E

# DTC P1464 FUEL LEVEL SENSOR

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

## CAUTION:

Do not use ECM ground terminals when measuring input/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)  |
|---------------|------------|--------------------------|-------------------------------------|--|
| 46            | G          | Fuel level sensor        | [Ignition switch ON]                | Approximately 0 - 4.8V<br>Output voltage varies with fuel level. |
| 66            | B          | Fuel level sensor ground | [Engine is running]<br>● Idle speed | Approximately 0V   |

## Diagnostic Procedure

UBS006Z3

### 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 body 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 body 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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## Removal and Installation FUEL LEVEL SENSOR

UBS0070T

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

## DTC P1490 VACUUM CUT VALVE BYPASS VALVE

PFP:17372

### Description

UBS0065N

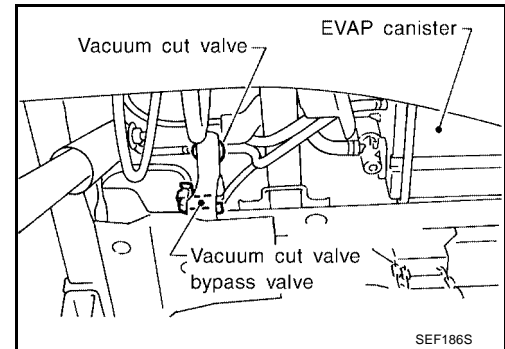
#### COMPONENT DESCRIPTION

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.

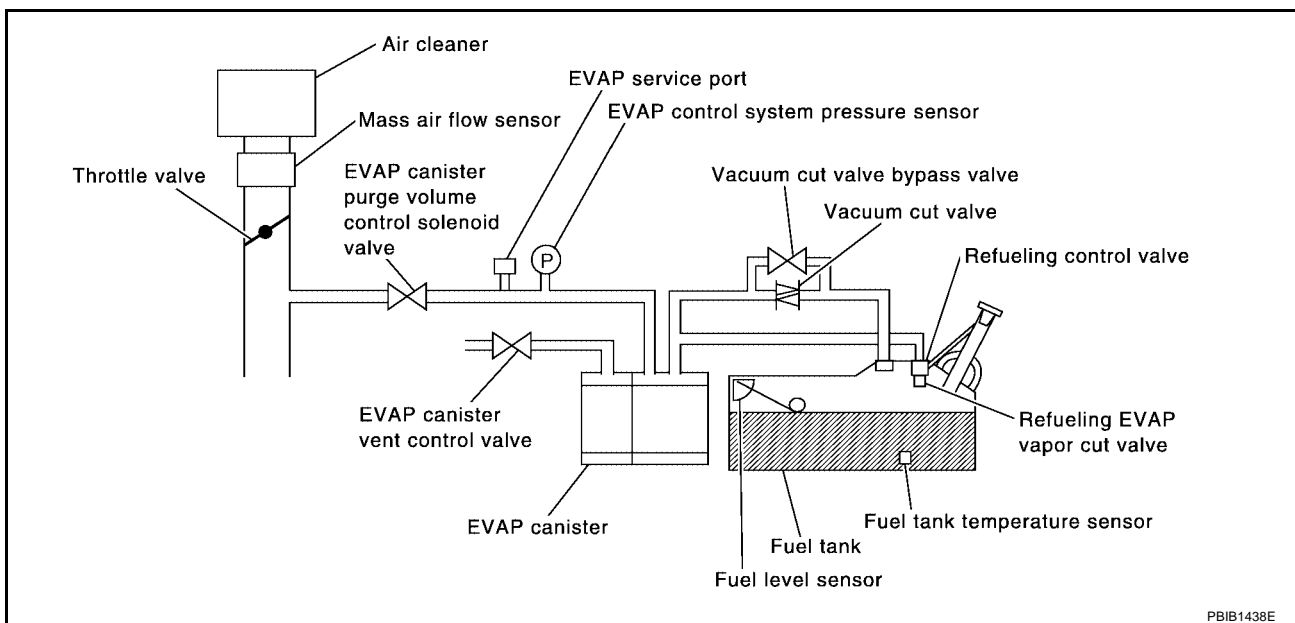
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

UBS0065O

Specification data are reference values.

| MONITOR ITEM  | CONDITION             | SPECIFICATION |
|---------------|-----------------------|---------------|
| VC/V BYPASS/V | ● Ignition switch: ON | OFF           |

#### On Board Diagnosis Logic

UBS006Z4

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors (The vacuum cut valve bypass valve circuit is open or shorted)</li> <li>● Vacuum cut valve bypass valve</li> </ul> |

#### DTC Confirmation Procedure

UBS006Z5

##### 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-1687, "Diagnostic Procedure"](#) .

| DATA MONITOR |         |
|--------------|---------|
| MONITOR      | NO DTC  |
| ENG SPEED    | XXX rpm |

SEF058Y

**WITH GST**

Follow the procedure "With CONSULT-II".

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

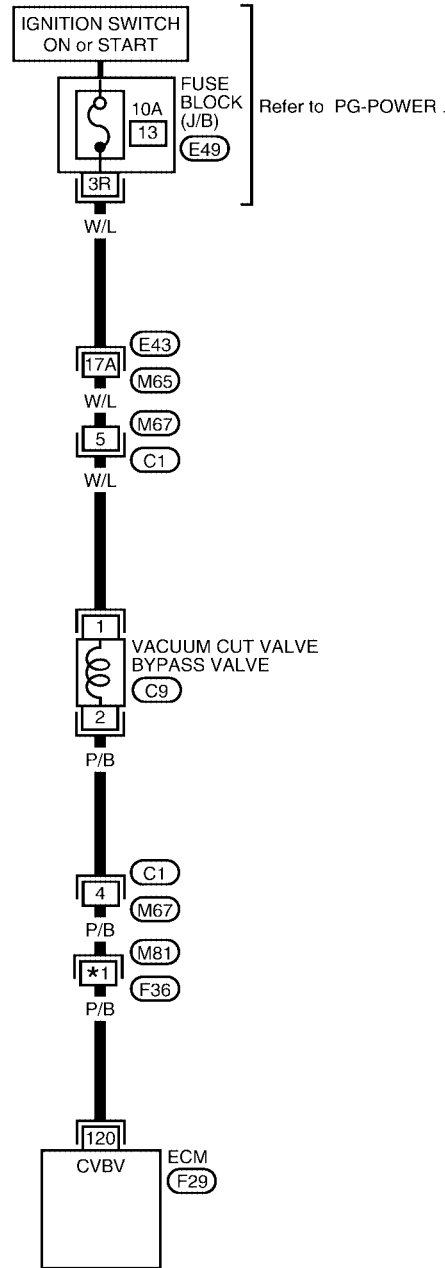
# DTC P1490 VACUUM CUT VALVE BYPASS VALVE

[VG33ER]

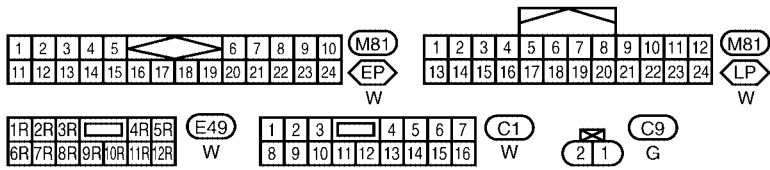
UBS006Z6

## Wiring Diagram

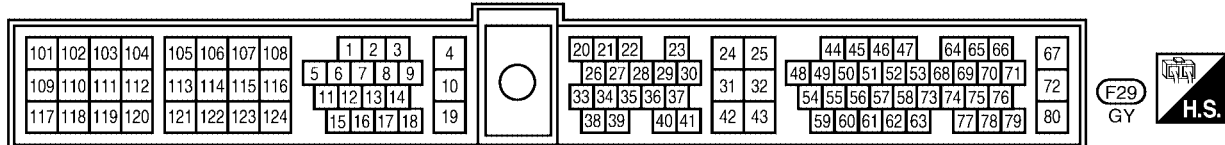
### EC-BYPS/V-01



- : Detectable line for DTC
- : Non-detectable line for DTC
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 15
- : 17



Refer to the following.  
 - SUPER MULTIPLE JUNCTION (SMJ)



WBWA0065E

# DTC P1490 VACUUM CUT VALVE BYPASS VALVE

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use 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 COLO R | ITEM                          | CONDITION            | DATA (DC Voltage)          |
|---------------|-------------|-------------------------------|----------------------|----------------------------|
| 120           | P/B         | Vacuum cut valve bypass valve | [Ignition switch ON] | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

UBS006Z7

### 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.

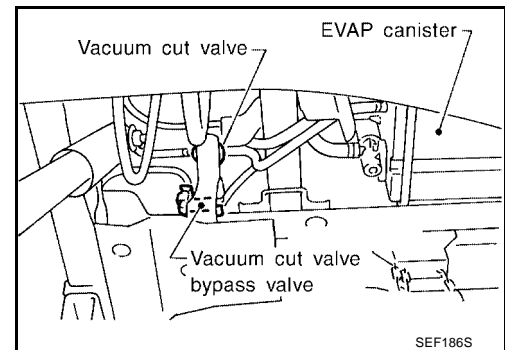
| ACTIVE TEST     |         |
|-----------------|---------|
| VC/V BYPASS/V   | OFF     |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| A/F ALPHA-B2    | XXX %   |
| HO2S1 MNTR (B1) | LEAN    |
| HO2S1 MNTR (B2) | LEAN    |
| THRTL POS SEN   | XXX V   |
|                 |         |

SEF014Z

## 3. CHECK VACUUM CUT VALVE BYPASS VALVE 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".

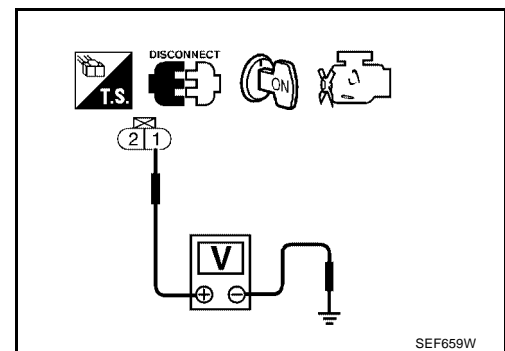


4. Check voltage between terminal 1 and ground with CONSULT-II or tester.

**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.

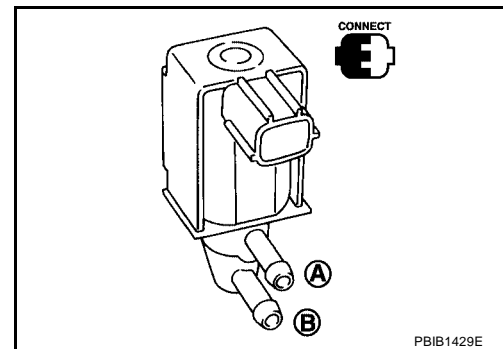
| ACTIVE TEST     |         |
|-----------------|---------|
| VC/V BYPASS/V   | OFF     |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| A/F ALPHA-B2    | XXX %   |
| HO2S1 MNTR (B1) | LEAN    |
| HO2S1 MNTR (B2) | LEAN    |
| THRTL POS SEN   | XXX V   |
|                 |         |

SEF014Z

2. Check air passage continuity and operation delay time under the following conditions.

| Condition<br>VC/V BYPASS/V | Air passage continuity between A and B |
|----------------------------|--|
| ON                         | Yes                                    |
| OFF                        | No                                     |

**Operation takes less than 1 second.**



### Without CONSULT-II

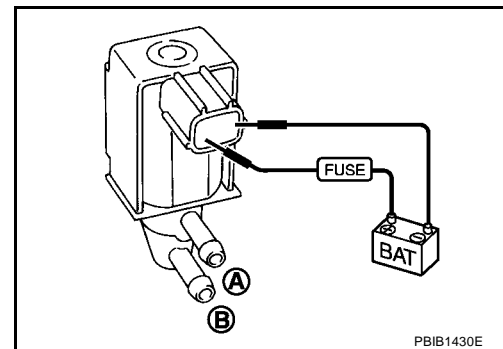
Check air passage continuity and operation delay time under the following conditions.

| 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.**

OK or NG

- OK >> GO TO 8.
- NG >> Replace vacuum cut valve bypass valve.



## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## DTC P1491 VACUUM CUT VALVE BYPASS VALVE

PF17372

### Description

UBS0065U

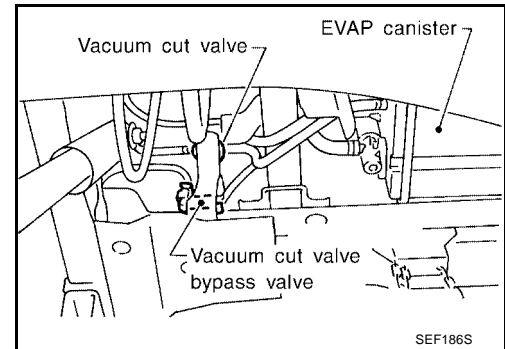
#### COMPONENT DESCRIPTION

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.

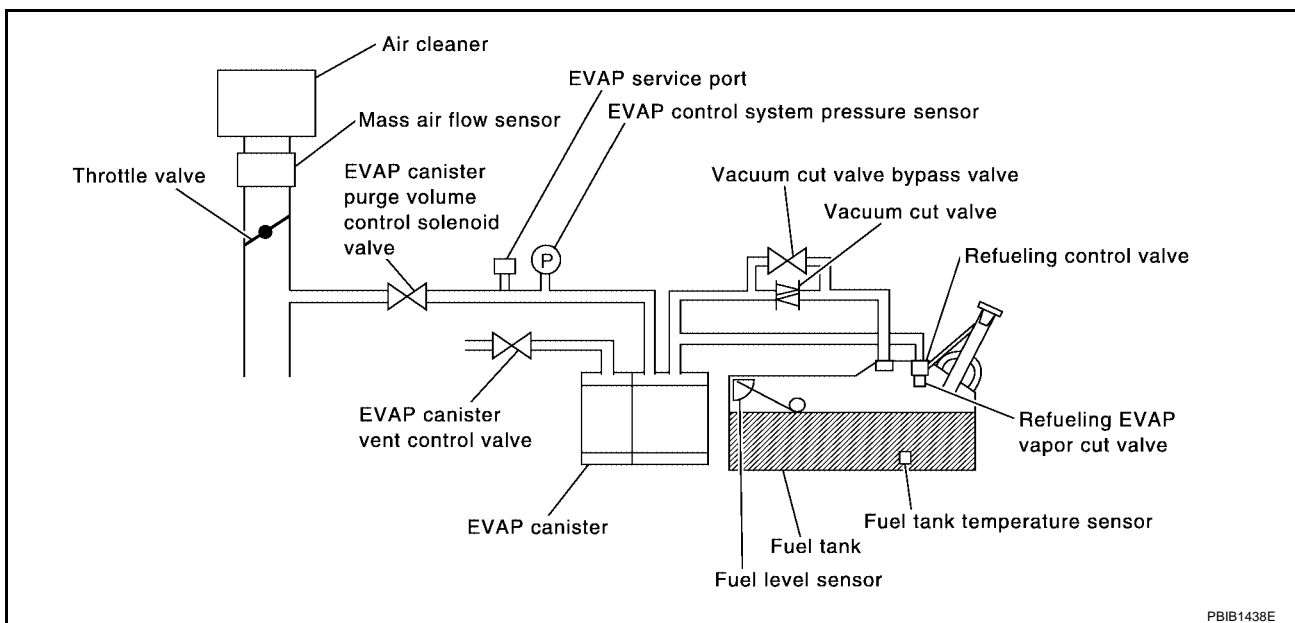
The vacuum cut valve prevents the intake manifold vacuum from being applied to the fuel tank.

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

UBS0065V

Specification data are reference values.

| MONITOR ITEM  | CONDITION             | SPECIFICATION |
|---------------|-----------------------|---------------|
| VC/V BYPASS/V | ● Ignition switch: ON | OFF           |

## On Board Diagnosis Logic

UBS006Z8

| 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. | <ul style="list-style-type: none"> <li>● Vacuum cut valve bypass valve</li> <li>● Vacuum cut valve</li> <li>● Bypass hoses for clogging</li> <li>● EVAP control system pressure sensor and circuit</li> <li>● EVAP canister vent control valve</li> <li>● Hose between fuel tank and vacuum cut valve clogged</li> <li>● Hose between vacuum cut valve and EVAP canister clogged</li> <li>● EVAP canister</li> <li>● EVAP purge port of fuel tank for clogging</li> <li>● Refueling control valve</li> <li>● Refueling EVAP vapor cut valve</li> </ul> |

## DTC Confirmation Procedure

UBS006Z9

**CAUTION:**

**Always drive vehicle at a safe speed.**

**NOTE:**

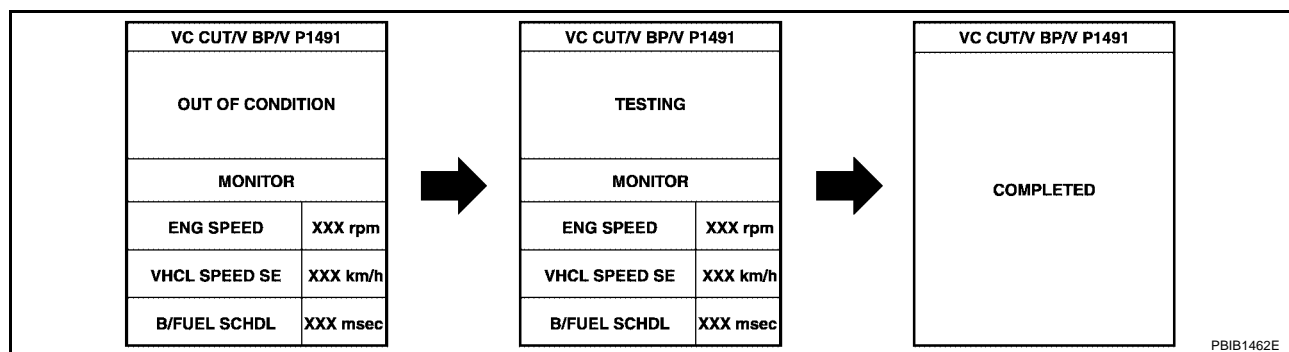
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

**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 37 km/h (23 MPH) |
| B/FUEL SCHDL   | 1.0 - 11.0 msec            |

**If “TESTING” is not displayed after 5 minutes, retry from step 3.**

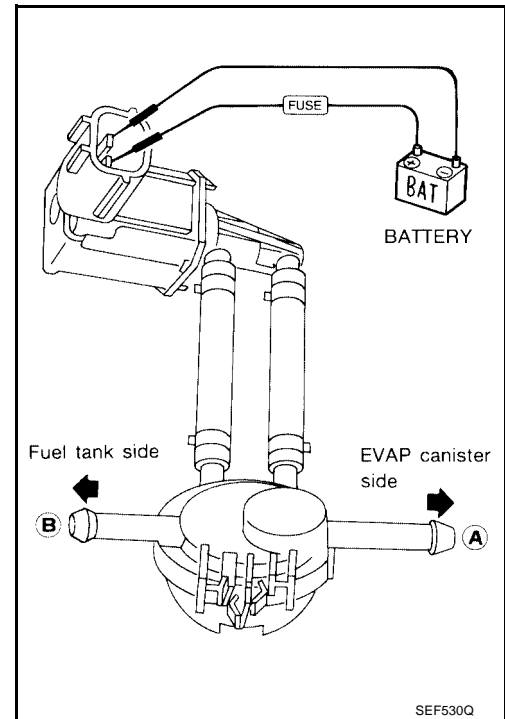
8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to [EC-1694, "Diagnostic Procedure"](#).

**Overall Function Check**

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-1694, "Diagnostic Procedure"](#).



