# SECTION EC
# ENGINE CONTROL SYSTEM



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## DTC No. Index

ABS00DFG

**NOTE:**
**If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-166, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**

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| P0335 | 0335 | CKP SEN/CIRCUIT | EC-292 |
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| P1166 | 1166 | HO2S2 (B2) | EC-431 |
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| P1276 | 1276 | A/F SENSOR1 (B1) | EC-511 |
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| P1286 | 1286 | A/F SENSOR1 (B2) | EC-511 |
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| P2135 | 2135 | TP SENSOR | EC-612 |
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*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: The troubleshooting for this DTC needs CONSULT-II.
*5: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

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**NOTE:**
**If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-166, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**

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| A/F SENSOR1 (B1) | P1273 | 1273 | EC-493 |
| A/F SENSOR1 (B1) | P1274 | 1274 | EC-502 |
| A/F SENSOR1 (B1) | P1276 | 1276 | EC-511 |
| A/F SENSOR1 (B1) | P1278 | 1278 | EC-520 |
| A/F SENSOR1 (B1) | P1279 | 1279 | EC-532 |
| A/F SENSOR1 (B2) | P1281 | 1281 | EC-477 |
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| A/F SENSOR1 (B2) | P1289 | 1289 | EC-532 |
| A/F SEN1 HTR (B1) | P1031 | 1031 | EC-395 |
| A/F SEN1 HTR (B1) | P1032 | 1032 | EC-395 |
| A/F SEN1 HTR (B2) | P1051 | 1051 | EC-395 |
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| ASCD VHL SPD SEN | P1574 | 1574 | EC-583 |
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| CLOSED LOOP-B2 | P1168 | 1168 | EC-453 |
| CMP SEN/CIRC-B1 | P0340 | 0340 | EC-299 |
| CMP SEN/CIRC-B2 | P0345 | 0345 | EC-299 |
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| EVAP PURG FLOW/MON | P0441 | 0441 | EC-314 |
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| FUEL LEV SEN SLOSH | P0460 | 0460 | EC-375 |
| FUEL LEVEL SENSOR | P0461 | 0461 | EC-377 |
| FUEL LEVL SEN/CIRC | P0462 | 0462 | EC-379 |
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| HO2S2 (B1) | P0139 | 0139 | EC-231 |
| HO2S2 (B1) | P1146 | 1146 | EC-431 |
| HO2S2 (B1) | P1147 | 1147 | EC-442 |
| HO2S2 (B2) | P0158 | 0158 | EC-222 |
| HO2S2 (B2) | P0159 | 0159 | EC-231 |
| HO2S2 (B2) | P1166 | 1166 | EC-431 |
| HO2S2 (B2) | P1167 | 1167 | EC-442 |
| HO2S2 HTR (B1) | P0037 | 0037 | EC-174 |
| HO2S2 HTR (B1) | P0038 | 0038 | EC-174 |
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| HO2S2 HTR (B2) | P0058 | 0058 | EC-174 |
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| MAF SEN/CIRCUIT | P0102 | 0102 | EC-191 |
| MAF SEN/CIRCUIT | P0103 | 0103 | EC-191 |
| MULTI CYL MISFIRE | P0300 | 0300 | EC-277 |
| NATS MALFUNCTION | P1610 - P1615 | 1610 - 1615 | EC-45 |
| **NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.** | **P0000** | **0000** | **—** |
| P-N POS SW/CIRCUIT | P1706 | 1706 | EC-585 |
| PNP SW/CIRC | P0705 | 0705 | AT-119 |
| PURG VOLUME CONT/V | P0444 | 0444 | EC-327 |
| PURG VOLUME CONT/V | P0445 | 0445 | EC-327 |
| PURG VOLUME CONT/V | P1444 | 1444 | EC-544 |
| PW ST P SEN/CIRC | P0550 | 0550 | EC-387 |
| SENSOR POWER/CIRC | P1229 | 1229 | EC-472 |
| TCC SOLENOID/CIRC | P0740 | 0740 | AT-130 |
| TCM | P0700 | 0700 | AT-118 |
| TCS C/U FUNCTN | P1211 | 1211 | EC-454 |
| TCS/CIRC | P1212 | 1212 | EC-455 |
| THERMSTAT FNCTN | P0128 | 0128 | EC-220 |
| TP SEN 1/CIRC | P0222 | 0222 | EC-270 |
| TP SEN 1/CIRC | P0223 | 0223 | EC-270 |
| TP SEN 2/CIRC | P0122 | 0122 | EC-207 |
| TP SEN 2/CIRC | P0123 | 0123 | EC-207 |
| TP SEN/CIRC A/T | P1705 | 1705 | AT-138 |
| TP SENSOR | P2135 | 2135 | EC-612 |
| TURBINE REV S/CIRC | P1716 | 1716 | AT-146 |
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| VENT CONTROL VALVE | P1446 | 1446 | EC-552 |

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: The troubleshooting for this DTC needs CONSULT-II.
*5: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

# PRECAUTIONS

PFP:00001

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

ABS00ANB

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

**WARNING:**

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

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

ABS00AND

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.

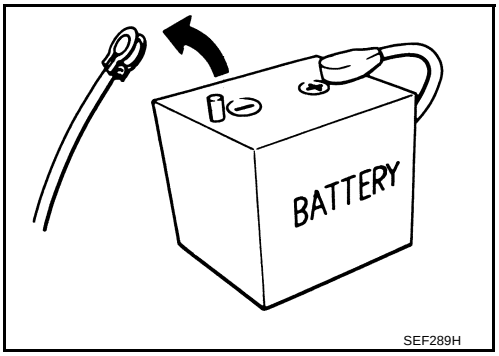
**CAUTION:**

- **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-69, "HARNESS CONNECTOR" .**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EVAP system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

## Precaution

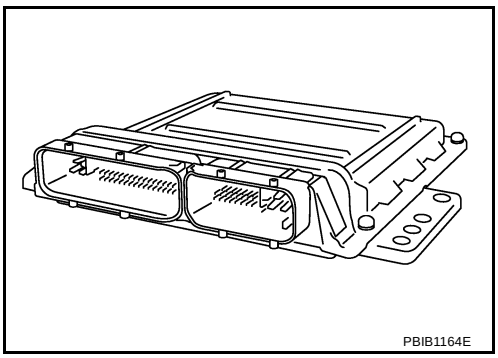
ABS00ANE

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

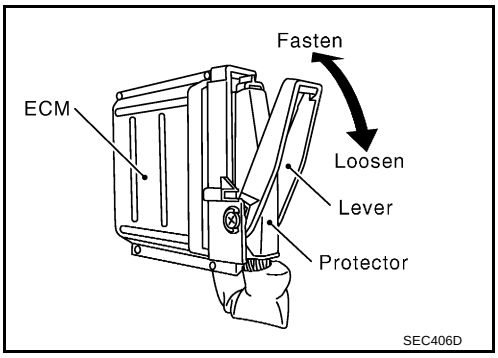


SEF289H

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

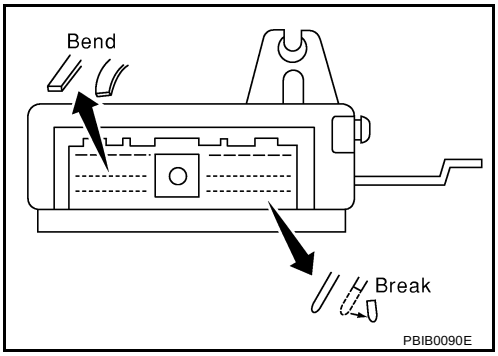

PBIB1164E

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



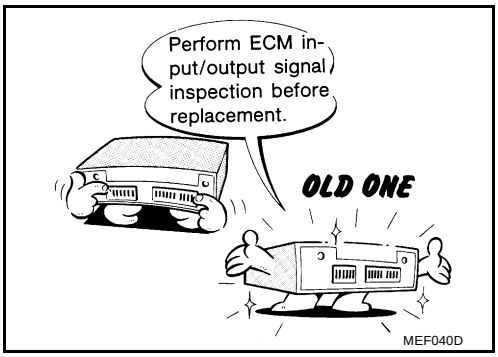
SEC406D

- **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.**



PBIB0090E

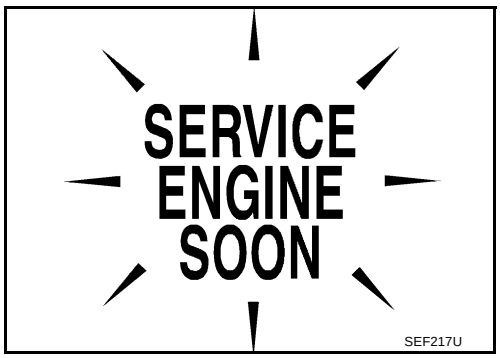
- **Keep engine control system parts and harness dry.**
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-117, "ECM Terminals and Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**



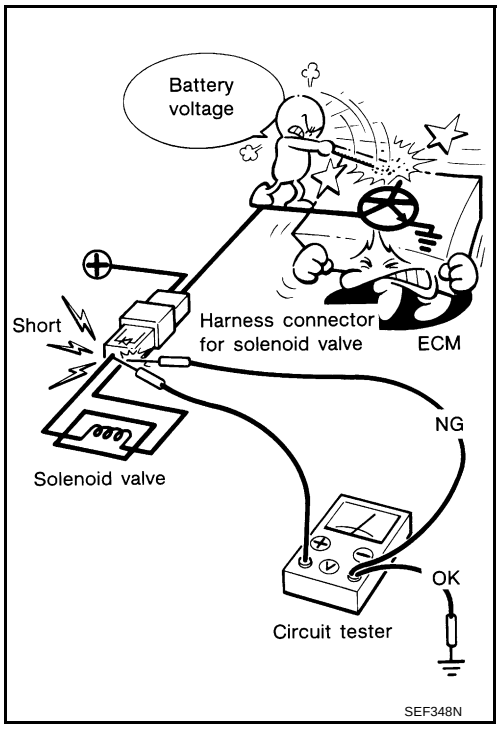
MEF040D

- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**

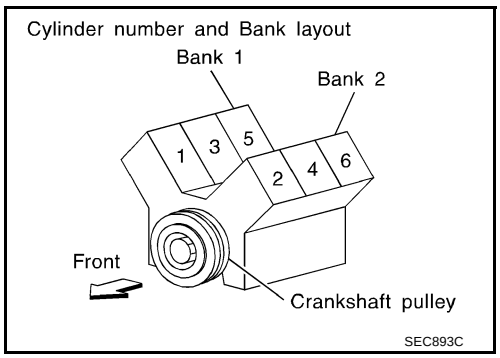
- **After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check.**
  **The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.**



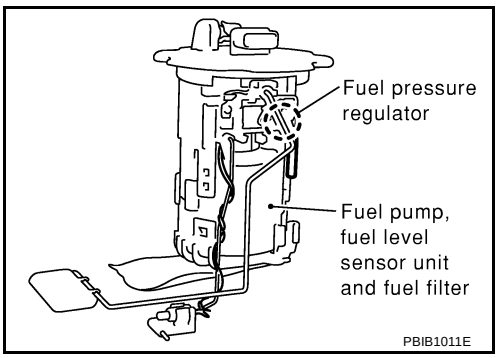

- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  **Accidental contact of probes will cause a short circuit and damage the ECM power transistor.**
- **Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage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



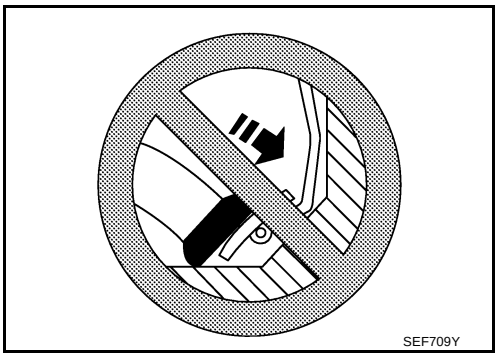

- **B1 indicates the bank 1, B2 indicates the bank 2 as shown in the figure.**



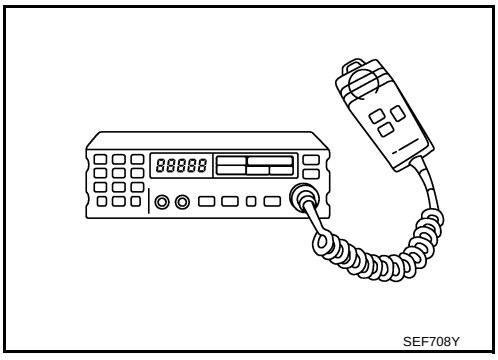
- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**




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




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




## Wiring Diagrams and Trouble Diagnosis

ABS00ANF

When you read wiring diagrams, refer to the following:

- GI-14, "How to Read Wiring Diagrams"
- PG-3, "POWER SUPPLY ROUTING CIRCUIT" for power distribution circuit

When you perform trouble diagnosis, refer to the following:

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

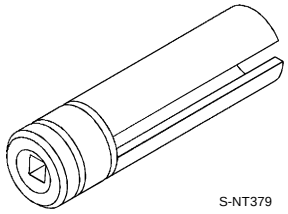
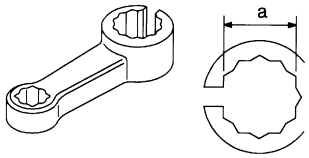
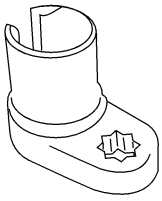
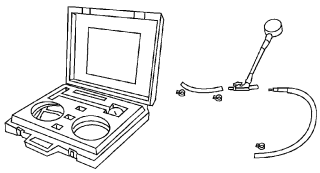
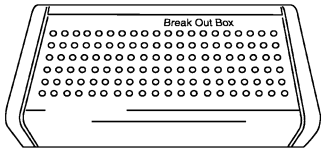
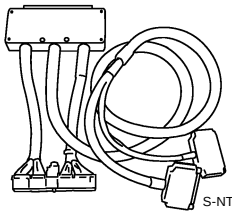
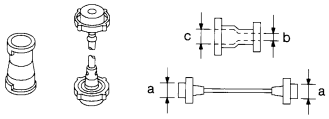
# PREPARATION

PFP:00002

## Special Service Tools

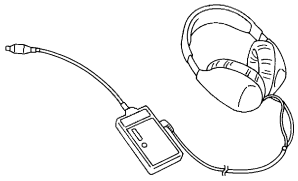
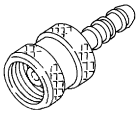
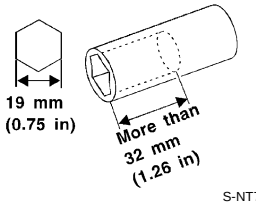
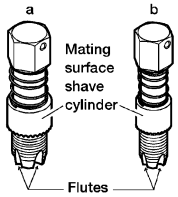
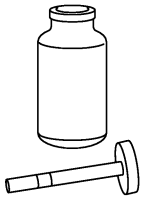
ABS00ANG

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

| Tool number (Kent-Moore No.) Tool name | | Description |
|---|---|---|
| KV10117100 (J-36471-A) Heated oxygen sensor wrench |  S-NT379 | Loosening or tightening heated oxygen sensor with 22 mm (0.87 in) hexagon nut |
| KV10114400 (J-38365) Heated oxygen sensor wrench |   S-NT636 | Loosening or tightening air fuel ratio (A/F) sensor **a: 22 mm (0.87 in)** |
| (J-44626) Air fuel ratio (A/F) sensor wrench |  LEM054 | Loosening or tightening air fuel ratio (A/F) sensor 1 |
| (J-44321) Fuel pressure gauge kit |  LEC642 | Checking fuel pressure |
| KV109E0010 (J-46209) Break-out box |   S-NT825 | Measuring ECM signals with a circuit tester |
| KV109E0080 (J-45819) Y-cable adapter |  S-NT826 | Measuring ECM signals with a circuit tester |
| EG17650301 (J-33984-A) Radiator cap tester adapter |   S-NT564 | Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in) |

## Commercial Service Tools

ABS00ANH

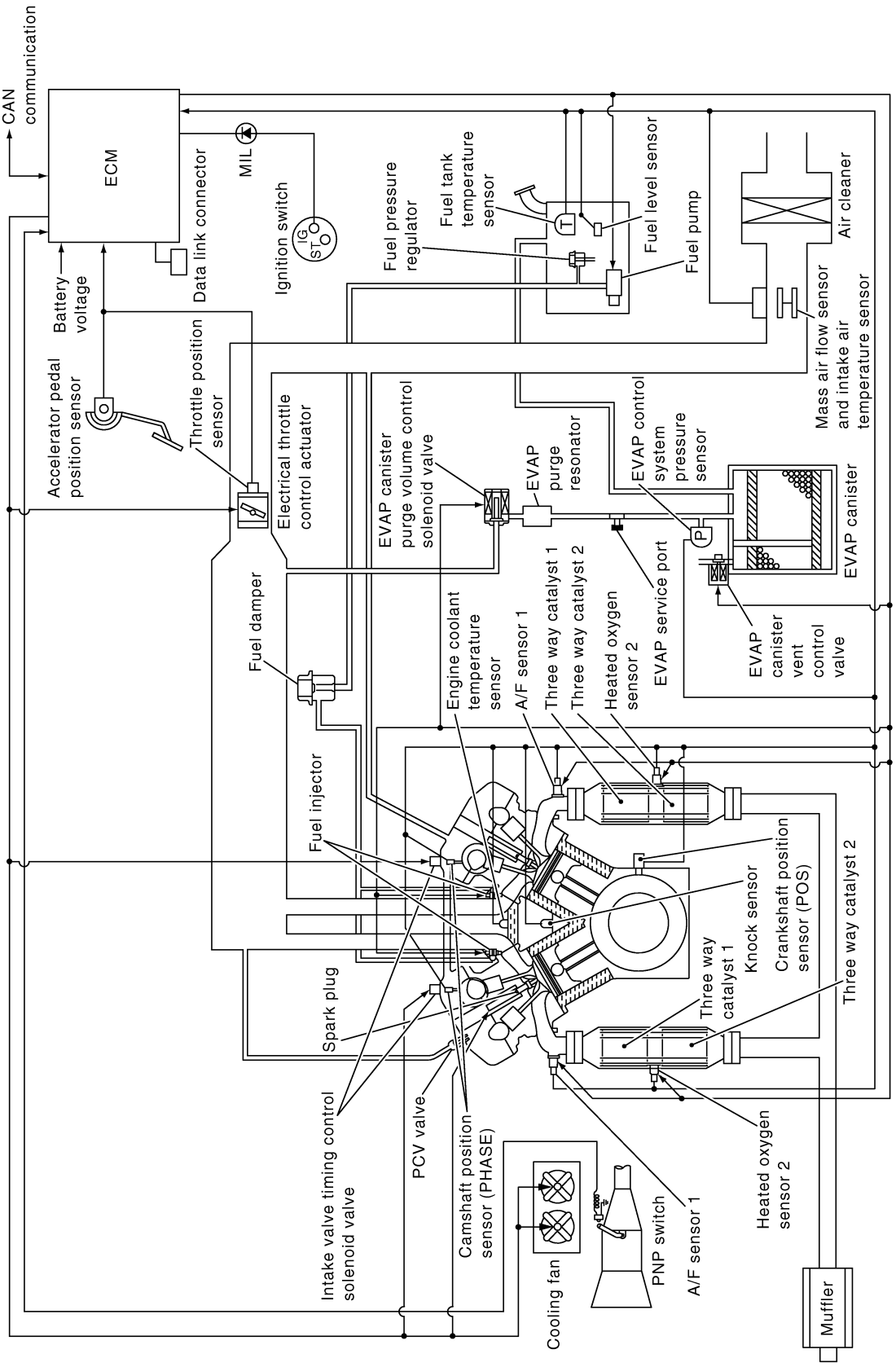
| Tool name (Kent-Moore No.) | | Description |
|---|---|---|
| Leak detector i.e.: (J-41416) |  S-NT703 | Locating the EVAP leak |
| EVAP service port adapter i.e.: (J-41413-OBD) |  S-NT704 | Applying positive pressure through EVAP service port |
| Fuel filler cap adapter i.e.: (MLR-8382) |  S-NT815 | Checking fuel tank vacuum relief valve opening pressure |
| Socket wrench |   S-NT705 | Removing and installing engine coolant temperature sensor |
| Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12) |   AEM488 | Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below.<br>**a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor**<br>**b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor** |
| Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907) |  S-NT779 | Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads. |

# ENGINE CONTROL SYSTEM

PFP:23710

## System Diagram

ABS00ANI




PBIB2552E

## Multiport Fuel Injection (MFI) System

ABS00ANL

### INPUT/OUTPUT SIGNAL CHART

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

*1: This sensor is not used to control the engine system under normal conditions.
*2: This signal is sent to the ECM through CAN communication line.
*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

### SYSTEM DESCRIPTION

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

### VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

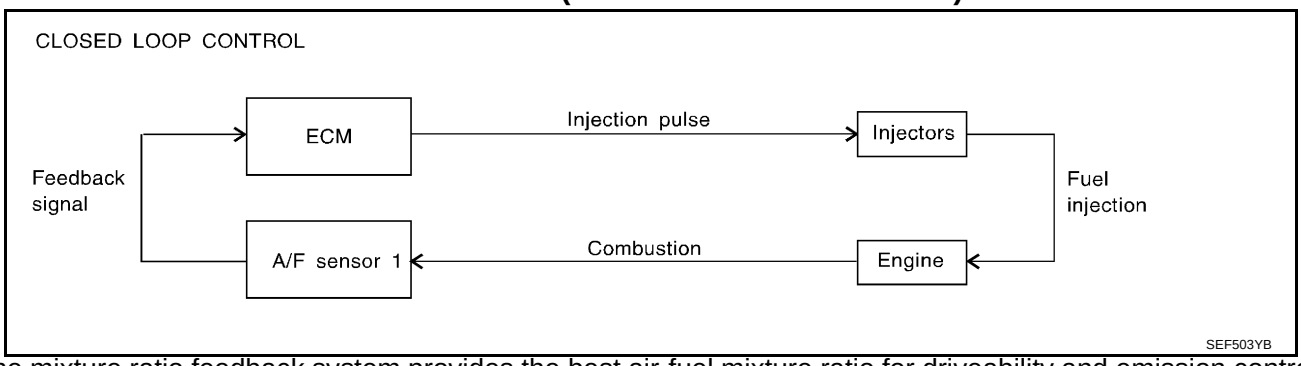
<Fuel increase>

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

<Fuel decrease>

- During deceleration
- During high engine speed operation

## MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)




The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst 1 can then better reduce CO, HC and NOx emissions. This system uses air fuel ratio (A/F) sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about air fuel ratio (A/F) sensor 1, refer to EC-477, "DTC P1271, P1281 A/F SENSOR 1" . 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 1. Even if the switching characteristics of air fuel ratio (A/F) sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

### Open Loop Control

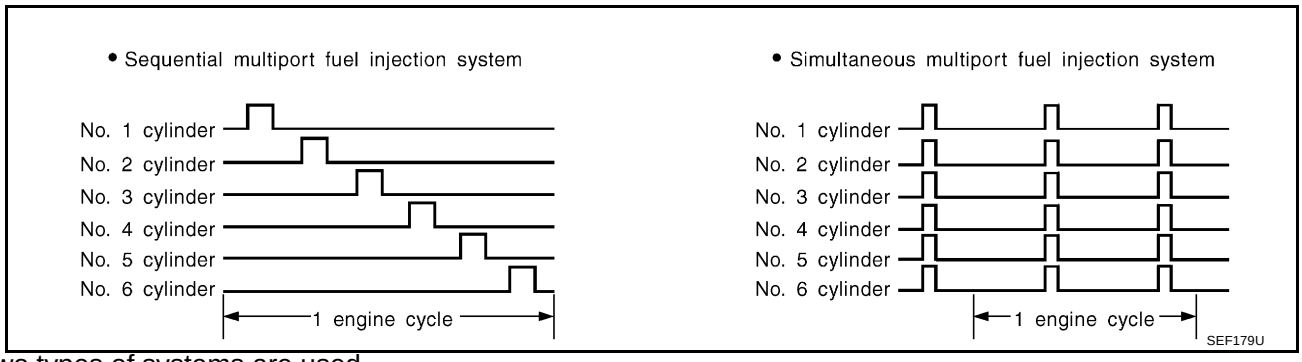
The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

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

## MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from air fuel ratio (A/F) sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.
“Fuel trim” refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
“Short term fuel trim” is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from air fuel ratio (A/F) sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
“Long term fuel trim” is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

## FUEL INJECTION TIMING




Two types of systems are used.

### Sequential Multiport Fuel Injection System

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

### Simultaneous Multiport Fuel Injection System

Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The six 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, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

# Electronic Ignition (EI) System

ABS00ANM

## INPUT/OUTPUT SIGNAL CHART

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

*1: This signal is sent to the ECM through CAN communication line.
*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

## SYSTEM DESCRIPTION

Firing order: 1 - 2 - 3 - 4 - 5 - 6
The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.
The ECM receives information such as the injection pulse width and camshaft position sensor (PHASE) signal. Computing this information, ignition signals are transmitted to the power transistor.
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

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

- During acceleration

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

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

ABS00ANO

### INPUT/OUTPUT SIGNAL CHART

| Sensor | Input Signal to ECM | ECM function | Actuator |
|---|---|---|---|
| Park/neutral position (PNP) switch | Neutral position | Fuel cut control | Fuel injector |
| Accelerator pedal position sensor | Accelerator pedal position | | |
| Engine coolant temperature sensor | Engine coolant temperature | | |
| Crankshaft position sensor (POS)<br>Camshaft position sensor (PHASE) | Engine speed | | |
| Wheel sensor* | Vehicle speed | | |

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

### SYSTEM DESCRIPTION

If the engine speed is above 1,800 rpm under no load (for example, the shift position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.
Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

**NOTE:**
This function is different from deceleration control listed under EC-23, "Multiport Fuel Injection (MFI) System" .

# AIR CONDITIONING CUT CONTROL

PFP:23710

## Input/Output Signal Chart

ABS00DEC

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

*1: This signal is sent to the ECM through CAN communication line.
*2: ECM determines the start signal status by the signal of engine speed and battery voltage.

## SYSTEM DESCRIPTION

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

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

# AUTOMATIC SPEED CONTROL DEVICE (ASCD)

PFP:18930

## System Description

ABS00B2Y

### INPUT/OUTPUT SIGNAL CHART

| Sensor | Input signal to ECM | ECM function | Actuator |
|---|---|---|---|
| ASCD brake switch | Brake pedal operation | ASCD vehicle speed control | Electric throttle control actuator |
| Stop lamp switch | Brake pedal operation | | |
| ASCD clutch switch | Clutch pedal position | | |
| ASCD steering switch | ASCD steering switch operation | | |
| Park/Neutral position (PNP) switch | Gear position | | |
| Combination meter* | Vehicle speed | | |
| TCM* | Powertrain revolution | | |

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

### BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH).
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

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

### SET OPERATION

Press MAIN switch. (The CRUISE indicator in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH), press SET/COAST switch. (Then SET indicator in combination meter illuminates.)

### ACCEL OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.
And then ASCD will keep the new set speed.

### CANCEL OPERATION

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

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

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

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ACCELERATE switch.
- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

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

### COAST OPERATION

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

### RESUME OPERATION

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

- Brake pedal is released
- Clutch pedal is released (M/T models)
- A/T selector lever is in other than P and N positions (A/T models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

## Component Description

ABS00B2Z

### ASCD STEERING SWITCH

Refer to EC-559 .

### ASCD BRAKE SWITCH

Refer to EC-567 and EC-659 .

### ASCD CLUTCH SWITCH

Refer to EC-567 and EC-659 .

### STOP LAMP SWITCH

Refer to EC-567 , EC-593 and EC-659 .

### ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EC-413 , EC-415 , EC-421 and EC-426 .

### ASCD INDICATOR

Refer to EC-674 .

# CAN COMMUNICATION

PFP:23710

## System Description

ABS00DED

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
Refer to LAN-21, "CAN Communication Unit" , about CAN communication for detail.