# DTC P1491 VACUUM CUT VALVE BYPASS VALVE

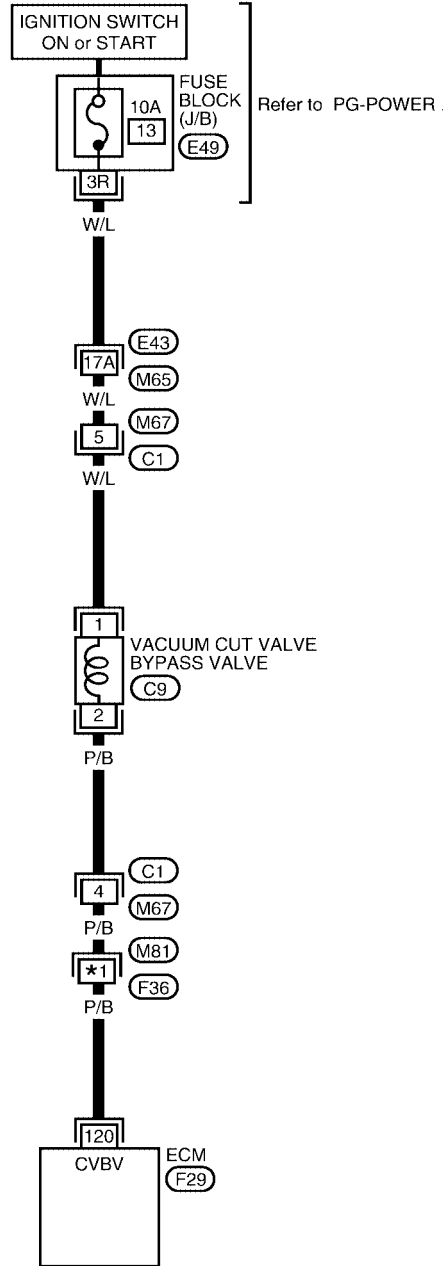
[VG33ER]

UBS006ZB

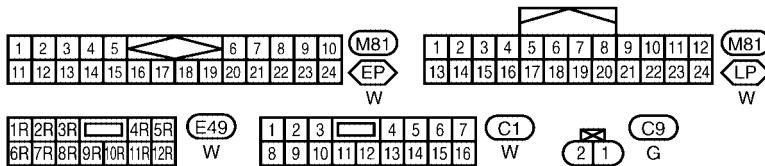
## Wiring Diagram

### EC-BYPS/V-01

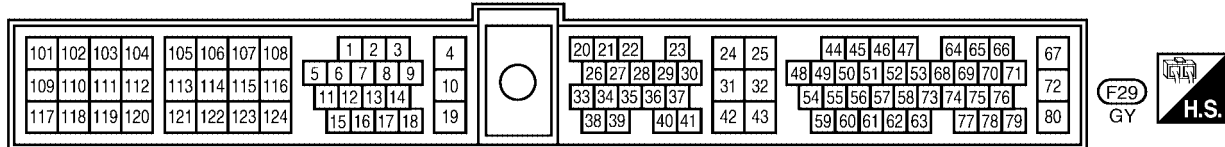
A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



- : Detectable line for DTC
- : Non-detectable line for DTC
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 15
- : 17



Refer to the following.  
 - SUPER MULTIPLE JUNCTION (SMJ)



WBWA0065E

# DTC P1491 VACUUM CUT VALVE BYPASS VALVE

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use 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 COLO R | ITEM                          | CONDITION            | DATA (DC Voltage)          |
|---------------|-------------|-------------------------------|----------------------|----------------------------|
| 120           | P/B         | Vacuum cut valve bypass valve | [Ignition switch ON] | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

UBS006ZC

### 1. INSPECTION START

Do you have CONSULT-II?

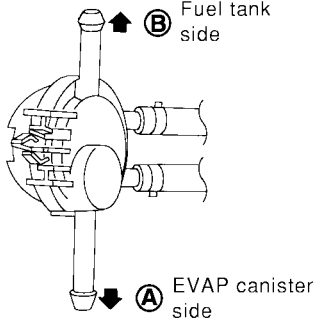
Yes or No

- 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

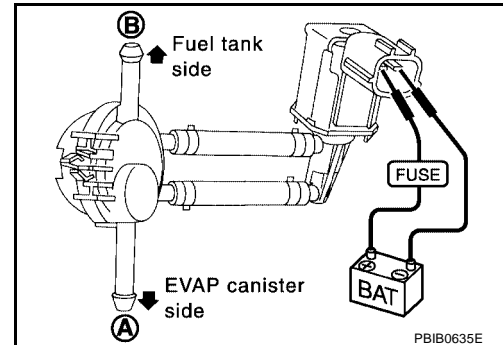
OK or NG

- 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-1745, "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.

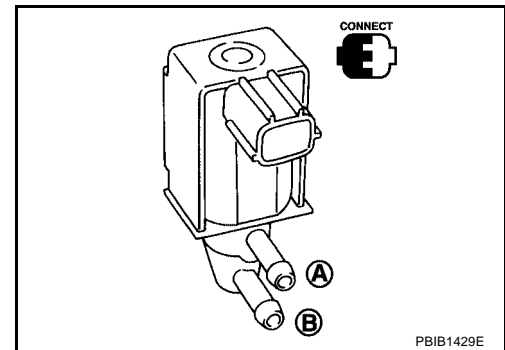
| ACTIVE TEST     |         |
|-----------------|---------|
| VC/V BYPASS/V   | OFF     |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| A/F ALPHA-B2    | XXX %   |
| HO2S1 MNTR (B1) | LEAN    |
| HO2S1 MNTR (B2) | LEAN    |
| THRTL POS SEN   | XXX V   |

SEF014Z

2. Check air passage continuity and operation delay time under the following conditions.

| Condition<br>VC/V BYPASS/V | Air passage continuity between A and B |
|----------------------------|--|
| ON                         | Yes                                    |
| OFF                        | No                                     |

**Operation takes less than 1 second.**



### Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

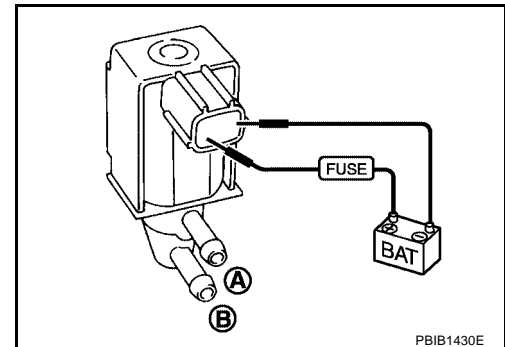
| Condition   | Air passage continuity between A and B |
|---|--|
| 12V direct current supply between terminals 1 and 2 | Yes                                    |
| No supply   | No                                     |

**Operation takes less than 1 second.**

OK or NG

OK >> GO TO 7.

NG >> Replace vacuum cut valve bypass valve.

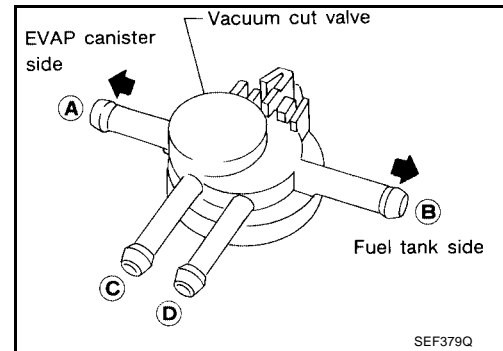




## 7. CHECK VACUUM CUT VALVE

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

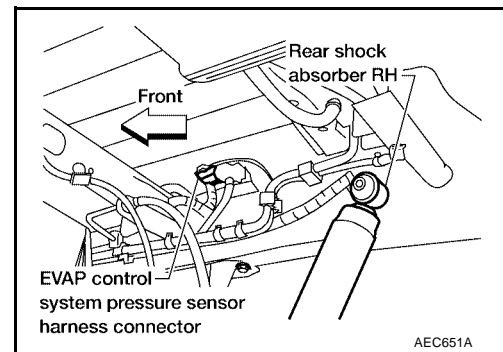
- OK >> GO TO 9.
- NG >> Repair or replace.

## 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 Confirmation Procedure" for DTC P0452 [EC-1528](#) or P0453 [EC-1534](#).

OK or NG

- OK >> GO TO 11.
- NG >> Replace EVAP control system pressure sensor.

## 11. CHECK EVAP CANISTER VENT CONTROL VALVE

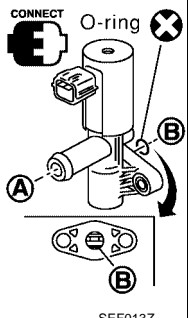
### With CONSULT-II

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.**

| 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.

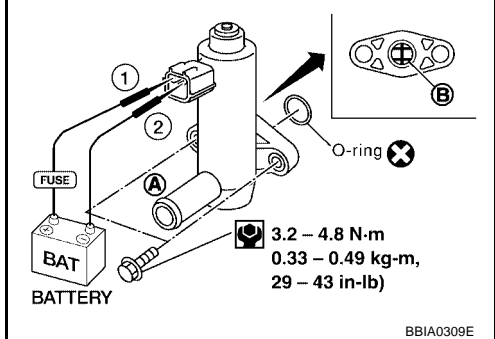
If portion **B** is rusted, replace control valve.

**Make sure new O-ring is installed properly.**

OK or NG

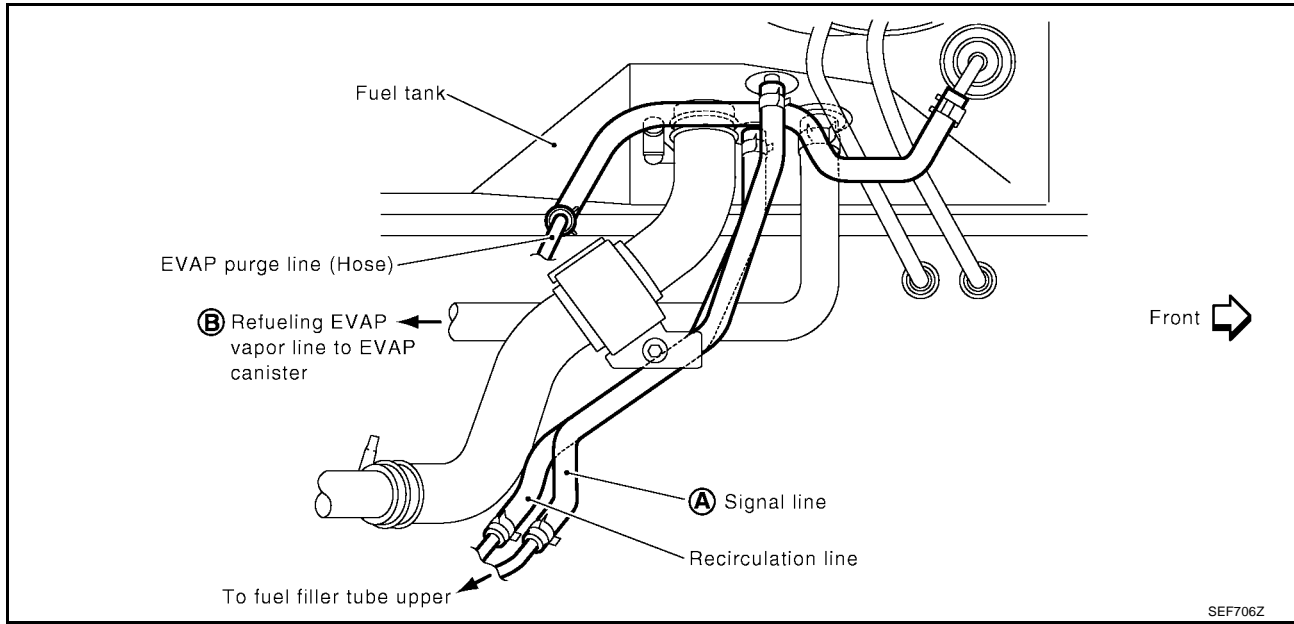
OK >> GO TO 12.

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

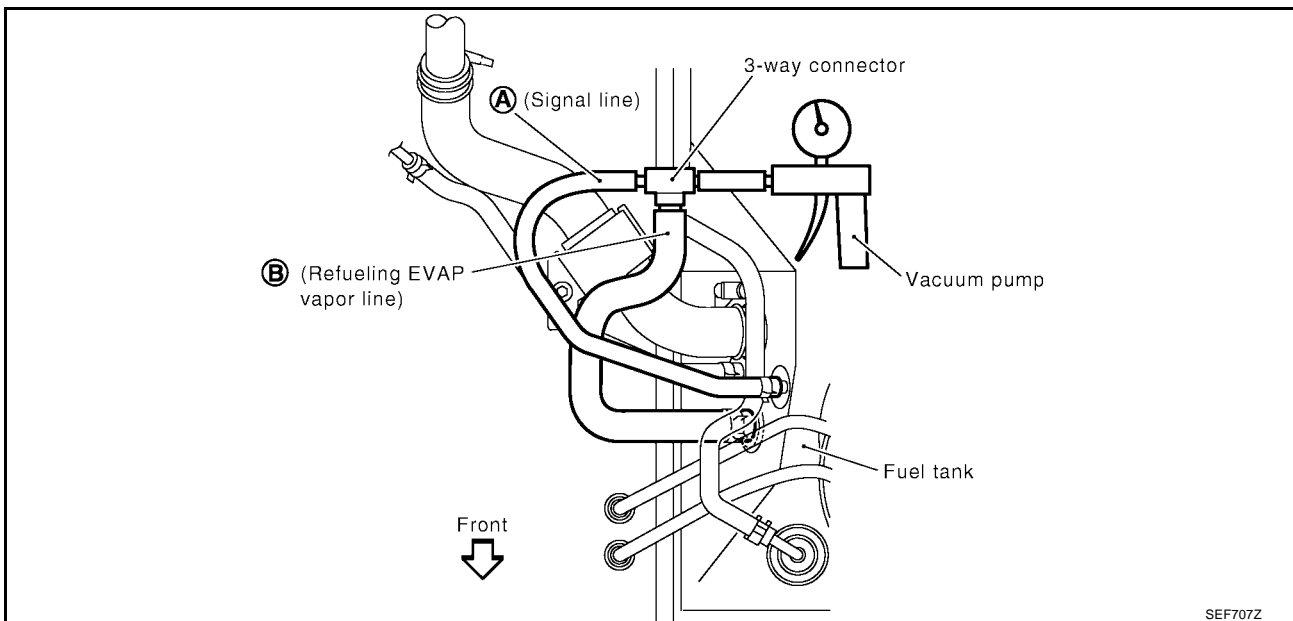
NG >> Replace refueling control valve with fuel tank.

## 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.



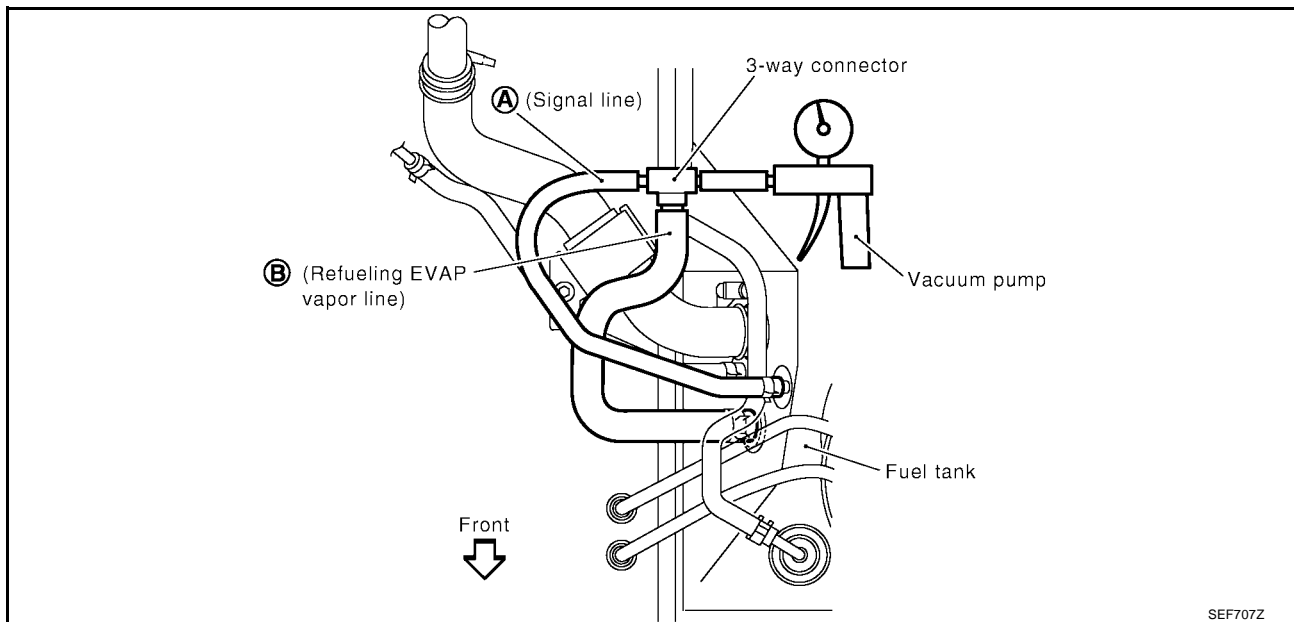
### OK or NG

- 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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

**DTC P1605 A/T DIAGNOSIS COMMUNICATION LINE**

**Component Description**

EBS00GN3

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**

EBS00GN4

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors<br/>[The communication line circuit between ECM and TCM (Transmission Control Module) is open or shorted.]</li> <li>● Dead (Weak) battery</li> <li>● TCM (Transmission Control Module)</li> </ul> |

**DTC Confirmation Procedure**

EBS00GN5

**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-1131, "Diagnostic Procedure"](#).

| 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

**WITH GST**

Follow the procedure "With CONSULT-II".

# DTC P1605 A/T DIAGNOSIS COMMUNICATION LINE

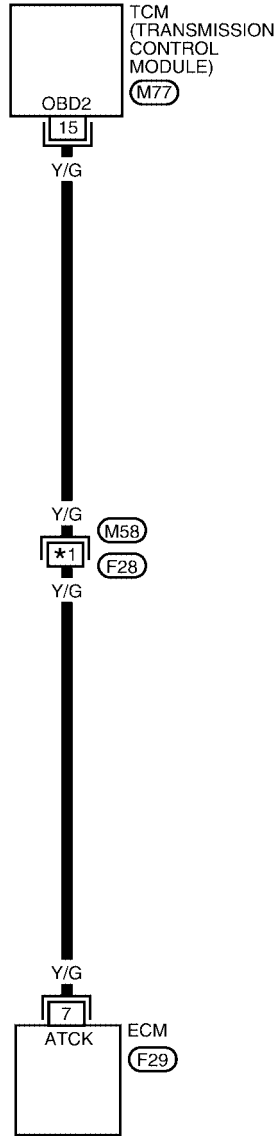
[VG33ER]

## Wiring Diagram WITHOUT VDC

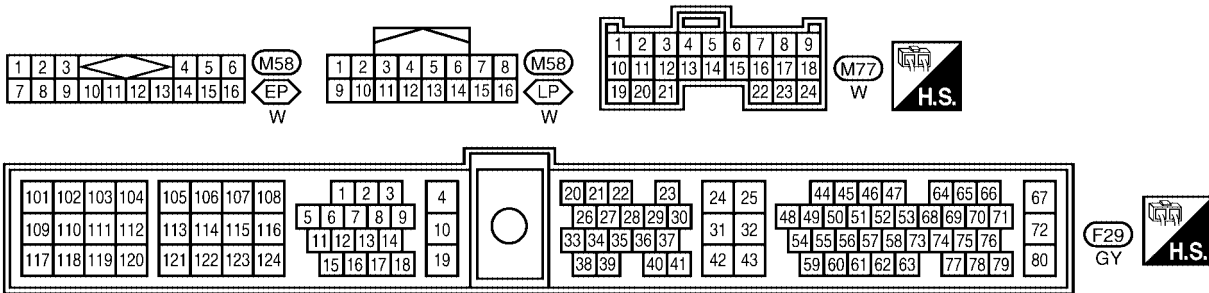
EBS00GN6

EC-ATDIAG-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



- : Detectable line for DTC
- : Non-detectable line for DTC
- EP : EARLY PRODUCTION
- LP : LATE PRODUCTION
- \*1 EP : 9
- LP : 11



WBWA0040E

# DTC P1605 A/T DIAGNOSIS COMMUNICATION LINE

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use 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 COLO R | ITEM             | CONDITION                                   | DATA (DC Voltage) |
|---------------|-------------|------------------|---|-------------------|
| 7             | Y/G         | A/T check signal | [Ignition switch ON]<br>[Engine is running] | 0 - 3.0V          |






# DTC P1605 A/T DIAGNOSIS COMMUNICATION LINE

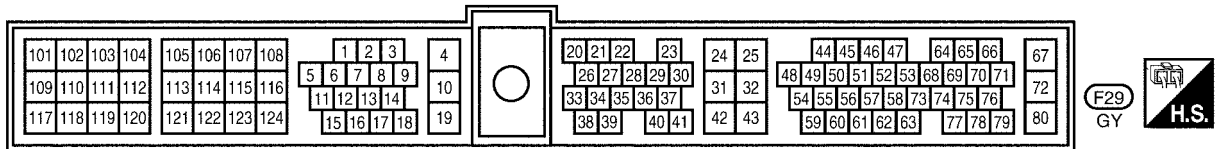
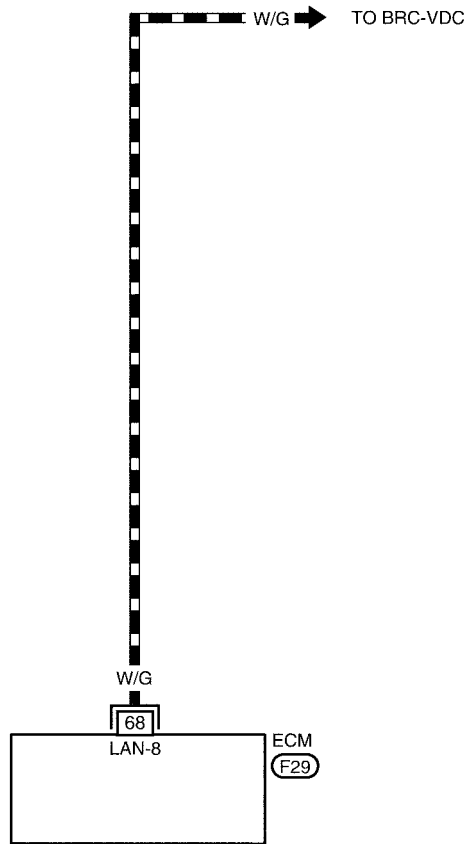
[VG33ER]

WITH VDC

EC-CAN-01

A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

-  : DETECTABLE LINE FOR DTC
-  : NON-DETECTABLE LINE FOR DTC
-  : DATA LINE



BBWA0503E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use 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.

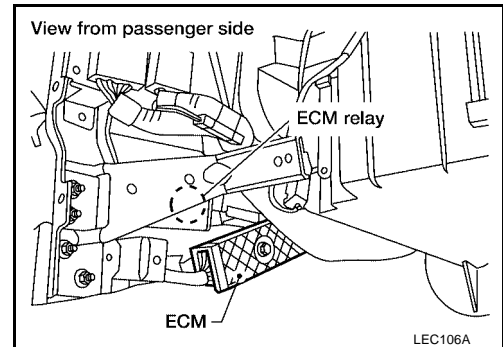
| TER-MINAL NO. | WIRE COLO R | ITEM       | CONDITION                                   | DATA (DC Voltage) |
|---------------|-------------|------------|---|-------------------|
| 68            | W/G         | A/T signal | <b>[Ignition switch ON]</b><br>● Idle speed | 0 - 5.0V          |

## Diagnostic Procedure

EBS00GN7

### 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.



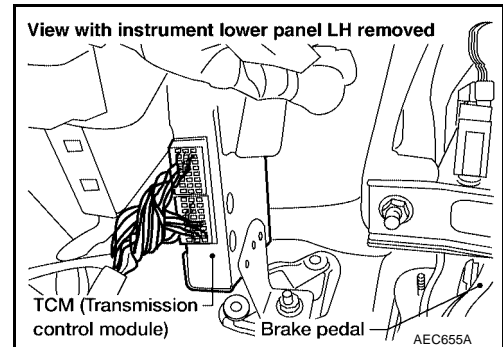
3. Check harness continuity between ECM terminal 7 and TCM terminal 15. Refer to Wiring Diagram.

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-699, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

## DTC P1706 PNP SWITCH

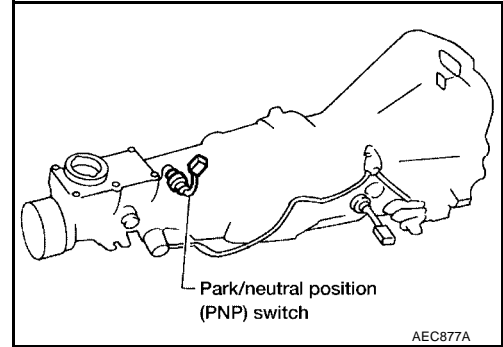
### Component Description

UBS00668

When the gear position is “P” (A/T models only) or “N”, park/neutral position (PNP) switch is “ON”.

ECM detects the position because the continuity of the line (the “ON” signal) exists.

For A/T models, the park/neutral position (PNP) switch assembly also includes a transmission range switch to detect selector lever position.



### CONSULT-II Reference Value in Data Monitor Mode

UBS00669

Specification data are reference values.

| MONITOR ITEM | CONDITION             |                         | SPECIFICATION |
|--------------|-----------------------|-------------------------|---------------|
| P/N POSI SW  | ● Ignition switch: ON | Shift lever: “P” or “N” | ON            |
|              |                       | Except above            | OFF           |

### On Board Diagnosis Logic

UBS0062D

| 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. | <ul style="list-style-type: none"> <li>● Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.]</li> <li>● Park/neutral position (PNP) switch</li> </ul> |

### DTC Confirmation Procedure

UBS0066C

**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**

- Turn ignition switch ON.
- Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II. Then check the “P/N POSI SW” signal under the following conditions.

| Position (Selector lever) | Known good signal |
|---------------------------|-------------------|
| “N” and “P” position      | ON                |
| Except the above position | OFF               |

If NG, go to [EC-1710, "Diagnostic Procedure"](#) .

If OK, go to following step.

- Select “DATA MONITOR” mode with CONSULT-II.
- Start engine and warm it up to normal operating temperature.

| DATA MONITOR |        |
|--------------|--------|
| MONITOR      | NO DTC |
| P/N POSI SW  | ON     |

SEF212Y

# DTC P1706 PNP SWITCH

[VG33ER]

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          |

| DATA MONITOR  |          |
|---------------|----------|
| MONITOR       | NO DTC   |
| ENG SPEED     | XXX rpm  |
| COOLAN TEMP/S | XXX °C   |
| VHCL SPEED SE | XXX km/h |
| P/N POSI SW   | OFF      |
| B/FUEL SCHDL  | XXX msec |

SEF213Y

6. If 1st trip DTC is detected, go to [EC-1710, "Diagnostic Procedure"](#).

## Overall Function Check

UBS0066D

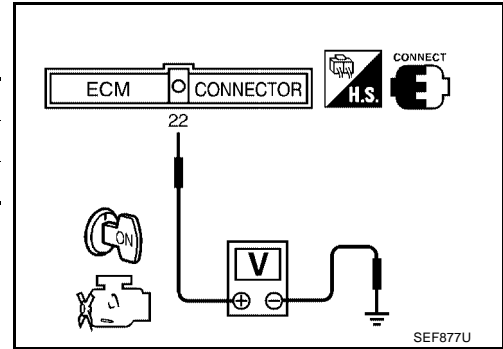
Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

### WITH GST

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 22 and body ground under the following conditions.

| Condition (Gear position) | Voltage (V) (Known good data) |
|---------------------------|-------------------------------|
| "P" and "N" position      | Approx. 0                     |
| Except the above position | Approx. 5                     |

3. If NG, go to [EC-1710, "Diagnostic Procedure"](#).



# DTC P1706 PNP SWITCH

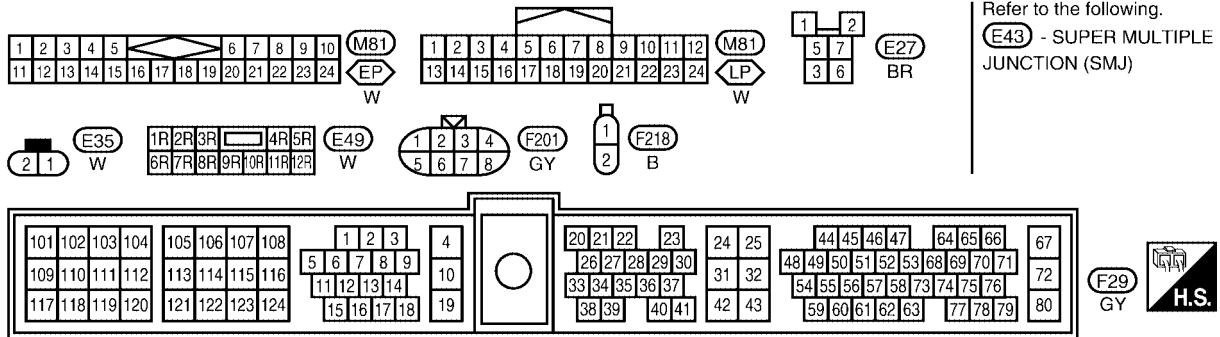
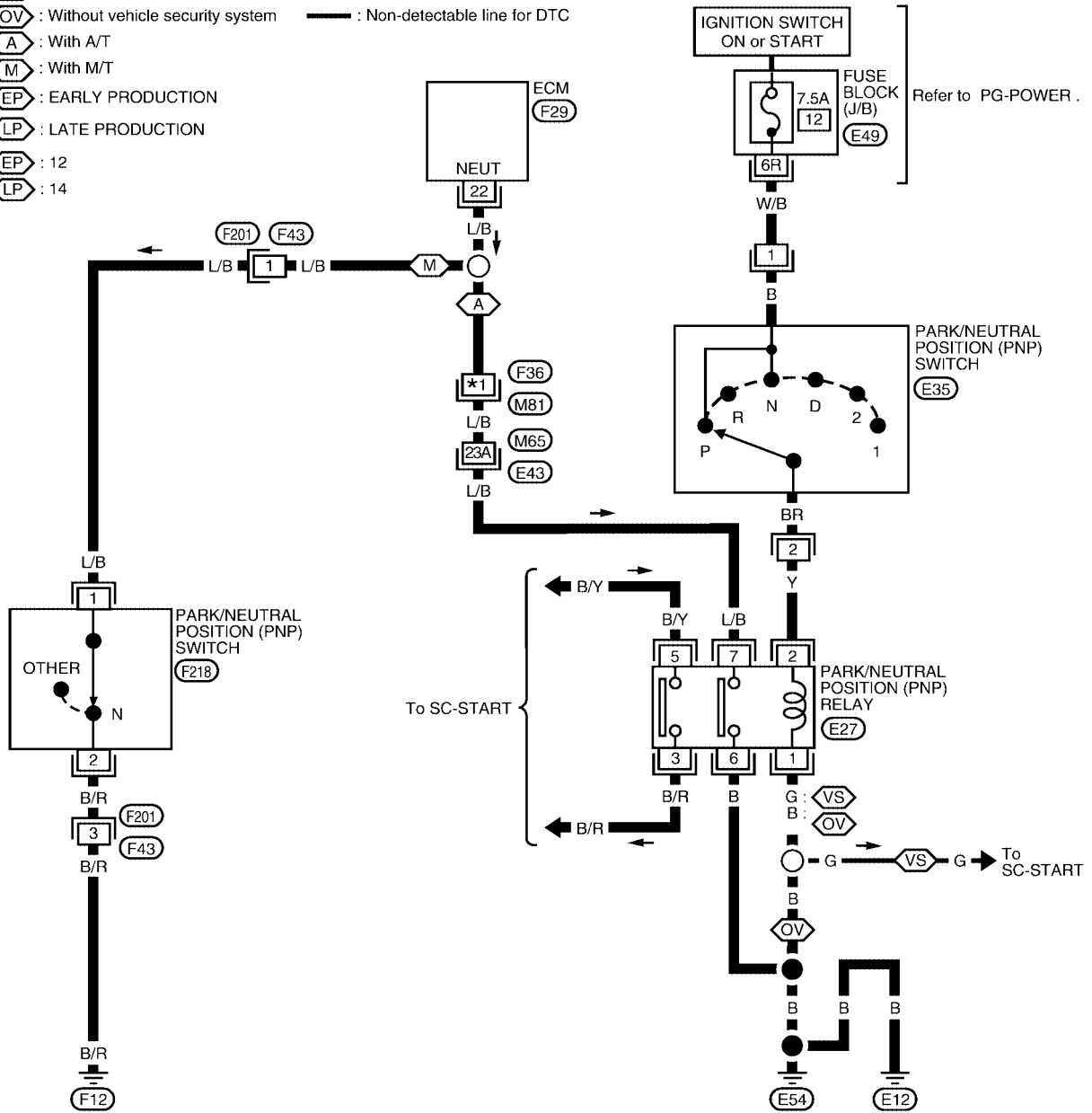
[VG33ER]

UBS0066E

## Wiring Diagram

- : With vehicle security system
- : Without vehicle security system
- : With A/T
- : With M/T
- : EARLY PRODUCTION
- : LATE PRODUCTION
- \*1 : 12
- \*1 : 14

EC-PNP/SW-01



WBWA0041E

# DTC P1706 PNP SWITCH

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

## CAUTION:

Do not use 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 COLO R | ITEM                               | CONDITION  | DATA (DC Voltage) |
|---------------|-------------|------------------------------------|--|-------------------|
| 22            | L/B         | Park/neutral position (PNP) switch | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"><li>● Gear position is "N" or "P"</li></ul>    | Approximately 0V  |
|               |             |                                    | <b>[Ignition switch ON]</b> <ul style="list-style-type: none"><li>● Except the above gear position</li></ul> | Approximately 5V  |

## Diagnostic Procedure FOR M/T MODELS

UBS0066F

### 1. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

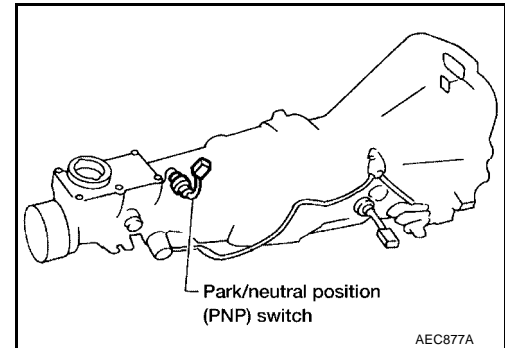
1. Turn ignition switch "OFF".
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and engine ground. Refer to Wiring Diagram.

**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 engine 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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

### FOR A/T MODELS

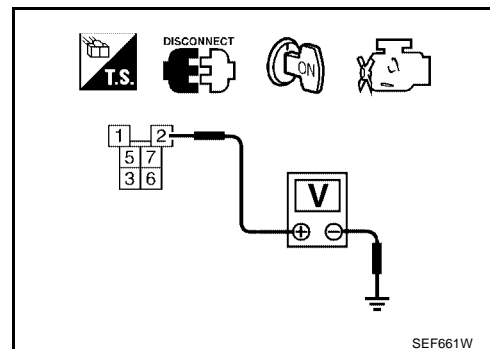
#### 1. CHECK PNP SWITCH POWER SUPPLY CIRCUIT-I

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

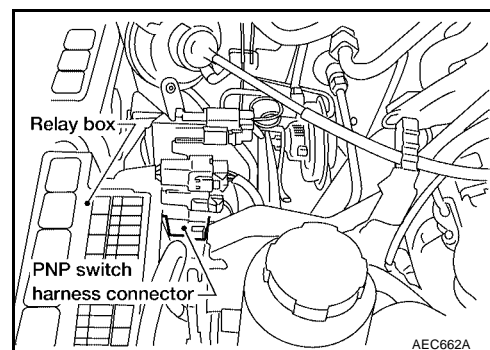
1. Turn ignition switch "OFF".
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and PNP relay terminal 2. Refer to Wiring Diagram.

**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, "Component Inspection"](#) .

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 body 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 body 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.



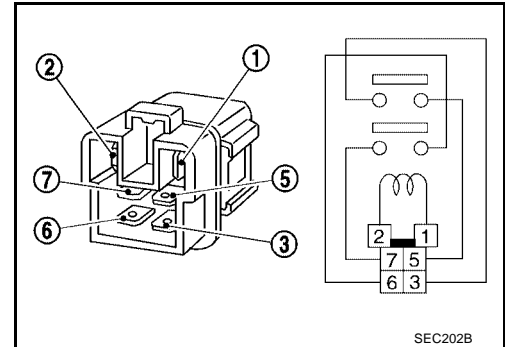
**10. CHECK PARK/NEUTRAL POSITION (PNP) RELAY**

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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

## IGNITION SIGNAL

### Component Description

#### IGNITION COIL & POWER TRANSISTOR

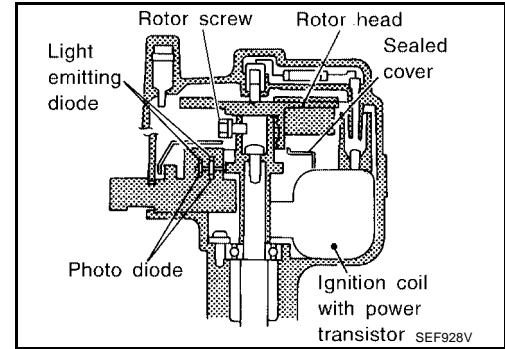
The power transistor switches on and off the ignition coil primary circuit according to the ECM signal. As the primary circuit is turned on and off, the proper high voltage is induced in the secondary circuit. The distributor is not repairable except for the distributor cap and rotor head.

#### 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)**



# IGNITION SIGNAL

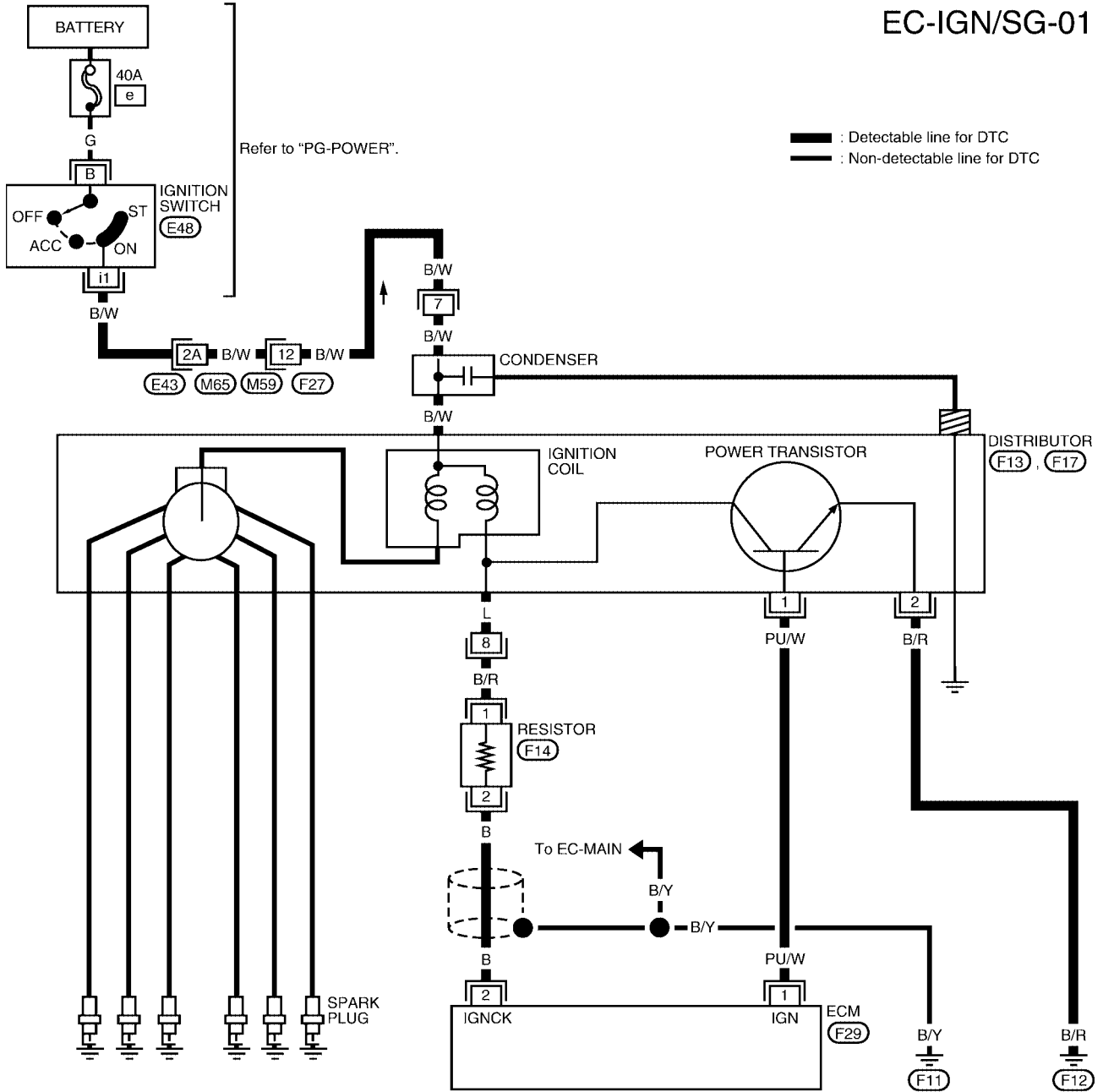
[VG33ER]

UBS0066I

## Wiring Diagram

EC-IGN/SG-01

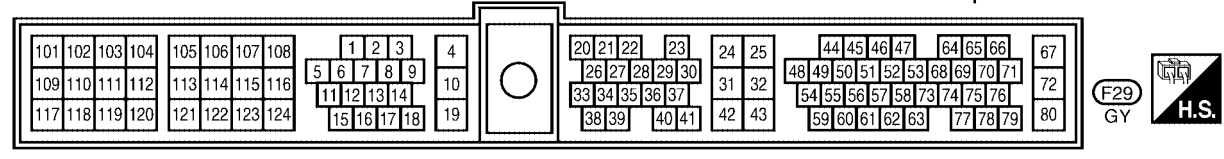
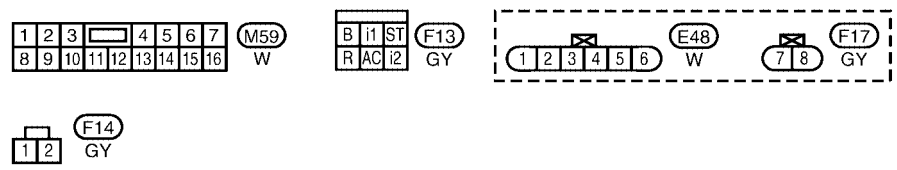
A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M



— : Detectable line for DTC  
 - - - : Non-detectable line for DTC

Refer to "PG-POWER".

Refer to the following.  
 (E43) - SUPER MULTIPLE JUNCTION (SMJ)



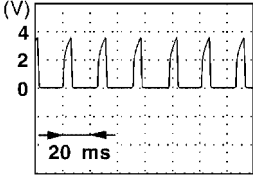
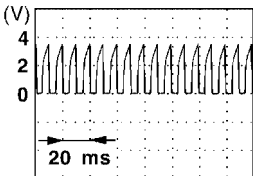
# IGNITION SIGNAL

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use 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]<br>● Idle speed                | Approximately 0.7V★<br> |
|               |            |                 | [Engine is running]<br>● Engine speed is 2,000 rpm | 1.1 - 1.5V★<br>         |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnostic Procedure

UBS0066J

### 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**

- Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.
- Make sure that all circuits do not produce a momentary engine speed drop.

OK or NG

OK >> **INSPECTION END.**

NG >> GO TO 4.