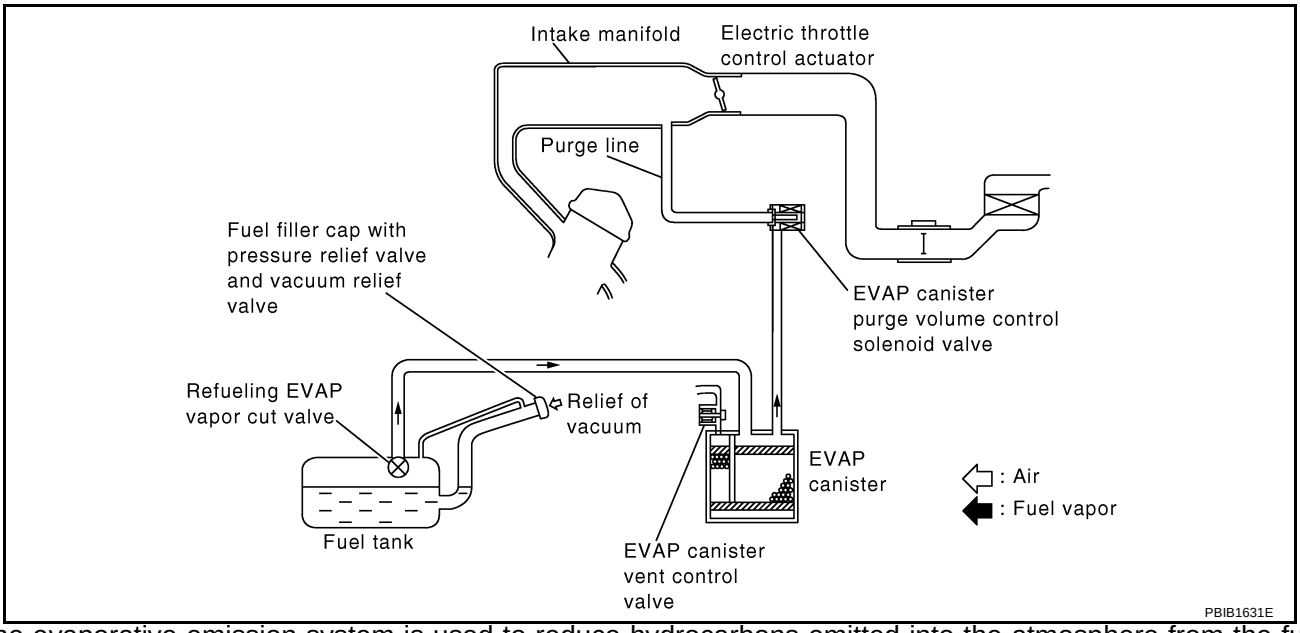
# EVAPORATIVE EMISSION SYSTEM

PFP:14950

## Description

ABS00B2P

### SYSTEM DESCRIPTION



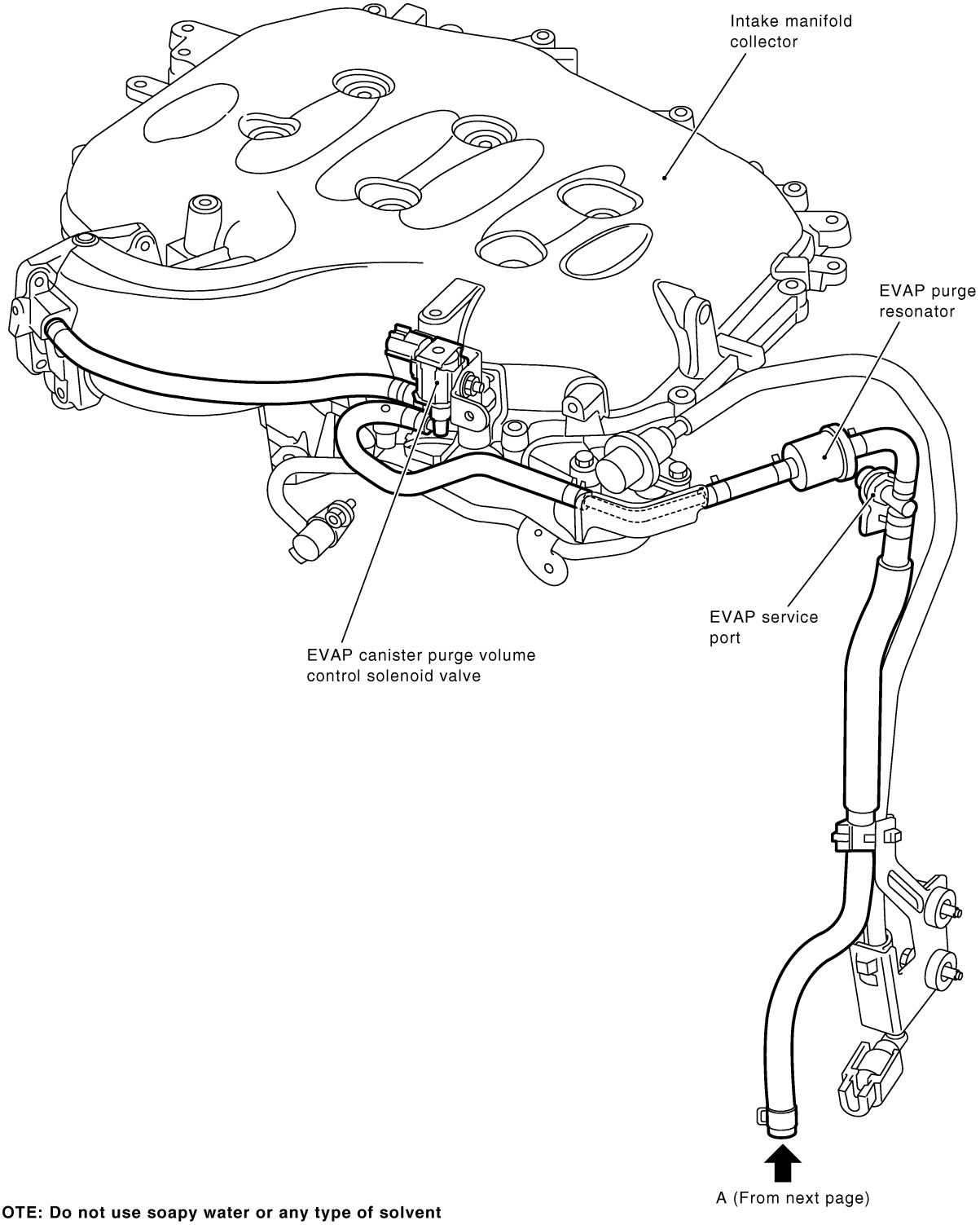

The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.

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

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

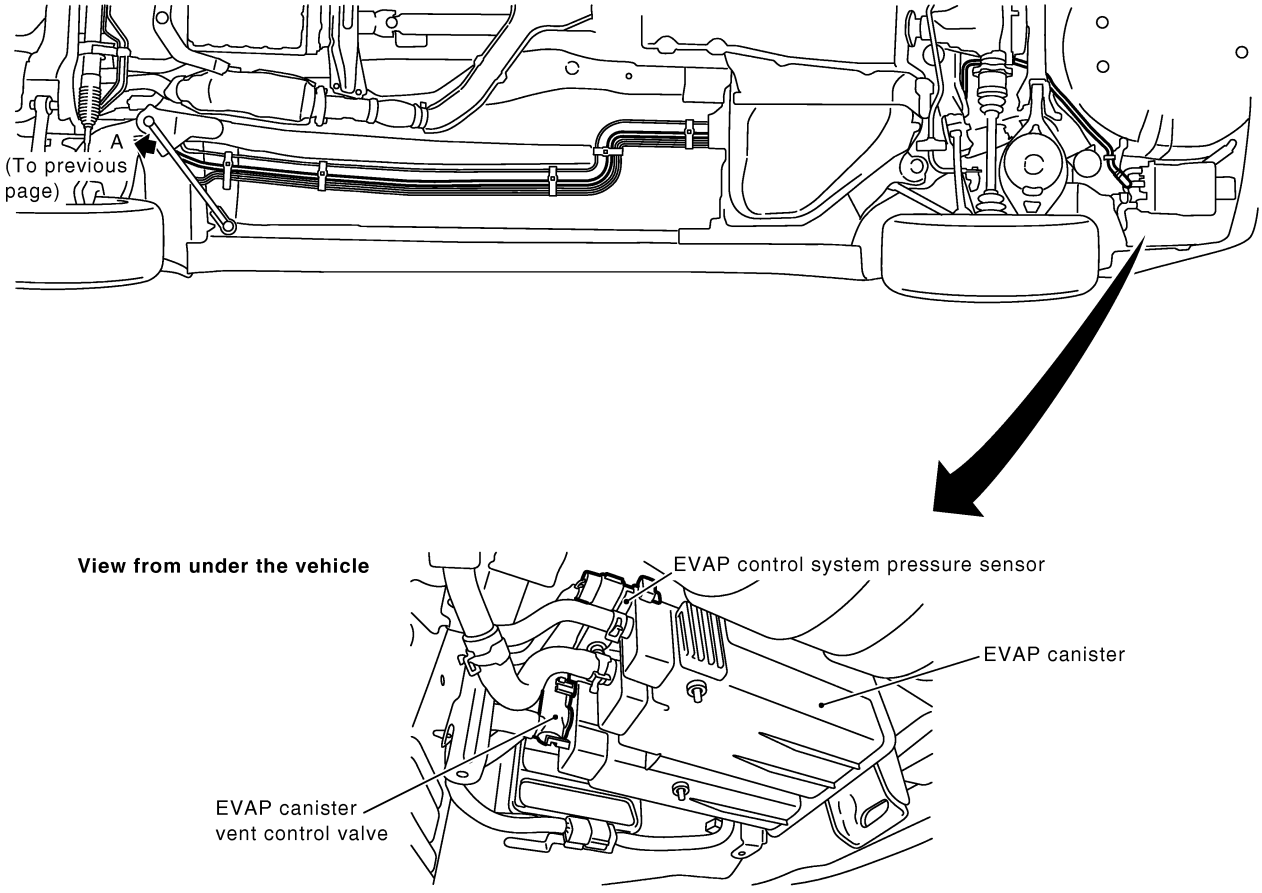
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

## EVAPORATIVE EMISSION LINE DRAWING




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

PBIB2096E


A
(To previous page)
View from under the vehicle
EVAP control system pressure sensor
EVAP canister
EVAP canister vent control valve

PBIB2540E

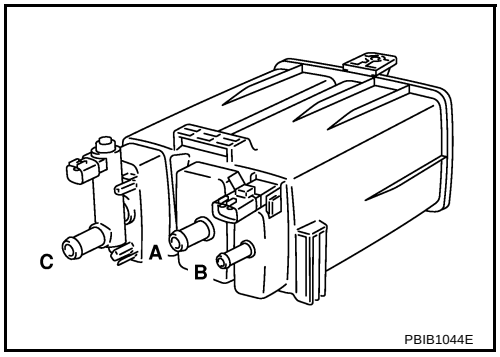
## Component Inspection

ABS00B2Q

### EVAP CANISTER

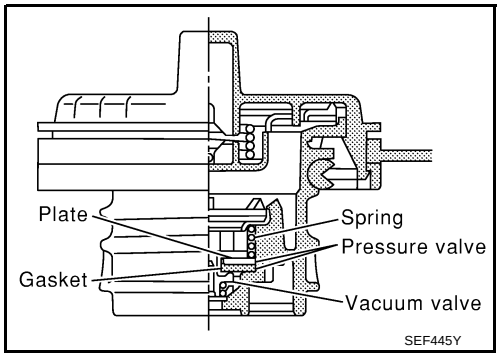
Check EVAP canister as follows:

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




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

1. Wipe clean valve housing.

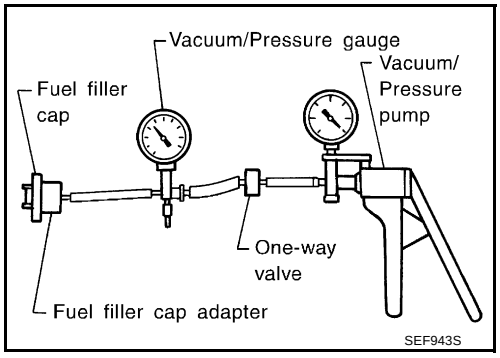



2. Check valve opening pressure and vacuum.

**Pressure:** **15.3 - 20.0 kPa (0.156 - 0.204 kg/cm$^2$ , 2.22 - 2.90 psi)**

**Vacuum:** **–6.0 to –3.3 kPa (–0.061 to –0.034 kg/cm$^2$ , –0.87 to –0.48 psi)**

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




**CAUTION:**

**Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**

### EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-332, "Component Inspection" .

### FUEL TANK TEMPERATURE SENSOR

Refer to EC-265, "Component Inspection" .

### EVAP CANISTER VENT CONTROL VALVE

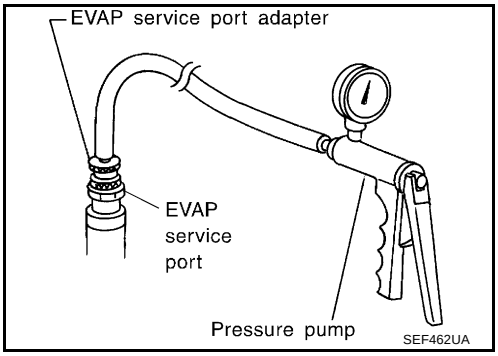
Refer to EC-339, "Component Inspection" .

### EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-343, "Component Inspection" .

## 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.

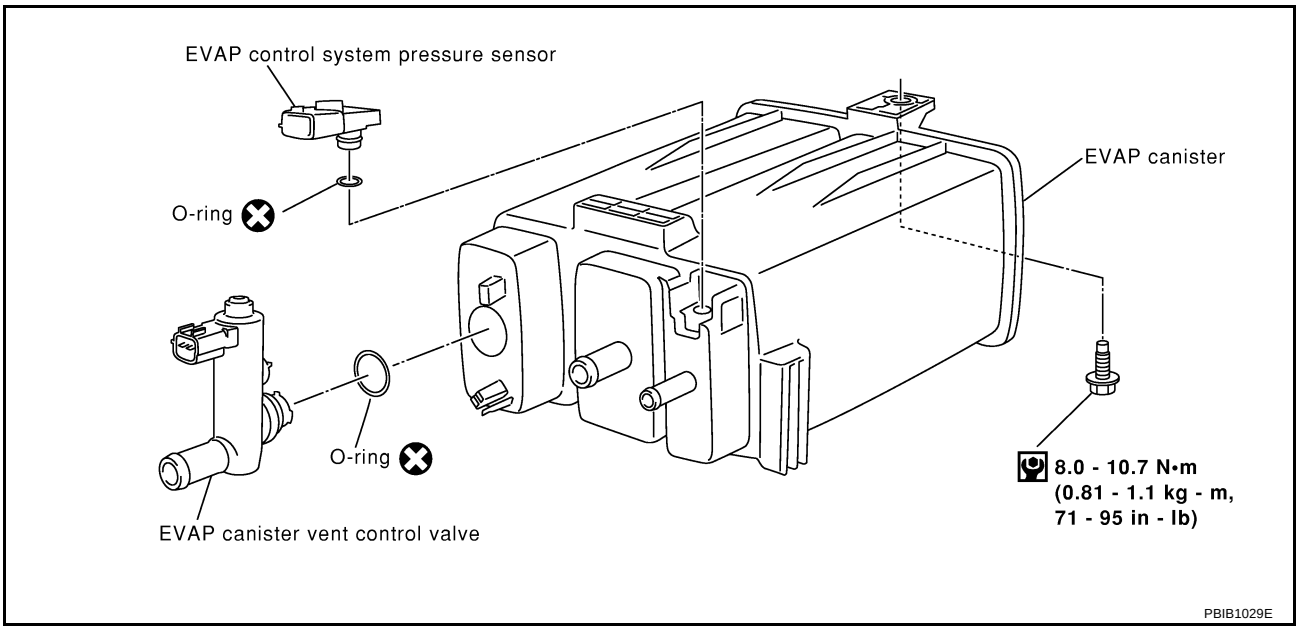



# Removal and Installation

ABS00B2R

## EVAP CANISTER

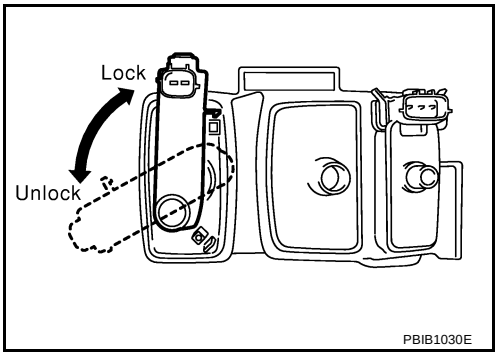
Tighten EVAP canister as shown in the figure.




## EVAP CANISTER VENT CONTROL VALVE

1. Turn EVAP canister vent control valve counterclockwise.
2. Remove the EVAP canister vent control valve.

**Always replace O-ring with a new one.**




# How to Detect Fuel Vapor Leakage

ABS00B2S

**CAUTION:**

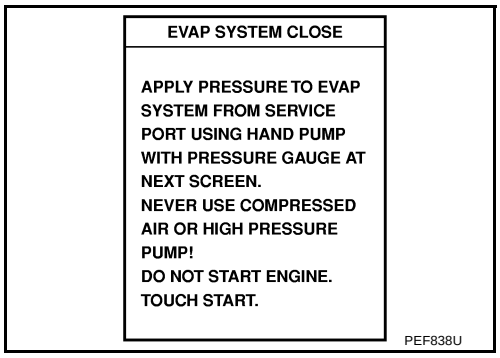
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm$^2$ , 0.6 psi) of pressure in EVAP system.**

**NOTE:**

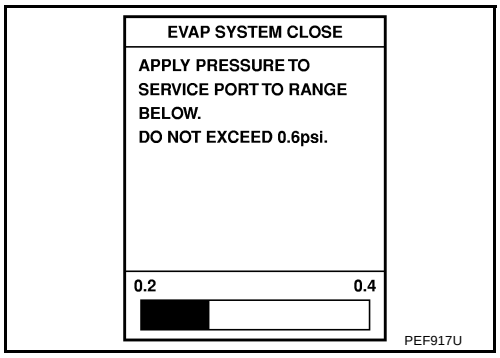
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

## WITH CONSULT-II

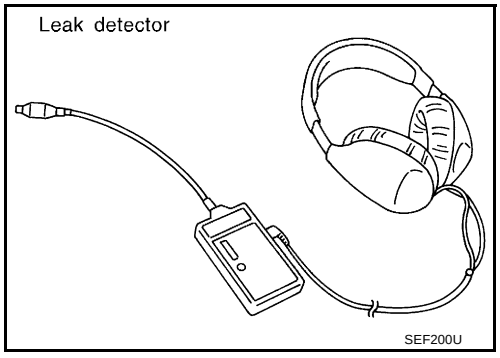
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose to the EVAP service port adapter.
3. Turn ignition switch ON.
4. Select the “EVAP SYSTEM CLOSE” of “WORK SUPPORT MODE” with CONSULT-II.
5. Touch “START”. A bar graph (Pressure indicating display) will appear on the screen.




6. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7. Remove EVAP service port adapter and hose with pressure pump.

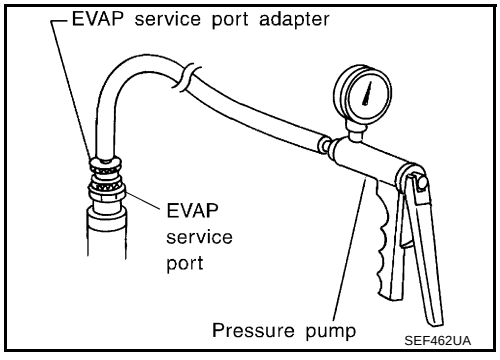



8. Locate the leak using a leak detector. Refer to EC-32, "EVAPORATIVE EMISSION LINE DRAWING" .

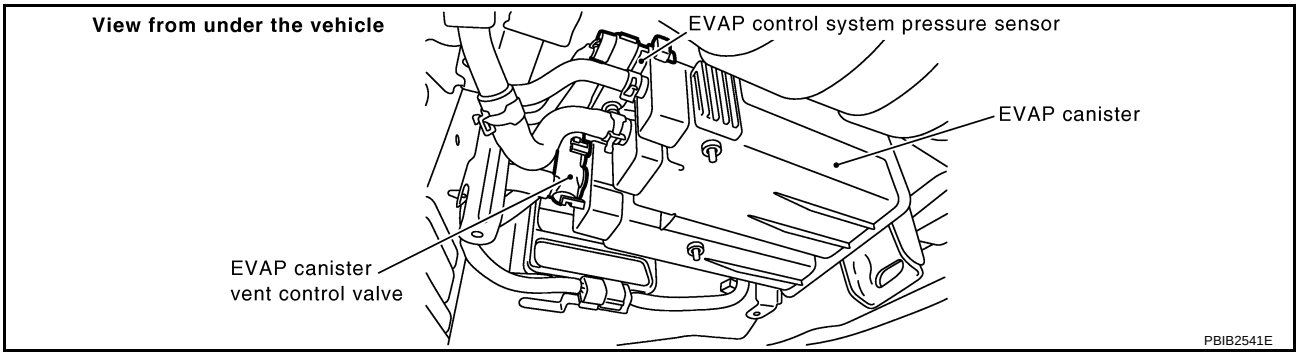



## WITHOUT CONSULT-II

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump with pressure gauge to the EVAP service port adapter.



3. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.



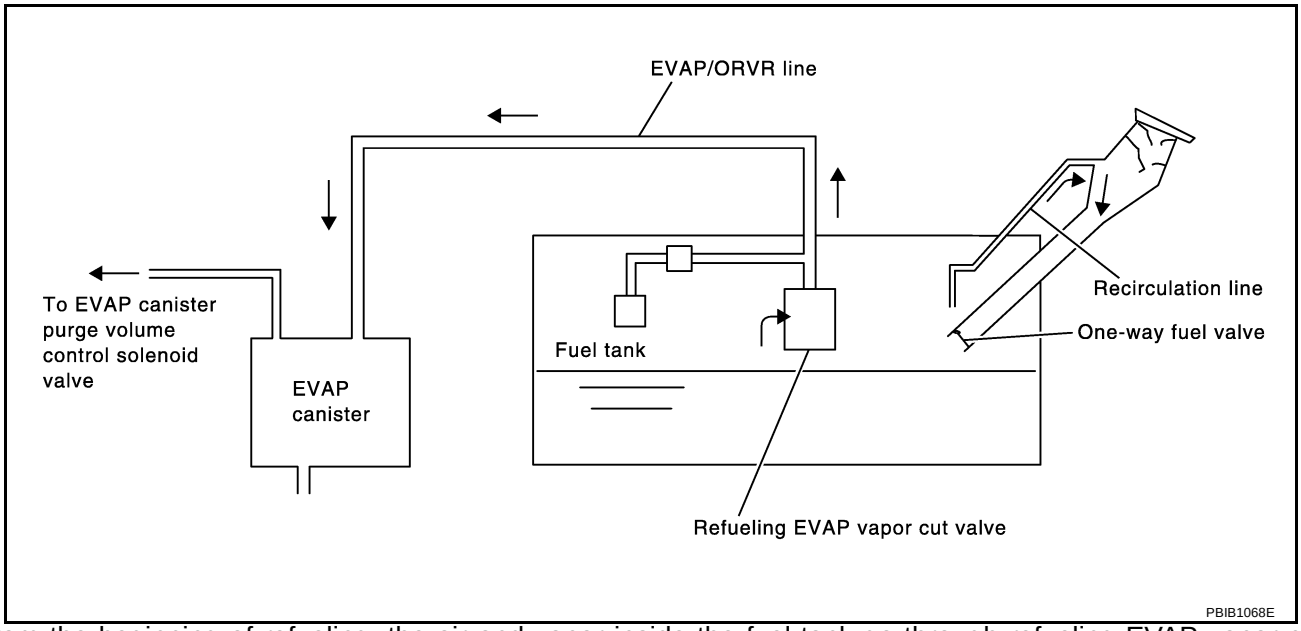

4. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm$^2$ , 0.2 to 0.4 psi).
5. Remove EVAP service port adapter and hose with pressure pump.
6. Locate the leak using a leak detector. Refer to EC-32, "EVAPORATIVE EMISSION LINE DRAWING" .

# ON BOARD REFUELING VAPOR RECOVERY (ORVR)

PFP:00032

## System Description

ABS00B2T




From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR 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.

**WARNING:**

**When conducting inspections below, be sure to observe the following:**

- **Put a "CAUTION: INFLAMMABLE" sign in workshop.**
- **Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Be sure to furnish the workshop with a $CO_2$ fire extinguisher.**

**CAUTION:**

- **Before removing fuel line parts, carry out the following procedures:**
  - **Put drained fuel in an explosion-proof container and put lid on securely.**
  - **Release fuel pressure from fuel line. Refer to EC-91, "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

ABS00B2U

**SYMPTOM: FUEL ODOR FROM EVAP CANISTER IS STRONG.**

### 1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   **The wight should be less than 2.1 kg (4.6 lb).**

OK or NG

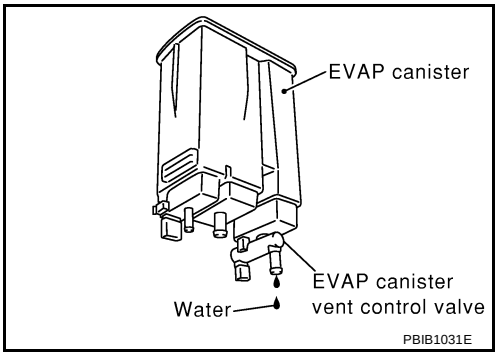
OK >> GO TO 2.
NG >> GO TO 3.

### 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 5.




### 3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

### 4. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

### 5. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-41, "Component Inspection" .

OK or NG

OK >> **INSPECTION END**
NG >> Replace refueling EVAP vapor cut 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 and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   **The wight should be less than 2.1 kg (4.6 lb).**

OK or NG

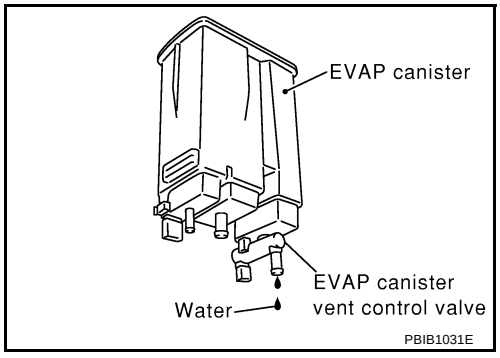
OK >> GO TO 2.
NG >> GO TO 3.

## 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 5.




## 3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

## 4. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

## 5. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling EVAP vapor cut valve for clogging, kink, looseness and improper connection.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace hoses and tubes.

## 6. CHECK FILLER NECK TUBE

Check recirculation line for clogging, dents and cracks.

OK or NG

OK >> GO TO 7.
NG >> Replace filler neck tube.

## 7. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-41, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

## 8. 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 9.
NG >> Replace fuel filler tube.

## 9. CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

OK or NG

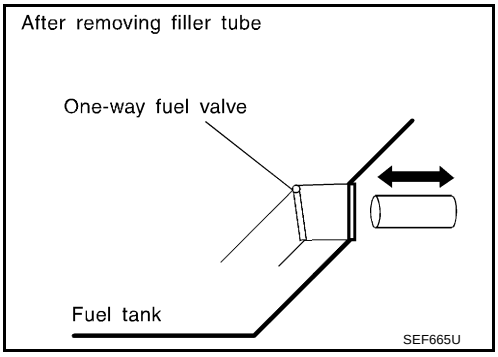
OK >> GO TO 10.
NG >> Repair or replace one-way fuel valve with fuel tank.

## 10. 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.




ABS00B2V

# Component Inspection

## REFUELING EVAP VAPOR CUT VALVE

### With CONSULT-II

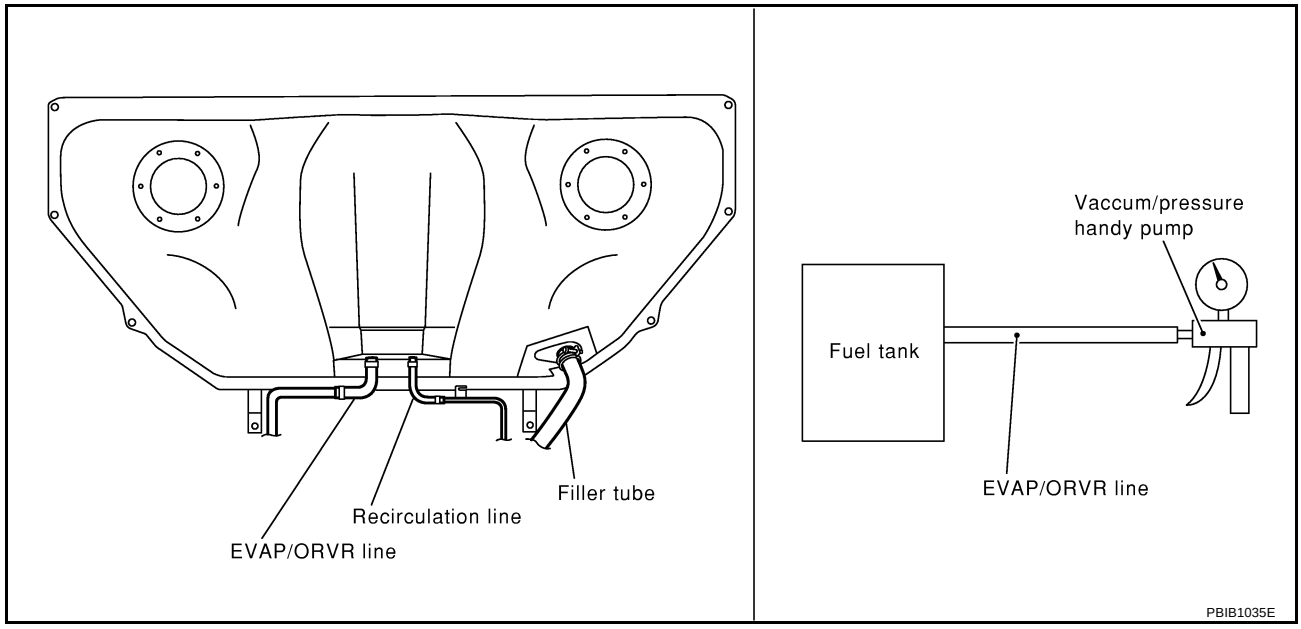
1. Remove fuel tank. Refer to FL-11, "FUEL TANK" .
2. Drain fuel from the tank as follows:

a. Remove fuel feed hose located on the fuel gauge retainer.
b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
c. Drain fuel using “FUEL PUMP RELAY” in “ACTIVE TEST” mode with CONSULT-II.

3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
   Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as follows.

a. Connect vacuum pump to hose end.
b. Remove fuel gauge retainer with fuel gauge unit.
   **Always replace O-ring with new one.**
c. Put fuel tank upside down.

d. Apply vacuum pressure to hose end [–13.3 kPa (–100 mmHg, –3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.




**Without CONSULT-II**

1. Remove fuel tank. Refer to FL-11, "FUEL TANK" .
2. Drain fuel from the tank as follows:

a. Remove fuel gauge retainer.

b. Drain fuel from the tank using a handy pump into a fuel container.

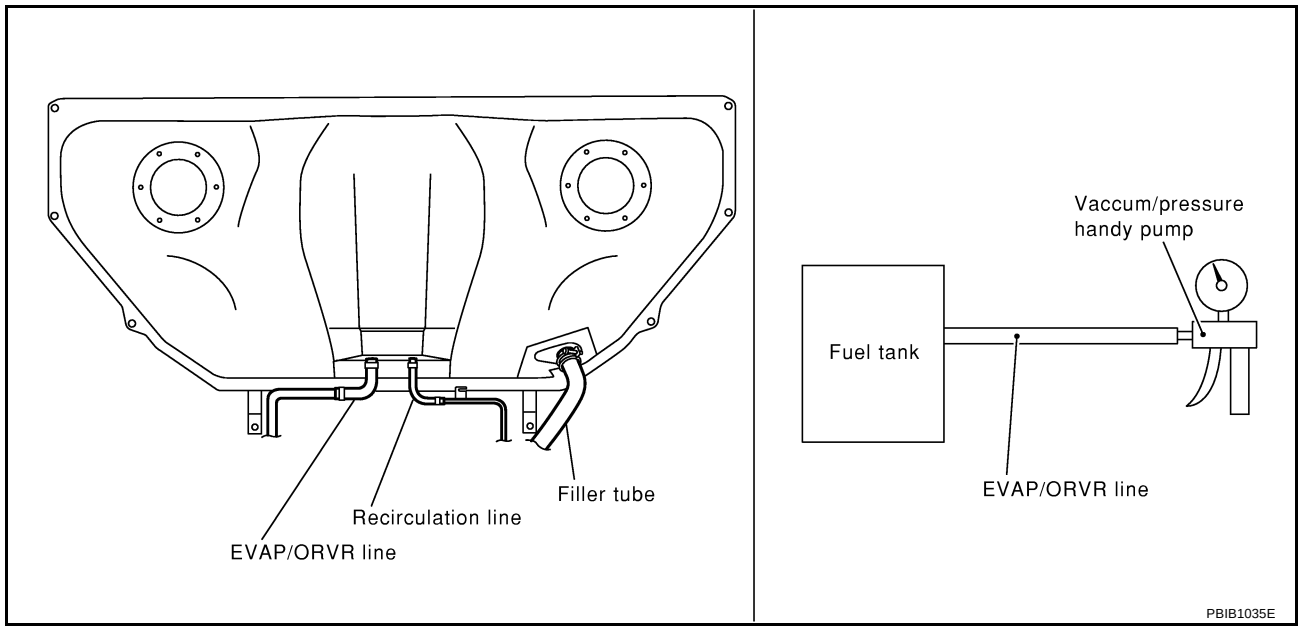
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
   Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as follows.

a. Connect vacuum pump to hose end.

b. Remove fuel gauge retainer with fuel gauge unit.
   **Always replace O-ring with new one.**

c. Put fuel tank upside down.

d. Apply vacuum pressure to hose end [–13.3 kPa (–100 mmHg, –3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



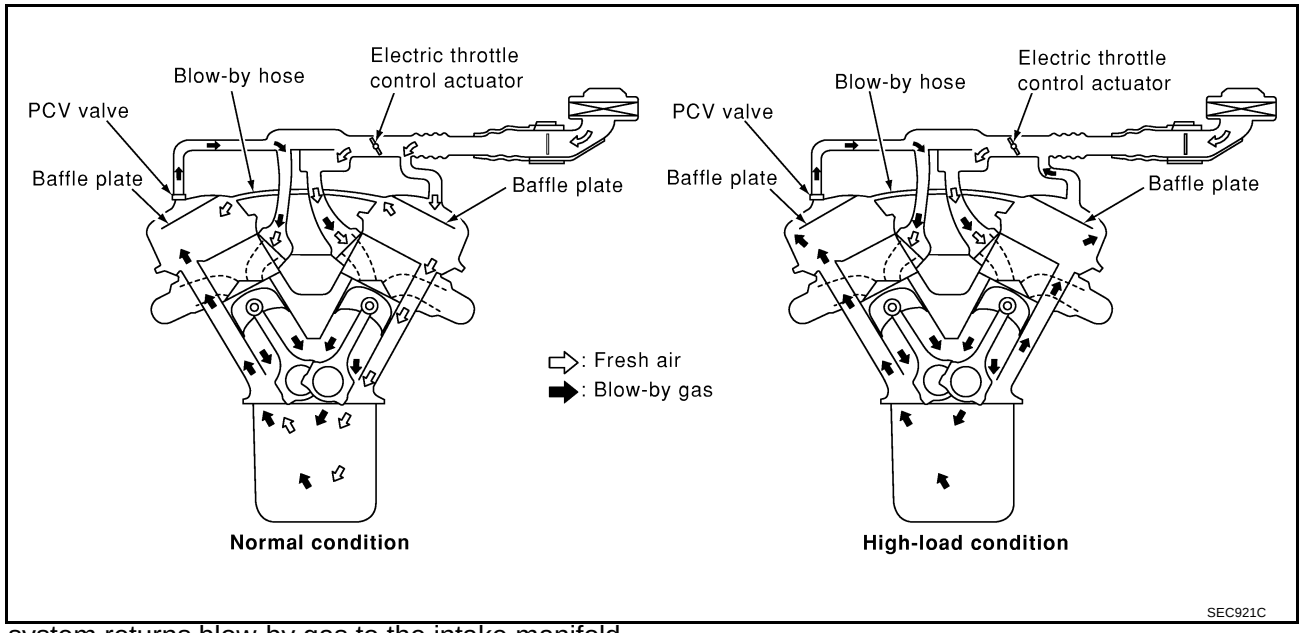
# POSITIVE CRANKCASE VENTILATION

PFP:11810

## Description

ABS00B2W

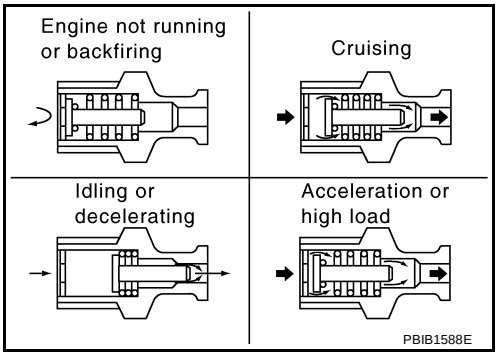
### SYSTEM DESCRIPTION




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

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

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

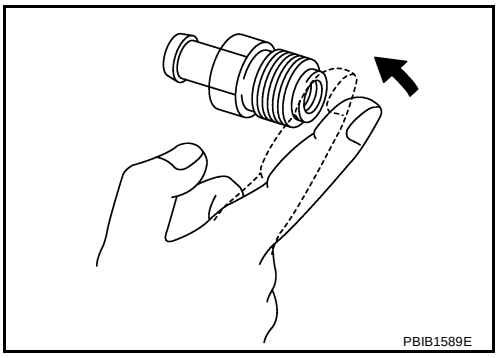



## Component Inspection

ABS00B2X

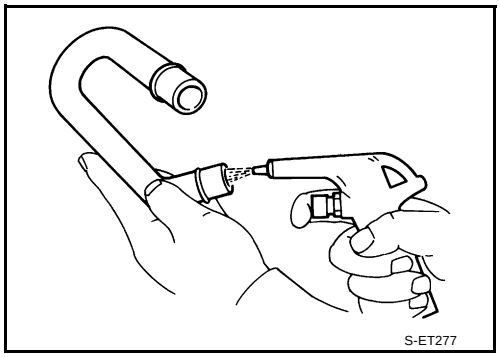
### PCV (POSITIVE CRANKCASE VENTILATION) VALVE

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



## 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.



# IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM-NATS)

PFP:28591

## Description

ABS00DEE

- **If the security indicator lights up with the ignition switch in the ON position or "NATS MALFUNCTION" is displayed on "SELF-DIAG RESULTS" screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to BL-225, "IVIS (INFINITI VEHICLE IMMOBILIZER SYSTEM-NATS)" .**
- **Confirm no self-diagnostic results of IVIS (NATS) is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.**
- **When replacing ECM, initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs must be carried out with CONSULT-II using NATS program card.**
  **Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of IVIS (NATS) initialization and all IVIS (NATS) ignition key ID registration, refer to CONSULT-II Operation Manual, IVIS/NVIS.**

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

SEF543X

# ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

## Introduction

ABS00ANX

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

| Emission-related diagnostic information | Diagnostic service |
|---|---|
| Diagnostic Trouble Code (DTC) | Service $03 of SAE J1979 |
| Freeze Frame data | Service $02 of SAE J1979 |
| System Readiness Test (SRT) code | Service $01 of SAE J1979 |
| 1st Trip Diagnostic Trouble Code (1st Trip DTC) | Service $07 of SAE J1979 |
| 1st Trip Freeze Frame data | |
| Test values and Test limits | Service $06 of SAE J1979 |
| Calibration ID | Service $09 of SAE J1979 |

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

×: Applicable —: Not applicable

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

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

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-101, "Fail-Safe Chart" .)

## Two Trip Detection Logic

ABS00ANY

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

×: Applicable —: Not applicable

| Items | MIL | | | | DTC | | 1st trip DTC | |
|---|---|---|---|---|---|---|---|---|
| | 1st trip | | 2nd trip | | 1st trip displaying | 2nd trip displaying | 1st trip displaying | 2nd trip displaying |
| | Blinking | Lighting up | Blinking | Lighting up | | | | |
| Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected | × | — | — | — | — | — | × | — |
| Misfire (Possible three way catalyst damage) — DTC: P0300 - P0306 is being detected | — | — | × | — | — | × | — | — |
| One trip detection diagnoses (Refer to EC-47, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" .) | — | × | — | — | × | — | — | — |
| Except above | — | — | — | × | — | × | × | — |

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

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

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

## Emission-Related Diagnostic Information

ABS00ANZ

### EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

×: Applicable —: Not applicable

| Items (CONSULT-II screen terms) | DTC*1 | | SRT code | Test value/ Test limit (GST only) | Trip | MIL lighting up | Reference page |
|---|---|---|---|---|---|---|---|
| | CONSULT-II GST*2 | ECM*3 | | | | | |
| CAN COMM CIRCUIT | U1000 | 1000*5 | — | — | 1 (A/T)<br>2 (M/T) | ×<br>— | EC-166 |
| CAN COMM CIRCUIT | U1001 | 1001*5 | — | — | 2 | — | EC-166 |
| **NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.** | **P0000** | **0000** | — | — | — | **Flashing*7** | EC-63 |
| INT/V TIM CONT-B1 | P0011 | 0011 | — | — | 2 | × | EC-169 |
| INT/V TIM CONT-B2 | P0021 | 0021 | — | — | 2 | × | EC-169 |
| HO2S2 HTR (B1) | P0037 | 0037 | × | × | 2 | × | EC-174 |
| HO2S2 HTR (B1) | P0038 | 0038 | × | × | 2 | × | EC-174 |
| HO2S2 HTR (B2) | P0057 | 0057 | × | × | 2 | × | EC-174 |
| HO2S2 HTR (B2) | P0058 | 0058 | × | × | 2 | × | EC-174 |
| MAF SEN/CIRCUIT | P0101 | 0101 | — | — | 2 | × | EC-182 |
| MAF SEN/CIRCUIT | P0102 | 0102 | — | — | 1 | × | EC-191 |
| MAF SEN/CIRCUIT | P0103 | 0103 | — | — | 1 | × | EC-191 |
| IAT SEN/CIRCUIT | P0112 | 0112 | — | — | 2 | × | EC-198 |
| IAT SEN/CIRCUIT | P0113 | 0113 | — | — | 2 | × | EC-198 |
| ECT SEN/CIRCUIT | P0117 | 0117 | — | — | 1 | × | EC-202 |
| ECT SEN/CIRCUIT | P0118 | 0118 | — | — | 1 | × | EC-202 |
| TP SEN 2/CIRC | P0122 | 0122 | — | — | 1 | × | EC-207 |
| TP SEN 2/CIRC | P0123 | 0123 | — | — | 1 | × | EC-207 |
| ECT SENSOR | P0125 | 0125 | — | — | 1 | × | EC-214 |
| IAT SENSOR | P0127 | 0127 | — | — | 2 | × | EC-217 |
| THERMSTAT FNCTN | P0128 | 0128 | — | — | 2 | × | EC-220 |
| HO2S2 (B1) | P0138 | 0138 | — | × | 2 | × | EC-222 |
| HO2S2 (B1) | P0139 | 0139 | × | × | 2 | × | EC-231 |
| HO2S2 (B2) | P0158 | 0158 | — | × | 2 | × | EC-222 |
| HO2S2 (B2) | P0159 | 0159 | × | × | 2 | × | EC-231 |
| FUEL SYS-LEAN-B1 | P0171 | 0171 | — | — | 2 | × | EC-242 |
| FUEL SYS-RICH-B1 | P0172 | 0172 | — | — | 2 | × | EC-252 |
| FUEL SYS-LEAN-B2 | P0174 | 0174 | — | — | 2 | × | EC-242 |
| FUEL SYS-RICH-B2 | P0175 | 0175 | — | — | 2 | × | EC-252 |
| FTT SENSOR | P0181 | 0181 | — | — | 2 | × | EC-261 |
| FTT SEN/CIRCUIT | P0182 | 0182 | — | — | 2 | × | EC-266 |
| FTT SEN/CIRCUIT | P0183 | 0183 | — | — | 2 | × | EC-266 |

| Items (CONSULT-II screen terms) | DTC*1 | | SRT code | Test value/ Test limit (GST only) | Trip | MIL lighting up | Reference page |
|---|---|---|---|---|---|---|---|
| | CONSULT-II GST*2 | ECM*3 | | | | | |
| TP SEN 1/CIRC | P0222 | 0222 | — | — | 1 | × | EC-270 |
| TP SEN 1/CIRC | P0223 | 0223 | — | — | 1 | × | EC-270 |
| MULTI CYL MISFIRE | P0300 | 0300 | — | — | 2 | × | EC-277 |
| CYL 1 MISFIRE | P0301 | 0301 | — | — | 2 | × | EC-277 |
| CYL 2 MISFIRE | P0302 | 0302 | — | — | 2 | × | EC-277 |
| CYL 3 MISFIRE | P0303 | 0303 | — | — | 2 | × | EC-277 |
| CYL 4 MISFIRE | P0304 | 0304 | — | — | 2 | × | EC-277 |
| CYL 5 MISFIRE | P0305 | 0305 | — | — | 2 | × | EC-277 |
| CYL 6 MISFIRE | P0306 | 0306 | — | — | 2 | × | EC-277 |
| KNOCK SEN/CIRC-B1 | P0327 | 0327 | — | — | 2 | — | EC-287 |
| KNOCK SEN/CIRC-B1 | P0328 | 0328 | — | — | 2 | — | EC-287 |
| CKP SEN/CIRCUIT | P0335 | 0335 | — | — | 2 | × | EC-292 |
| CMP SEN/CIRC-B1 | P0340 | 0340 | — | — | 2 | × | EC-299 |
| CMP SEN/CIRC-B2 | P0345 | 0345 | — | — | 2 | × | EC-299 |
| TW CATALYST SYS-B1 | P0420 | 0420 | × | × | 2 | × | EC-308 |
| TW CATALYST SYS-B2 | P0430 | 0430 | × | × | 2 | × | EC-308 |
| EVAP PURG FLOW/MON | P0441 | 0441 | × | × | 2 | × | EC-314 |
| EVAP SMALL LEAK | P0442 | 0442 | × | × | 2 | × | EC-319 |
| PURG VOLUME CONT/V | P0444 | 0444 | — | — | 2 | × | EC-327 |
| PURG VOLUME CONT/V | P0445 | 0445 | — | — | 2 | × | EC-327 |
| VENT CONTROL VALVE | P0447 | 0447 | — | — | 2 | × | EC-334 |
| EVAP SYS PRES SEN | P0451 | 0451 | — | — | 2 | × | EC-341 |
| EVAP SYS PRES SEN | P0452 | 0452 | — | — | 2 | × | EC-344 |
| EVAP SYS PRES SEN | P0453 | 0453 | — | — | 2 | × | EC-350 |
| EVAP GROSS LEAK | P0455 | 0455 | — | — | 2 | × | EC-358 |
| EVAP VERY SML LEAK | P0456 | 0456 | ×*4 | × | 2 | × | EC-366 |
| FUEL LEV SEN SLOSH | P0460 | 0460 | — | — | 2 | × | EC-375 |
| FUEL LEVEL SENSOR | P0461 | 0461 | — | — | 2 | × | EC-377 |
| FUEL LEVL SEN/CIRC | P0462 | 0462 | — | — | 2 | × | EC-379 |
| FUEL LEVL SEN/CIRC | P0463 | 0463 | — | — | 2 | × | EC-379 |
| VEH SPEED SEN/CIRC*6 | P0500 | 0500 | — | — | 2 | × | EC-381 |
| ISC SYSTEM | P0506 | 0506 | — | — | 2 | × | EC-383 |
| ISC SYSTEM | P0507 | 0507 | — | — | 2 | × | EC-385 |
| PW ST P SEN/CIRC | P0550 | 0550 | — | — | 2 | — | EC-387 |
| ECM | P0605 | 0605 | — | — | 1 or 2 | × or — | EC-392 |
| TCM | P0700 | 0700 | — | — | 1 | × | AT-118 |
| PNP SW/CIRC | P0705 | 0705 | — | — | 2 | × | AT-119 |
| ATF TEMP SEN/CIRC | P0710 | 0710 | — | — | 2 | × | AT-141 |
| VEH SPD SEN/CIR AT*6 | P0720 | 0720 | — | — | 2 | × | AT-123 |
| ENGINE SPEED SIG | P0725 | 0725 | — | — | 2 | × | AT-128 |
| TCC SOLENOID/CIRC | P0740 | 0740 | — | — | 2 | × | AT-130 |
| A/T TCC S/V FNCTN | P0744 | 0744 | — | — | 2 | × | AT-132 |

| Items (CONSULT-II screen terms) | DTC*1 | | SRT code | Test value/ Test limit (GST only) | Trip | MIL lighting up | Reference page |
|---|---|---|---|---|---|---|---|
| | CONSULT-II GST*2 | ECM*3 | | | | | |
| L/PRESS SOL/CIRC | P0745 | 0745 | — | — | 2 | × | AT-134 |
| A/F SEN1 HTR (B1) | P1031 | 1031 | × | × | 2 | × | EC-395 |
| A/F SEN1 HTR (B1) | P1032 | 1032 | × | × | 2 | × | EC-395 |
| A/F SEN1 HTR (B2) | P1051 | 1051 | × | × | 2 | × | EC-395 |
| A/F SEN1 HTR (B2) | P1052 | 1052 | × | × | 2 | × | EC-395 |
| ECM BACK UP/CIRC | P1065 | 1065 | — | — | 2 | × | EC-402 |
| INT/V TIM V/CIR-B1 | P1111 | 1111 | — | — | 2 | × | EC-406 |
| ETC ACTR | P1121 | 1121 | — | — | 1 | × | EC-413 |
| ETC FUNCTION/CIRC | P1122 | 1122 | — | — | 1 | × | EC-415 |
| ETC MOT PWR | P1124 | 1124 | — | — | 1 | × | EC-421 |
| ETC MOT PWR | P1126 | 1126 | — | — | 1 | × | EC-421 |
| ETC MOT | P1128 | 1128 | — | — | 1 | × | EC-426 |
| INT/V TIM V/CIR-B2 | P1136 | 1136 | — | — | 2 | × | EC-406 |
| HO2S2 (B1) | P1146 | 1146 | × | × | 2 | × | EC-431 |
| HO2S2 (B1) | P1147 | 1147 | × | × | 2 | × | EC-442 |
| CLOSED LOOP-B1 | P1148 | 1148 | — | — | 1 | × | EC-453 |
| HO2S2 (B2) | P1166 | 1166 | × | × | 2 | × | EC-431 |
| HO2S2 (B2) | P1167 | 1167 | × | × | 2 | × | EC-442 |
| CLOSED LOOP-B2 | P1168 | 1168 | — | — | 1 | × | EC-453 |
| TCS C/U FUNCTN | P1211 | 1211 | — | — | 2 | — | EC-454 |
| TCS/CIRC | P1212 | 1212 | — | — | 2 | — | EC-455 |
| ENG OVER TEMP | P1217 | 1217 | — | — | 1 | × | EC-456 |
| CTP LEARNING | P1225 | 1225 | — | — | 2 | — | EC-468 |
| CTP LEARNING | P1226 | 1226 | — | — | 2 | — | EC-470 |
| SENSOR POWER/CIRC | P1229 | 1229 | — | — | 1 | × | EC-472 |
| A/F SENSOR1 (B1) | P1271 | 1271 | — | × | 2 | × | EC-477 |
| A/F SENSOR1 (B1) | P1272 | 1272 | — | × | 2 | × | EC-485 |
| A/F SENSOR1 (B1) | P1273 | 1273 | — | × | 2 | × | EC-493 |
| A/F SENSOR1 (B1) | P1274 | 1274 | — | × | 2 | × | EC-502 |
| A/F SENSOR1 (B1) | P1276 | 1276 | — | × | 2 | × | EC-511 |
| A/F SENSOR1 (B1) | P1278 | 1278 | × | × | 2 | × | EC-520 |
| A/F SENSOR1 (B1) | P1279 | 1279 | × | × | 2 | × | EC-532 |
| A/F SENSOR1 (B2) | P1281 | 1281 | — | × | 2 | × | EC-477 |
| A/F SENSOR1 (B2) | P1282 | 1282 | — | × | 2 | × | EC-485 |
| A/F SENSOR1 (B2) | P1283 | 1283 | — | × | 2 | × | EC-493 |
| A/F SENSOR1 (B2) | P1284 | 1284 | — | × | 2 | × | EC-502 |
| A/F SENSOR1 (B2) | P1286 | 1286 | — | × | 2 | × | EC-511 |
| A/F SENSOR1 (B2) | P1288 | 1288 | × | × | 2 | × | EC-520 |
| A/F SENSOR1 (B2) | P1289 | 1289 | × | × | 2 | × | EC-532 |
| PURG VOLUME CONT/V | P1444 | 1444 | — | — | 2 | × | EC-544 |
| VENT CONTROL VALVE | P1446 | 1446 | — | — | 2 | × | EC-552 |
| ASCD SW | P1564 | 1564 | — | — | 1 | — | EC-559 |

| Items (CONSULT-II screen terms) | DTC*1 | | SRT code | Test value/ Test limit (GST only) | Trip | MIL lighting up | Reference page |
|---|---|---|---|---|---|---|---|
| | CONSULT-II GST*2 | ECM*3 | | | | | |
| ASCD BRAKE SW | P1572 | 1572 | — | — | 1 | — | EC-567 |
| ASCD VHL SPD SEN | P1574 | 1574 | — | — | 1 | — | EC-583 |
| NATS MALFUNCTION | P1610 - P1615 | 1610 - 1615 | — | — | 2 | — | EC-45 |
| TPV SEN/CIRC A/T | P1705 | 1705 | — | — | 1 | × | AT-138 |
| P-N POS SW/CIRCUIT | P1706 | 1706 | — | — | 2 | × | EC-585 |
| TURBINE REV S/CIRC | P1716 | 1716 | — | — | 2 | × | AT-146 |
| A/T INTERLOCK | P1730 | 1730 | — | — | 1 | × | AT-150 |
| I/C SOLENOID/CIRC | P1752 | 1752 | — | — | 1 | × | AT-155 |
| I/C SOLENOID FNCTN | P1754 | 1754 | — | — | 1 | × | AT-157 |
| FR/B SOLENOID/CIRC | P1757 | 1757 | — | — | 1 | × | AT-159 |
| FR/B SOLENOID/CIRC | P1759 | 1759 | — | — | 1 | × | AT-161 |
| D/C SOLENOID/CIRC | P1762 | 1762 | — | — | 1 | × | AT-163 |
| D/C SOLENOID FNCTN | P1764 | 1764 | — | — | 1 | × | AT-165 |
| HLR/C SOL/CIRC | P1767 | 1767 | — | — | 1 | × | AT-167 |
| HLR/C SOL FNCTN | P1769 | 1769 | — | — | 1 | × | AT-169 |
| LC/B SOLENOID/CIRC | P1772 | 1772 | — | — | 1 | × | AT-171 |
| LC/B SOLENOID FNCT | P1774 | 1774 | — | — | 1 | × | AT-173 |
| BRAKE SW/CIRCUIT | P1805 | 1805 | — | — | 2 | — | EC-593 |
| APP SEN 1/CIRC | P2122 | 2122 | — | — | 1 | × | EC-598 |
| APP SEN 1/CIRC | P2123 | 2123 | — | — | 1 | × | EC-598 |
| APP SEN 2/CIRC | P2127 | 2127 | — | — | 1 | × | EC-605 |
| APP SEN 2/CIRC | P2128 | 2128 | — | — | 1 | × | EC-605 |
| TP SENSOR | P2135 | 2135 | — | — | 1 | × | EC-612 |
| APP SENSOR | P2138 | 2138 | — | — | 1 | × | EC-619 |

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: SRT code will not be set if the self-diagnostic result is NG.
*5: The troubleshooting for this DTC needs CONSULT-II.
*6: When the fail-safe operations for both self-diagnoses occur at the same time, the MIL illuminates.
*7: When the ECM is in the mode of displaying SRT status, MIL may flash. For the details, refer to EC-55, "How to Display SRT Status" .

## 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-60, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

For malfunctions in which 1st trip DTCs are displayed, refer to EC-47, "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 Service $07 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-94, "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, P1148, P1706, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

**No Tools**

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

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

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.
If the DTC is being detected currently, the time data will be [0].
If a 1st trip DTC is stored in the ECM, the time data will be [1t].

DTC display

| SELF DIAG RESULTS | |
|---|---|
| DTC RESULTS | TIME |
| CKP SEN/CIRCUIT [P0335 ] | 0 |
| | |
| | |

1st trip DTC display

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

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## FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II 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-130, "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-60, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

## SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service $01 of SAE J1979.
As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.
If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”.
In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.
Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate “INCMP” for these items.