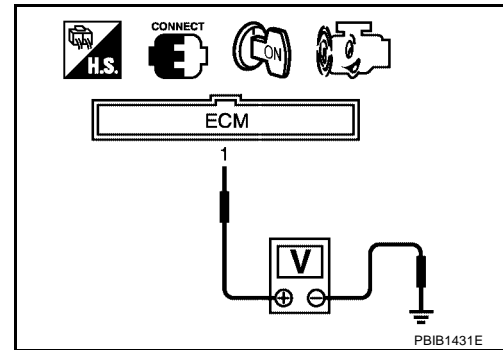
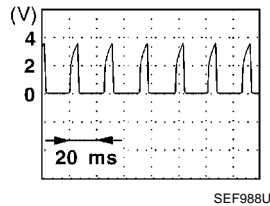
| ACTIVE TEST   |          |
|---------------|----------|
| POWER BALANCE |          |
| MONITOR       |          |
| ENG SPEED     | XXX rpm  |
| MAS AIF SE-B1 | XXX V    |
| IACV-AAC/V    | XXX step |
|               |          |
|               |          |
|               |          |

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.

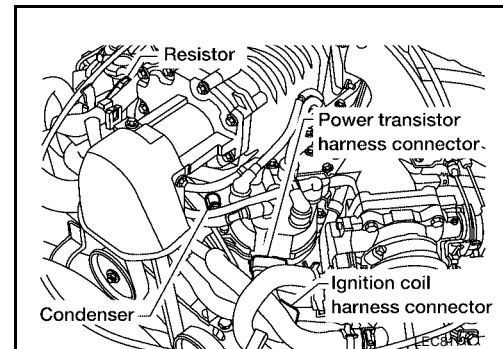


OK or NG

- 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".

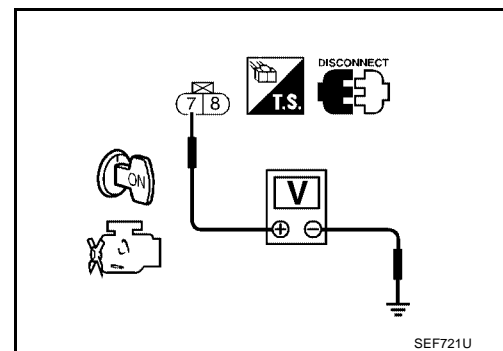


4. Check voltage between terminal 7 and ground with CONSULT-II or tester.

**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 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 engine 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. 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.**

4. 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

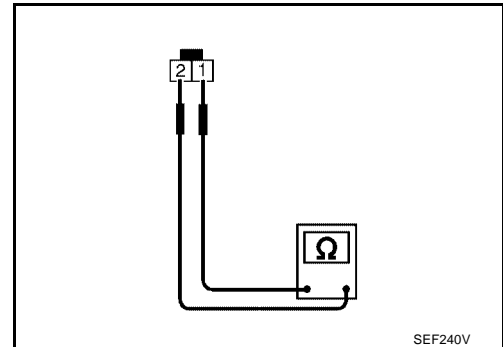
Check resistance between resistor terminals 1 and 2.

**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. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 1 and power transistor terminal 1. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to ground and short to power.

OK or NG

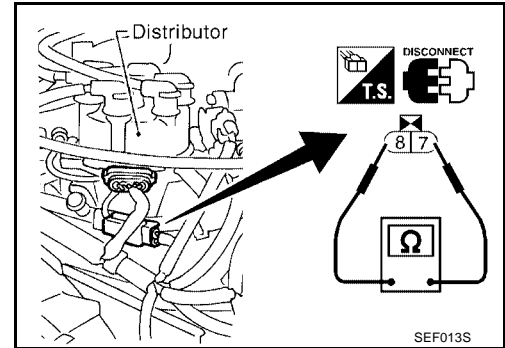
OK >> GO TO 10.

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.

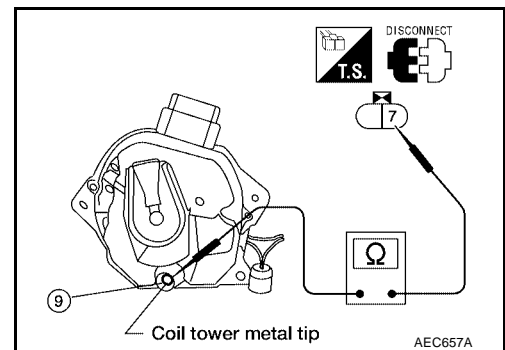
| Terminal               | Resistance [at 20°C (68°F)] |
|------------------------|-----------------------------|
| 7 - 8 (Primary coil)   | Approx. 1.0Ω                |
| 7 - 9 (secondary coil) | Approx. 10 kΩ               |



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.



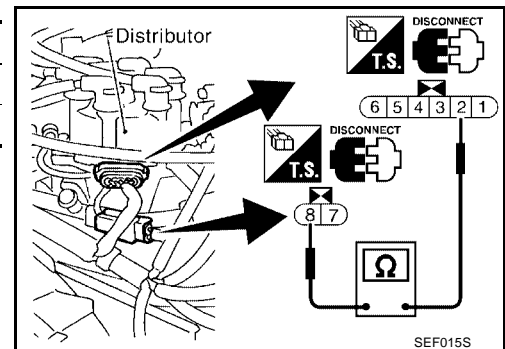
11. CHECK POWER TRANSISTOR

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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

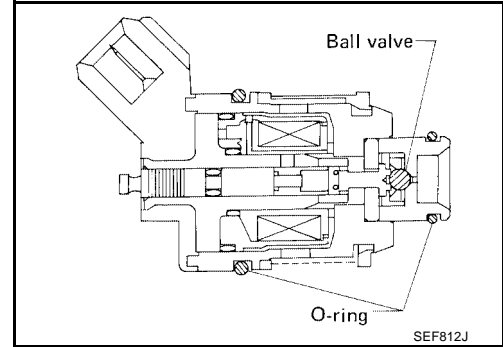
Removal and Installation  
DISTRIBUTOR

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

## INJECTOR CIRCUIT

### Component Description

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

Specification data are reference values.

| MONITOR ITEM                 | CONDITION   | SPECIFICATION               |
|------------------------------|---|-----------------------------|
| INJ PULSE-B1<br>INJ PULSE-B2 | ● Engine: After warming up<br>● Air conditioner switch: "OFF" | Idle<br>2.4 - 3.7 msec      |
|                              | ● Shift lever: "N"<br>● No-load                               | 2,000 rpm<br>1.9 - 3.3 msec |
| B/FUEL SCHDL                 | ● Engine: After warming up<br>● Air conditioner switch: "OFF" | Idle<br>1.0 - 1.6 msec      |
|                              | ● Shift lever: "N"<br>● No-load                               | 2,000 rpm<br>0.7 - 1.4 msec |



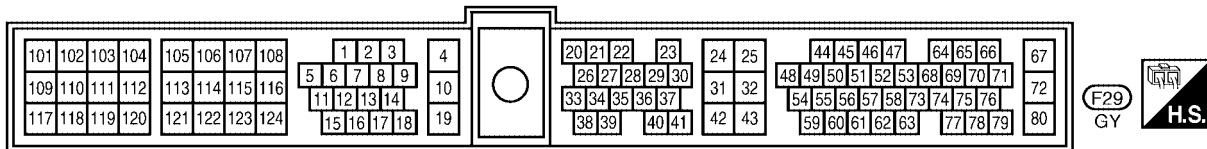
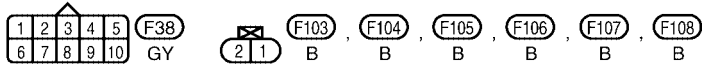
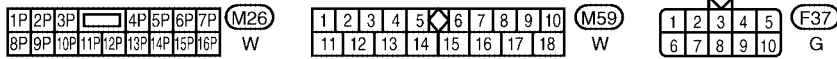
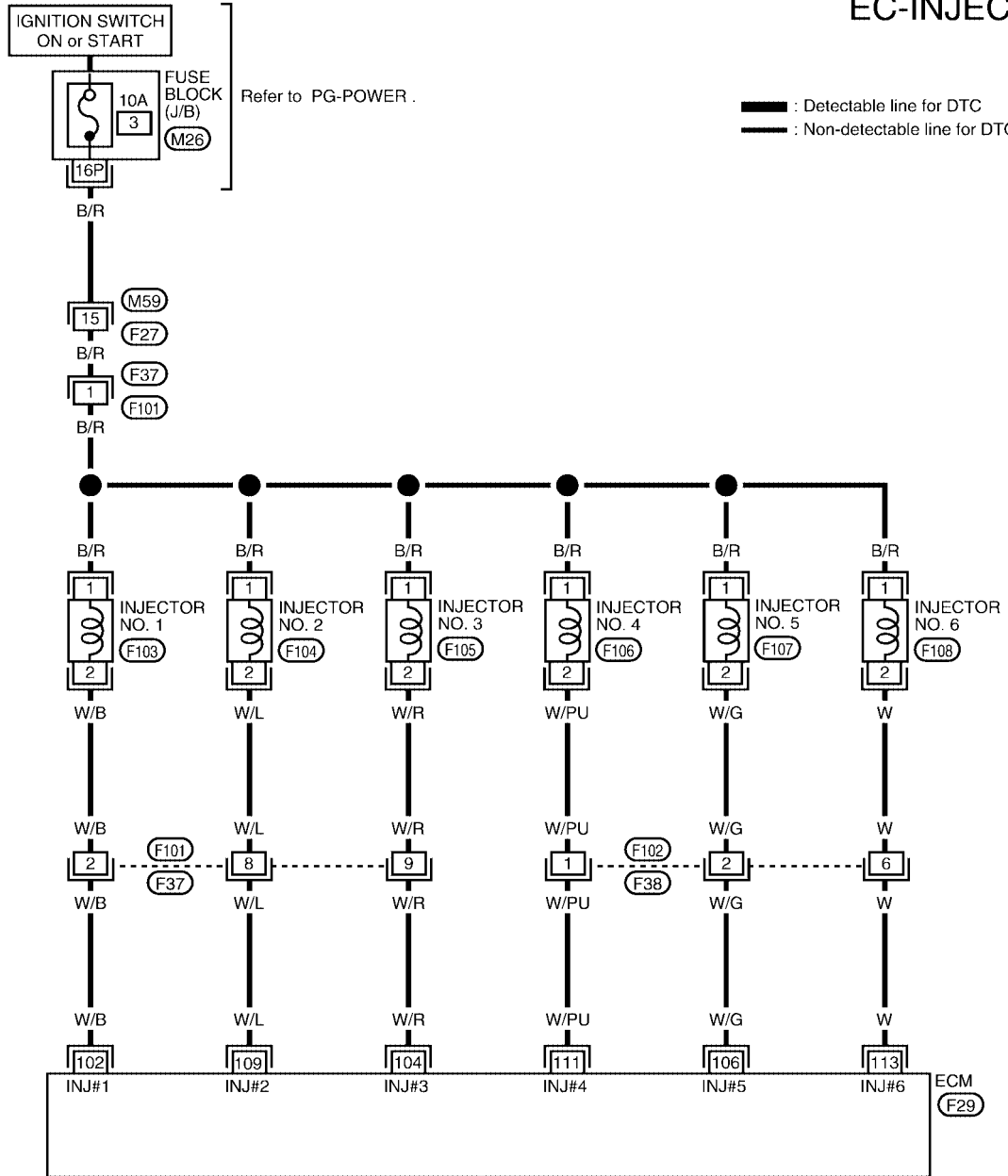
# INJECTOR CIRCUIT

[VG33ER]

## Wiring Diagram

UBS0066N

### EC-INJECT-01



BBWA0515E

# INJECTOR CIRCUIT

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use 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)                      |
|--|---------------------------------------|--|---|--|
| 102<br>104<br>106<br>109<br>111<br>113 | W/B<br>W/R<br>W/G<br>W/L<br>W/PU<br>W | Injector No. 1<br>Injector No. 3<br>Injector No. 5<br>Injector No. 2<br>Injector No. 4<br>Injector No. 6 | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Idle speed</li> </ul>                | <p>BATTERY VOLTAGE<br/>(11 - 14V)★</p> |
|  |                                       |  | <p>[Engine is running]</p> <ul style="list-style-type: none"> <li>● Warm-up condition</li> <li>● Engine speed is 2,000 rpm</li> </ul> | <p>BATTERY VOLTAGE<br/>(11 - 14V)★</p> |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnostic Procedure

UBS00660

### 1. INSPECTION START

Turn ignition switch to START.

**Is any cylinder ignited?**

Yes or No

- Yes >> GO TO 2.
- No >> GO TO 3.

## 2. CHECK OVERALL FUNCTION

### With CONSULT-II

1. Start engine.
2. Perform "POWER BALANCE" in "ACTIVE TEST" mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.

| ACTIVE TEST   |          |
|---------------|----------|
| POWER BALANCE |          |
| MONITOR       |          |
| ENG SPEED     | XXX rpm  |
| MAS AIF SE-B1 | XXX V    |
| IACV-AAC/V    | XXX step |
|               |          |
|               |          |
|               |          |

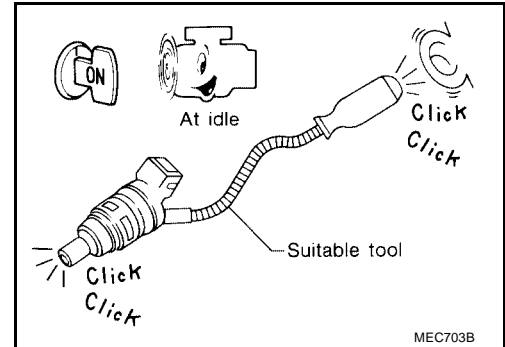
SEF070Y

### Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.  
**Clicking noise should be heard.**

OK or NG

- OK    >> **INSPECTION END.**  
 NG    >> GO TO 3.



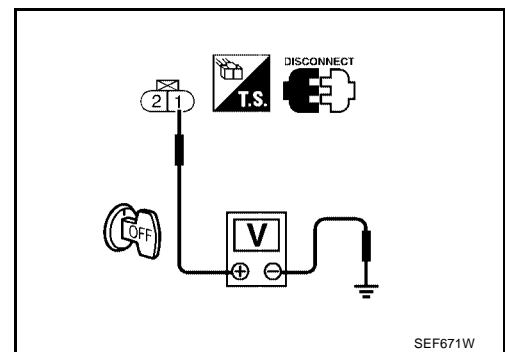
## 3. CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect injector harness connector.
3. 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. Disconnect ECM harness connector.
2. Check harness continuity between injector terminal 2 and ECM terminals 102, 104, 106, 109, 111, 113. 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 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.

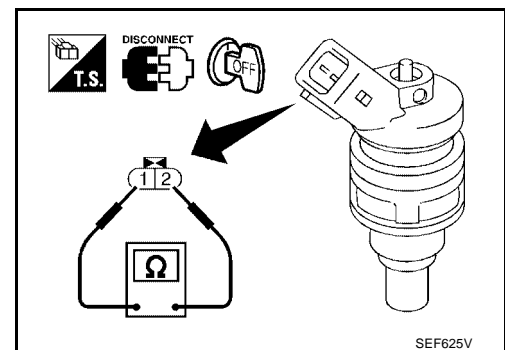
## 7. CHECK INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

**Resistance : 10 - 14Ω [at 25°C (77°F)]**

OK or NG

- OK >> GO TO 8.
- NG >> Replace injector.



## 8. CHECK INTERMITTENT INCIDENT

Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## Removal and Installation INJECTOR

Refer to [EM-80, "OUTER COMPONENT PARTS"](#) .

# START SIGNAL

[VG33ER]

## START SIGNAL

PFP:48750

### CONSULT-II Reference Value in Data Monitor Mode

UBS0066Q

Specification data are reference values.

| MONITOR ITEM | CONDITION                          | SPECIFICATION  |
|--------------|------------------------------------|----------------|
| START SIGNAL | ● Ignition switch: ON → START → ON | OFF → ON → OFF |

A

EC

C

D

E

F

G

H

I

J

K

L

M

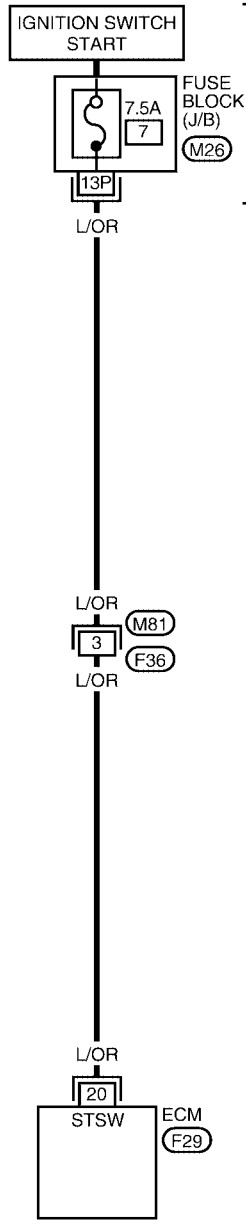
# START SIGNAL

[VG33ER]

UBS0066S

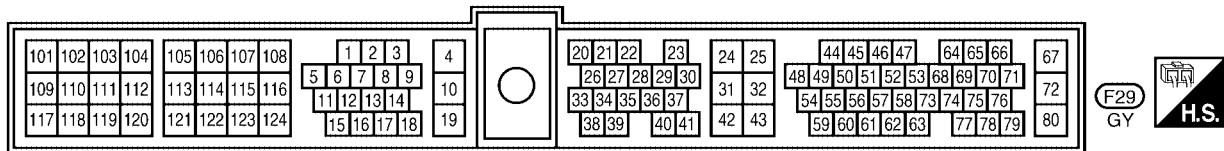
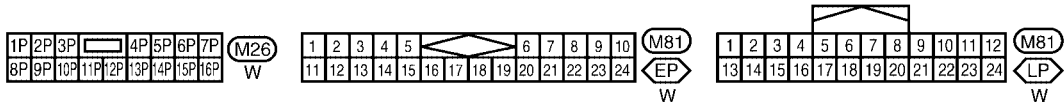
## Wiring Diagram

EC-S/SIG-01



Refer to PG-POWER.

- : Detectable line for DTC
- : Non-detectable line for DTC
- : EARLY PRODUCTION
- : LATE PRODUCTION



WBWA0042E

# START SIGNAL

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use 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 COLO R | ITEM         | CONDITION               | DATA (DC Voltage)          |
|---------------|-------------|--------------|-------------------------|----------------------------|
| 20            | L/OR        | Start signal | [Ignition switch ON]    | Approximately 0V           |
|               |             |              | [Ignition switch START] | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

UBS0066T

### 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**

- Turn ignition switch "ON".
- 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             |

| DATA MONITOR |        |
|--------------|--------|
| MONITOR      | NO DTC |
| START SIGNAL | OFF    |
| CLSD THL POS | ON     |
| AIR COND SIG | OFF    |
| P/N POSI SW  | ON     |

PBIB0182E

OK or NG

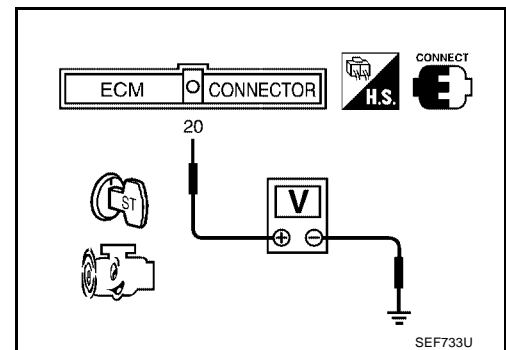
- OK >> **INSPECTION END.**
- NG >> GO TO 4.