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

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

## SRT Item

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

| SRT item (CONSULT-II indication) | Performance Priority* | Required self-diagnostic items to set the SRT to “CMPLT” | Corresponding DTC No. |
|---|---|---|---|
| CATALYST | 2 | Three way catalyst function | P0420, P0430 |
| EVAP SYSTEM | 1 | EVAP control system | P0442 |
| | 2 | EVAP control system | P0456 |
| | 2 | EVAP control system purge flow monitoring | P0441 |
| HO2S | 2 | Air fuel ratio (A/F) sensor 1 | P1278, P1279 |
| | | Air fuel ratio (A/f) sensor 1 | P1288, P1289 |
| | | Heated oxygen sensor 2 | P0139, P0159 |
| | | Heated oxygen sensor 2 | P1146, P1166 |
| | | Heated oxygen sensor 2 | P1147, P1167 |
| HO2S HTR | 2 | Air fuel ratio (A/F) sensor 1 heater | P1031, P1032, P1051, P1052 |
| | | Heated oxygen sensor 2 heater | P0037, P0038, P0057, P0058 |

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

## SRT Set Timing

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

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

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

When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result. → Case 2 above

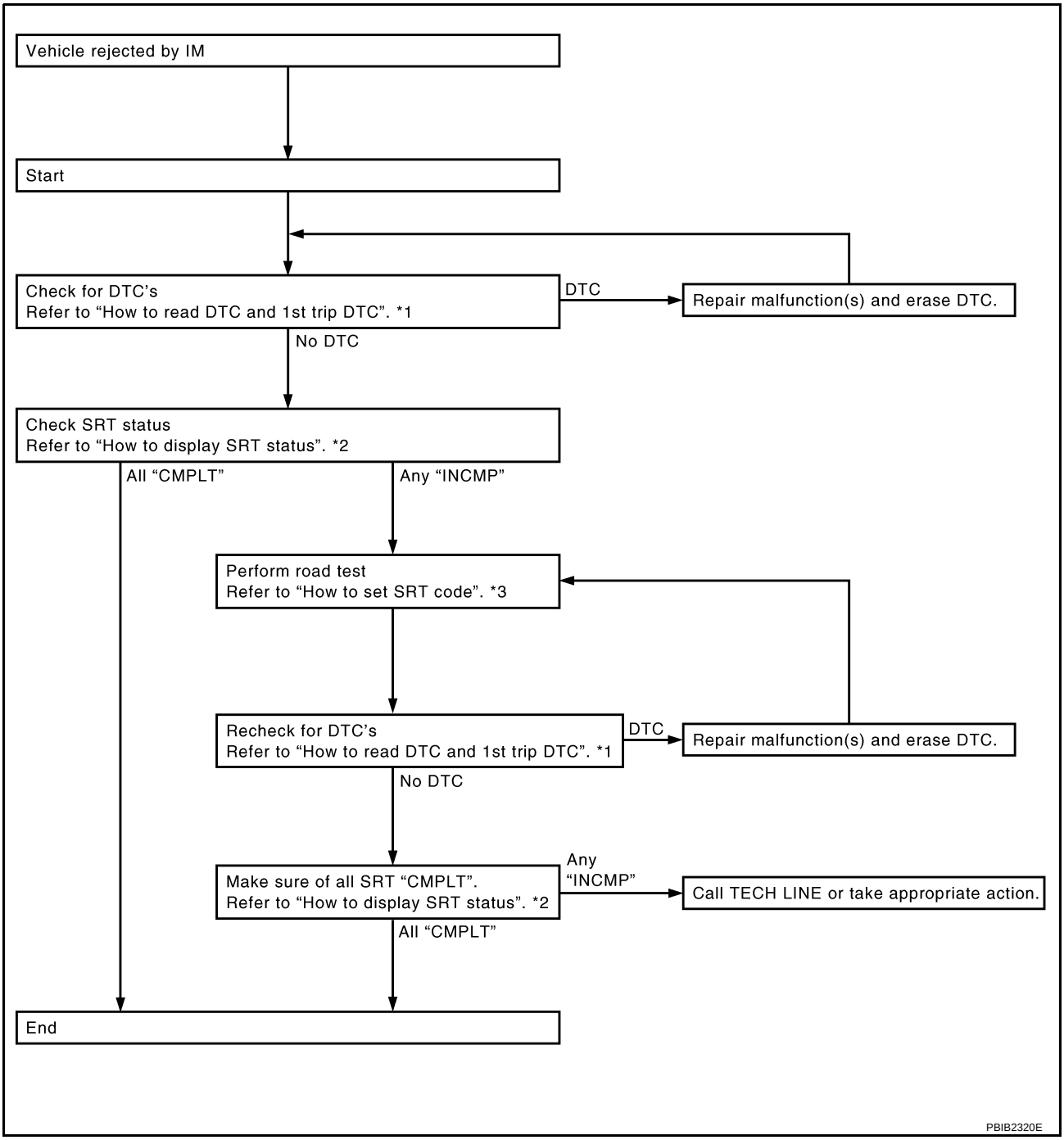
If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”. → Case 3 above
The table above shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

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

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

### SRT Service Procedure

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




*1 EC-51 *2 EC-55 *3 EC-56

## How to Display SRT Status

**WITH CONSULT-II**

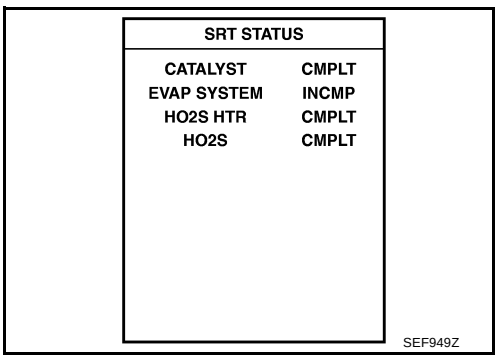
Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.

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 in the figure.

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

"CMPLT" means the self-diagnosis is complete and SRT is set.




**WITH GST**

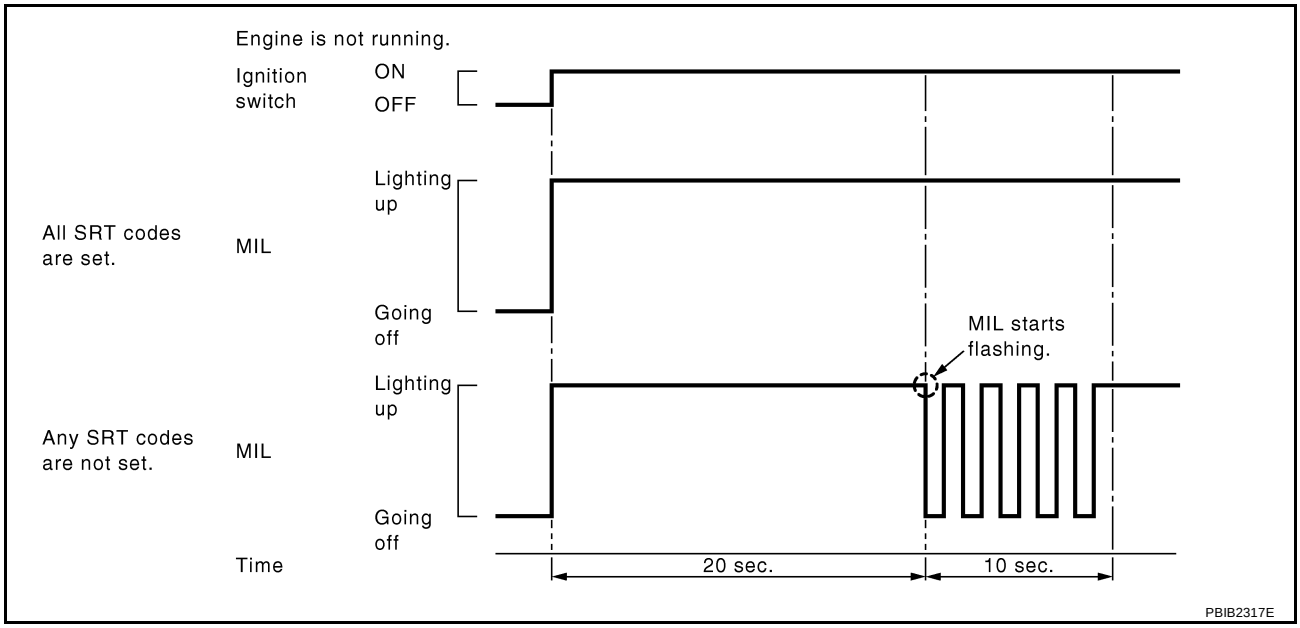
Selecting Service $01 with GST (Generic Scan Tool)

**NO TOOLS**

A SRT code itself can not be displayed while only SRT status can be.

1. Turn ignition switch ON and wait 20 seconds.
2. SRT status is indicated as shown below.

- When all SRT codes are set, MIL lights up continuously.
- When any SRT codes are not set, MIL will flash periodically for 10 seconds.




## 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.

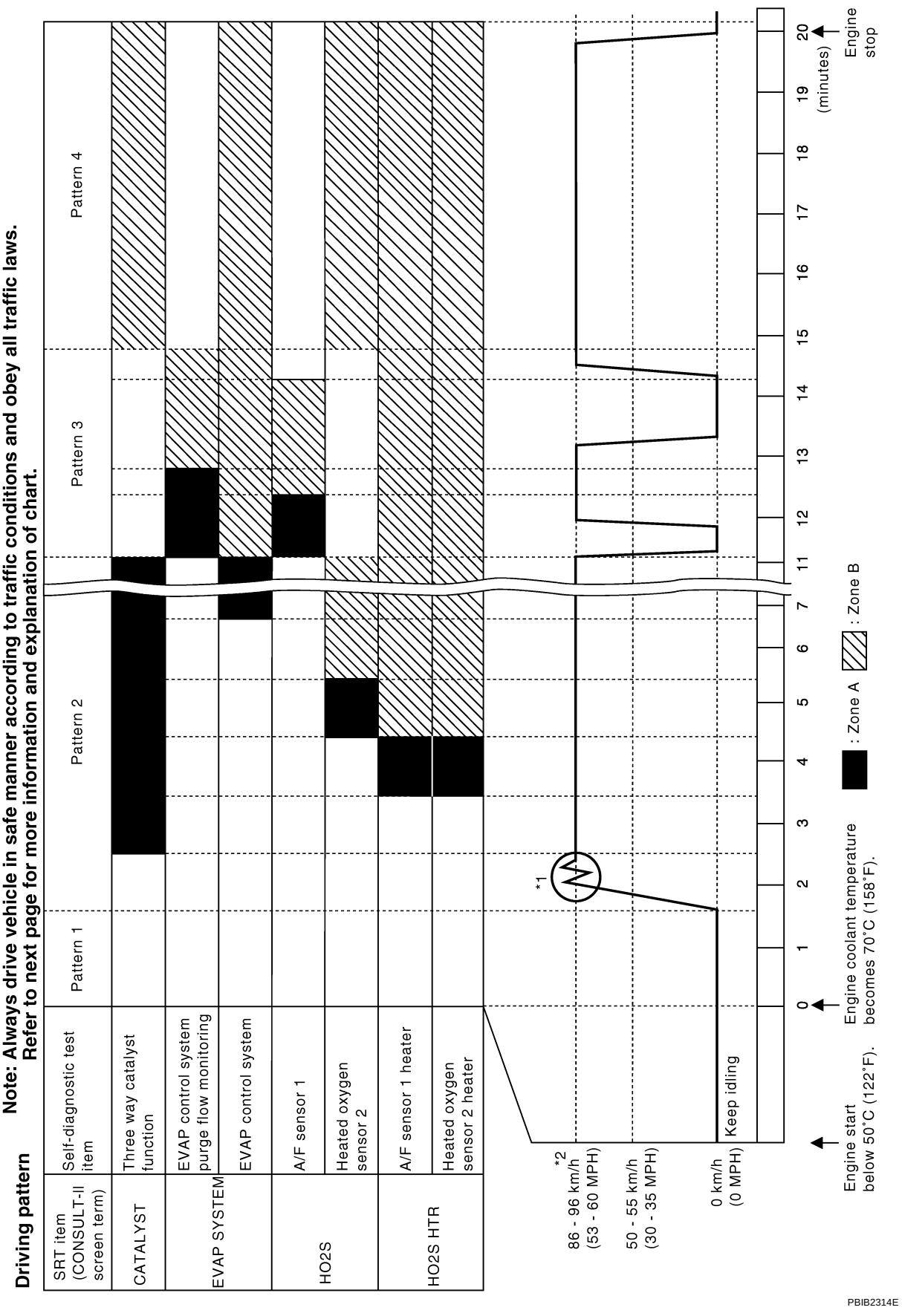
**WITH CONSULT-II**

Perform corresponding DTC Confirmation Procedure one by one based on Performance Priority in the table on EC-53, "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.

## Driving Pattern



- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
  Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.
  Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
  Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

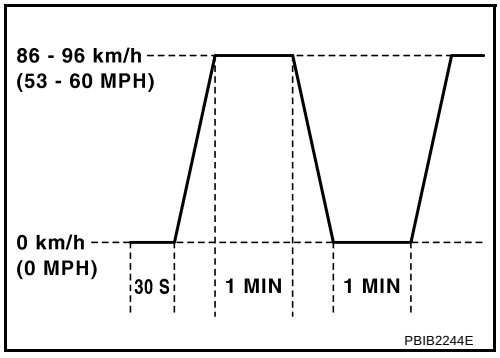
- **The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 73 and ground is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 73 and ground is lower than 1.4V).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 107 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:

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during decelerating vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).




Pattern 4:

- 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: Checking the vehicle speed with GST is advised.

**Suggested Transmission Gear Position for A/T Models**
Set the selector lever in the D position.
**Suggested Upshift Speeds for M/T Models**
Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

| | For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]: | | For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]: |
|---|---|---|---|
| Gear change | ACCEL shift point km/h (MPH) | CRUISE shift point km/h (MPH) | km/h (MPH) |
| 1st to 2nd | 21 (13) | 13 (8) | 24 (15) |
| 2nd to 3rd | 37 (23) | 26 (16) | 40 (25) |
| 3rd to 4th | 48 (30) | 40 (25) | 64 (40) |
| 4th to 5th | 60 (37) | 45 (28) | 72 (45) |
| 6th | 68 (42) | 53 (33) | 80 (50) |

**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 sage 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) |
|---|---|
| 1st | 56 (35) |
| 2nd | 96 (60) |
| 3rd | 136 (85) |
| 4th | — |
| 5th | — |
| 6th | — |

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

The following is the information specified in Service $06 of SAE J1979.

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

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

| Item | Self-diagnostic test item | DTC | Test value (GST display) | | Test limit | Conversion |
|---|---|---|---|---|---|---|
| | | | TID | CID | | |
| CATALYST | Three way catalyst function (Bank 1) | P0420 | 01H | 01H | Max. | 1/128 |
| | | P0420 | 02H | 81H | Min. | 1 |
| | Three way catalyst function (Bank 2) | P0430 | 03H | 02H | Max. | 1/128 |
| | | P0430 | 04H | 82H | Min. | 1 |
| EVAP SYSTEM | EVAP control system (Small leak) | P0442 | 05H | 03H | Max. | 1/128mm$^2$ |
| | EVAP control system purge flow monitoring | P0441 | 06H | 83H | Min. | 20mV |
| | EVAP control system (Very small leak) | P0456 | 07H | 03H | Max. | 1/128mm$^2$ |

| Item | Self-diagnostic test item | DTC | Test value (GST display) | | Test limit | Conversion |
|---|---|---|---|---|---|---|
| | | | TID | CID | | |
| HO2S | Air fuel ratio (A/F) sensor 1 (Bank 1) | P1271 | 41H | 8EH | Min. | 5 mV |
| | | P1272 | 42H | 0EH | Max. | 5 mV |
| | | P1273 | 43H | 0EH | Max. | 0.002 |
| | | P1274 | 44H | 8EH | Min. | 0.002 |
| | | P1278 | 45H | 8EH | Min. | 0.004 |
| | | P1276 | 46H | 0EH | Max. | 5 mV |
| | | P1276 | 47H | 8EH | Min. | 5 mV |
| | | P1279 | 48H | 8EH | Min. | 0.004 |
| | Air fuel ratio (A/F) sensor 1 (Bank 2) | P1281 | 4CH | 8FH | Min. | 5 mV |
| | | P1282 | 4DH | 0FH | Max. | 5 mV |
| | | P1283 | 4EH | 0FH | Max. | 0.002 |
| | | P1284 | 4FH | 8FH | Min. | 0.002 |
| | | P1288 | 50H | 8FH | Min. | 0.004 |
| | | P1286 | 51H | 0FH | Max. | 5 mV |
| | | P1286 | 52H | 8FH | Min. | 5 mV |
| | | P1289 | 53H | 8FH | Min. | 0.004 |
| | Heated oxygen sensor 2 (Bank 1) | P0139 | 19H | 86H | Min. | 10mV/500ms |
| | | P1147 | 1AH | 86H | Min. | 10mV |
| | | P1146 | 1BH | 06H | Max. | 10mV |
| | | P0138 | 1CH | 06H | Max. | 10mV |
| | Heated oxygen sensor 2 (Bank 2) | P0159 | 21H | 87H | Min. | 10mV/500ms |
| | | P1167 | 22H | 87H | Min. | 10mV |
| | | P1166 | 23H | 07H | Max. | 10mV |
| | | P0158 | 24H | 07H | Max. | 10mV |
| HO2S HEATER | Air fuel ratio (A/F) sensor 1 heater (Bank 1) | P1032 | 57H | 10H | Max. | 5 mV |
| | | P1031 | 58H | 90H | Min. | 5 mV |
| | Air fuel ratio (A/F) sensor 1 heater (Bank 2) | P1052 | 59H | 11H | Max. | 5 mV |
| | | P1051 | 5AH | 91H | Min. | 5 mV |
| | Heated oxygen sensor 2 heater (Bank 1) | P0038 | 2DH | 0AH | Max. | 20mV |
| | | P0037 | 2EH | 8AH | Min. | 20mV |
| | Heated oxygen sensor 2 heater (Bank 2) | P0058 | 2FH | 0BH | Max. | 20mV |
| | | P0057 | 30H | 8BH | Min. | 20mV |

## HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

### How to Erase DTC

**WITH CONSULT-II**

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

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

**NOTE:**

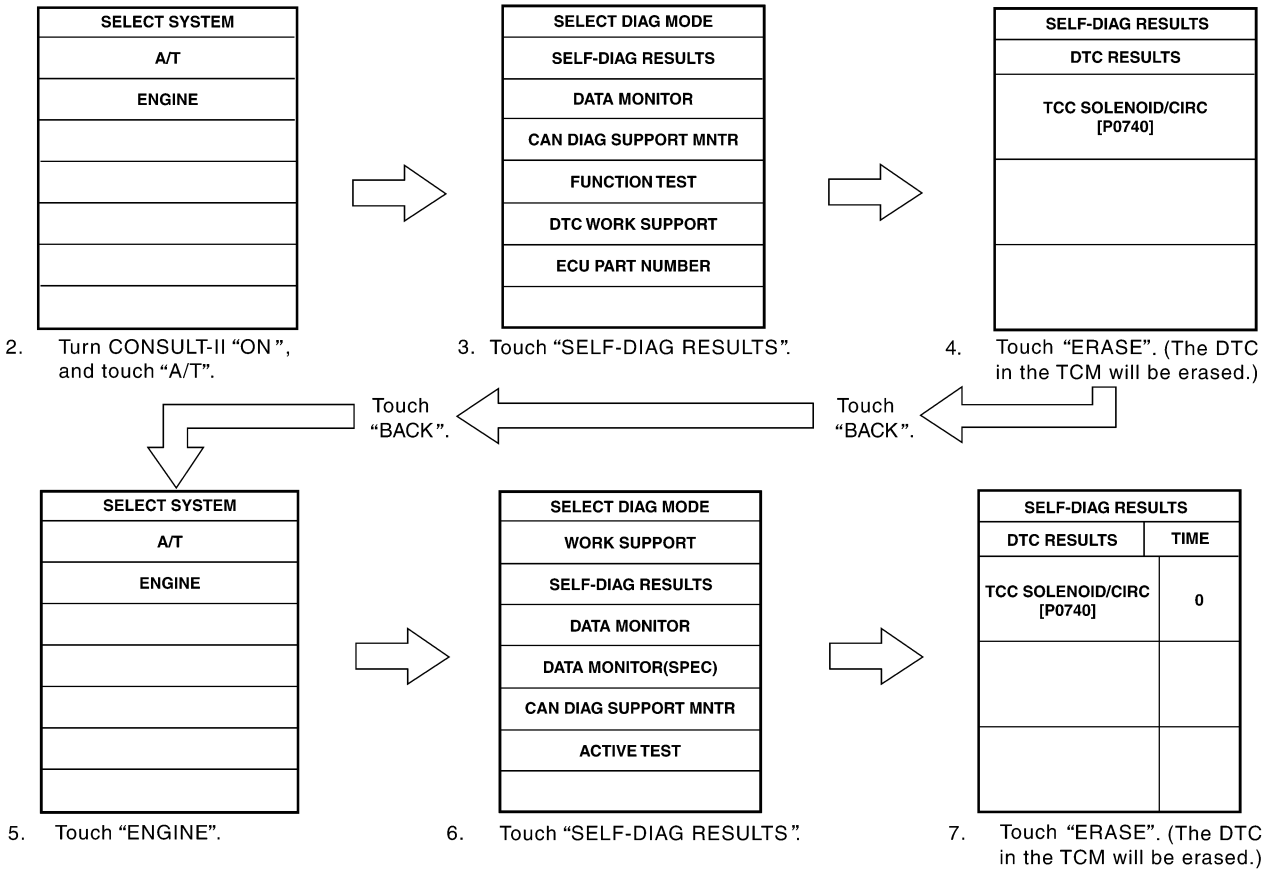
**If the DTC is not for A/T related items (see EC-8, "INDEX FOR DTC" ), skip steps 2 through 4.**

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Turn CONSULT-II ON and touch “A/T”.

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

**How to erase DTC (With CONSULT-II)**

1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 10 seconds and then turn it “ON” (engine stopped) again.




**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-8, "INDEX FOR DTC" ), skip step 2.**

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Perform AT-41, "HOW TO ERASE DTC (WITH GST)" . (The DTC in the TCM will be erased.)
3. Select Service $04 with GST (Generic Scan Tool).

**NO TOOLS**

**NOTE:**

**If the DTC is not for A/T related items (see EC-8, "INDEX FOR DTC" ), skip step 2.**

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Perform AT-41, "HOW TO ERASE DTC (NO TOOLS)" . (The DTC in the TCM will be erased.)
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal. Refer to EC-63, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**

- **The following data are cleared when the ECM memory is erased.**
  - Diagnostic trouble codes
  - 1st trip diagnostic trouble codes
  - Freeze frame data
  - 1st trip freeze frame data
  - System readiness test (SRT) codes
  - Test values

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

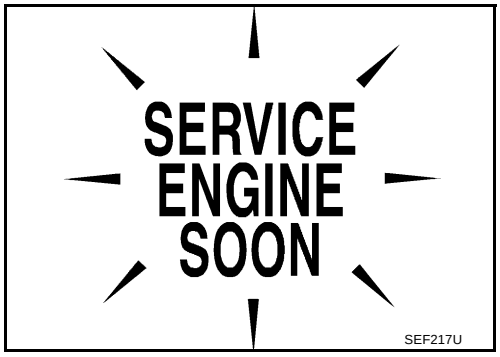
## Malfunction Indicator Lamp (MIL)

ABS00AO1

### 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-26, "WARNING LAMPS" , or see EC-683, "MIL AND 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 three functions.

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

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

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

### MIL Flashing without DTC

When any SRT codes are not set, MIL may flash without DTC. For the details, refer to EC-55, "How to Display SRT Status" .

## HOW TO SWITCH DIAGNOSTIC TEST MODE

**NOTE:**

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

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

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

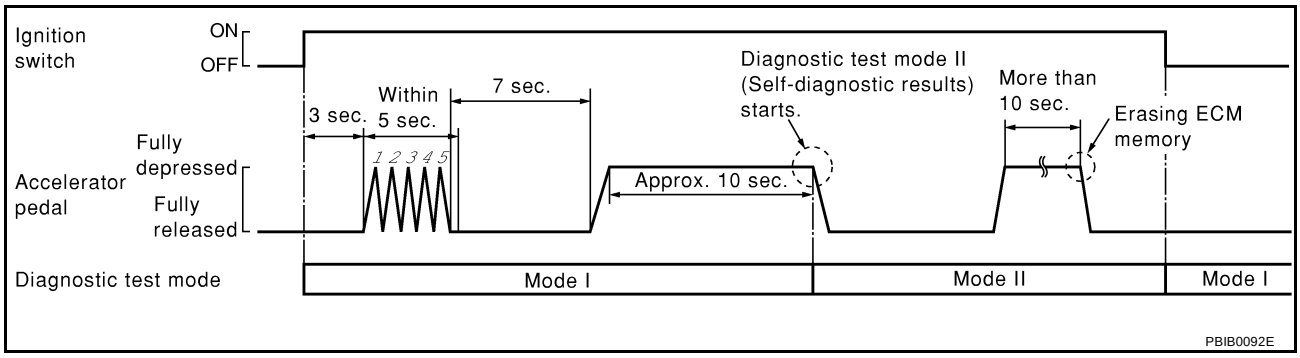
a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.

**NOTE:**
**Do not release the accelerator pedal for 10 seconds if MIL may start blinking on the halfway of this 10 seconds. This blinking is displaying SRT status and is continued for another 10 seconds. For the details, refer to EC-55, "How to Display SRT Status" .**

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

**NOTE:**
**Wait until the same DTC (or 1st trip DTC) appears to confirm all DTCs certainly.**




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

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-63, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

## DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to DI-26, "WARNING LAMPS" or see EC-683, "MIL AND DATA LINK CONNECTOR" .

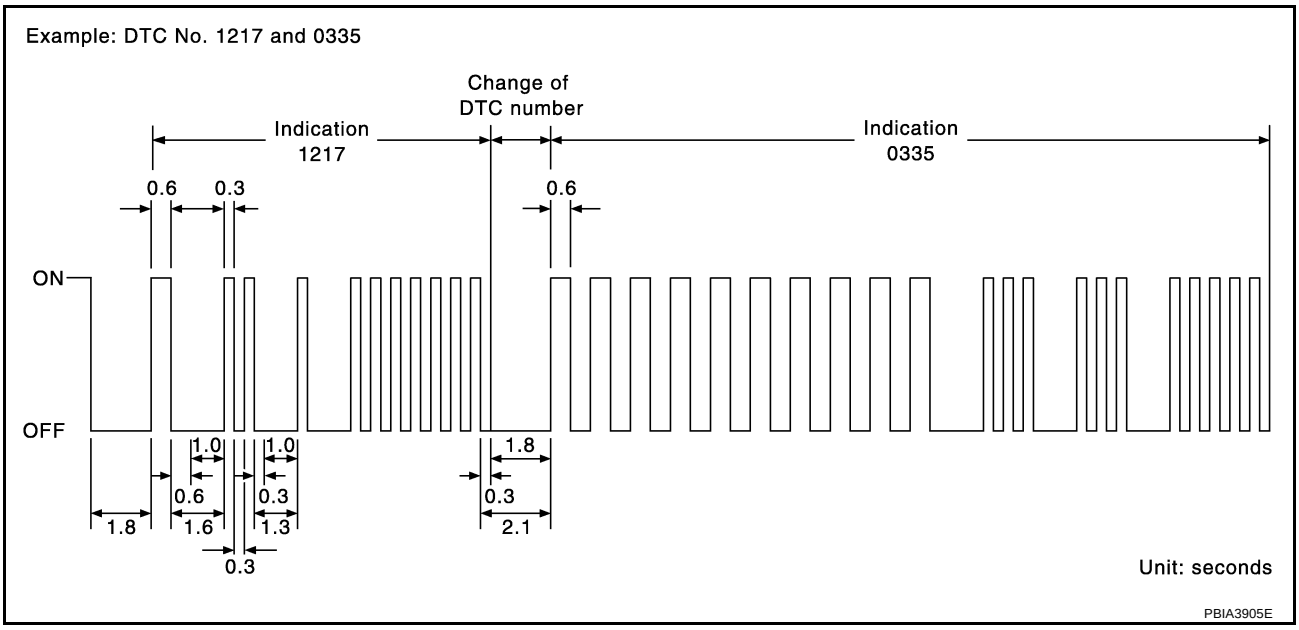
## DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

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

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

## DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

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




A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See EC-8, "INDEX FOR DTC" )

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

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to EC-64, "How to Erase Diagnostic Test Mode II (Self-diagnostic Results)" .

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

## OBD System Operation Chart

ABS00AO2

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

- When a malfunction is detected for the 1st 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-46, "Two Trip Detection Logic" .
- The MIL will go off after the vehicle is driven 3 times (driving pattern B) 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.

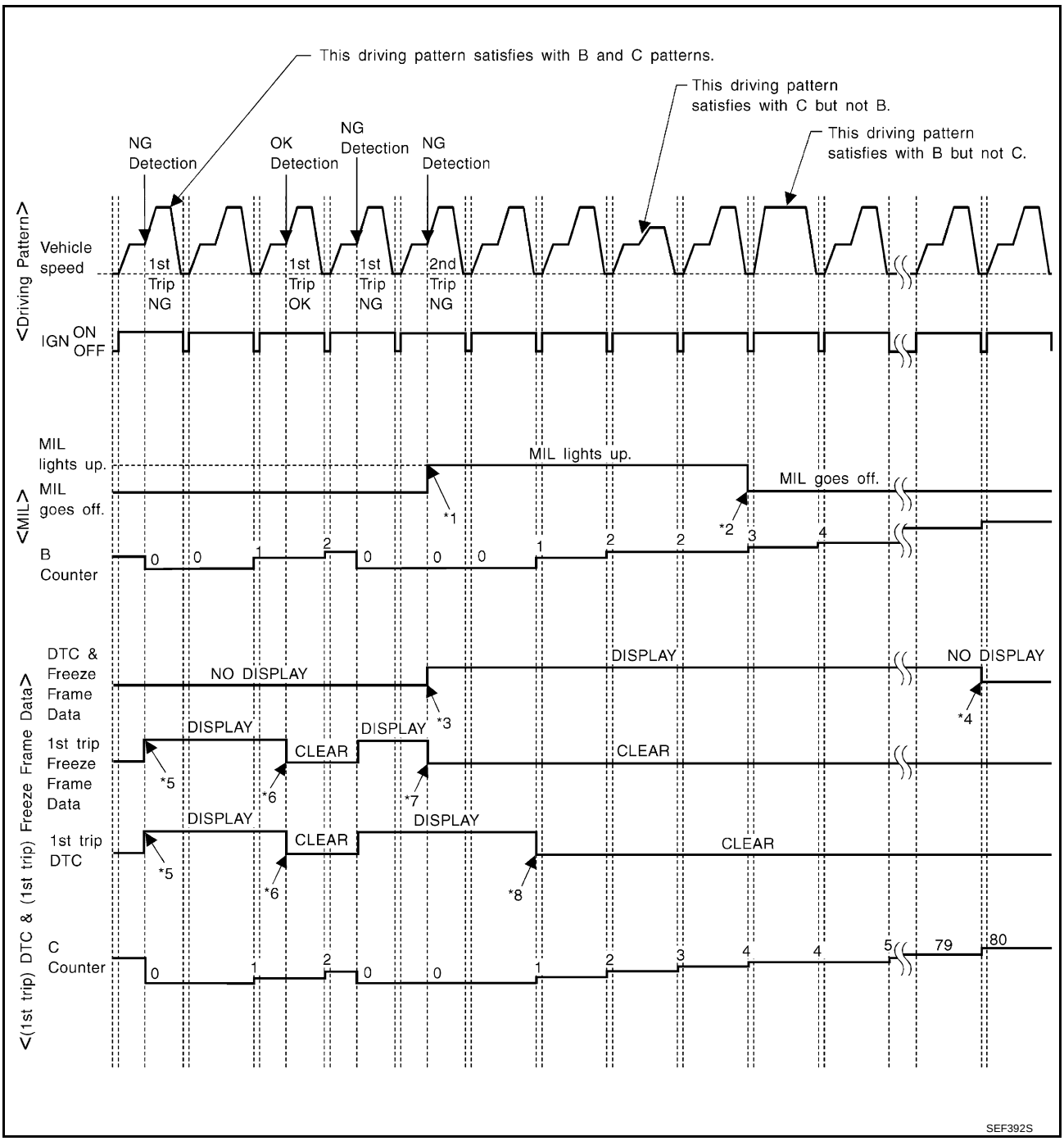
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

## 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-68 .
For details about patterns A and B under “Other”, see EC-70
*1: Clear timing is at the moment OK is detected.
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

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




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

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

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

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

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

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

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

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

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

### <Driving Pattern B>

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

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

### <Driving Pattern C>

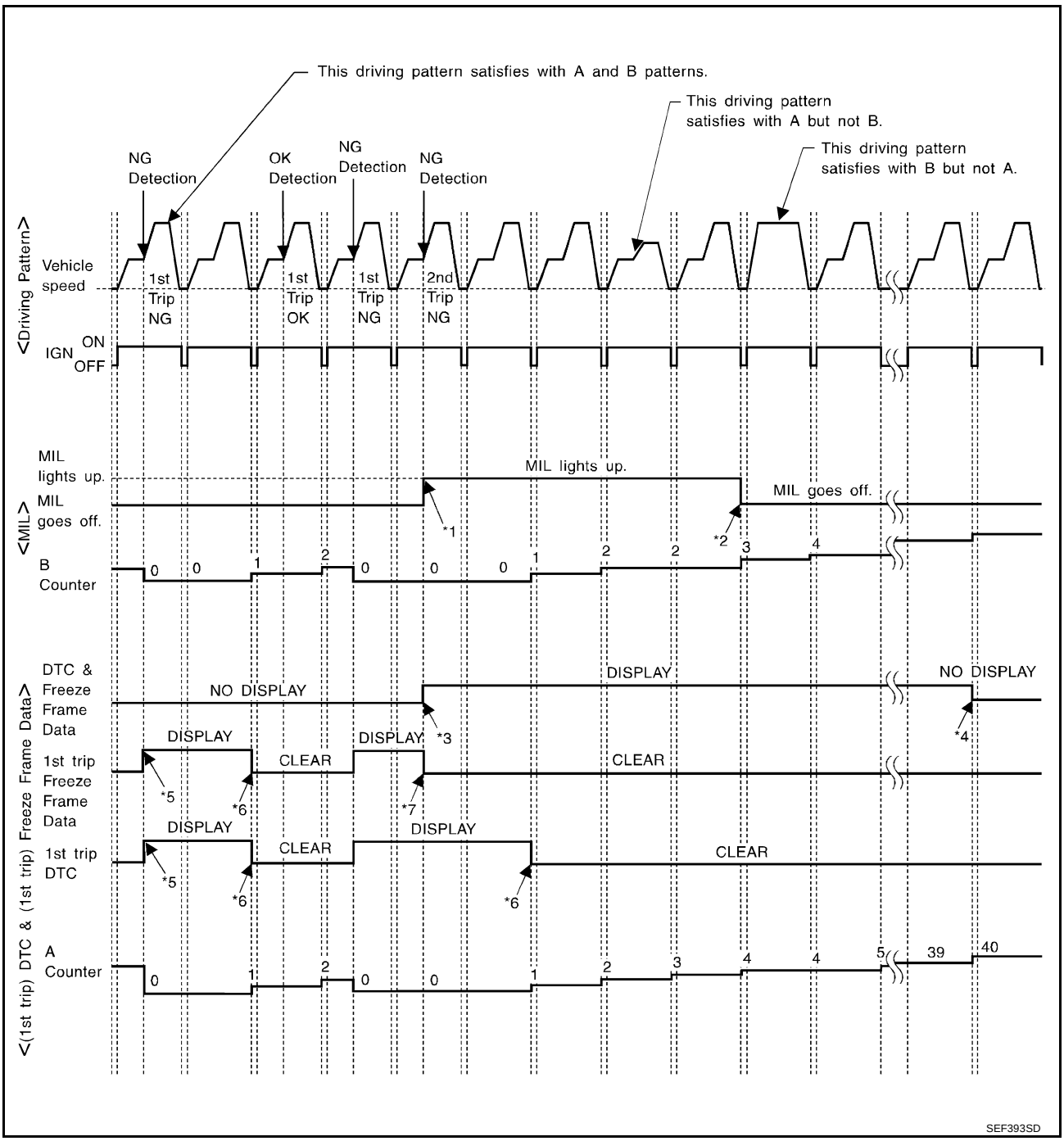
Driving pattern C means the vehicle operation as follows:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature (T) condition:

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

Example:
If the stored freeze frame data is as follows:
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)
To be satisfied with driving pattern C, the vehicle should run under the following conditions:
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

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

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




*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.)

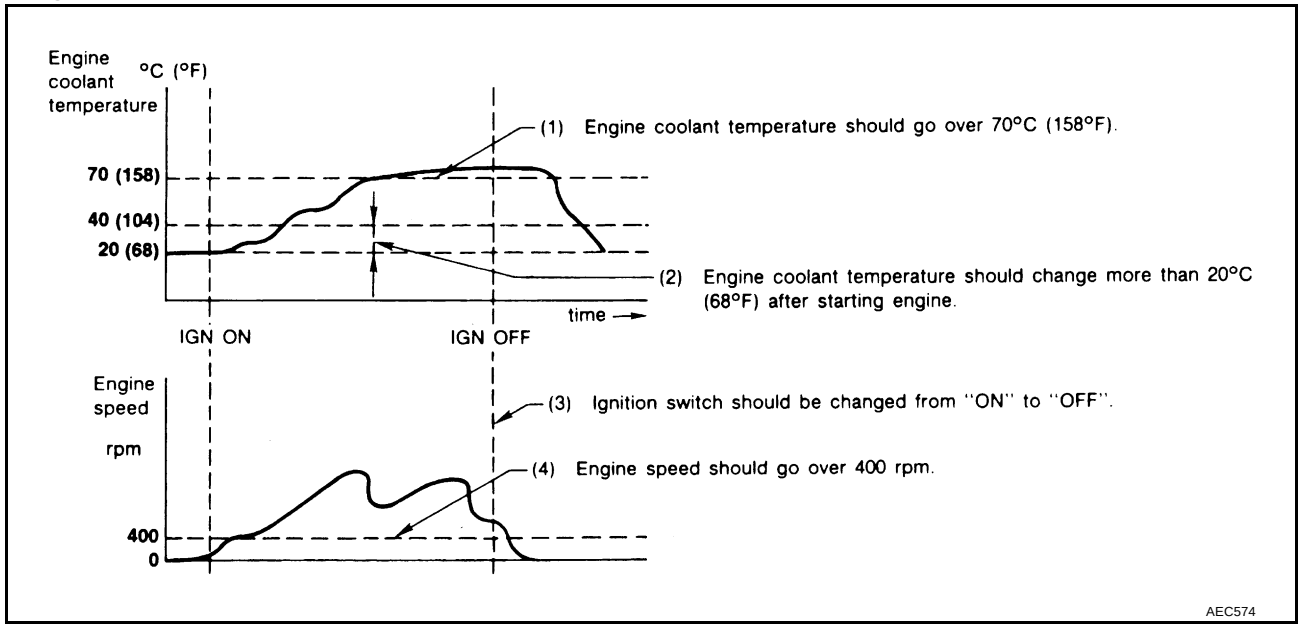
*5: When a malfunction is detected for the 1st time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*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).

# BASIC SERVICE PROCEDURE

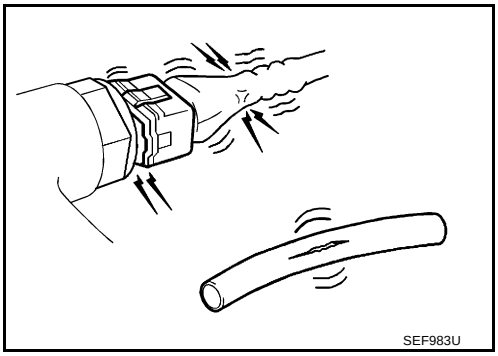
PFP:00018

## Basic Inspection

ABS00AO6

### 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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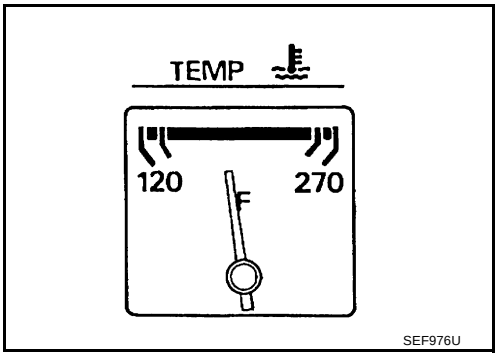
3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
Ensure engine stays below 1,000 rpm.



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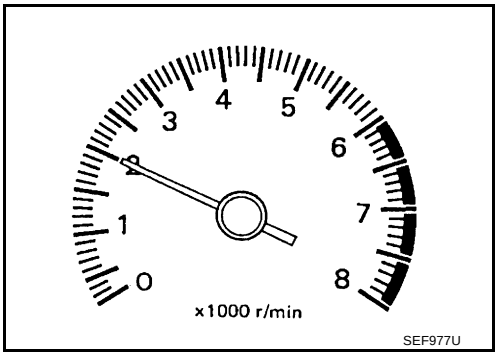
5. Run engine at about 2,000 rpm for about 2 minutes under no-load.
6. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

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



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### 2. REPAIR OR REPLACE

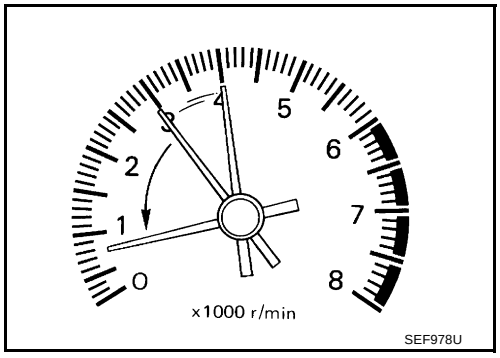
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3.

## 3. CHECK TARGET IDLE SPEED

**With CONSULT-II**

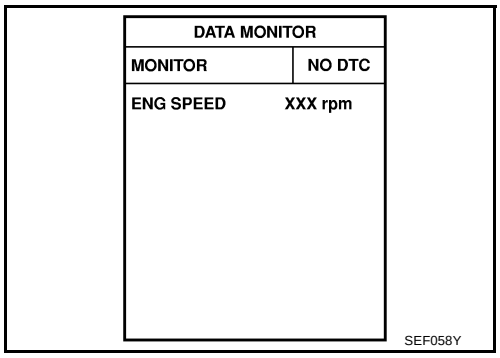
1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.




3. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-76, "IDLE SPEED" .

**A/T: 650 ± 50 rpm (in P or N position)**

**M/T: 650 ± 50 rpm (in Neutral position)**




**Without CONSULT-II**

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.
3. Check idle speed. Refer to EC-76, "IDLE SPEED" .

**A/T: 650 ± 50 rpm (in P or N position)**

**M/T: 650 ± 50 rpm (in Neutral position)**

OK or NG

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

## 4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-88, "Accelerator Pedal Released Position Learning" .

>> GO TO 5.

## 5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-88, "Throttle Valve Closed Position Learning" .

>> GO TO 6.

## 6. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-89, "Idle Air Volume Learning" .

**Is Idle Air Volume Learning carried out successfully?**

Yes or No

Yes >> GO TO 7.

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

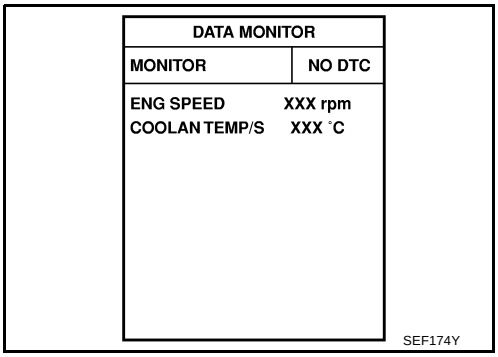
## 7. CHECK TARGET IDLE SPEED AGAIN

**With CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II.
   Refer to EC-76, "IDLE SPEED" .

**A/T: 650 ± 50 rpm (in P or N position)**

**M/T: 650 ± 50 rpm (in Neutral position)**




**Without CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   Refer to EC-76, "IDLE SPEED" .

**A/T: 650 ± 50 rpm (in P or N position)**

**M/T: 650 ± 50 rpm (in Neutral position)**

OK or NG

OK >> GO TO 10.

NG >> GO TO 8.

## 8. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit.
  Refer to EC-299, "DTC P0340, P0345 CMP SENSOR (PHASE)" .
- Check crankshaft position sensor (POS) and circuit.
  Refer to EC-292, "DTC P0335 CKP SENSOR (POS)" .

OK or NG

OK >> GO TO 9.

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

## 9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-228, "ECM Re-communicating Function" .

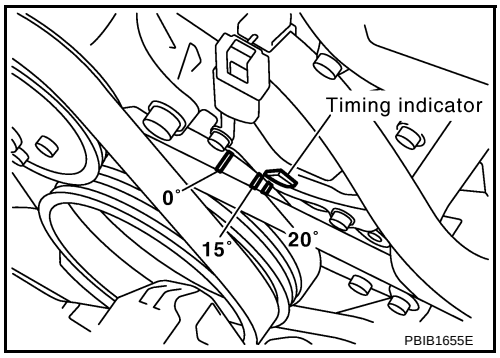
>> GO TO 4.

## 10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.
   Refer to EC-76, "IGNITION TIMING" .

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

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




OK or NG

OK >> GO TO 19.
NG >> GO TO 11.

## 11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-88, "Accelerator Pedal Released Position Learning" .

>> GO TO 12.

## 12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-88, "Throttle Valve Closed Position Learning" .

>> GO TO 13.

## 13. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-89, "Idle Air Volume Learning" .

**Is Idle Air Volume Learning carried out successfully?**

Yes or No

Yes >> GO TO 14.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

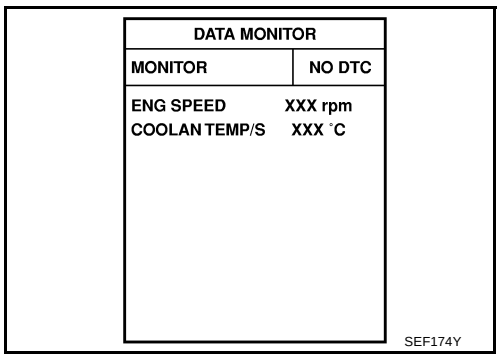
## 14. CHECK TARGET IDLE SPEED AGAIN

**With CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II.
   Refer to EC-76, "IDLE SPEED" .

**A/T: 650 ± 50 rpm (in P or N position)**

**M/T: 650 ± 50 rpm (in Neutral position)**




**Without CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-76, "IDLE SPEED" .

**A/T: 650 ± 50 rpm (in P or N position)**

**M/T: 650 ± 50 rpm (in Neutral position)**

OK or NG

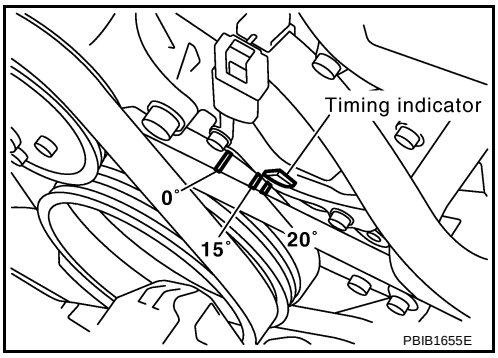
OK >> GO TO 15.
NG >> GO TO 17.

## 15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
   Refer to EC-76, "IGNITION TIMING" .

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

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




OK or NG

OK >> GO TO 19.
NG >> GO TO 16.

## 16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-64, "TIMING CHAIN" .

OK or NG

OK >> GO TO 17.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

## 17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit.
  Refer to EC-299, "DTC P0340, P0345 CMP SENSOR (PHASE)" .
- Check crankshaft position sensor (POS) and circuit.
  Refer to EC-292, "DTC P0335 CKP SENSOR (POS)" .

OK or NG

OK >> GO TO 18.
NG >> 1. Repair or replace.
2. GO TO 4.

## 18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of a incident, but this is a rare case.)
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-228, "ECM Re-communicating Function" .

>> GO TO 4.

## 19. INSPECTION END

Did you replace the ECM, referring this Basic Inspection procedure?

Yes or No

Yes >> 1. Perform EC-88, "VIN Registration" .
2. **INSPECTION END**

No >> **INSPECTION END**

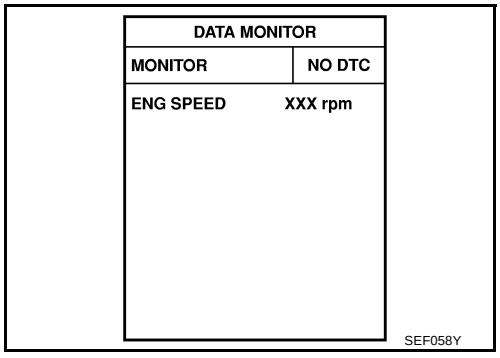
# Idle Speed and Ignition Timing Check

ABS00ANQ

## IDLE SPEED

### With CONSULT-II

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




### With GST

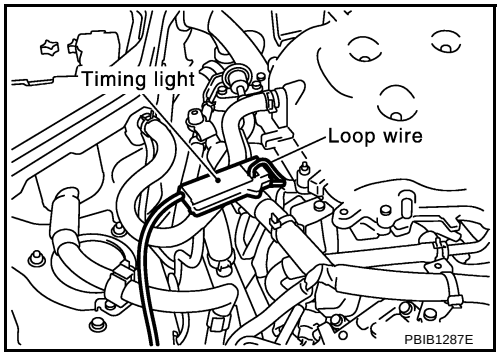
Check idle speed Service $01 with GST.

## IGNITION TIMING

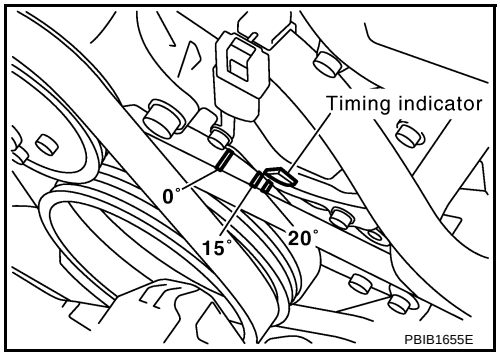
Any of following two methods may be used.

### Method A

1. Attach timing light to loop wire as shown.

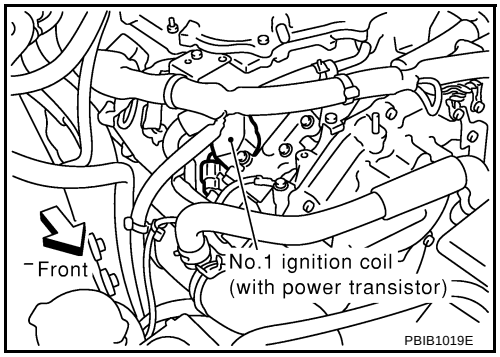



2. Check ignition timing.

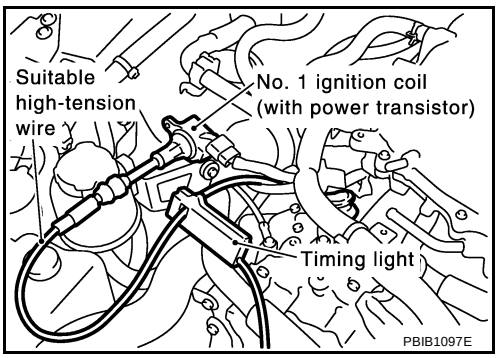


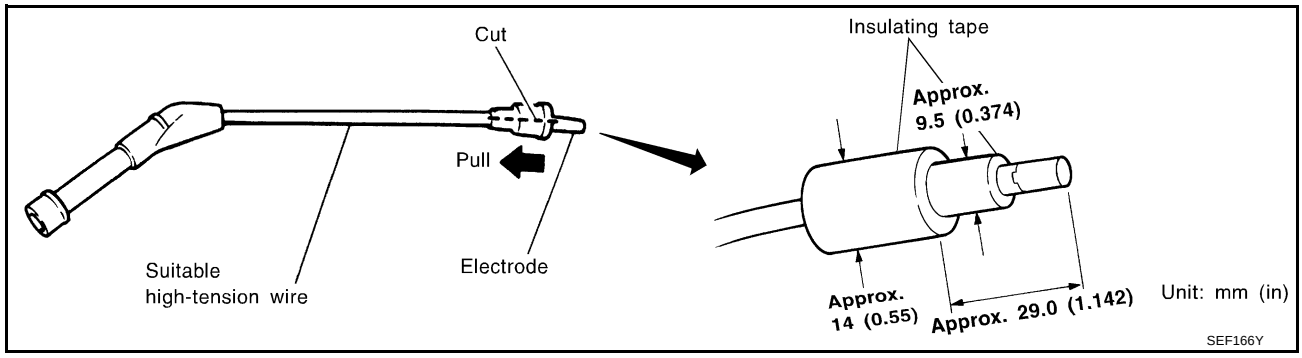

### Method B

1. Remove No. 1 ignition coil.

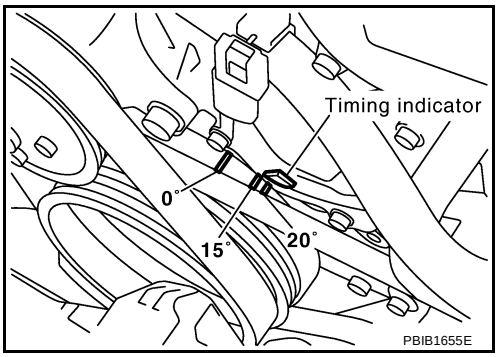


2. Connect No. 1 ignition coil and No. 1 spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire.




3. Check ignition timing.




## Idle Mixture Ratio Adjustment

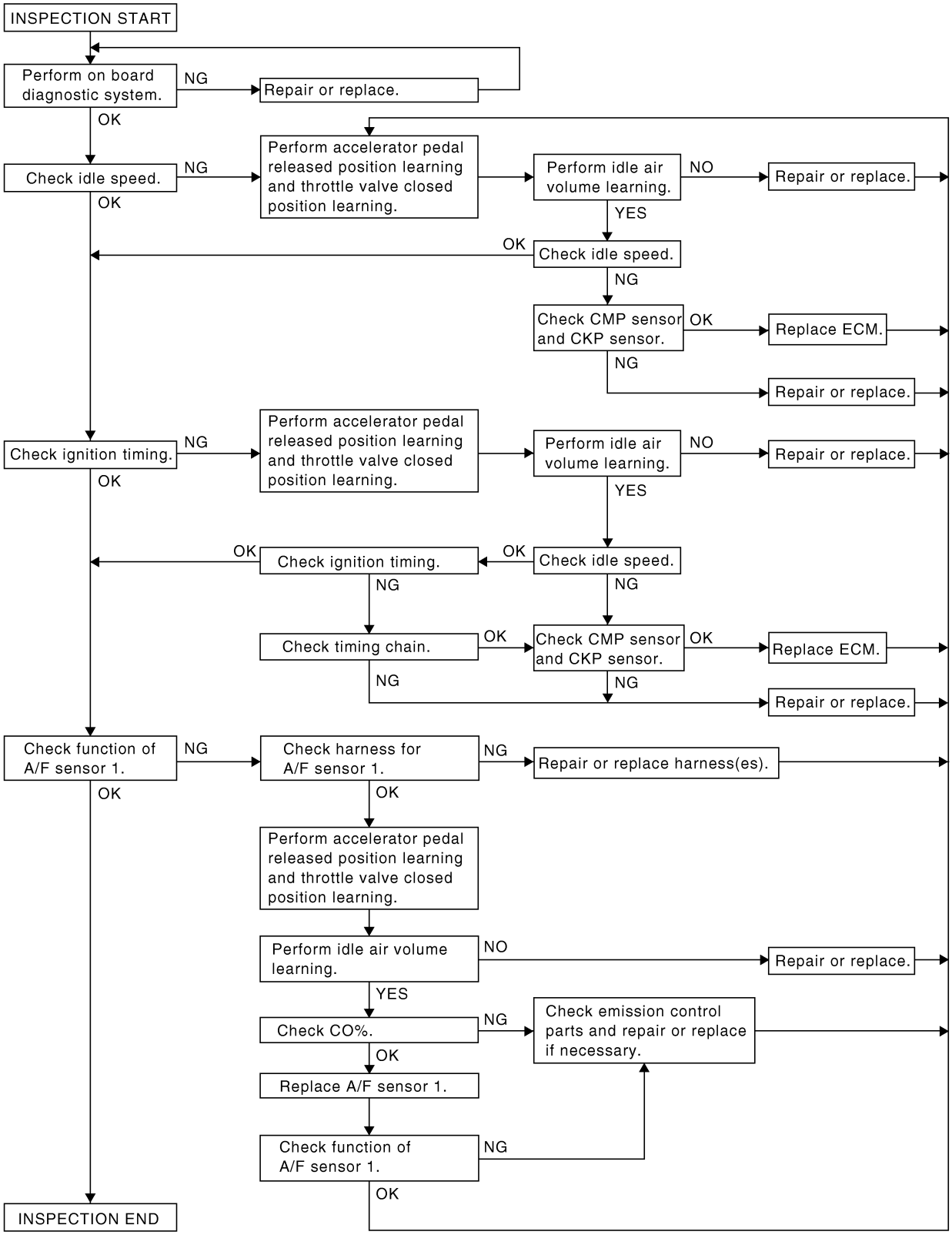
ABS00ANR

### 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 P or N position.
4. When measuring CO percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
5. Turn OFF headlamp, heater blower, rear window defogger.