### 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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**



# FUEL PUMP CIRCUIT

[VG33ER]

PF:17042

UBS0066U

## FUEL PUMP CIRCUIT

### Description SYSTEM DESCRIPTION

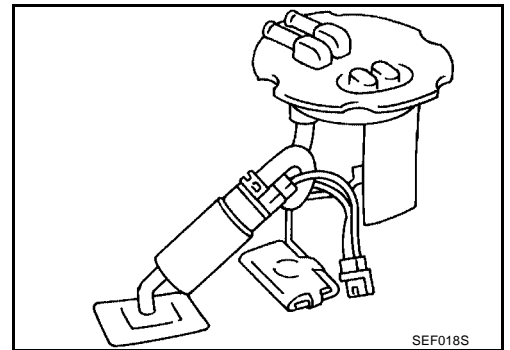
| Sensor                   | Input Signal to ECM | ECM function      | Actuator        |
|--------------------------|---------------------|-------------------|-----------------|
| Camshaft position sensor | Engine speed        | Fuel pump control | Fuel pump relay |
| Ignition switch          | Start 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

UBS0066W

Specification data are reference values.

| MONITOR ITEM  | CONDITION   | SPECIFICATION |
|---------------|---|---------------|
| FUEL PUMP RLY | <ul style="list-style-type: none"> <li>● Ignition switch is turned to ON. (Operates for 5 seconds.)</li> <li>● Engine running and cranking</li> </ul> | ON            |
|               | Except as shown above   | OFF           |

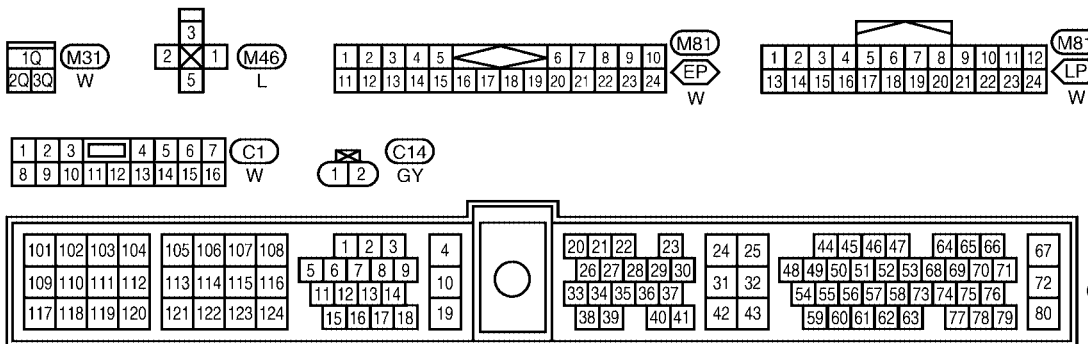
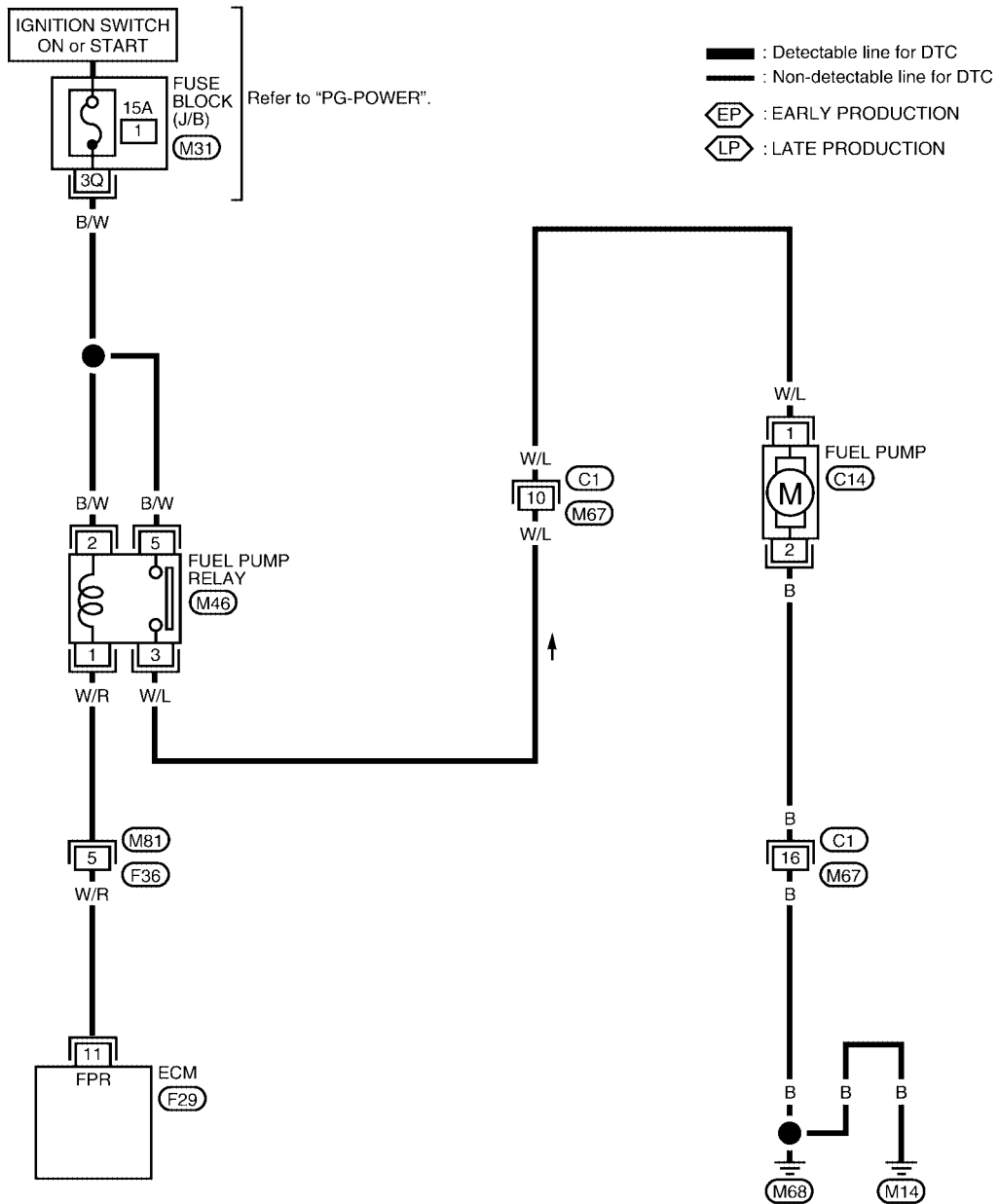
# FUEL PUMP CIRCUIT

[VG33ER]

UBS0066Y

## Wiring Diagram

### EC-F/PUMP-01



WBWA0066E

# FUEL PUMP CIRCUIT

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

Do not use 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 COLO R | ITEM            | CONDITION   | DATA (DC Voltage)             |
|---------------|-------------|-----------------|---|-------------------------------|
| 11            | W/R         | Fuel pump relay | [Ignition switch ON]<br>● For 5 seconds after turning ignition switch ON                              | 0 - 1V                        |
|               |             |                 | [Engine is running]<br>[Ignition switch ON]<br>● More than 5 seconds after turning ignition switch ON | BATTERY VOLTAGE<br>(11 - 14V) |

## Diagnostic Procedure

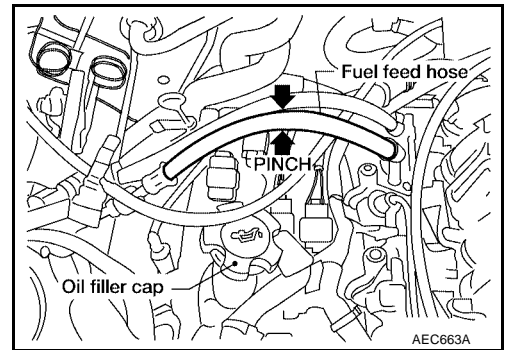
UBS0066Z

### 1. CHECK OVERALL FUNCTION

- Turn ignition switch "ON".
- 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".

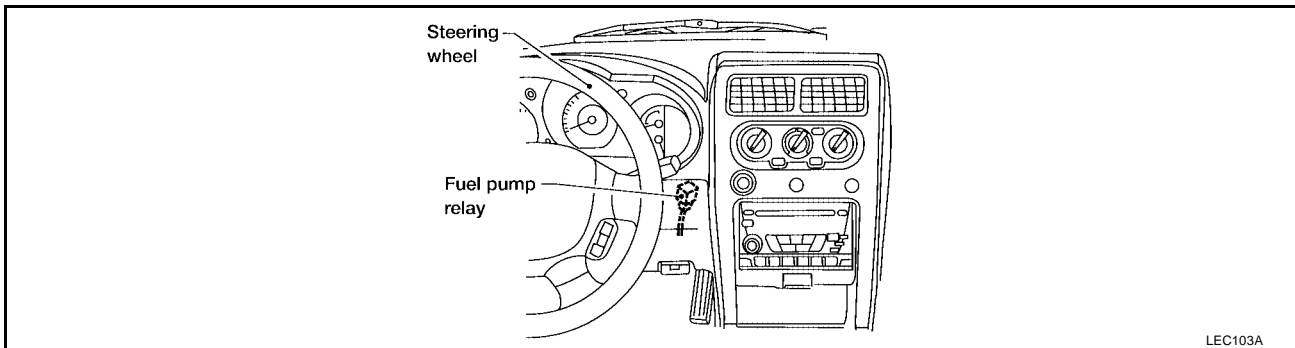
OK or NG

- OK >> **INSPECTION END.**  
NG >> GO TO 2.



### 2. CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

- Turn ignition switch "OFF".
- Disconnect fuel pump relay.

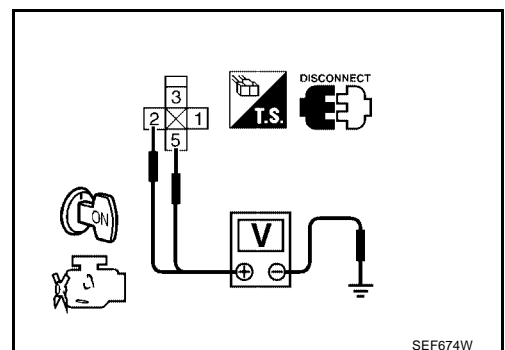


- Turn ignition switch "ON".
- Check voltage between terminals 2, 5 and ground with CONSULT-II or tester.

**Voltage : Battery voltage**

OK or NG

- OK >> GO TO 4.  
NG >> GO TO 3.



SEF674W

## 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

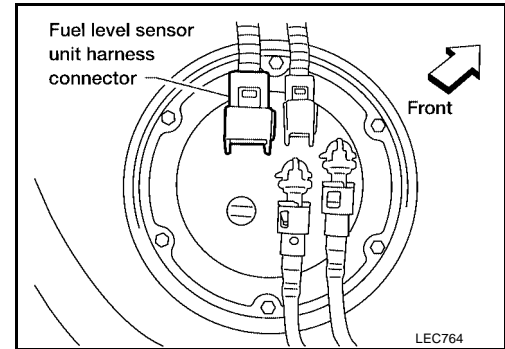
1. Turn ignition switch "OFF".
2. Disconnect fuel pump harness connector.
3. Check harness continuity between fuel pump terminal 2 and body ground, fuel pump terminal 1 and fuel pump relay terminal 3. Refer to Wiring Diagram.

**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 body 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.

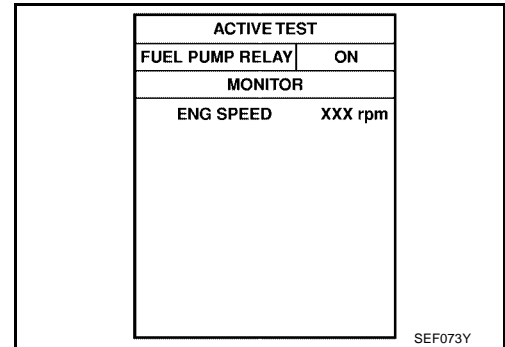
- Harness connectors M81, F36
- Harness for open or short between ECM and fuel pump relay

>> 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.



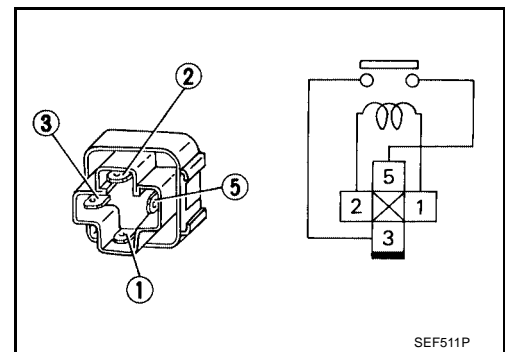
### Without CONSULT-II

Check continuity between 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.



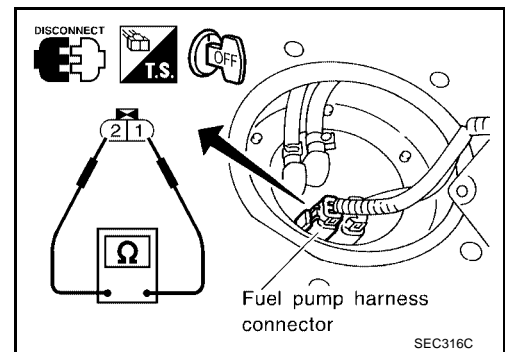
## 9. CHECK FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between 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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

## Removal and Installation FUEL PUMP

Refer to [FL-6, "FUEL LEVEL SENSOR UNIT AND FUEL PUMP ASSEMBLY"](#) .

# POWER STEERING OIL PRESSURE SWITCH

[VG33ER]

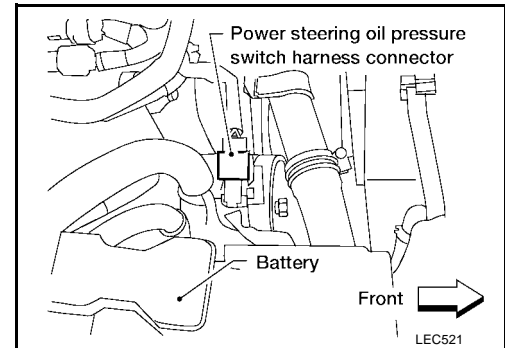
## POWER STEERING OIL PRESSURE SWITCH

PFP:49761

### Component Description

UBS00670

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

UBS00671

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 fully turned.                    | ON            |

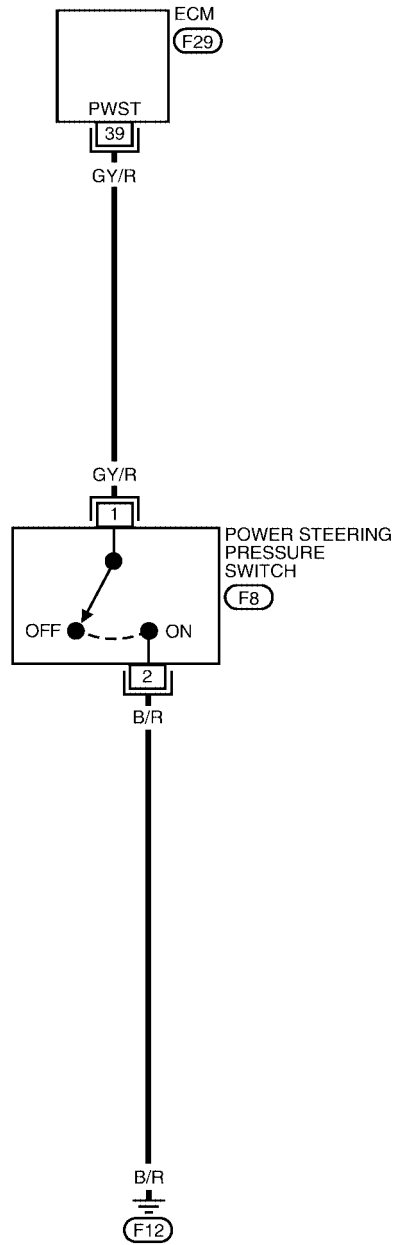
# POWER STEERING OIL PRESSURE SWITCH

[VG33ER]

UBS00673

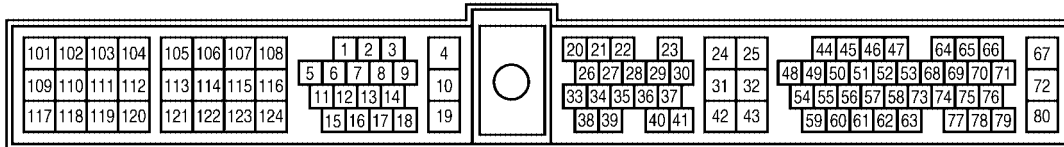
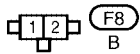
## Wiring Diagram

EC-PST/SW-01



— : Detectable line for DTC  
 — : Non-detectable line for DTC

A  
 EC  
 C  
 D  
 E  
 F  
 G  
 H  
 I  
 J  
 K  
 L  
 M



BBWA0500E

# POWER STEERING OIL PRESSURE SWITCH

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use 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 COLO R | ITEM                               | CONDITION   | DATA (DC Voltage) |
|---------------|-------------|------------------------------------|---|-------------------|
| 39            | GY/R        | Power steering oil pressure switch | [Engine is running]<br>● Steering wheel is being turned     | Approximately 0V  |
|               |             |                                    | [Engine is running]<br>● Steering wheel is not being turned | Approximately 5V  |

## Diagnostic Procedure

UBS00674

### 1. INSPECTION START

Do you have CONSULT-II?

Yes or No

- Yes >> GO TO 2.
- No >> GO TO 3.

### 2. CHECK OVERALL FUNCTION

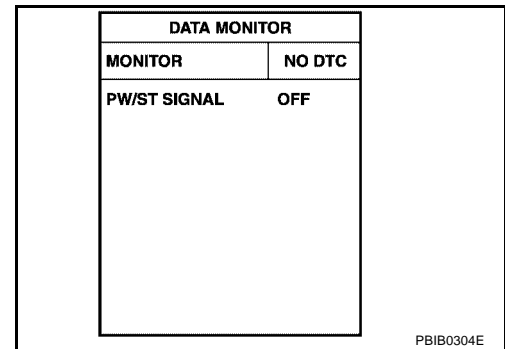
**Ⓢ With CONSULT-II**

- Start engine.
- 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

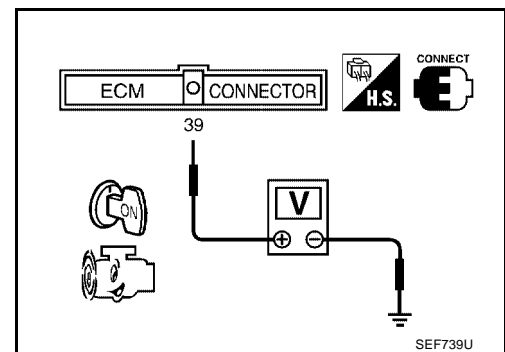
**ⓧ Without CONSULT-II**

- Start engine.
- 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**

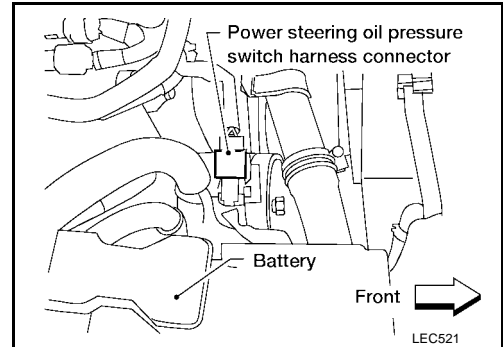
1. Turn ignition switch OFF.
2. Disconnect power steering oil pressure switch harness connector.
3. Check harness continuity between power steering oil pressure switch terminal 2 and engine ground. Refer to Wiring Diagram.

**Continuity should exist.**

4. Also check harness for short to power.

OK or NG

- OK >> GO TO 5.
- NG >> 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.

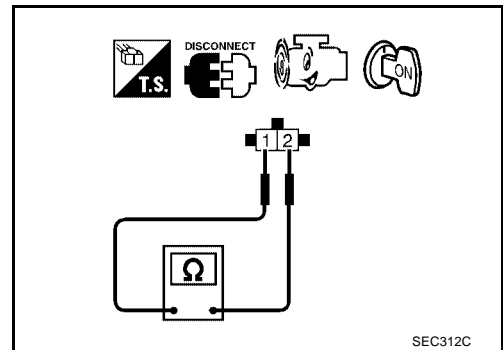
**6. CHECK POWER STEERING OIL PRESSURE SWITCH**

1. Disconnect power steering oil pressure switch harness connector then start engine.
2. Check continuity between 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**

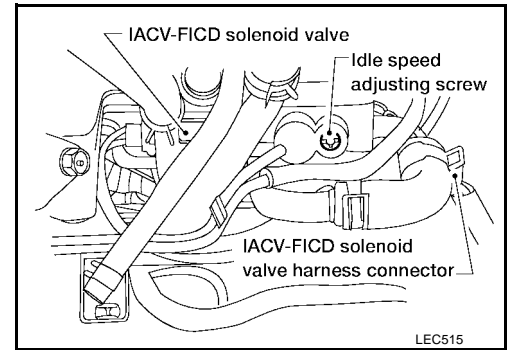
Refer to [EC-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> **INSPECTION END.**

## IACV-FICD SOLENOID VALVE

### Component Description

When the air conditioner is on, the IACV-FICD solenoid valve supplies additional air to adjust to the increased load.