6. Keep front wheels pointed straight ahead.

## OVERALL SEQUENCE



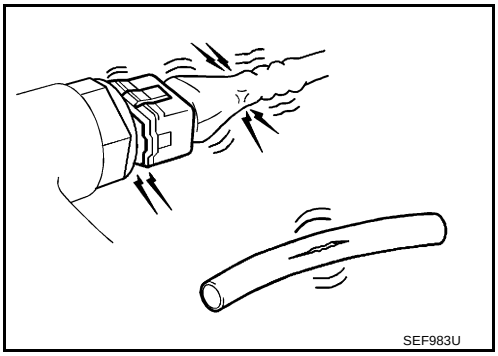

**NOTE:**
**If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably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

PBIB2086E

## 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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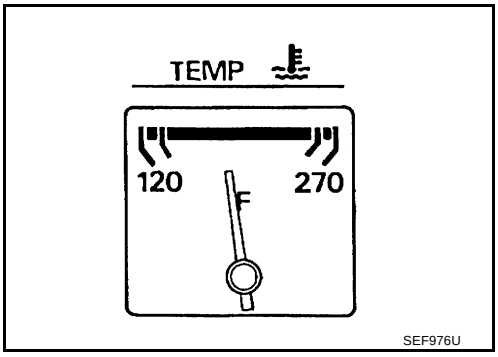
3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.

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



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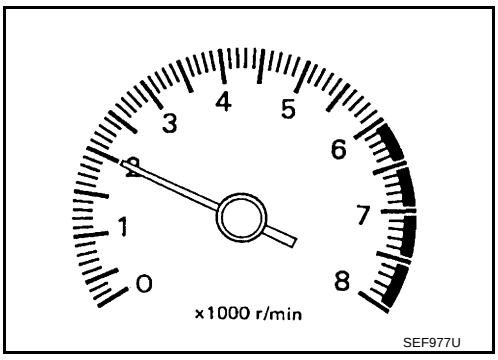
5. Run engine at about 2,000 rpm for about 2 minutes under no-load.
6. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

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



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### 2. REPAIR OR REPLACE

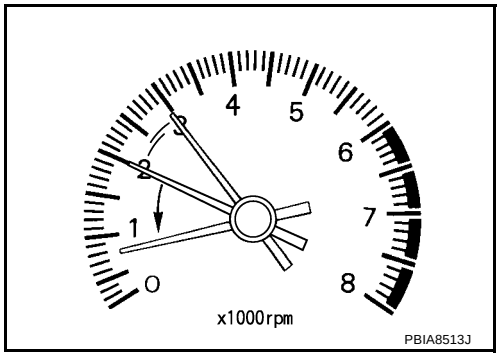
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3.

## 3. CHECK TARGET IDLE SPEED

**With CONSULT-II**

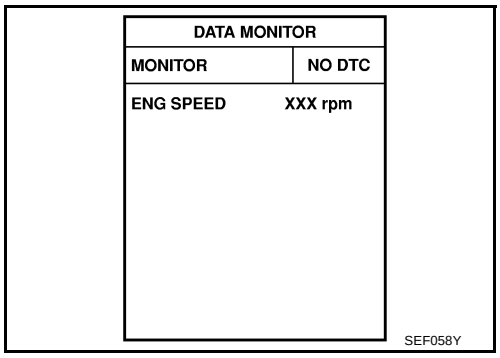
1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.




3. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-76, "IDLE SPEED" .

**A/T: 650 ± 50 rpm (in P or N position)**

**M/T: 650 ± 50 rpm (in Neutral position)**




**Without CONSULT-II**

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.
3. Check idle speed. Refer to EC-76, "IDLE SPEED" .

**A/T: 650 ± 50 rpm (in P or N position)**

**M/T: 650 ± 50 rpm (in Neutral position)**

OK or NG

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

## 4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-88, "Accelerator Pedal Released Position Learning" .

>> GO TO 5.

## 5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-88, "Throttle Valve Closed Position Learning" .

>> GO TO 6.

## 6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-89, "Idle Air Volume Learning" .
**Is Idle Air Volume Learning carried out successfully?**

Yes or No

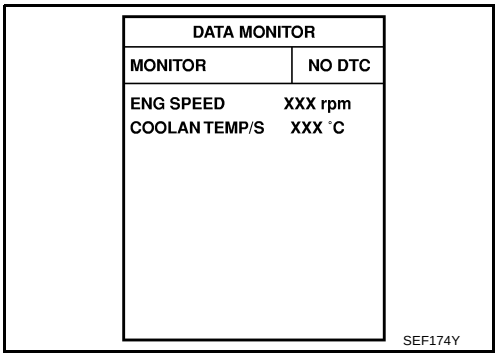
Yes >> GO TO 7.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

## 7. CHECK TARGET IDLE SPEED AGAIN

**With CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-76, "IDLE SPEED" .

**A/T: 650 ± 50 rpm (in P or N position)**
**M/T: 650 ± 50 rpm (in Neutral position)**




**Without CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-76, "IDLE SPEED" .

**A/T: 650 ± 50 rpm (in P or N position)**
**M/T: 650 ± 50 rpm (in Neutral position)**

OK or NG

OK >> GO TO 10.
NG >> GO TO 8.

## 8. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-299, "DTC P0340, P0345 CMP SENSOR (PHASE)" .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-292, "DTC P0335 CKP SENSOR (POS)" .

OK or NG

OK >> GO TO 9.
NG >> 1. Repair or replace.
2. GO TO 4.

## 9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-228, "ECM Re-communicating Function" .

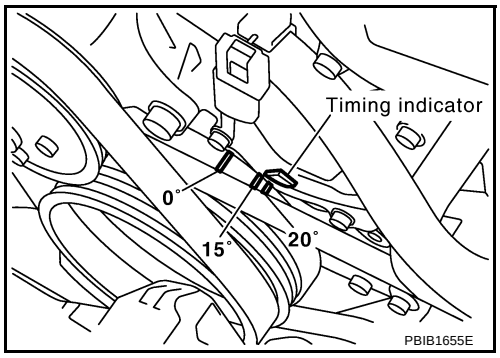
>> GO TO 4.

## 10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.
   Refer to EC-76, "IGNITION TIMING" .

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

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




OK or NG

OK (With CONSULT-II)>>GO TO 19.
OK (With GST)>>GO TO 20.
NG >> GO TO 11.

## 11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-88, "Accelerator Pedal Released Position Learning" .

>> GO TO 12.

## 12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-88, "Throttle Valve Closed Position Learning" .

>> GO TO 13.

## 13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-89, "Idle Air Volume Learning" .

**Is Idle Air Volume Learning carried out successfully?**

Yes or No

Yes >> GO TO 14.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

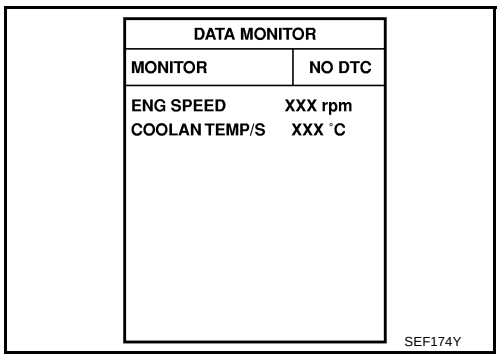
## 14. CHECK TARGET IDLE SPEED AGAIN

**With CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II.
   Refer to EC-76, "IDLE SPEED" .

**A/T: 650 ± 50 rpm (in P or N position)**

**M/T: 650 ± 50 rpm (in Neutral position)**




**Without CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-76, "IDLE SPEED" .

**A/T: 650 ± 50 rpm (in P or N position)**

**M/T: 650 ± 50 rpm (in Neutral position)**

OK or NG

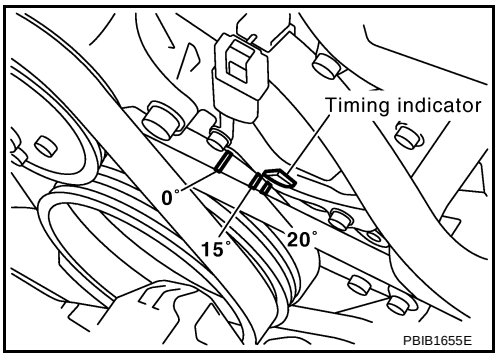
OK >> GO TO 15.
NG >> GO TO 17.

## 15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
   Refer to EC-76, "IGNITION TIMING" .

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

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




OK or NG

OK (With CONSULT-II)>>GO TO 19.
OK (With GST)>>GO TO 20.
NG >> GO TO 16.

## 16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-64, "TIMING CHAIN" .

OK or NG

OK >> GO TO 17.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

## 17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit.
  Refer to EC-299, "DTC P0340, P0345 CMP SENSOR (PHASE)" .
- Check crankshaft position sensor (POS) and circuit.
  Refer to EC-292, "DTC P0335 CKP SENSOR (POS)" .

OK or NG

OK >> GO TO 18.
NG >> 1. Repair or replace.
2. GO TO 4.

## 18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-228, "ECM Re-communicating Function" .

>> GO TO 4.

## 19. CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

**With CONSULT-II**

1. Turn ignition switch OFF and wait at a least 10 seconds.
2. Start engine and warm it up to normal operating temperature.
3. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position (A/T) or 5th position (M/T).

   **NOTE:**
   Keep the accelerator pedal as steady as possible during the cruising.
4. Then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

   **NOTE:**
   Never apply brake during releasing the accelerator pedal.
5. Repeat steps 3 to 4 for five times.
6. Stop the vehicle and connect CONSULT-II to the vehicle.
7. Make sure that no (1st trip) DTC is displayed in “SELF-DIAG RESULTS” mode.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 21.

## 20. CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

**With GST**

1. Turn ignition switch OFF and wait at a least 10 seconds.
2. Start engine and warm it up to normal operating temperature.
3. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position (A/T) or 5th position (M/T).

   **NOTE:**
   Keep the accelerator pedal as steady as possible during the cruising.
4. Then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

   **NOTE:**
   Never apply brake during releasing the accelerator pedal.
5. Repeat steps 3 to 4 for five times.
6. Stop the vehicle and connect GST to the vehicle.
7. Make sure that no (1st trip) DTC is displayed.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 21.

## 21. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HARNESS

1. Turn ignition switch OFF and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect A/F sensor 1 harness connector.
4. Check harness continuity between the following terminals. Refer to EC-479, "Wiring Diagram" .

| | A/F sensor 1 terminal | ECM terminal |
|---|---|---|
| Bank 1 | 1 | 16 |
| | 2 | 75 |
| | 4 | 2 |
| | 5 | 35 |
| | 6 | 56 |
| Bank 2 | 1 | 76 |
| | 2 | 77 |
| | 4 | 24 |
| | 5 | 57 |
| | 6 | 58 |

**Continuity should exist.**

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

OK or NG

OK >> GO TO 22.
NG >> 1. Repair open circuit or short to ground or short to power in harness or connectors.
2. GO TO 4.

## 22. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Reconnect ECM harness connector.
2. Perform EC-88, "Accelerator Pedal Released Position Learning" .

>> GO TO 23.

## 23. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-88, "Throttle Valve Closed Position Learning" .

>> GO TO 24.

## 24. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-89, "Idle Air Volume Learning" .
**Is Idle Air Volume Learning carried out successfully?**

Yes or No

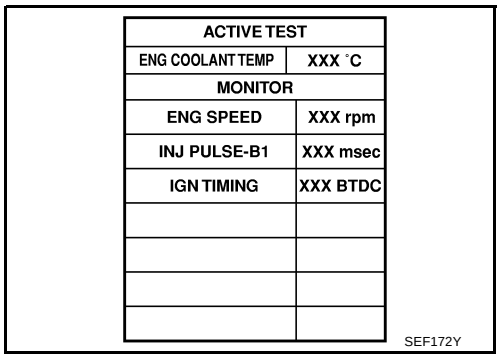
Yes (With CONSULT-II)>>GO TO 25.
Yes (Without CONSULT-II)>>GO TO 26.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

## 25. CHECK CO%

**With CONSULT-II**

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

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




OK or NG

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

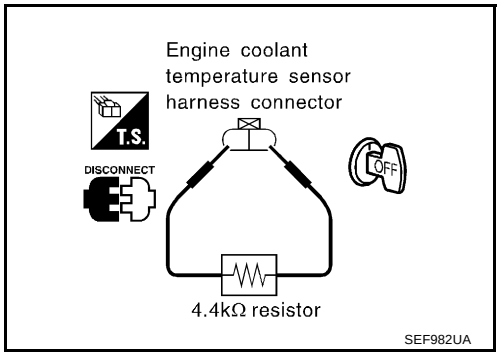
## 26. CHECK CO%

**Without CONSULT-II**

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

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

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




OK or NG

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

## 27. RECONNECT AIR FUEL RATIO (A/F) SENSOR 1 HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Reconnect A/F sensor 1 harness connector.

>> GO TO 31.

## 28. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

1. Stop engine.
2. Replace A/F sensor 1 on the malfunctioning bank.

With CONSULT-II>>GO TO 29.
With GST>>GO TO 30.

## 29. CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

**With CONSULT-II**

1. Turn ignition switch OFF and wait at a least 10 seconds.
2. Start engine and warm it up to normal operating temperature.
3. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position (A/T) or 5th position (M/T).
   **NOTE:**
   Keep the accelerator pedal as steady as possible during the cruising.
4. Then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
   **NOTE:**
   Never apply brake during releasing the accelerator pedal.
5. Repeat steps 3 to 4 for five times.
6. Stop the vehicle and connect CONSULT-II to the vehicle.
7. Make sure that no (1st trip) DTC is displayed in “SELF-DIAG RESULTS” mode.

OK or NG

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

## 30. CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

**With GST**

1. Turn ignition switch OFF and wait at a least 10 seconds.
2. Start engine and warm it up to normal operating temperature.
3. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position (A/T) or 5th position (M/T).
   **NOTE:**
   Keep the accelerator pedal as steady as possible during the cruising.
4. Then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
   **NOTE:**
   Never apply brake during releasing the accelerator pedal.
5. Repeat steps 3 to 4 for five times.
6. Stop the vehicle and connect GST to the vehicle.
7. Make sure that no (1st trip) DTC is displayed.

OK or NG

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

## 31. DETECT MALFUNCTIONING PART

Check the following.

- Check fuel pressure regulator and repair or replace if necessary. Refer to EC-91, "Fuel Pressure Check" .
- Check mass air flow sensor and its circuit, and repair or replace if necessary.
  Refer to EC-182, "DTC P0101 MAF SENSOR" and EC-191, "DTC P0102, P0103 MAF SENSOR" .
- Check injector and its circuit, and repair or replace if necessary. Refer to EC-640, "INJECTOR CIRCUIT" .
- Check engine coolant temperature sensor and its circuit, and repair or replace if necessary.
  Refer to EC-202, "DTC P0117, P0118 ECT SENSOR" and EC-214, "DTC P0125 ECT SENSOR" .

OK or NG

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

## 32. ERASE UNNECESSARY DTC

After this inspection, unnecessary DTC might be displayed.
Erase the stored memory in ECM and TCM. Refer to EC-60, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" and AT-39, "HOW TO ERASE DTC" .

>> GO TO 4.

## 33. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-228, "ECM Re-communicating Function" .

>> GO TO 4.

## VIN Registration

ABS00ANS

### DESCRIPTION

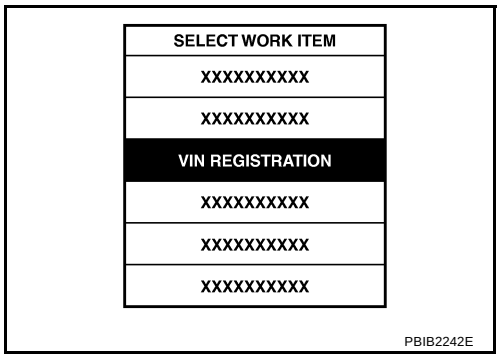
VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced.

**NOTE:**
Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

### OPERATION PROCEDURE

**With CONSULT-II**

1. Check the VIN of the vehicle and note it. Refer to GI-47, "IDENTIFICATION INFORMATION" .
2. Turn ignition switch ON and engine stopped.
3. Select “VIN REGISTRATION” in “WORK SUPPORT” mode.
4. Follow the instruction of CONSULT-II display.




## Accelerator Pedal Released Position Learning

ABS00ANT

### DESCRIPTION

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

### OPERATION PROCEDURE

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

## Throttle Valve Closed Position Learning

ABS00ANU

### DESCRIPTION

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

### OPERATION PROCEDURE

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

## Idle Air Volume Learning

ABS00ANV

### DESCRIPTION

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

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

### PREPARATION

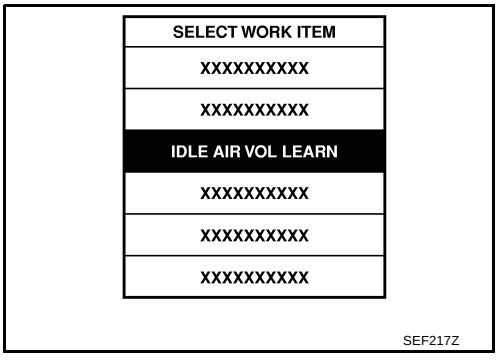
Before performing Idle Air Volume Learning, make sure that all of the following conditions are satisfied. Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- Park/neutral position (PNP) switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
  **On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started, the headlamp will not be illuminated.**
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
  With CONSULT-II, drive vehicle until “ATF TEMP SE 1” in “DATA MONITOR” mode of “A/T” system indicates less than 0.9V.
  For A/T models without CONSULT-II and M/T models, drive vehicle for 10 minutes.

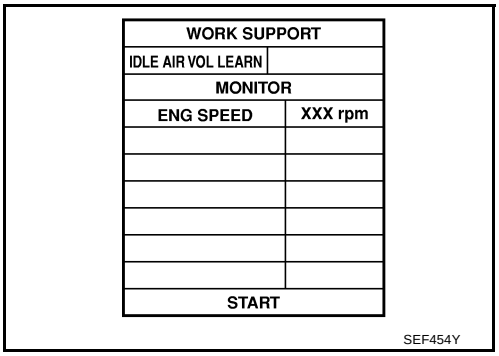
### OPERATION PROCEDURE

#### With CONSULT-II

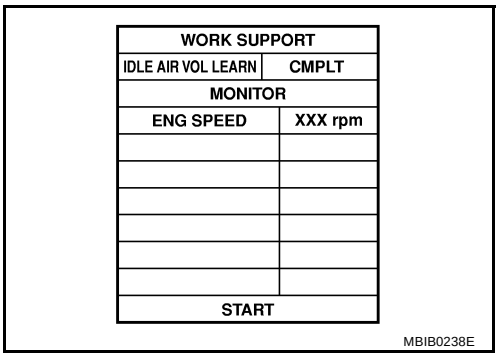
1. Perform EC-88, "Accelerator Pedal Released Position Learning" .
2. Perform EC-88, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.



6. Touch “START” and wait 20 seconds.




7. Make sure that “CMPLT” is displayed on CONSULT-II screen. If “CMPLT” is not displayed, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the Diagnostic Procedure below.
8. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.




| ITEM | SPECIFICATION |
|---|---|
| Idle speed | A/T: 650 ± 50 rpm (in P or N position)<br>M/T: 650 ± 50 rpm (in Neutral position) |
| Ignition timing | A/T: 15 ± 5° BTDC (in P or N position)<br>M/T: 15 ± 5° BTDC (in Neutral position) |

### Without CONSULT-II

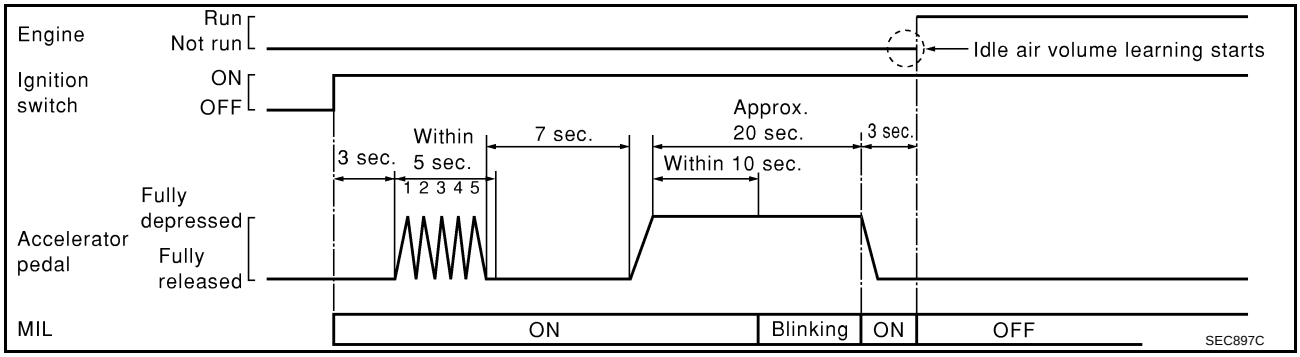
**NOTE:**

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

1. Perform EC-88, "Accelerator Pedal Released Position Learning" .
2. Perform EC-88, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
7. Repeat the following procedure quickly five times within 5 seconds.

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

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



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

| ITEM | SPECIFICATION |
|---|---|
| Idle speed | A/T: 650 ± 50 rpm (in P or N position)<br>M/T: 650 ± 50 rpm (in Neutral position) |
| Ignition timing | A/T: 15 ± 5° BTDC (in P or N position)<br>M/T: 15 ± 5° BTDC (in Neutral position) |

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

### DIAGNOSTIC PROCEDURE

**If Idle Air Volume Learning cannot be performed successfully, proceed as follows:**

1. **Check that throttle valve is fully closed.**
2. **Check PCV valve operation.**
3. **Check that downstream of throttle valve is free from air leakage.**
4. **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.**
   **It is useful to perform EC-146, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .**
5. **If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:**
   - **Engine stalls.**
   - **Erroneous idle.**

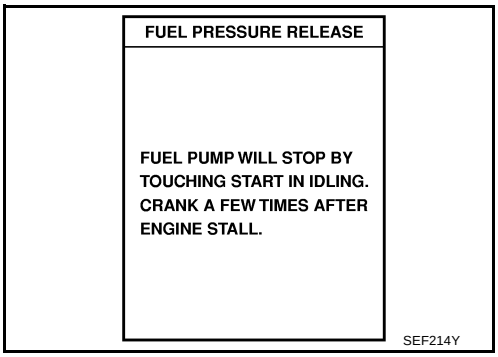
## Fuel Pressure Check

ABS00ANW

### FUEL PRESSURE RELEASE

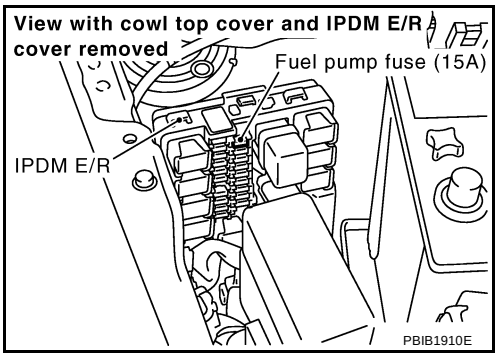
#### With CONSULT-II

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




#### Without CONSULT-II

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




### FUEL PRESSURE CHECK

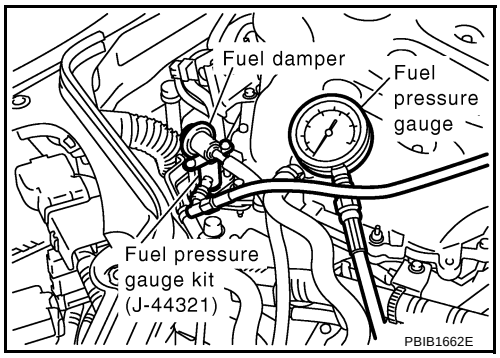
**CAUTION:**

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

**NOTE:**

- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because V35 models do not have fuel return system.**
- **Use Fuel Pressure Gauge Kit (J-44321) to check fuel pressure.**

1. Release fuel pressure to zero. Refer to EC-91, "FUEL PRESSURE RELEASE" .
2. Install the inline fuel quick disconnected fitting between fuel damper and injector tube.
3. Connect the fuel pressure gauge (quick connector adapter hose) to the inline fuel quick disconnected 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 350 kPa (3.57 kg/cm$^2$ , 51 psi)**

7. If result is unsatisfactory, go to next step.
8. Check the following.
   - Fuel hoses and fuel tubes for clogging
   - Fuel filter for clogging
   - Fuel pump
   - Fuel pressure regulator for clogging

   If OK, replace fuel pressure regulator.
   If NG, repair or replace.

# TROUBLE DIAGNOSIS

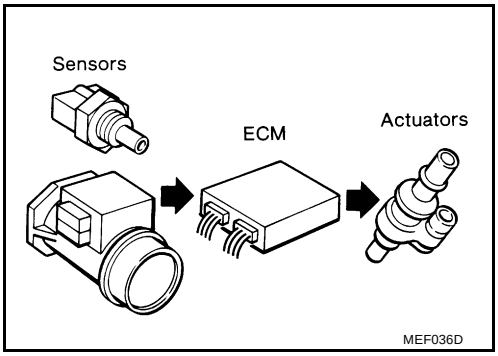
PFP:00004

## Trouble Diagnosis Introduction

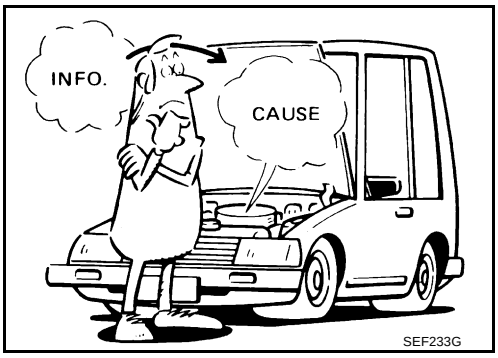
ABS00DFI

### INTRODUCTION

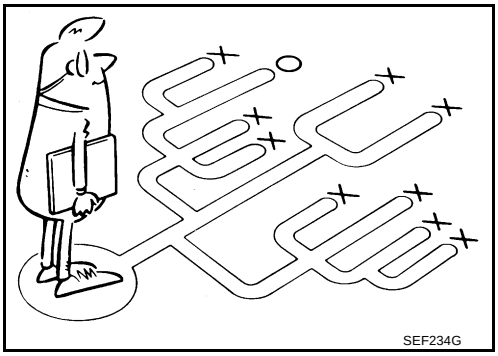
The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that 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.

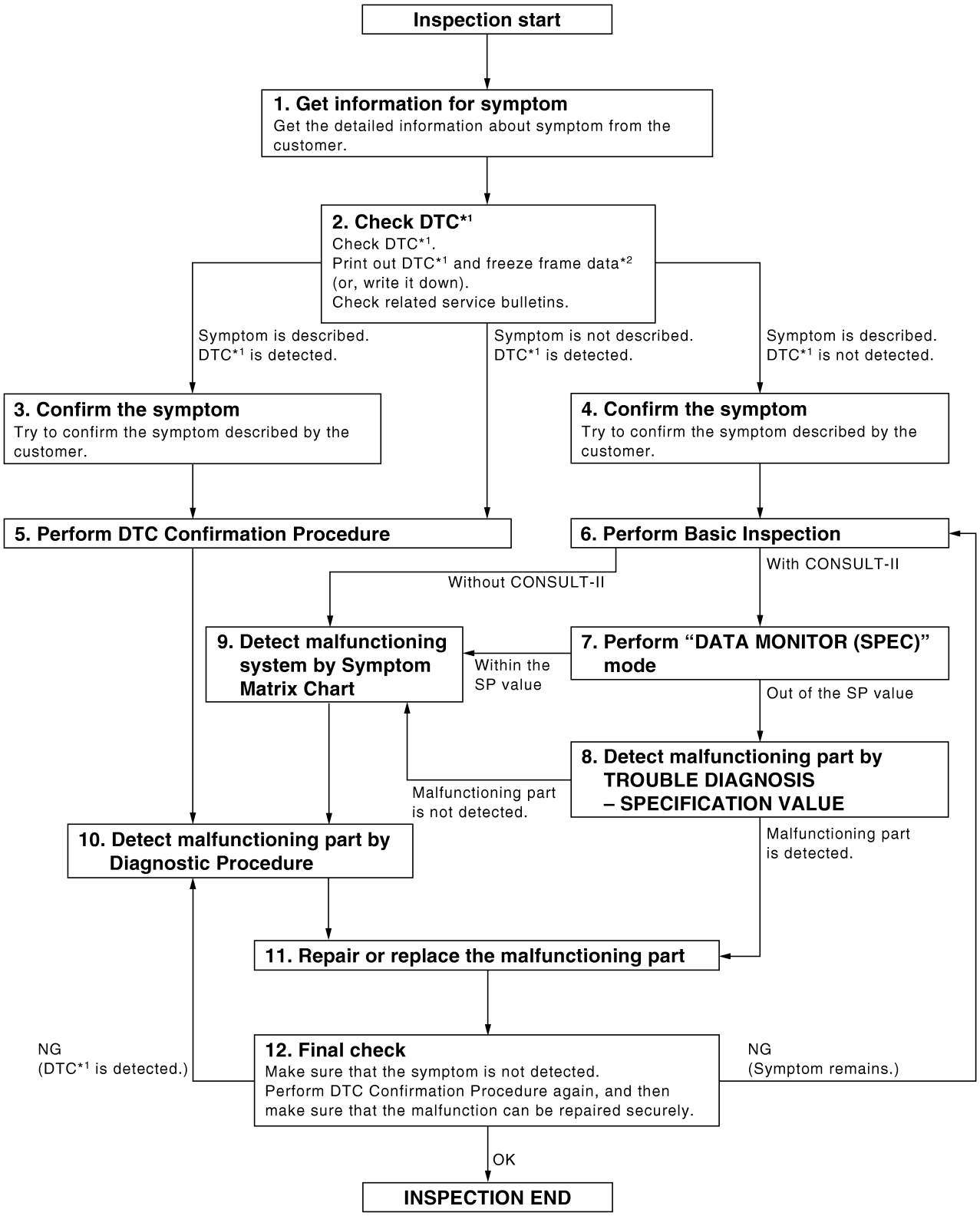



A visual check only may not find the cause of the incidents. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the WORK FLOW on EC-94, "WORK FLOW" . Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability 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 EC-97, "DIAGNOSTIC WORKSHEET" 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

### Overall Sequence




*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

PBIB2267E

## Detailed Flow

### 1. GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the EC-97, "DIAGNOSTIC WORKSHEET" .

>> GO TO 2.