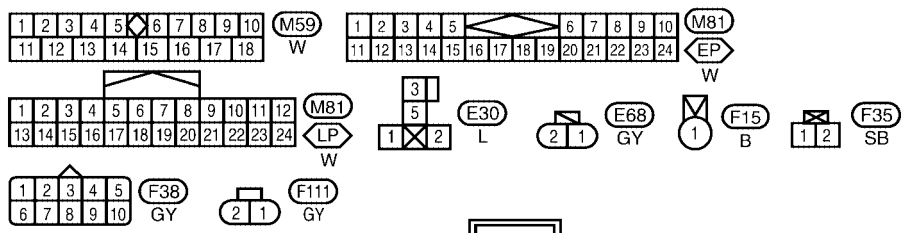
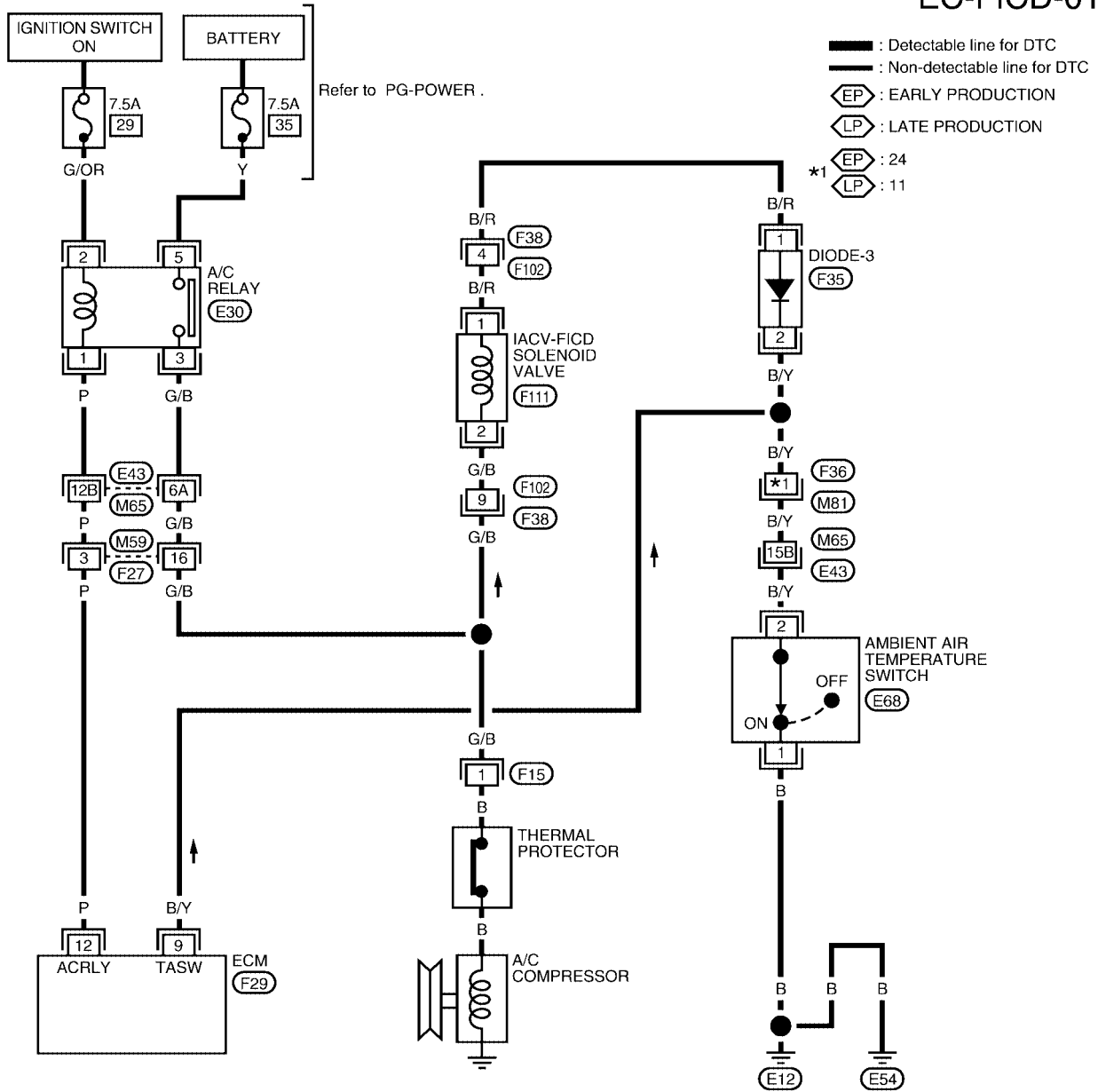
# IACV-FICD SOLENOID VALVE

[VG33ER]

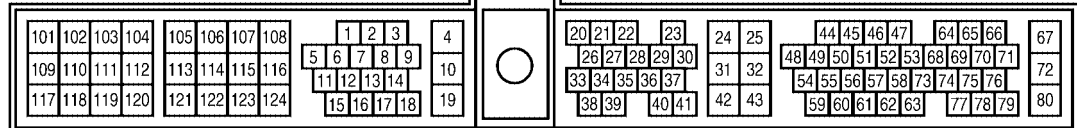
UBS00677

## Wiring Diagram

EC-FICD-01



Refer to the following.  
 (E43) - SUPER MULTIPLE JUNCTION (SMJ)



WBWA0048E

# IACV-FICD SOLENOID VALVE

[VG33ER]

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use 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 COLO R | ITEM                           | CONDITION   | DATA (DC Voltage)          |
|---------------|-------------|--------------------------------|---|----------------------------|
| 9             | B/Y         | Ambient air temperature switch | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> <li>● Ambient air temperature is above 25°C (77°F)</li> <li>● Air conditioner is operating</li> </ul>     | 0V                         |
|               |             |                                | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> <li>● Ambient air temperature is below 19°C (66°F)</li> <li>● Air conditioner is operating</li> </ul>     | BATTERY VOLTAGE (11 - 14V) |
|               |             |                                | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Idle speed</li> <li>● Ambient air temperature is below 19°C (66°F)</li> <li>● Air conditioner is not operating</li> </ul> | Approximately 5V           |
| 12            | P           | Air conditioner relay          | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● Both A/C switch and blower switch are ON*</li> </ul>  | 0 - 1V                     |
|               |             |                                | <b>[Engine is running]</b> <ul style="list-style-type: none"> <li>● A/C switch is OFF</li> </ul>  | BATTERY VOLTAGE (11 - 14V) |

\*: Any mode except "OFF", ambient air temperature is above 25°C (77°F).

## Diagnostic Procedure

UBS00678

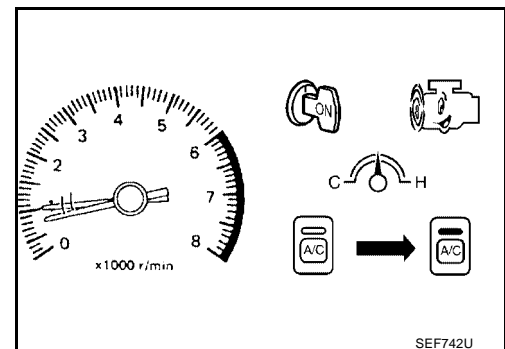
### 1. CHECK OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.  
**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.

**850 rpm or more (in "P" or "N" position)**

OK or NG

- OK >> **INSPECTION END.**
- NG >> GO TO 2.



SEF742U

### 2. CHECK AIR CONDITIONER FUNCTION

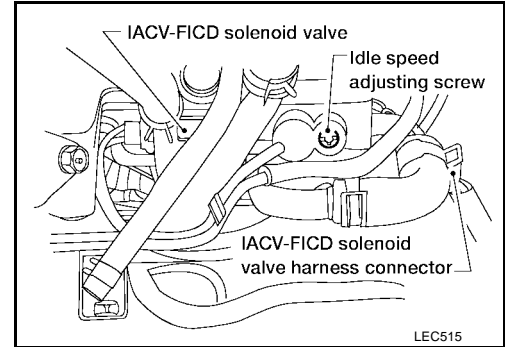
Check if air conditioner compressor functions normally.

OK or NG

- OK >> GO TO 3.
- NG >> Refer to [MTC-24, "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.

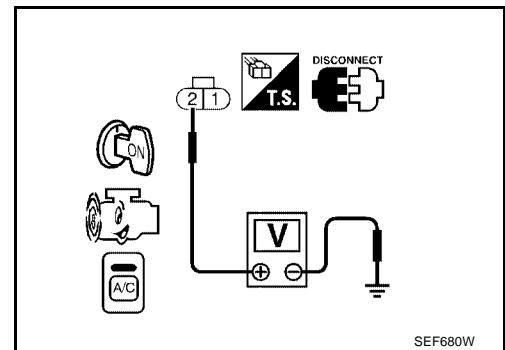


5. Check voltage between terminal 2 and ground with CONSULT-II or tester.

**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 for open or short between IACV-FICD solenoid valve and harness connector F27

>> 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 body 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

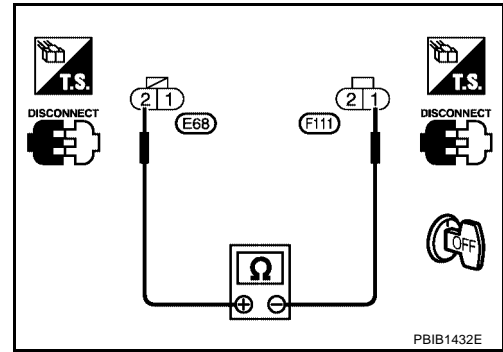
1. Check harness continuity between ambient air temperature switch terminal 2 and IACV-FICD solenoid valve terminal 1.

**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

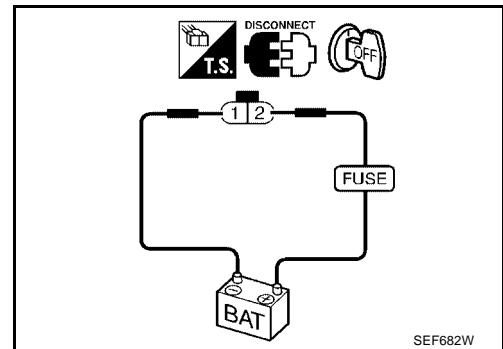
Check the following.

- 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

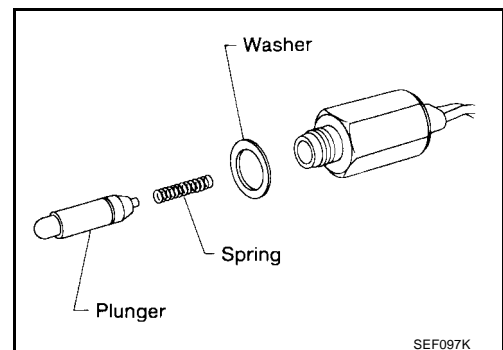
1. Disconnect IACV-FICD solenoid valve harness connector.
2. Check for clicking sound when applying 12V direct current to terminals.
3. Check plunger for seizing or sticking.



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-1301, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"](#) .

>> INSPECTION END.

# MIL AND DATA LINK CONNECTOR

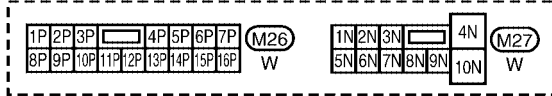
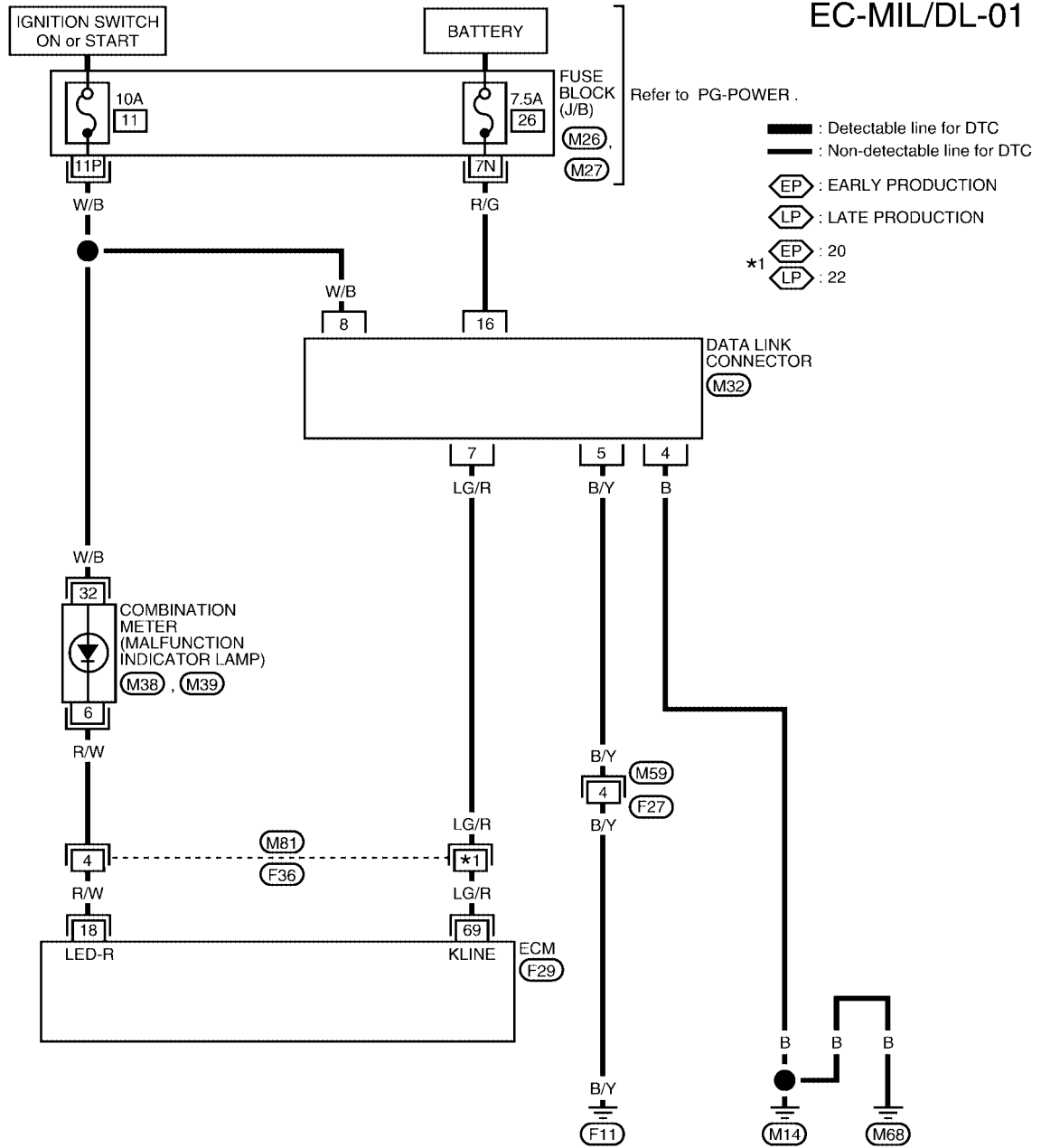
[VG33ER]

## MIL AND DATA LINK CONNECTOR

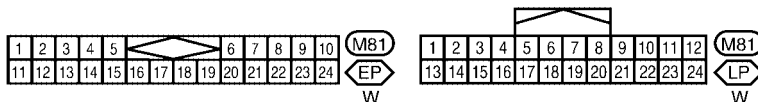
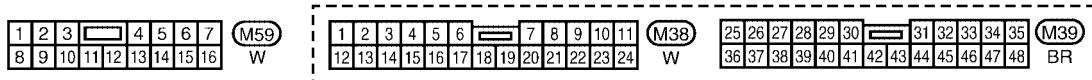
PF:24814

### Wiring Diagram

UBS00679



Refer to the following.  
F29 - ELECTRICAL UNITS

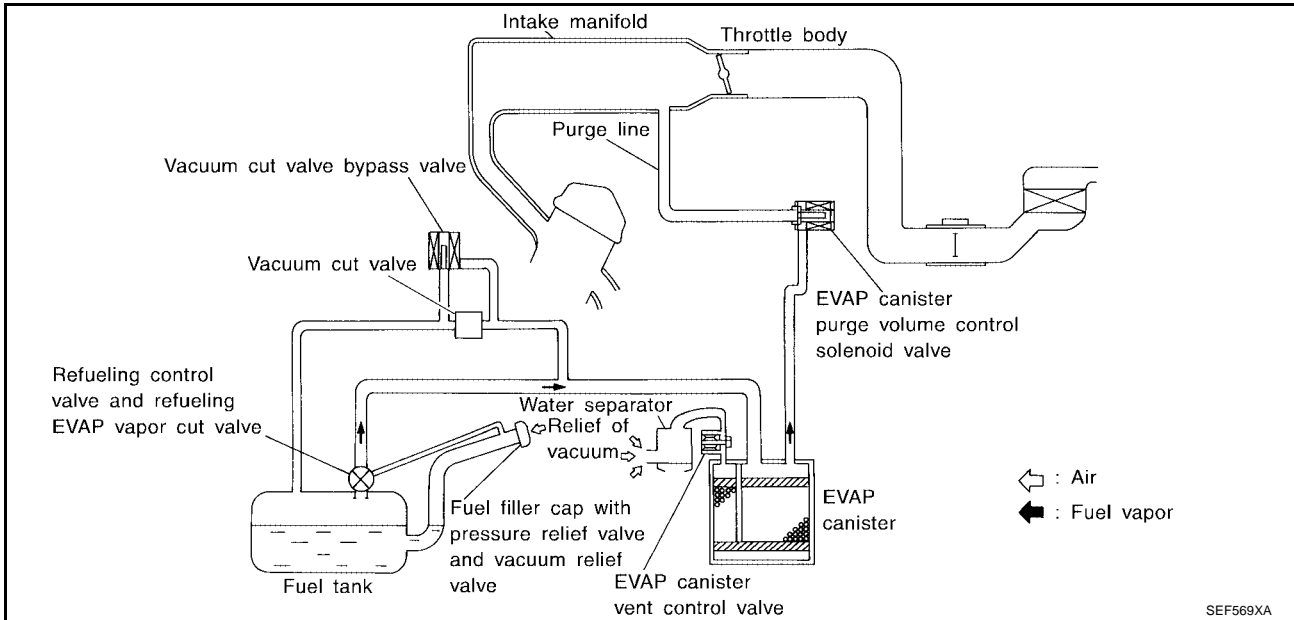


## EVAPORATIVE EMISSION SYSTEM

PFP:14950

### Description SYSTEM DESCRIPTION

UBS007FD



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.

The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.

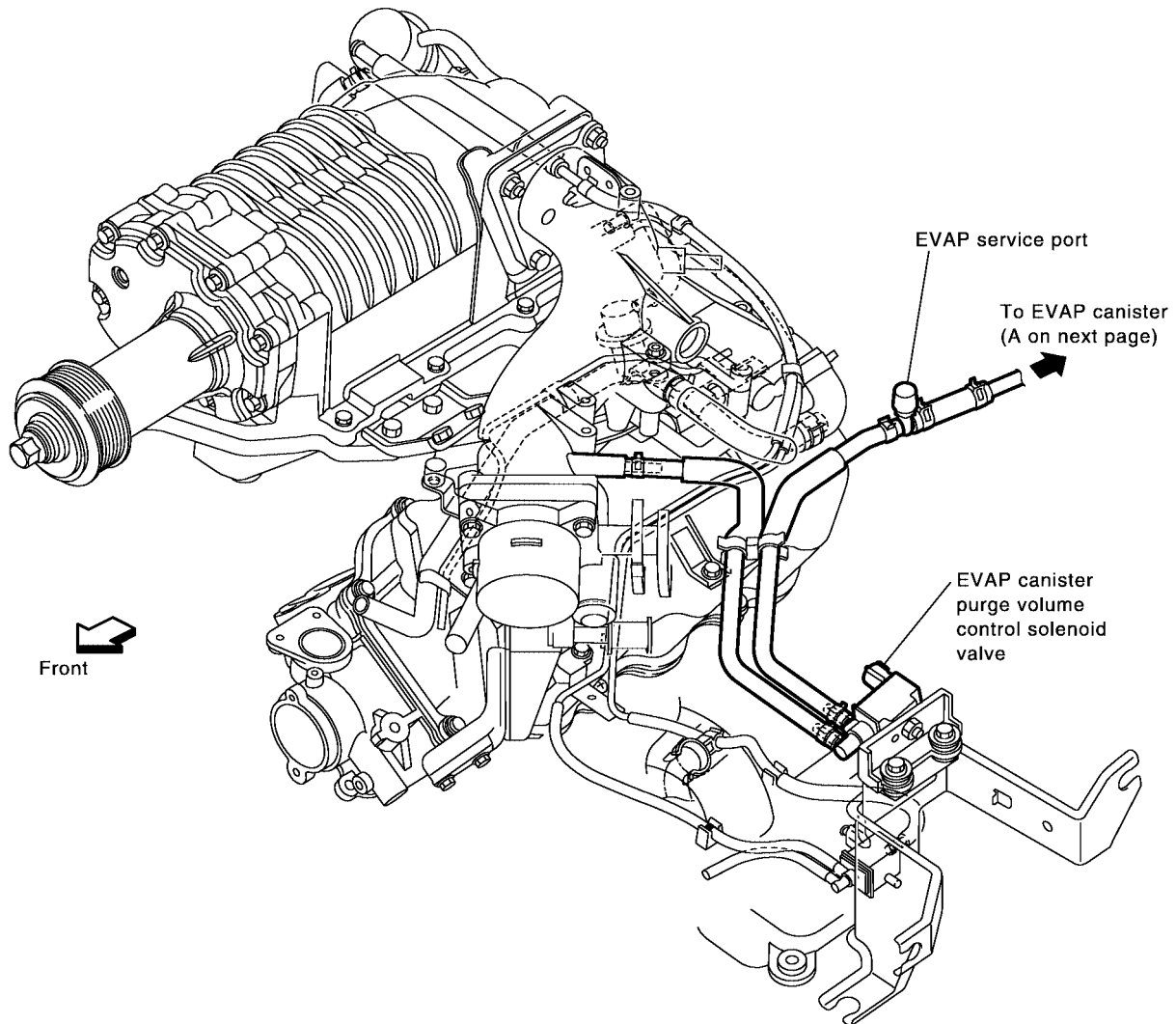
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.



# EVAPORATIVE EMISSION SYSTEM

[VG33ER]

## EVAPORATIVE EMISSION LINE DRAWING



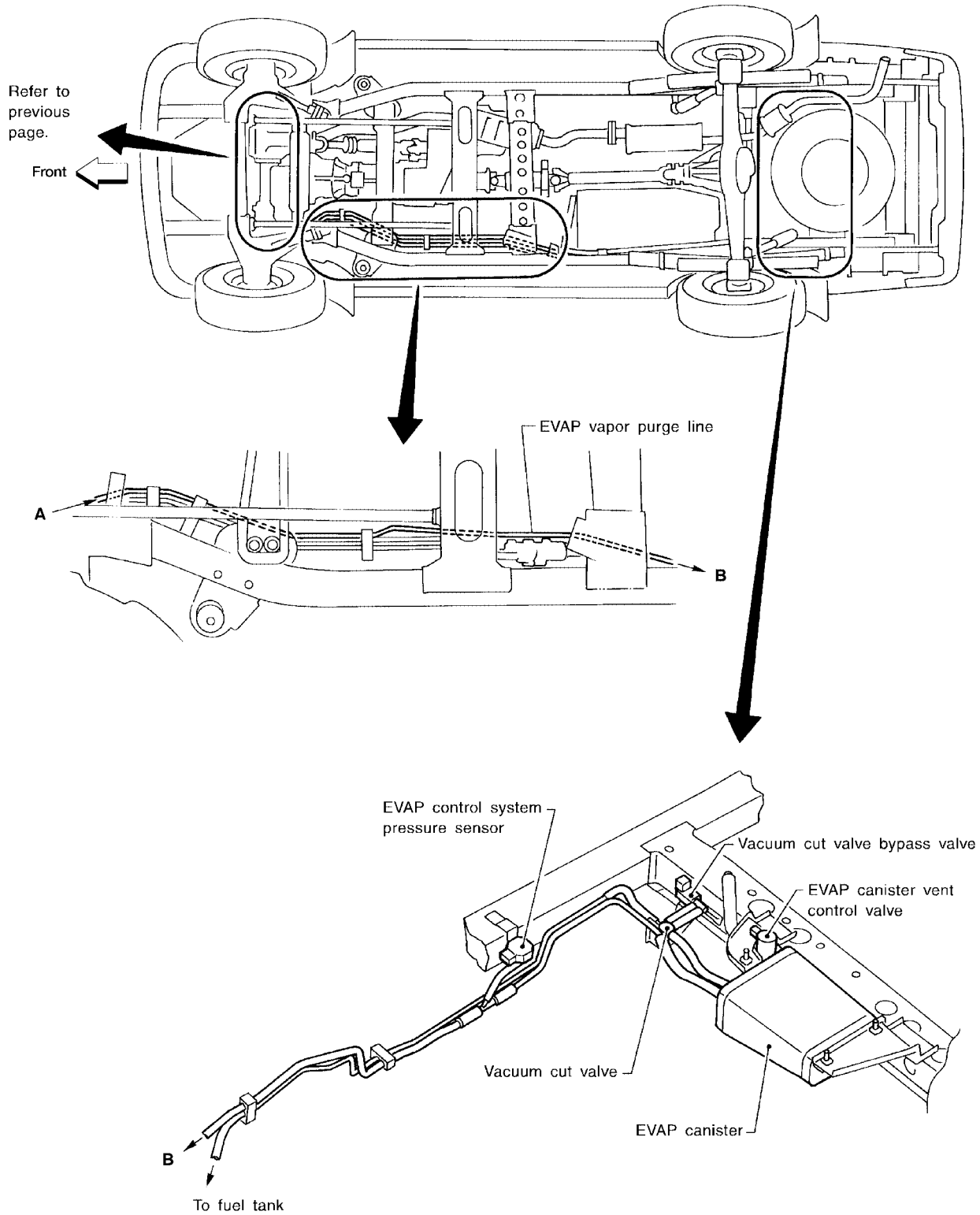
**NOTE:**  
Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

PBIB1463E

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# EVAPORATIVE EMISSION SYSTEM

[VG33ER]

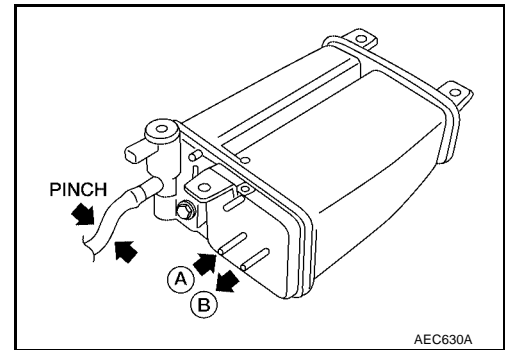


AEC886A

### Component Inspection EVAP CANISTER

Check EVAP canister as follows:

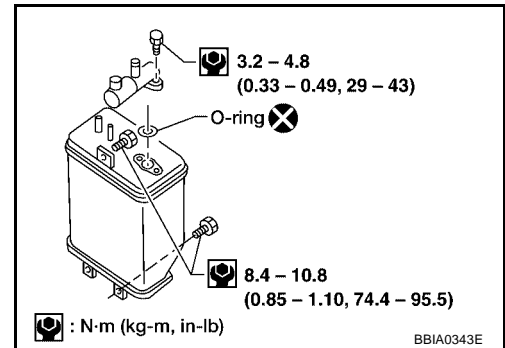
1. Pinch the fresh air hose.
2. Blow air into port **A** and check that it flows freely out of port **B**.



### Tightening Torque

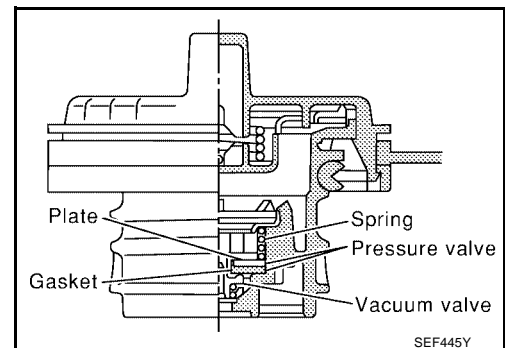
Tighten EVAP canister as shown in the figure.

**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.

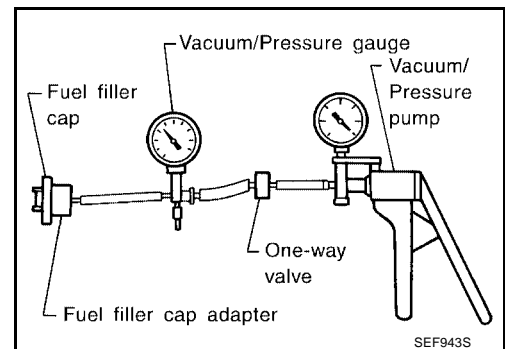
**Pressure:** 15.3 - 20.0 kPa (0.156 - 0.204 kg/cm<sup>2</sup>, 2.22 - 2.90 psi)

**Vacuum:** -6.0 to -3.3 kPa (-0.061 to -0.034 kg/cm<sup>2</sup>, -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

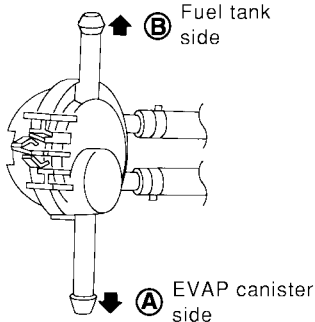
**With CONSULT-II**

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.

# EVAPORATIVE EMISSION SYSTEM

[VG33ER]

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.

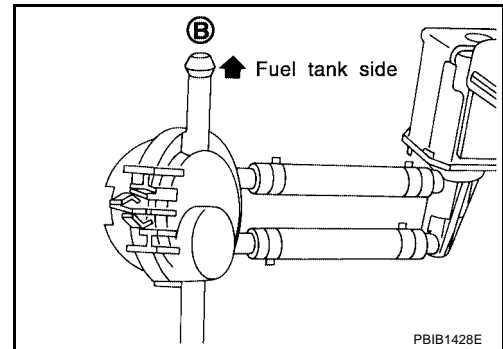


| ACTIVE TEST     |         |
|-----------------|---------|
| VC/V BYPASS/V   | OFF     |
| MONITOR         |         |
| ENG SPEED       | XXX rpm |
| A/F ALPHA-B1    | XXX %   |
| A/F ALPHA-B2    | XXX %   |
| HO2S1 MNTR (B1) | LEAN    |
| HO2S1 MNTR (B2) | LEAN    |
| THRTL POS SEN   | XXX V   |

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.



## 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

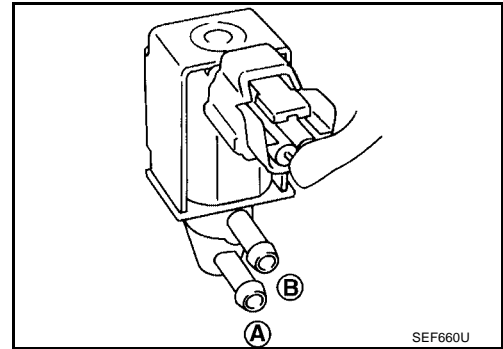
3. Check air passage continuity.

# EVAPORATIVE EMISSION SYSTEM

[VG33ER]

| Condition<br>PURG VOL CONT/V value | Air passage continuity<br>between A and B |
|------------------------------------|---|
| 100.0%                             | Yes                                       |
| 0.0%                               | No  |

If NG, replace the EVAP canister purge volume control solenoid valve.

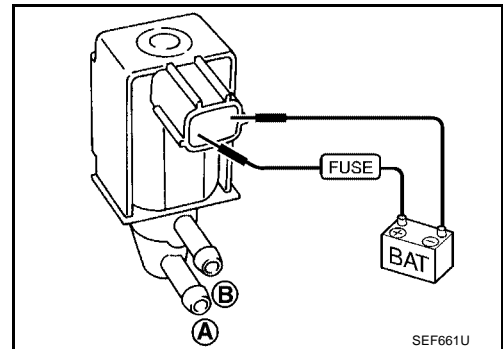


## ⊗ Without CONSULT-II

1. Check air passage continuity.

| Condition  | Air passage continuity<br>between A and B |
|--|---|
| 12V direct current supply between<br>terminals 1 and 2 | Yes                                       |
| No supply  | No  |

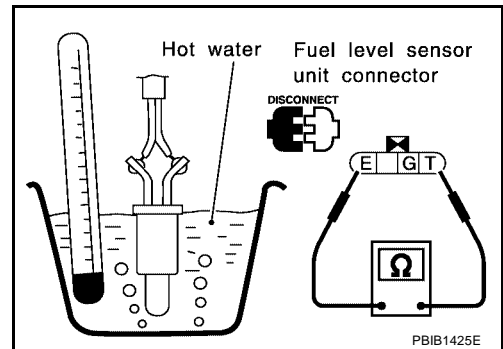
2. If NG, replace the EVAP canister purge volume control solenoid valve.



## FUEL TANK TEMPERATURE SENSOR

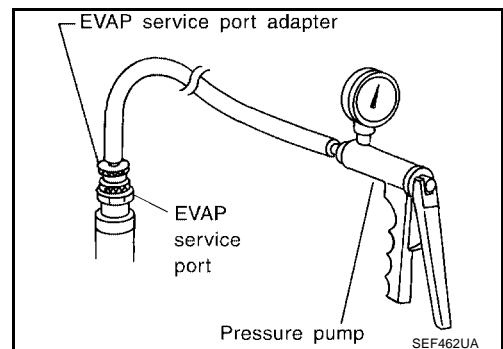
1. Remove fuel level sensor unit.
2. Check resistance fuel level sensor unit terminals T and E by heating with hot water or heat gun as shown in the figure.

| 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

### CAUTION:

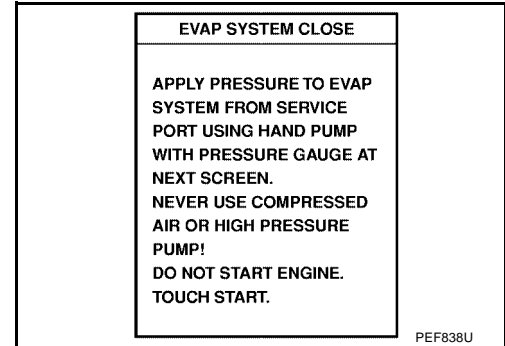
- Never use compressed air or a high pressure pump.
- Do not exceed 4.12 kPa (0.042 kg/cm<sup>2</sup>, 0.6 psi) of pressure in EVAP system.

**NOTE:**

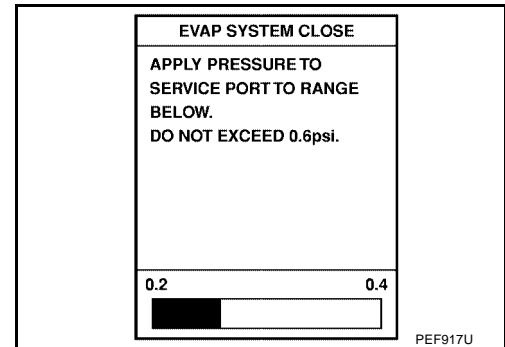
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

**WITH CONSULT-II**

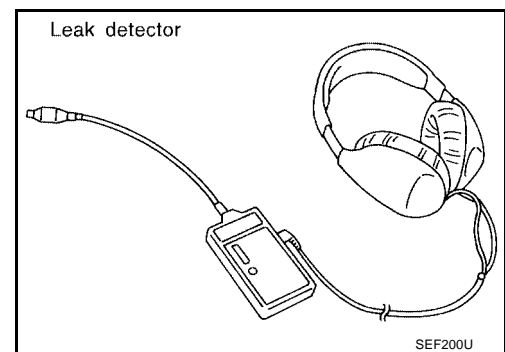
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose to the EVAP service port adapter.
3. Turn ignition switch "ON".
4. Select the "EVAP SYSTEM CLOSE" of "WORK SUPPORT MODE" with CONSULT-II.
5. Touch "START". A bar graph (Pressure indicating 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.

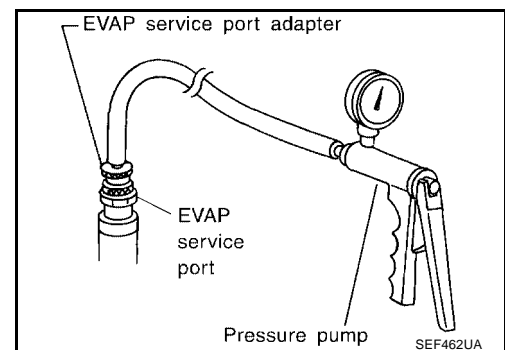


8. Locate the leak using a leak detector. Refer to [EC-1745, "EVAPORATIVE EMISSION LINE DRAWING"](#).



**WITHOUT CONSULT-II**

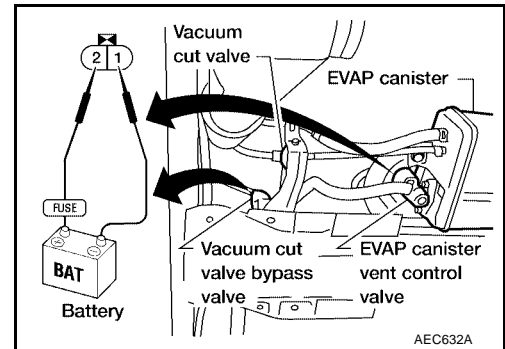
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump with pressure gauge to the EVAP service port adapter.



# EVAPORATIVE EMISSION SYSTEM

[VG33ER]

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<sup>2</sup> , 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-1745. "EVAPORATIVE EMISSION LINE DRAWING"](#) .



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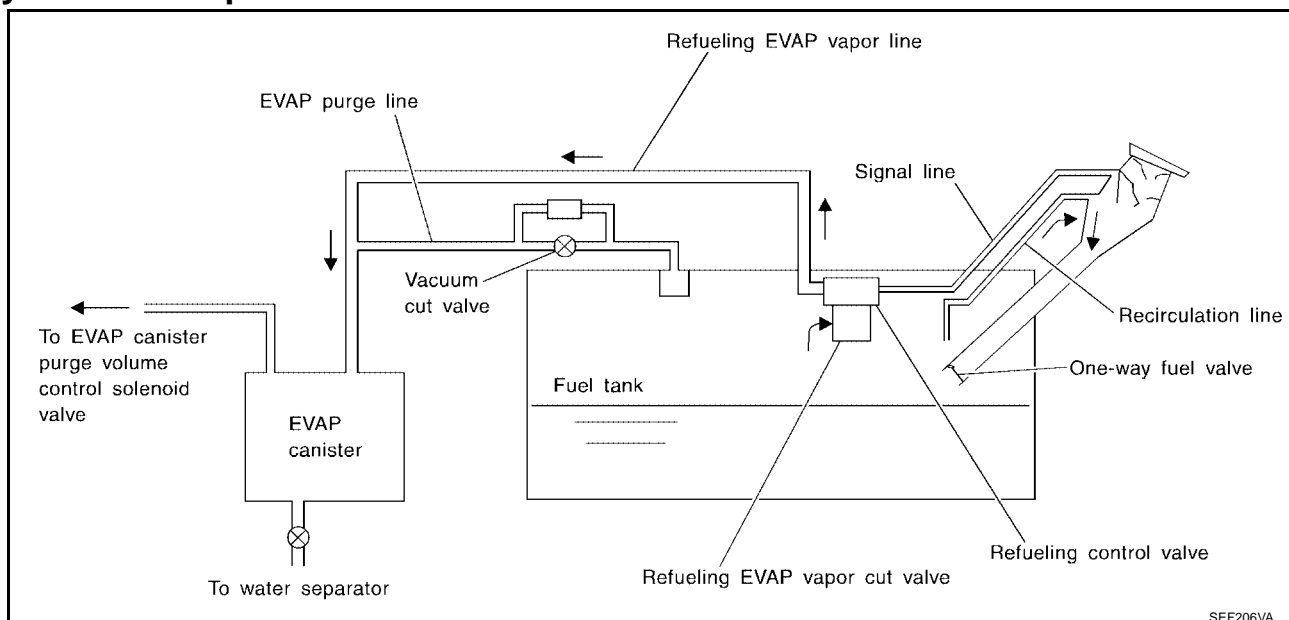
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## ON BOARD REFUELING VAPOR RECOVERY (ORVR)

PFP:00032

## System Description

UBS006ZH



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<sub>2</sub> 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-1222, "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

**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

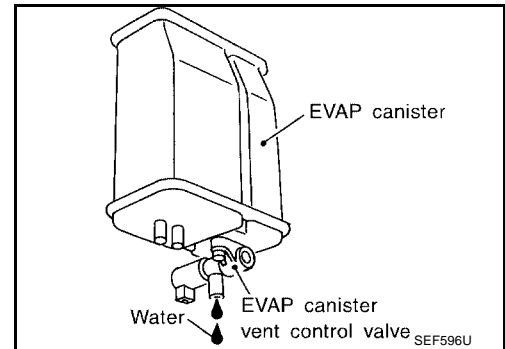
- OK >> GO TO 2.
- NG >> GO TO 3.

### 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

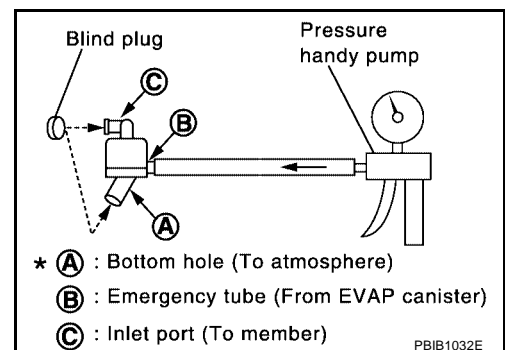
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG 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

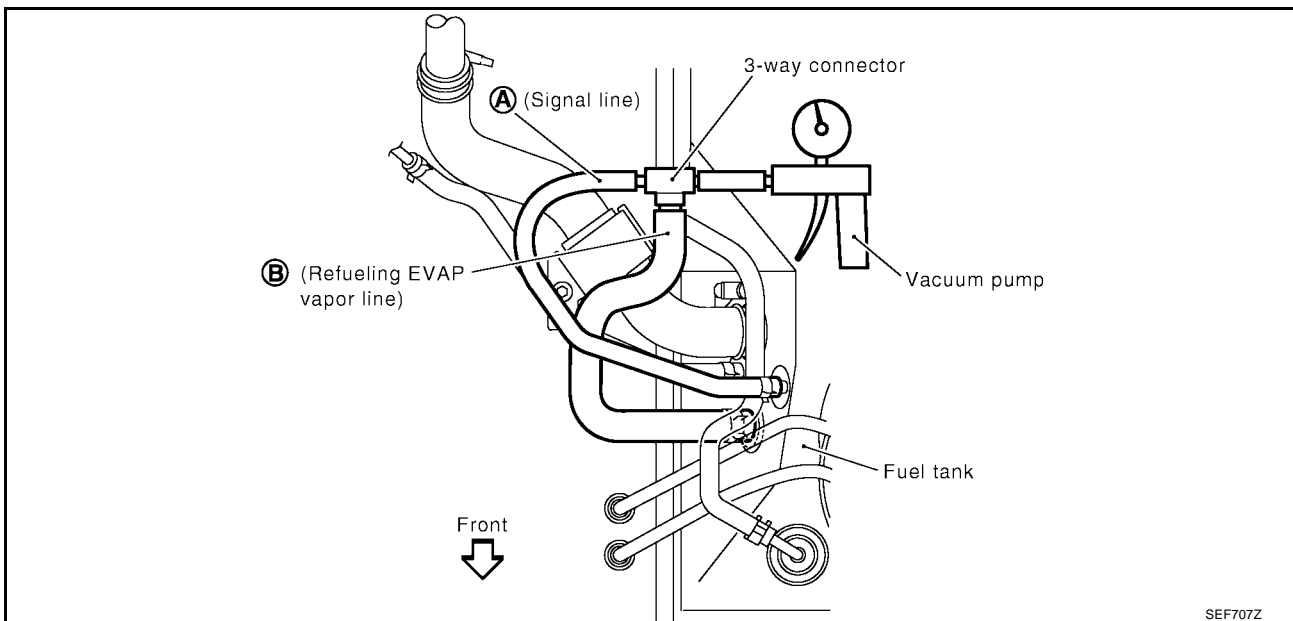
Check the EVAP hose between EVAP canister and water separator for clogging or poor connection.