### 2. CHECK DTC*1

1. Check DTC*1 .
2. Perform the following procedure if DTC*1 is displayed.

- Record DTC*1 and freeze frame data*2 . (Print them out with CONSULT-II or GST.)
- Erase DTC*1 . (Refer to EC-60, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .)
- Study the relationship between the cause detected by DTC*1 and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to EC-102, "Symptom Matrix Chart" .)

3. Check related service bulletins for information.

Is any symptom described and any DTC detected?

Symptom is described, DTC*1 is displayed>>GO TO 3.
Symptom is described, DTC*1 is not displayed>>GO TO 4.
Symptom is not described, DTC*1 is displayed>>GO TO 5.

### 3. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).
DIAGNOSIS WORK SHEET is useful to verify the incident.
Connect CONSULT-II to the vehicle in “DATA MONITOR (AUTO TRIG)” mode and check real time diagnosis results.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

### 4. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
DIAGNOSIS WORK SHEET is useful to verify the incident.
Connect CONSULT-II to the vehicle in “DATA MONITOR (AUTO TRIG)” mode and check real time diagnosis results.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

## 5. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC Confirmation Procedure for the displayed DTC*1 , and then make sure that DTC*1 is detected again.
At this time, always connect CONSULT-II to the vehicle, and check diagnostic results in real time on “DATA MONITOR (AUTO TRIG)”.
If two or more DTCs*1 are detected, refer to EC-99, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

**NOTE:**

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

Is DTC*1 detected?

Yes >> GO TO 10.
No >> Check according to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

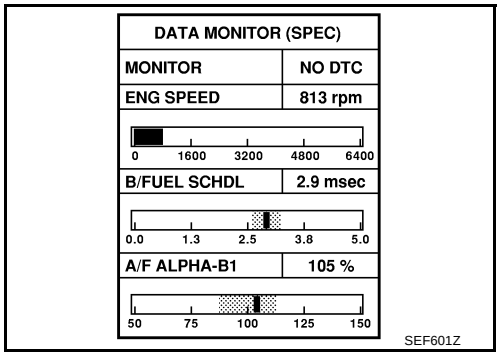
## 6. PERFORM BASIC INSPECTION

Perform EC-71, "Basic Inspection" .

With CONSULT-II>>GO TO 7.
Without CONSULT-II>>GO TO 9.

## 7. PERFORM DATA MONITOR (SPEC) MODE

With CONSULT-II
Make sure that “MAS A/F SE-B1”, “B/FUEL SCHDL”, and “A/F ALPHA-B1”, “A/F ALPHA-B2” are within the SP value using CONSULT-II “DATA MONITOR (SPEC)” mode. Refer to EC-147, "Diagnostic Procedure" .




Are they within the SP value?

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

## 8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-146, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .

Is malfunctioning part detected?

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

## 9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM MATRIX CHART

Detect malfunctioning system according to EC-102, "Symptom Matrix Chart" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

## 10. DETECT MALFUNCTIONING PART BY DIAGNOSTIC PROCEDURE

Inspect according to Diagnostic Procedure of the system.

**NOTE:**
The Diagnostic Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to Circuit Inspection in GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" .

Is malfunctioning part detected?

Yes >> GO TO 11.
No >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT-II. Refer to EC-140, "CONSULT-II Reference Value in Data Monitor" , EC-117, "ECM Terminals and Reference Value" .

## 11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnostic Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it, refer to EC-60, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 12.

## 12. FINAL CHECK

When DTC was detected in step 2, perform DTC Confirmation Procedure or Overall Function Check again, and then make sure that the malfunction have been repaired securely.
When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

OK or NG

NG (DTC*1 is detected)>>GO TO 10.
NG (Symptom remains)>>GO TO 6.
OK >> 1. Before returning the vehicle to the customer, make sure to erase unnecessary DTC*1 in ECM and TCM (Transmission Control Module). (Refer to EC-60, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" and AT-39, "HOW TO ERASE DTC" .)
2. If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to EC-57, "Driving Pattern" .
3. **INSPECTION END**

*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

## DIAGNOSTIC WORKSHEET

### Description

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.
Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

**KEY POINTS**

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

SEF907L

## Worksheet Sample

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

MTBL0017

## DTC Inspection Priority Chart

ABS00DFJ

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

**NOTE:**
**If DTC U1000 and/or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-166, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**

| Priority | Detected items (DTC) |
|---|---|
| 1 | ● U1000 U1001 CAN communication line<br>● P0101 P0102 P0103 Mass air flow sensor<br>● P0112 P0113 P0127 Intake air temperature sensor<br>● P0117 P0118 P0125 Engine coolant temperature sensor<br>● P0128 Thermostat function<br>● P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor<br>● P0181 P0182 P0183 Fuel tank temperature sensor<br>● P0327 P0328 Knock sensor<br>● P0335 Crankshaft position sensor (POS)<br>● P0340 P0345 Camshaft position sensor (PHASE)<br>● P0460 P0461 P0462 P0463 Fuel level sensor<br>● P0500 Vehicle speed sensor<br>● P0605 ECM<br>● P0700 TCM<br>● P0705 Park/Neutral position (PNP) switch<br>● P1229 Sensor power supply<br>● P1610 - P1615 NATS<br>● P1706 Park/Neutral position (PNP) switch<br>● P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor |

| Priority | Detected items (DTC) |
|---|---|
| 2 | ● P0037 P0038 P0057 P0058 Heated oxygen sensor 2 heater<br>● P0138 P0139 P0158 P0159 P1146 P1147 P1166 P1167 Heated oxygen sensor 2<br>● P0441 EVAP control system purge flow monitoring<br>● P0444 P0445 P1444 EVAP canister purge volume control solenoid valve<br>● P0447 P1446 EVAP canister vent control valve<br>● P0451 P0452 P0453 EVAP control system pressure sensor<br>● P0550 Power steering pressure sensor<br>● P0710 P0720 P0725 P0740 P0744 P0745 P1705 P1716 P1730 P1752 P1754 P1757 P1759 P1762 P1764 P1767 P1769 P1772 P1774 A/T related sensors, solenoid valves and switches<br>● P1031 P1032 P1051 P1052 A/F sensor 1 heater<br>● P1065 ECM power supply<br>● P1111 P1136 Intake valve timing control solenoid valve<br>● P1122 Electric throttle control function<br>● P1124 P1126 P1128 Electric throttle control actuator<br>● P1217 Engine over temperature (OVERHEAT)<br>● P1271 P1272 P1273 P1274 P1276 P1278 P1279 P1281 P1282 P1283 P1284 P1286 P1288 P1289 A/F sensor 1<br>● P1805 Brake switch |
| 3 | ● P0011 P0021 Intake valve timing control<br>● P0171 P0172 P0174 P0175 Fuel injection system function<br>● P0300 - P0306 Misfire<br>● P0420 P0430 Three way catalyst function<br>● P0442 EVAP control system (SMALL LEAK)<br>● P0455 EVAP control system (GROSS LEAK)<br>● P0456 EVAP control system (VERY SMALL LEAK)<br>● P0506 P0507 Idle speed control system<br>● P1121 Electric throttle control actuator<br>● P1148 P1168 Closed loop control<br>● P1211 TCS control unit<br>● P1212 TCS communication line<br>● P1564 ASCD steering switch<br>● P1572 ASCD brake switch<br>● P1574 ASCD vehicle speed sensor |

## Fail-Safe Chart

ABS00DEF

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

| DTC No. | Detected items | Engine operating condition in fail-safe mode |
|---|---|---|
| P0102<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: Just as ignition switch is turned ON or START — Engine coolant temperature decided (CONSULT-II display): 40°C (104°F) |
| | | Condition: More than approx. 4 minutes after ignition ON or START — Engine coolant temperature decided (CONSULT-II display): 80°C (176°F) |
| | | Condition: Except as shown above — Engine coolant temperature decided (CONSULT-II display): 40 - 80°C (104 - 176°F) (Depends on the time) |
| | | When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running. |
| P0122<br>P0123<br>P0222<br>P0223<br>P2135 | Throttle position sensor | The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.<br>The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.<br>So, the acceleration will be poor. |
| P1121 | Electric throttle control actuator | (When electric throttle control actuator does not function properly due to the return spring malfunction:)<br>ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm. |
| | | (When throttle valve opening angle in fail-safe mode is not in specified range:)<br>ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less. |
| | | (When ECM detects the throttle valve is stuck open:)<br>While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls.<br>The engine can restart in N or P (A/T), Neutral (M/T) position, and engine speed will not exceed 1,000 rpm or more. |
| P1122 | Electric throttle control function | ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. |
| P1124<br>P1126 | Throttle control motor relay | ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. |
| P1128 | Throttle control motor | ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. |
| P1229 | Sensor power supply | ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. |
| P2122<br>P2123<br>P2127<br>P2128<br>P2138 | Accelerator pedal position sensor | The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.<br>The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.<br>So, the acceleration will be poor. |

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

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

## Symptom Matrix Chart
### SYSTEM — BASIC ENGINE CONTROL SYSTEM

ABS00AO7

| | | SYMPTOM | | | | | | | | | | | | | Reference page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | HARD/NO START/RESTART (EXCP. HA) | ENGINE STALL | HESITATION/SURGING/FLAT SPOT | SPARK KNOCK/DETONATION | LACK OF POWER/POOR ACCELERATION | HIGH IDLE/LOW IDLE | ROUGH IDLE/HUNTING | IDLING VIBRATION | SLOW/NO RETURN TO IDLE | OVERHEATS/WATER TEMPERATURE HIGH | EXCESSIVE FUEL CONSUMPTION | EXCESSIVE OIL CONSUMPTION | BATTERY DEAD (UNDER CHARGE) | |
| Warranty symptom code | | AA | AB | AC | AD | AE | AF | AG | AH | AJ | AK | AL | AM | HA | |
| Fuel | Fuel pump circuit | 1 | 1 | 2 | 3 | 2 | | 2 | 2 | | | 3 | | 2 | EC-647 |
| | Fuel pressure regulator system | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | | 4 | | | EC-91 |
| | Injector circuit | 1 | 1 | 2 | 3 | 2 | | 2 | 2 | | | 2 | | | EC-640 |
| | Evaporative emission system | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | | 4 | | | EC-31 |
| Air | Positive crankcase ventilation system | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | | 4 | 1 | | EC-43 |
| | Incorrect idle speed adjustment | | | | | | 1 | 1 | 1 | 1 | | 1 | | | EC-71 |
| | Electric throttle control actuator | 1 | 1 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | | 2 | | 2 | EC-413, EC-415 |
| Ignition | Incorrect ignition timing adjustment | 3 | 3 | 1 | 1 | 1 | | 1 | 1 | | | 1 | | | EC-71 |
| | Ignition circuit | 1 | 1 | 2 | 2 | 2 | | 2 | 2 | | | 2 | | | EC-627 |
| Power supply and ground circuit | | 2 | 2 | 3 | 3 | 3 | | 3 | 3 | | 2 | 3 | | | EC-157 |
| Mass air flow sensor circuit | | 1 | 1 | 2 | 2 | 2 | | 2 | 2 | | | 2 | | | EC-182, EC-191 |
| Engine coolant temperature sensor circuit | | | | | 3 | | 3 | | | 3 | | | | | EC-202, EC-214 |
| Air fuel ratio (A/F) sensor 1 circuit | | | 1 | 2 | 3 | 2 | | 2 | 2 | | | 2 | | | EC-477, EC-485, EC-493, EC-502, EC-511, EC-520, EC-532 |
| Throttle position sensor circuit | | | | | | | 2 | | | 2 | | | | | EC-207, EC-270, EC-468, EC-470, EC-612 |
| Accelerator pedal position sensor circuit | | | | 3 | 2 | 1 | | | | | | | | | EC-472, EC-598, EC-605, EC-619 |
| Knock sensor circuit | | | | 2 | | | | | | | | 3 | | | EC-287 |
| Crankshaft position sensor (POS) circuit | | 2 | 2 | | | | | | | | | | | | EC-292 |
| Camshaft position sensor (PHASE) circuit | | 3 | 2 | | | | | | | | | | | | EC-299 |

| | 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 | |
| Vehicle speed signal circuit | | 2 | 3 | | 3 | | | | | | 3 | | | EC-381 |
| Power steering pressure sensor circuit | | 2 | | | | | 3 | 3 | | | | | | EC-387 |
| ECM | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | | | EC-392, EC-402 |
| Intake valve timing control solenoid valve circuit | | 3 | 2 | | 1 | 3 | 2 | 2 | 3 | | 3 | | | EC-406 |
| Park/neutral position (PNP) switch circuit | | | 3 | | 3 | | 3 | 3 | | | 3 | | | EC-585 |
| Refrigerant pressure sensor circuit | | 2 | | | | 3 | | | 3 | | 4 | | | EC-653 |
| Electrical load signal circuit | | | | | | | 3 | | | | | | | EC-658 |
| Air conditioner circuit | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | | 3 | | 2 | ATC-39 |
| VDC/TCS/ABS control unit | | | 4 | | | | | | | | | | | BRC-10 |

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

## SYSTEM — ENGINE MECHANICAL & OTHER

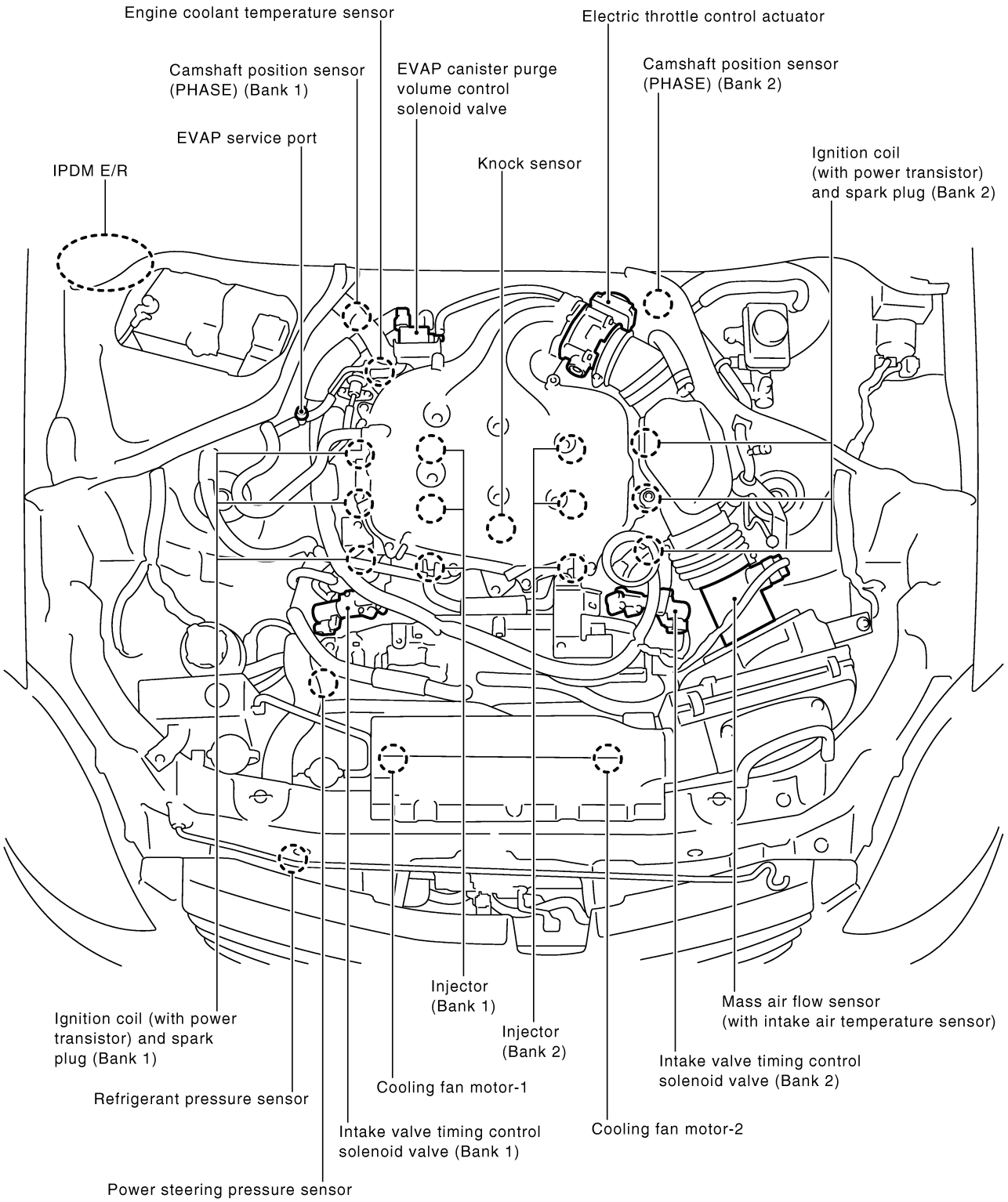
| | | SYMPTOM | | | | | | | | | | | | | Reference page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | HARD/NO START/RESTART (EXCP. HA) | ENGINE STALL | HESITATION/SURGING/FLAT SPOT | SPARK KNOCK/DETONATION | LACK OF POWER/POOR ACCELERATION | HIGH IDLE/LOW IDLE | ROUGH IDLE/HUNTING | IDLING VIBRATION | SLOW/NO RETURN TO IDLE | OVERHEATS/WATER TEMPERATURE HIGH | EXCESSIVE FUEL CONSUMPTION | EXCESSIVE OIL CONSUMPTION | BATTERY DEAD (UNDER CHARGE) | |
| Warranty symptom code | | AA | AB | AC | AD | AE | AF | AG | AH | AJ | AK | AL | AM | HA | |
| Fuel | Fuel tank | 5 | 5 | | | | | | | | | | | | FL-11 |
| | Fuel piping | | | 5 | 5 | 5 | | 5 | 5 | | | 5 | | | EM-46 |
| | Vapor lock | | | | | | | | | | | | | | — |
| | Valve deposit | 5 | | 5 | 5 | 5 | | 5 | 5 | | | 5 | | | — |
| | Poor fuel (Heavy weight gasoline, Low octane) | | | | | | | | | | | | | | — |
| Air | Air duct | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | | 5 | | | EM-17 |
| | Air cleaner | | | | | | | | | | | | | | EM-17 |
| | Air leakage from air duct (Mass air flow sensor — electric throttle control actuator) | | | | | | | | | | | | | | EM-17 |
| | Electric throttle control actuator | | | | | | | | | | | | | | EM-19 |
| | Air leakage from intake manifold/ Collector/Gasket | | | | | | | | | | | | | | EM-19, EM-24 |
| Cranking | Battery | 1 | 1 | 1 | | 1 | | 1 | 1 | | | 1 | | 1 | SC-4 |
| | Generator circuit | | | | | | | | | | | | | | SC-22 |
| | Starter circuit | 3 | | | | | | | | | | | | | SC-9 |
| | Signal plate | 6 | | | | | | | | | | | | | EM-123 |
| | Park/neutral position (PNP) switch | 4 | | | | | | | | | | | | | AT-119 or MT-12 |
| Engine | Cylinder head | 5 | 5 | 5 | 5 | 5 | | 5 | 5 | | | 5 | | | EM-101 |
| | Cylinder head gasket | | | | | | | | | | 4 | | 3 | | |
| | Cylinder block | 6 | 6 | 6 | 6 | 6 | | 6 | 6 | | | 6 | 4 | | EM-123 |
| | Piston | | | | | | | | | | | | | | |
| | Piston ring | | | | | | | | | | | | | | |
| | Connecting rod | | | | | | | | | | | | | | |
| | Bearing | | | | | | | | | | | | | | |
| | Crankshaft | | | | | | | | | | | | | | |

| | | 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 | |
| Valve mechanism | Timing chain | 5 | 5 | 5 | 5 | 5 | | 5 | 5 | | | 5 | | | EM-64 |
| | Camshaft | | | | | | | | | | | | | | EM-84 |
| | Intake valve timing control | | | | | | | | | | | | | | EM-64 |
| | Intake valve | | | | | | | | | | | | 3 | | EM-101 |
| | Exhaust valve | | | | | | | | | | | | | | |
| Exhaust | Exhaust manifold/Tube/Muffler/Gasket | 5 | 5 | 5 | 5 | 5 | | 5 | 5 | | | 5 | | | EM-26, EX-3 |
| | Three way catalyst | | | | | | | | | | | | | | |
| Lubrication | Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler | 5 | 5 | 5 | 5 | 5 | | 5 | 5 | | | 5 | | | EM-30, LU-17 , LU-10 , LU-14 |
| | Oil level (Low)/Filthy oil | | | | | | | | | | | | | | LU-6 |
| Cooling | Radiator/Hose/Radiator filler cap | 5 | 5 | 5 | 5 | 5 | | 5 | 5 | | 4 | 5 | | | CO-13, CO-17 |
| | Thermostat | | | | | | | | | 5 | | | | | CO-28 |
| | Water pump | | | | | | | | | | | | | | CO-23 |
| | Water gallery | | | | | | | | | | | | | | CO-30 |
| | Cooling fan | | | | | | | | | 5 | | | | | CO-21 |
| | Coolant level (Low)/Contaminated coolant | | | | | | | | | | | | | | CO-10 |
| IVIS (Infiniti Vehicle Immobilizer System — NATS) | | 1 | 1 | | | | | | | | | | | | EC-45 or BL-225 |

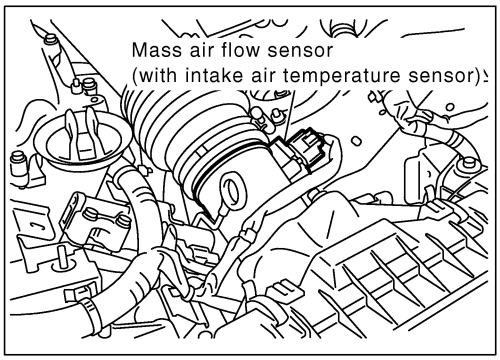
1 - 6: The numbers refer to the order of inspection.

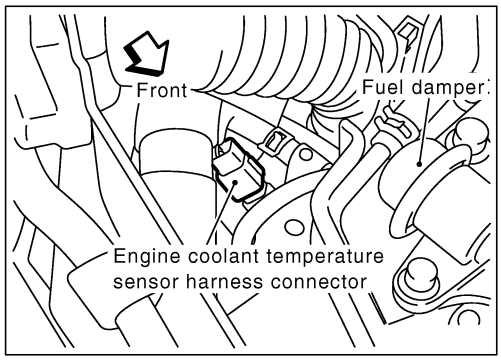
## Engine Control Component Parts Location

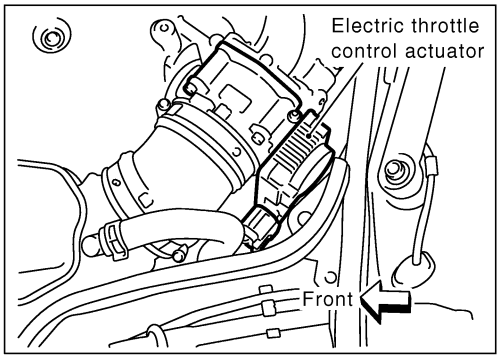
ABS00AO8

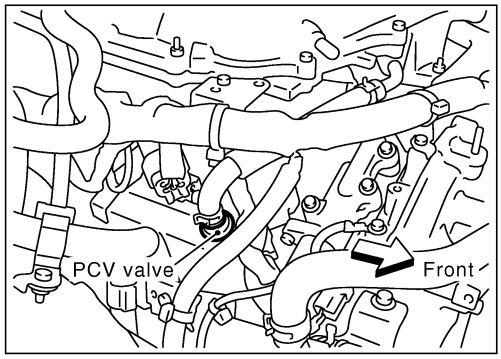


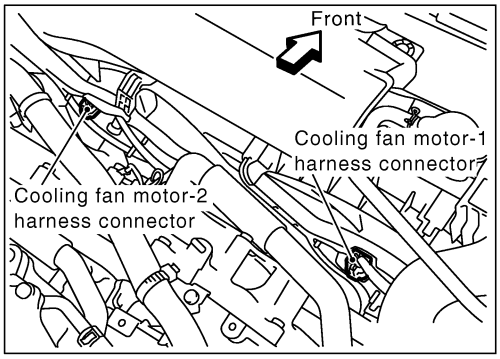

PBIB2251E

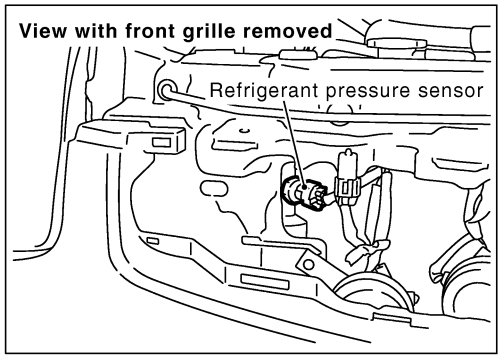

Mass air flow sensor
(with intake air temperature sensor)

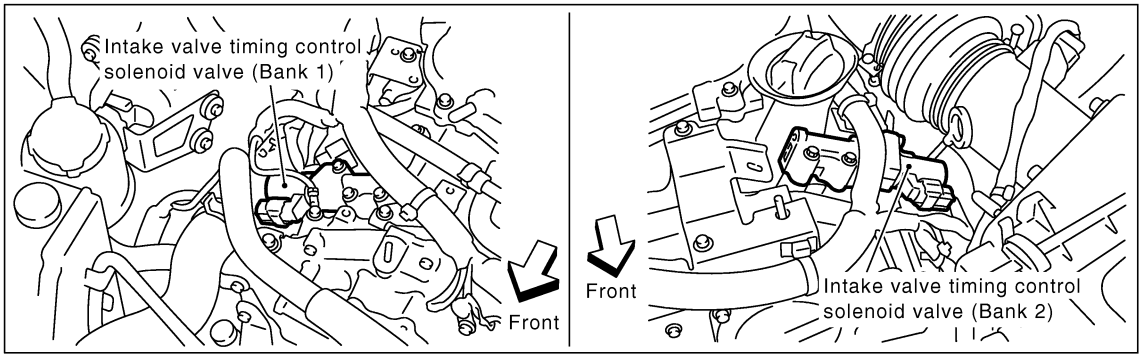

Front
Fuel damper
Engine coolant temperature
sensor harness connector


Electric throttle
control actuator
Front


PCV valve
Front

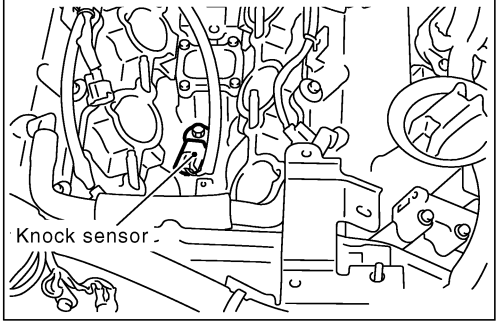

Front
Cooling fan motor-1
harness connector
Cooling fan motor-2
harness connector


View with front grille removed
Refrigerant pressure sensor

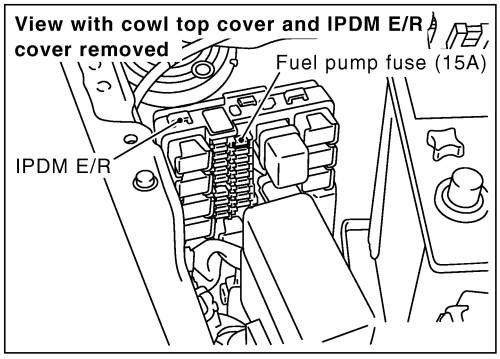

Intake valve timing control
solenoid valve (Bank 1)
Front
Front
Intake valve timing control
solenoid valve (Bank 2)