>> 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.

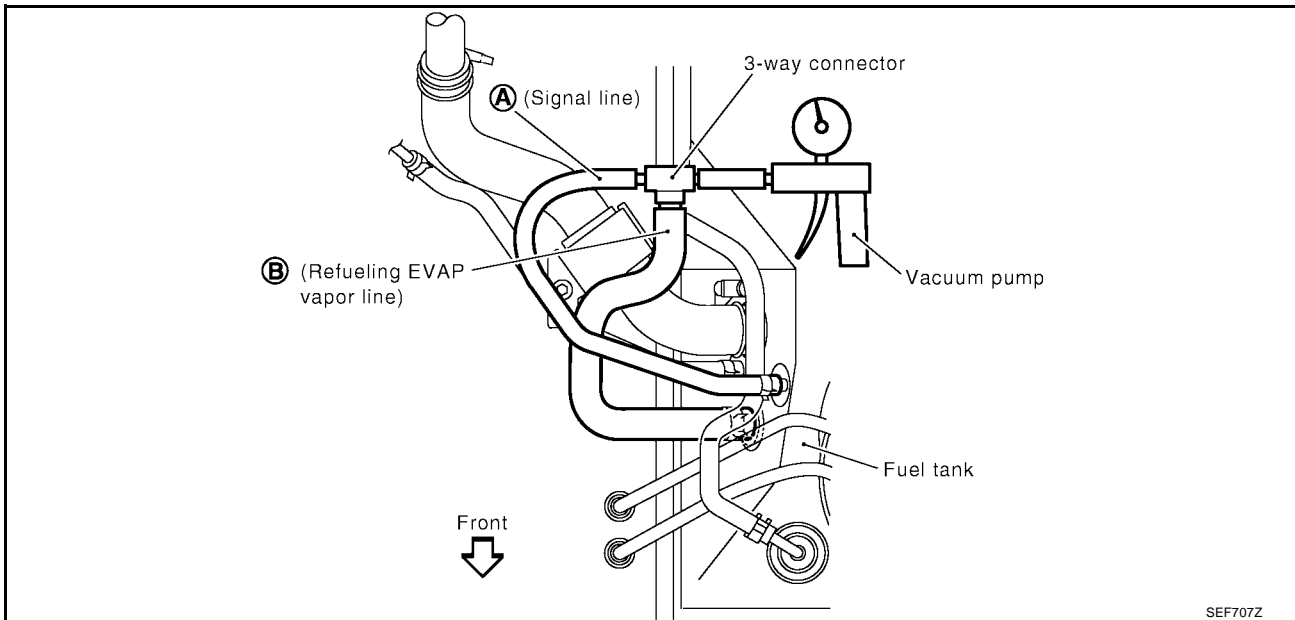
**OK or NG**

- 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.

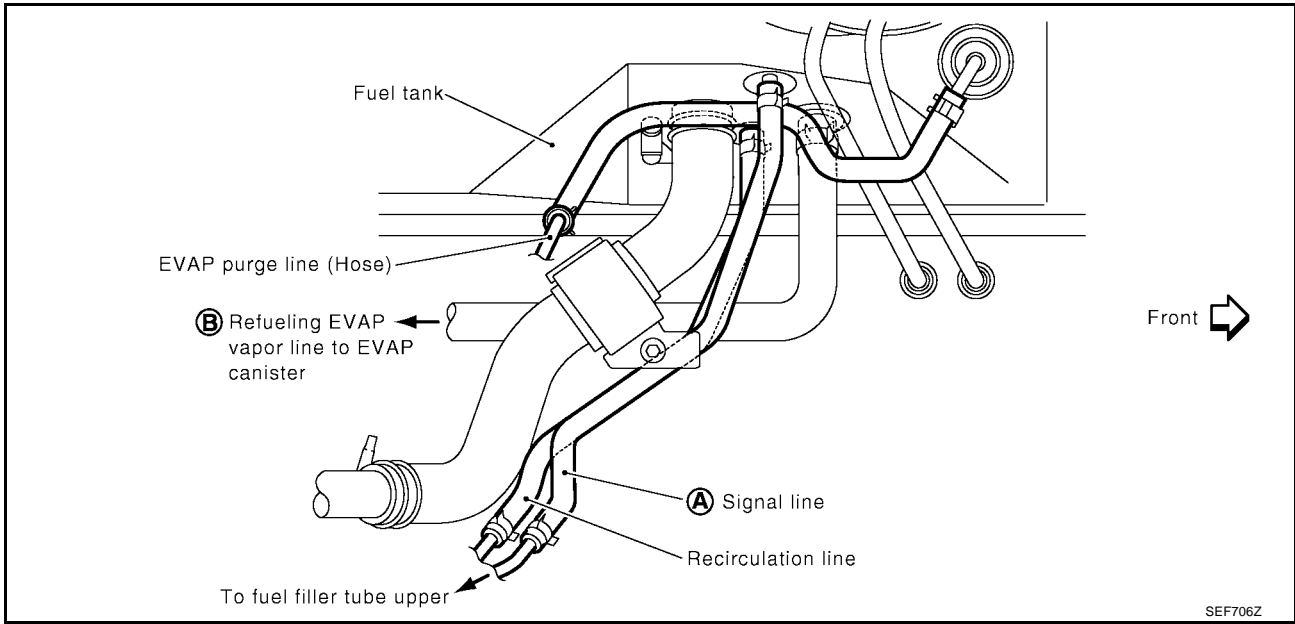


OK or NG

- 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.

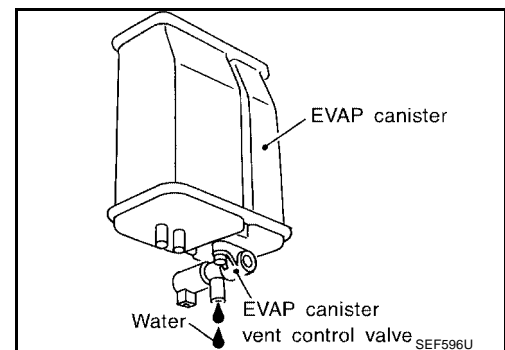
## 2. CHECK IF EVAP CANISTER SATURATED WITH WATER

- 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

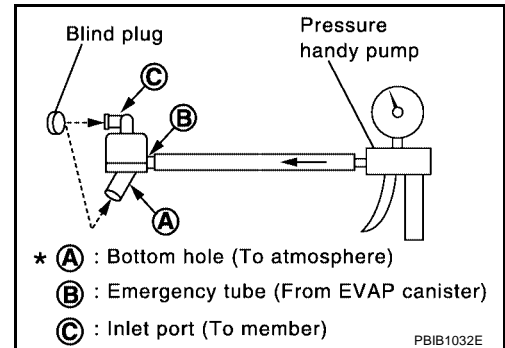
1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A**, and then **C** plugged.
5. In case of NG 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

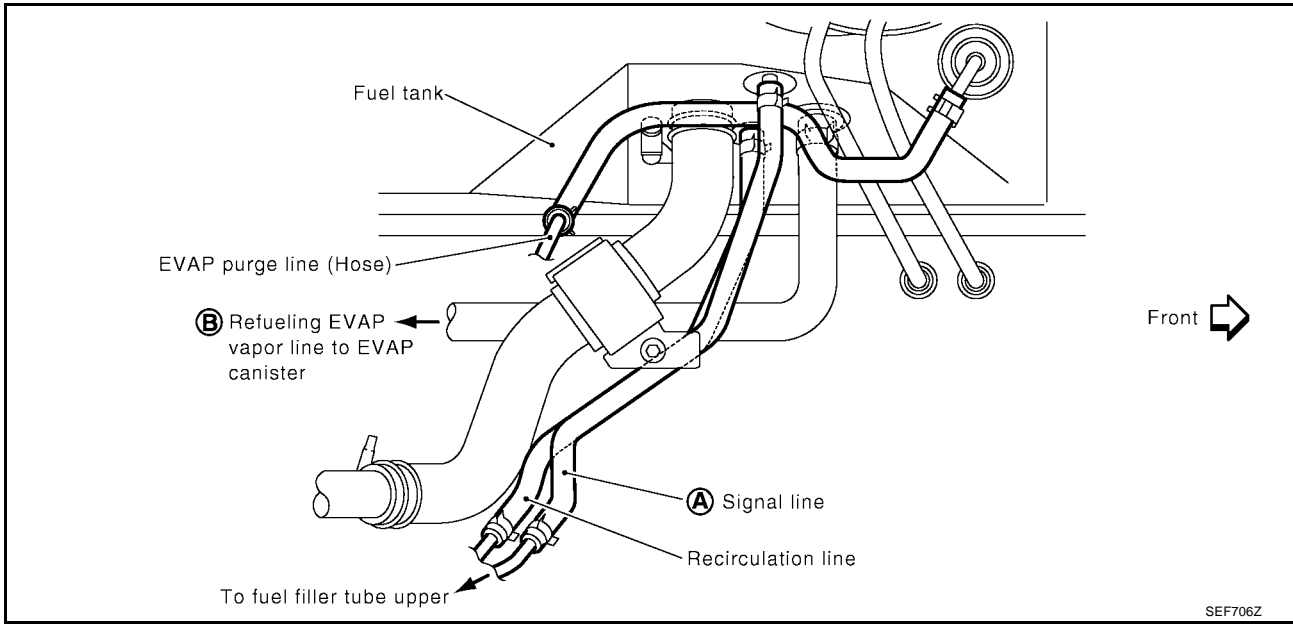
Check signal line and recirculation line for clogging, dents and cracks.

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.

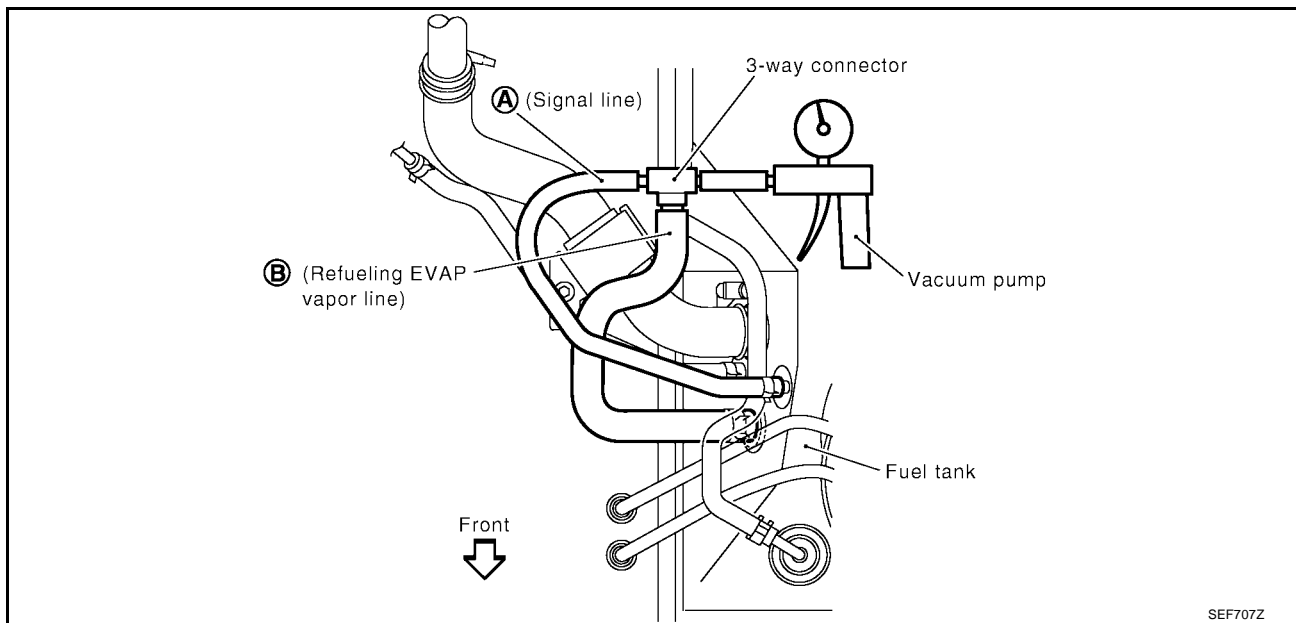
NG >> Replace refueling control valve with fuel tank.

## 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.



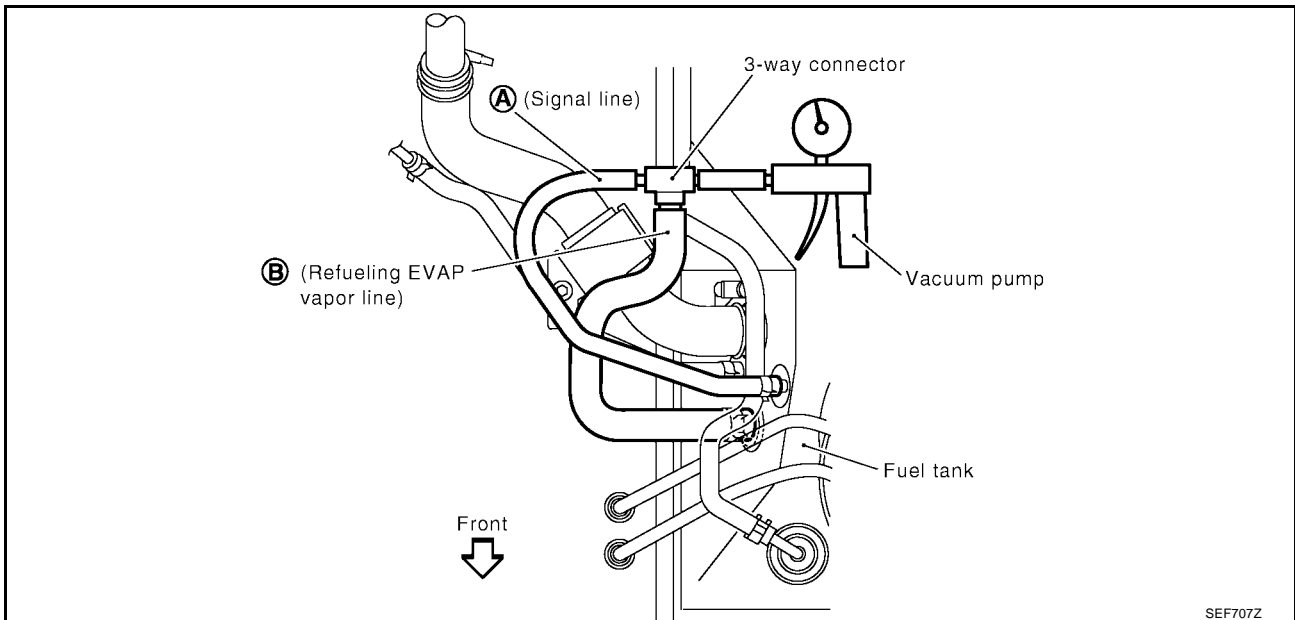
OK or NG

- 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**

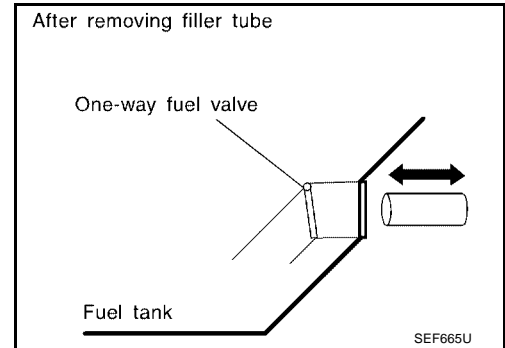
1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.  
When a stick is inserted, the valve should open, when removing stick it should close.

**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.

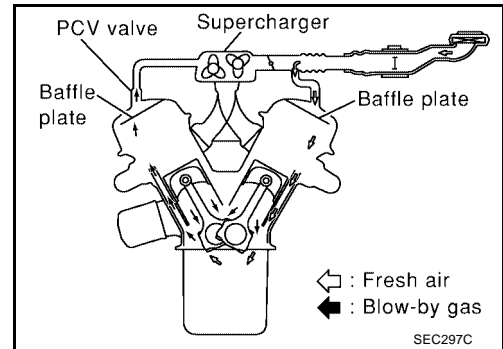
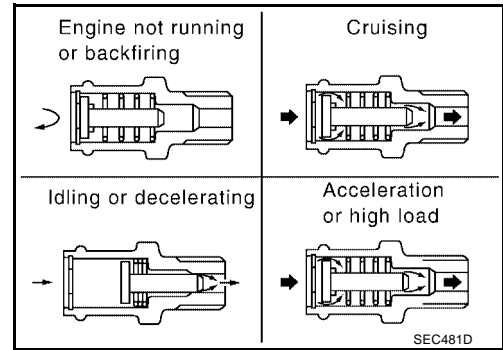


A  
EC  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

**POSITIVE CRANKCASE VENTILATION**

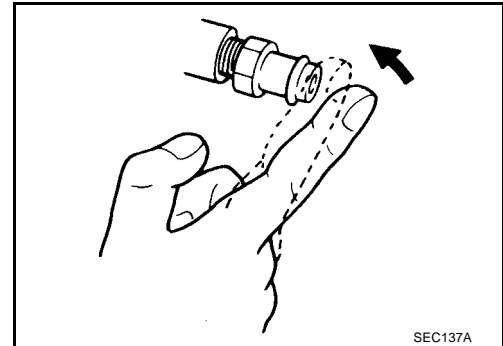
**Description**

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.



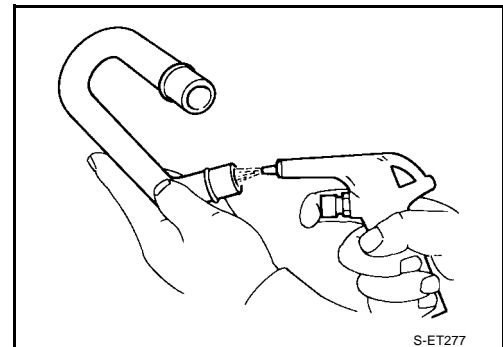
**Component Inspection**  
**PCV (POSITIVE CRANKCASE VENTILATION) VALVE**

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)

[VG33ER]

## SERVICE DATA AND SPECIFICATIONS (SDS)

PF0:00030

### Fuel Pressure Regulator

UBS0067E

| Fuel pressure at idling kPa (kg/cm <sup>2</sup> , psi) |                             |
|--|-----------------------------|
| Vacuum hose is connected                               | Approximately 235 (2.4, 34) |
| Vacuum hose is disconnected                            | Approximately 294 (3.0, 43) |

### Idle Speed and Ignition Timing

UBS0067F

|  |                                   |                 |
|--|-----------------------------------|-----------------|
| Base idle speed*1                      | No-load*4 (in "P" or N" position) | 700±50 rpm      |
| Target idle speed*2                    | No-load*4 (in "P" or N" position) | 750±50 rpm      |
| Air conditioner: ON                    | In "P" or N" position             | 850 rpm or more |
| Ignition timing*3                      | In "P" or N" position             | 10°±2° BTDC     |
| 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

UBS0067G

|                                       |                     |
|---------------------------------------|---------------------|
| 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

UBS0067H

|   |   |
|---|---|
| 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*<br>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

UBS0067I

| 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

UBS0067J

|                             |            |
|-----------------------------|------------|
| Resistance [at 25°C (77°F)] | 2.3 - 4.3Ω |
|-----------------------------|------------|

### Fuel Pump

UBS0067K

|                             |            |
|-----------------------------|------------|
| Resistance [at 25°C (77°F)] | 0.2 - 5.0Ω |
|-----------------------------|------------|

### IACV-AAC Valve

UBS0067L

|                             |                     |
|-----------------------------|---------------------|
| Resistance [at 20°C (68°F)] | Approximately 10.0Ω |
|-----------------------------|---------------------|

### Injector

UBS0067M

|                             |          |
|-----------------------------|----------|
| Resistance [at 25°C (77°F)] | 10 - 14Ω |
|-----------------------------|----------|

# SERVICE DATA AND SPECIFICATIONS (SDS)

[VG33ER]

## Throttle Position Sensor

UBS0067N

| Throttle valve conditions | Voltage (at normal operating temperature, engine off, ignition switch ON) |
|---------------------------|---|
| Completely closed (a)     | 0.15 - 0.85V  |
| Partially open            | Between (a) and (b)   |
| Completely open (b)       | 3.5 - 4.7V  |

## Calculated Load Value

UBS0067O

|              | 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

UBS0067P

| Temperature °C (°F) | Resistance kΩ |
|---------------------|---------------|
| 20 (68)             | 2.1 - 2.9     |
| 80 (176)            | 0.27 - 0.38   |

## Heated Oxygen Sensor 2 Heater

UBS0067Q

|                             |            |
|-----------------------------|------------|
| Resistance [at 25°C (77°F)] | 2.3 - 4.3Ω |
|-----------------------------|------------|

## Crankshaft Position Sensor (OBD)

UBS0067R

|                             |            |
|-----------------------------|------------|
| Resistance [at 20°C (68°F)] | 512 - 632Ω |
|-----------------------------|------------|

## Fuel Tank Temperature Sensor

UBS0067S

| Temperature °C (°F) | Resistance kΩ |
|---------------------|---------------|
| 20 (68)             | 2.3 - 2.7     |
| 50 (122)            | 0.79 - 0.90   |