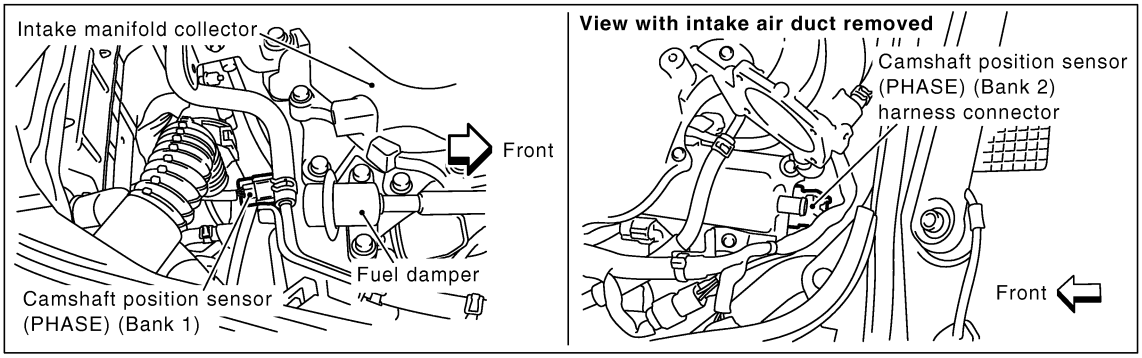
PBIB2542E

View with intake manifold collector removed

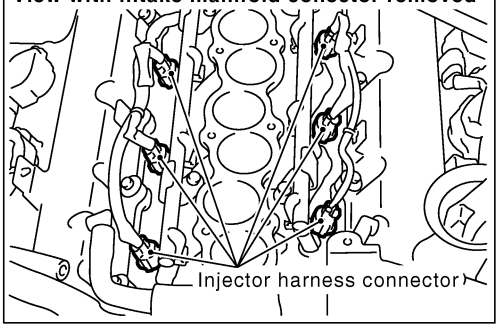


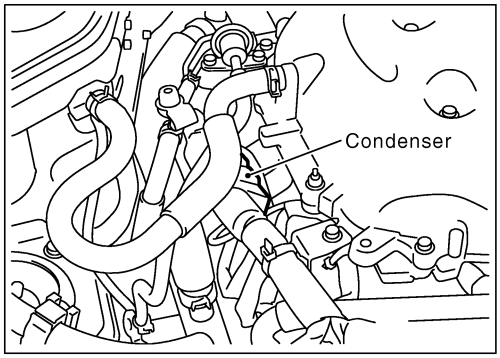

View with cowl top cover and IPDM E/R cover removed

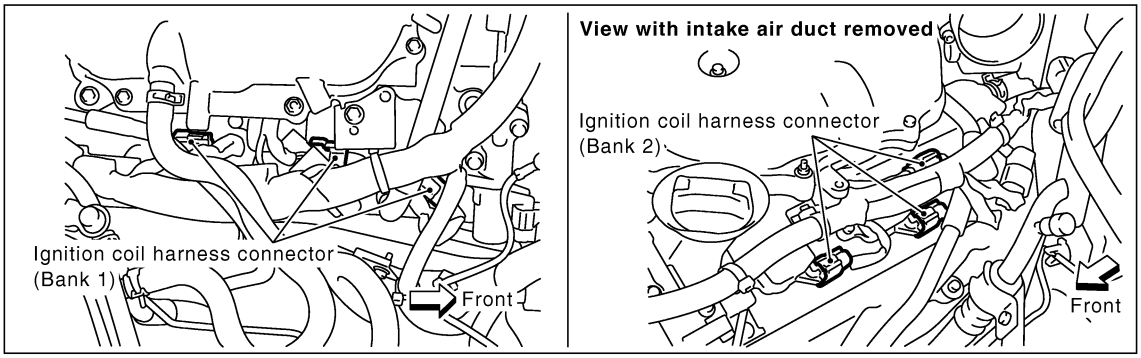


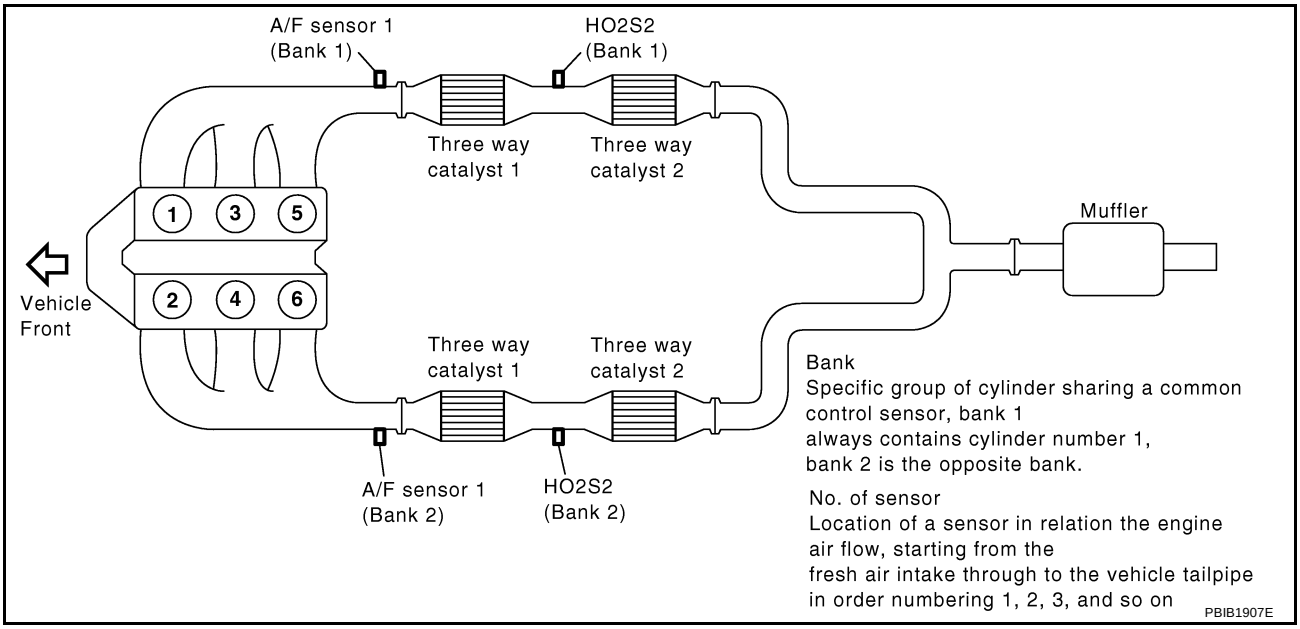

View with intake manifold collector removed

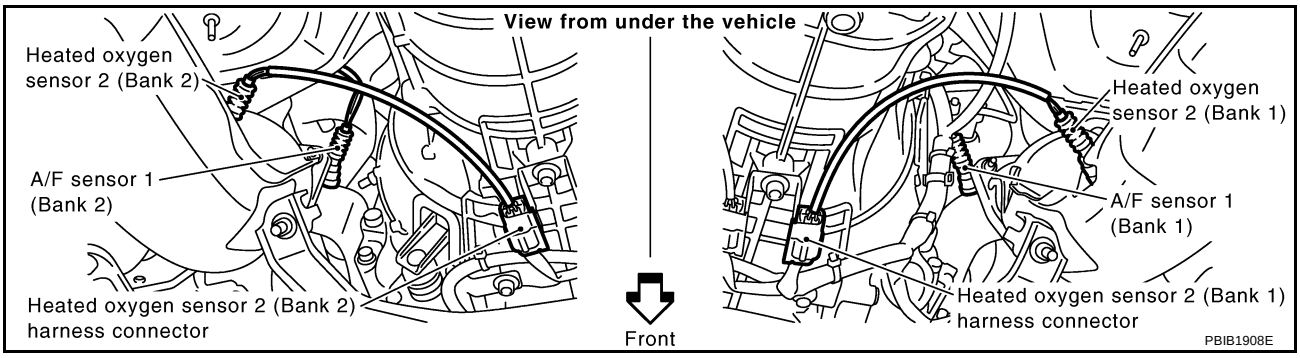


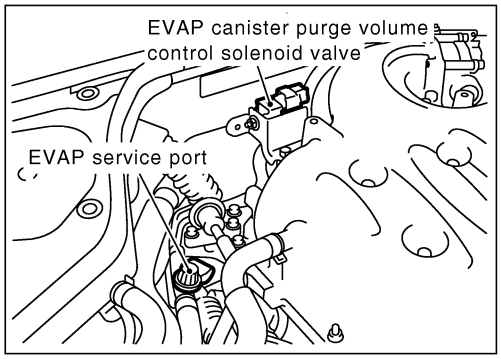



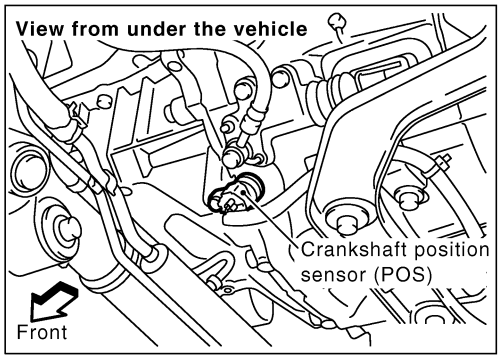



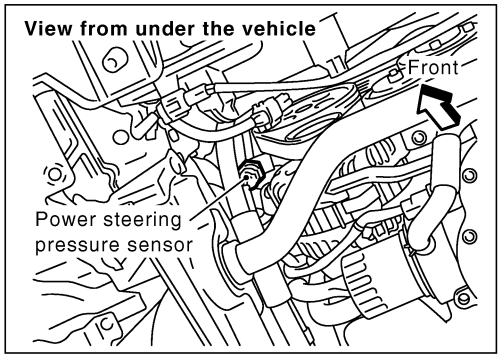

PBIB2543E

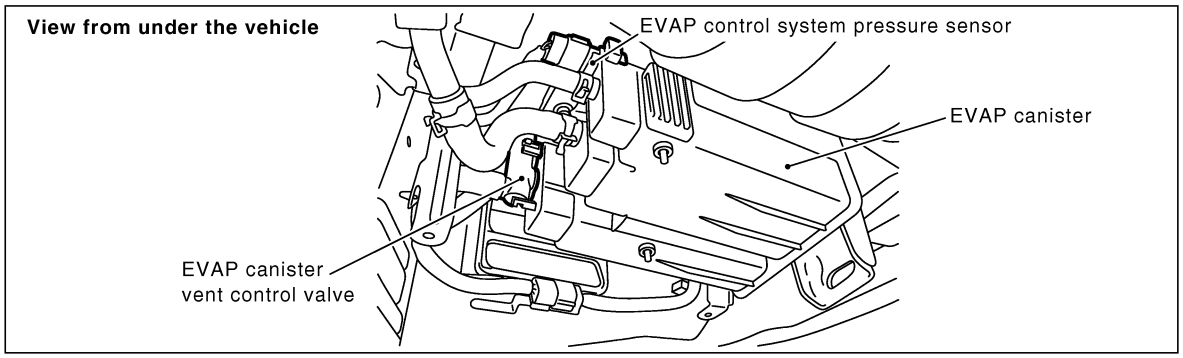

A/F sensor 1
(Bank 1)
HO2S2
(Bank 1)
Three way
catalyst 1
Three way
catalyst 2
Muffler
1
3
5
2
4
6
Vehicle
Front
Three way
catalyst 1
Three way
catalyst 2
A/F sensor 1
(Bank 2)
HO2S2
(Bank 2)
Bank
Specific group of cylinder sharing a common control sensor, bank 1
always contains cylinder number 1,
bank 2 is the opposite bank.
No. of sensor
Location of a sensor in relation the engine air flow, starting from the
fresh air intake through to the vehicle tailpipe
in order numbering 1, 2, 3, and so on
PBIB1907E


View from under the vehicle
Heated oxygen
sensor 2 (Bank 2)
A/F sensor 1
(Bank 2)
Heated oxygen sensor 2 (Bank 2)
harness connector
Front
Heated oxygen
sensor 2 (Bank 1)
A/F sensor 1
(Bank 1)
Heated oxygen sensor 2 (Bank 1)
harness connector
PBIB1908E

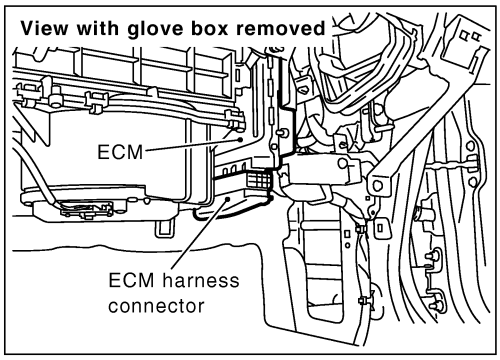

EVAP canister purge volume control solenoid valve
EVAP service port

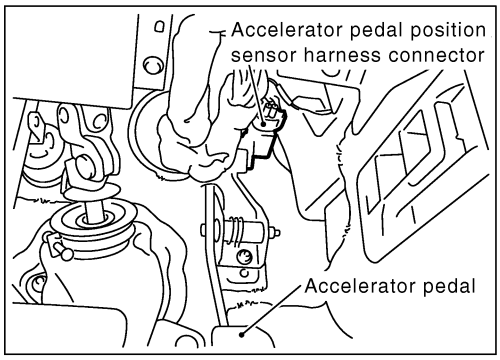

View from under the vehicle
Crankshaft position sensor (POS)
Front

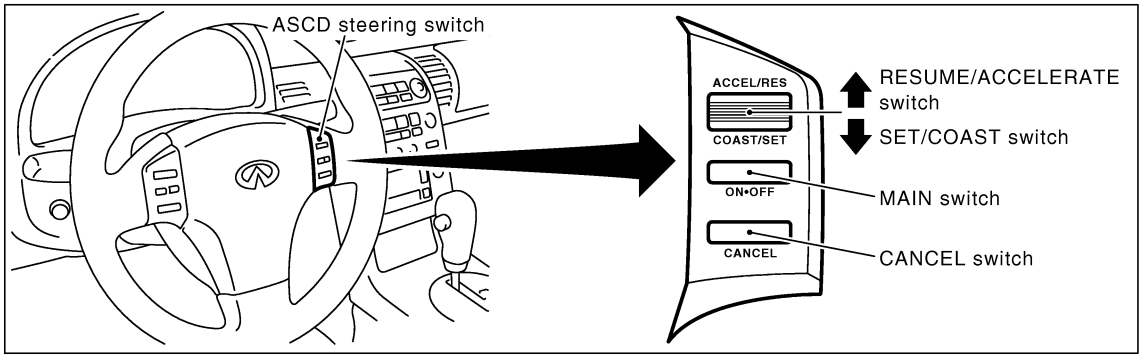

View from under the vehicle
Front
Power steering pressure sensor

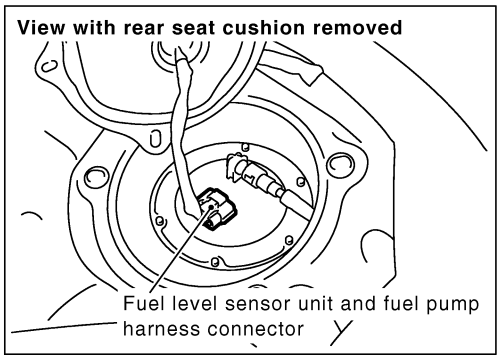

View from under the vehicle
EVAP control system pressure sensor
EVAP canister
EVAP canister vent control valve

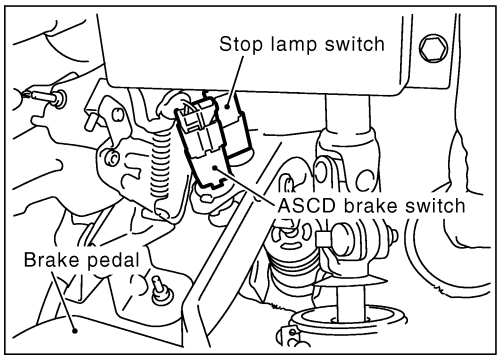
PBIB2544E

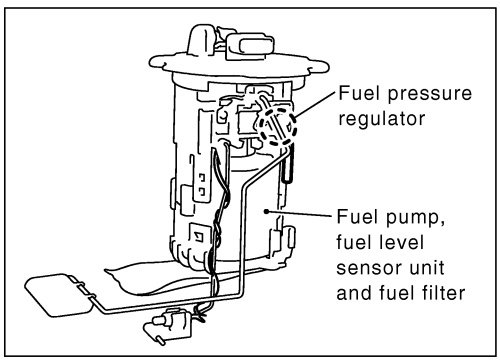

View with glove box removed
ECM
ECM harness connector


Accelerator pedal position sensor harness connector
Accelerator pedal


ASCD steering switch
ACCEL/RES
COAST/SET
ON•OFF
CANCEL
RESUME/ACCELERATE switch
SET/COAST switch
MAIN switch
CANCEL switch


View with rear seat cushion removed
Fuel level sensor unit and fuel pump harness connector

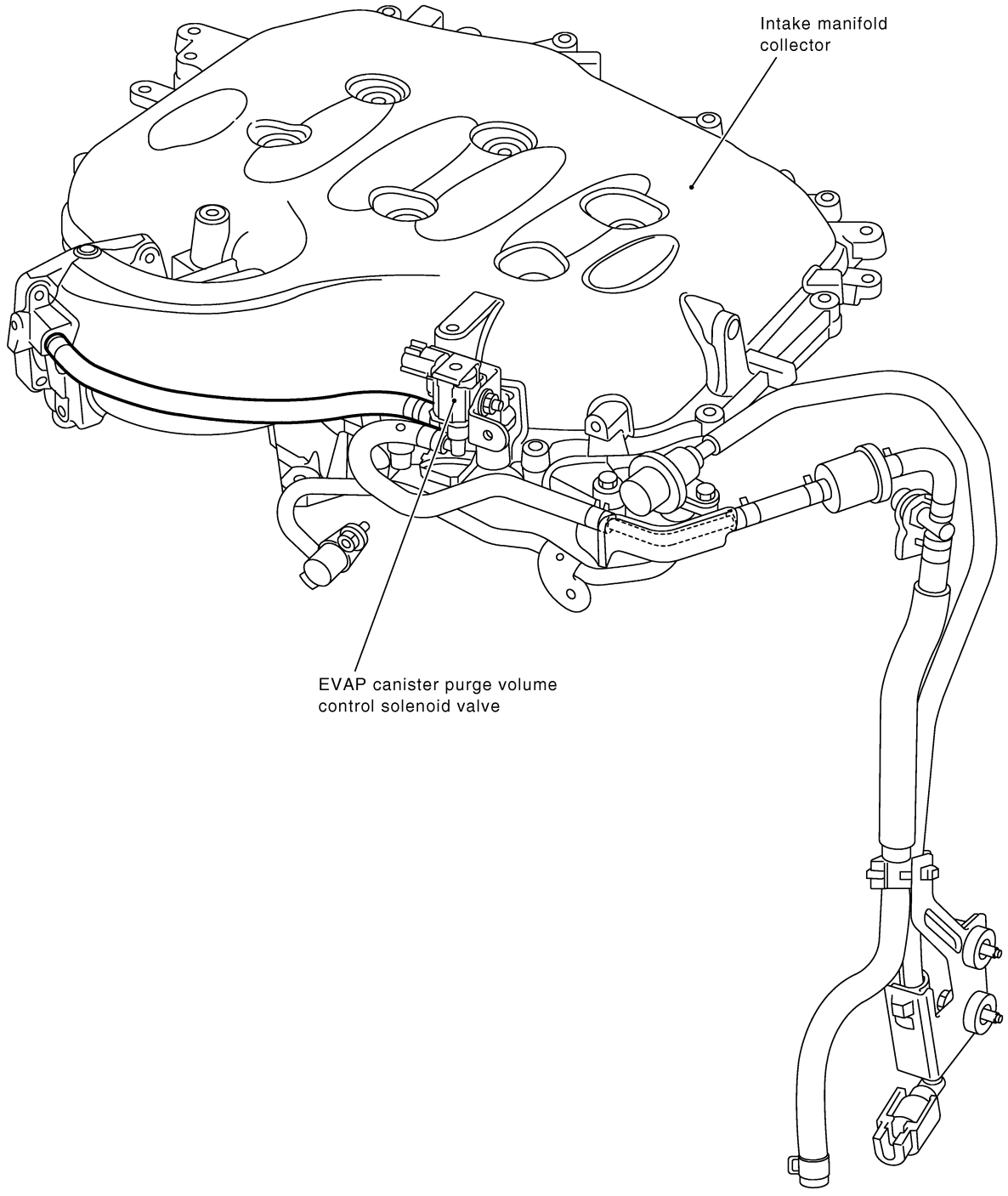

Stop lamp switch
ASCD brake switch
Brake pedal


Fuel pressure regulator
Fuel pump, fuel level sensor unit and fuel filter

PBIB2545E

## Vacuum Hose Drawing

ABS00ANJ



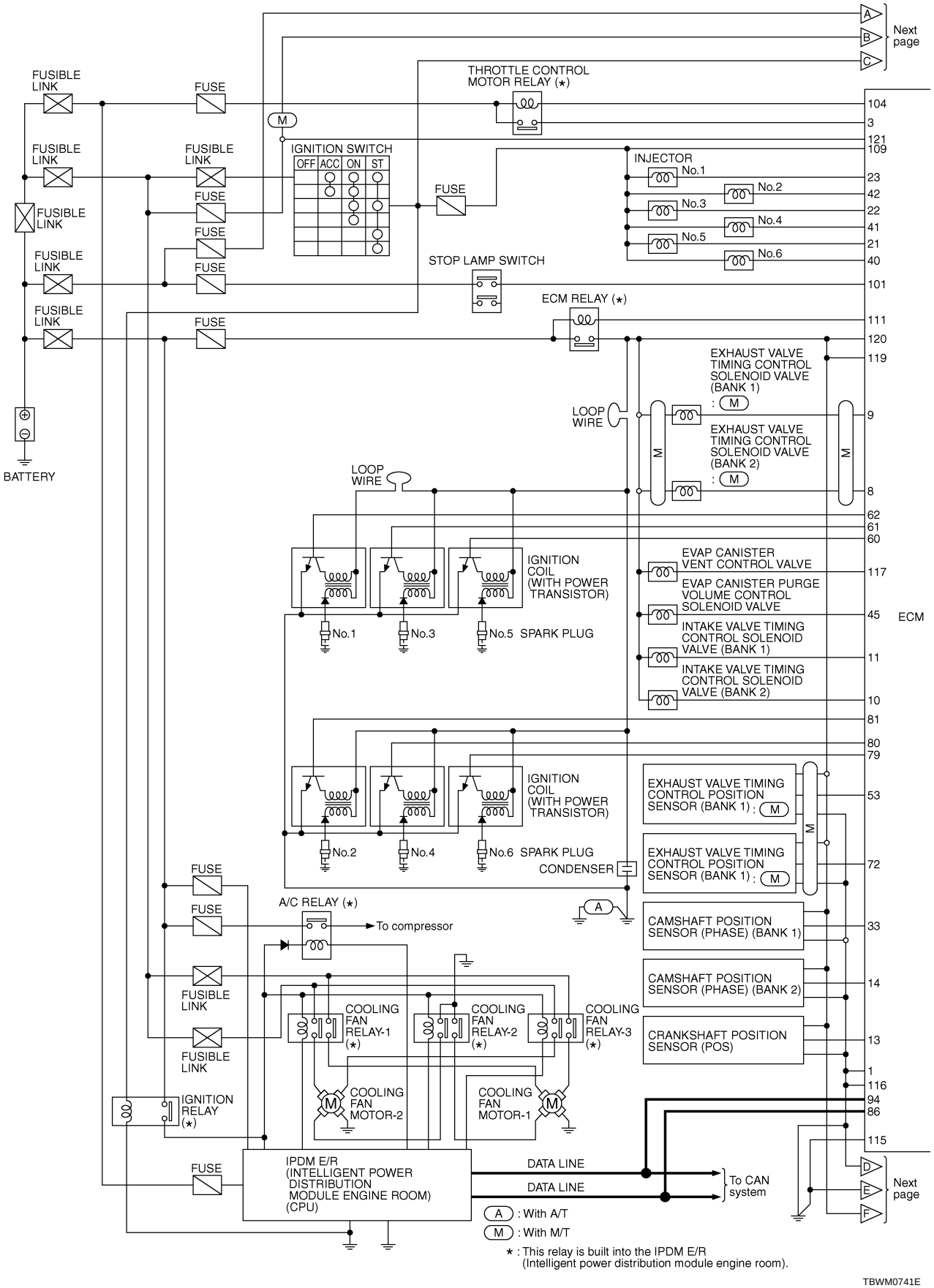

**NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.**

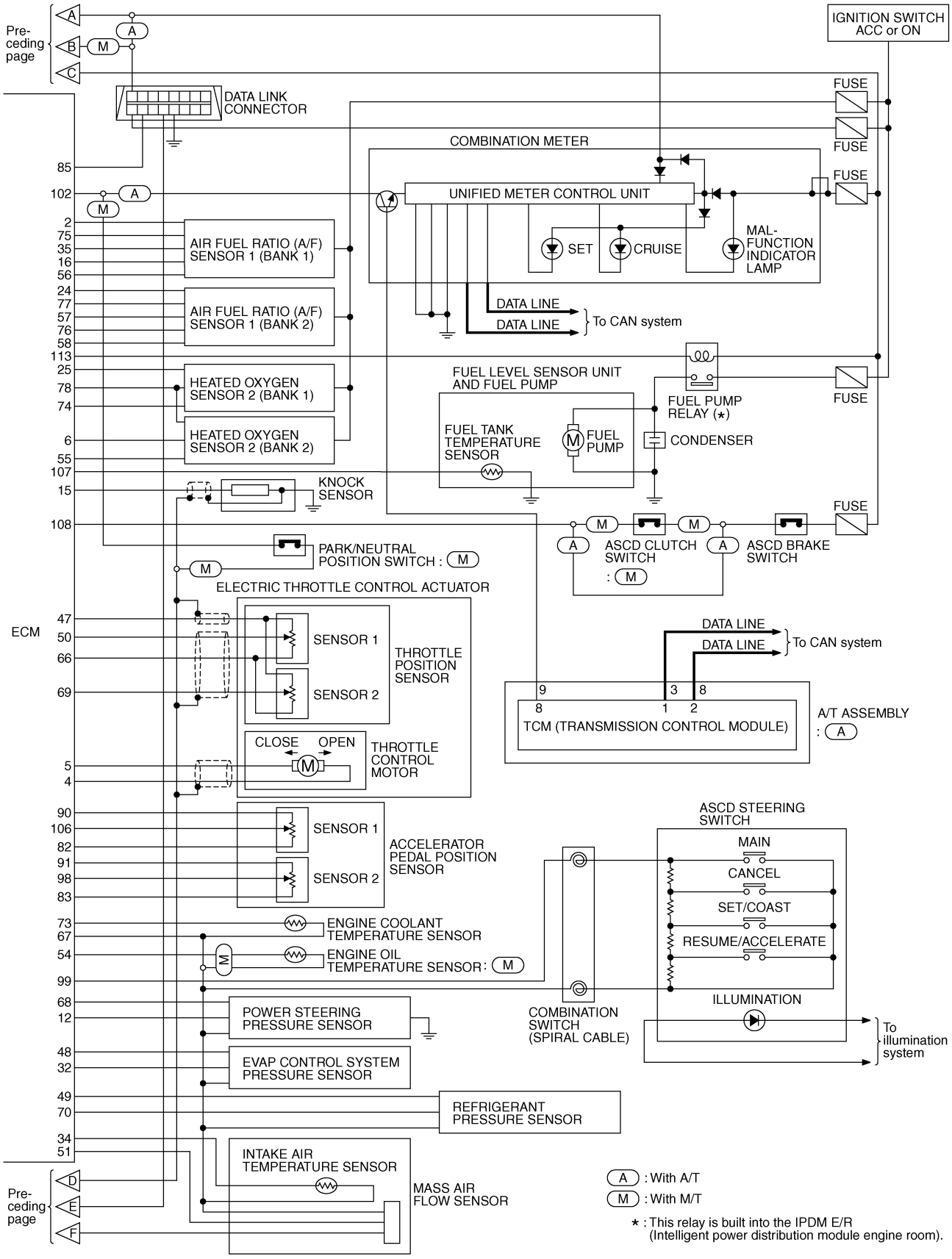
PBIB2095E

**Refer to EC-22, "System Diagram" for Vacuum Control System.**

# Circuit Diagram
## 2WD MODELS

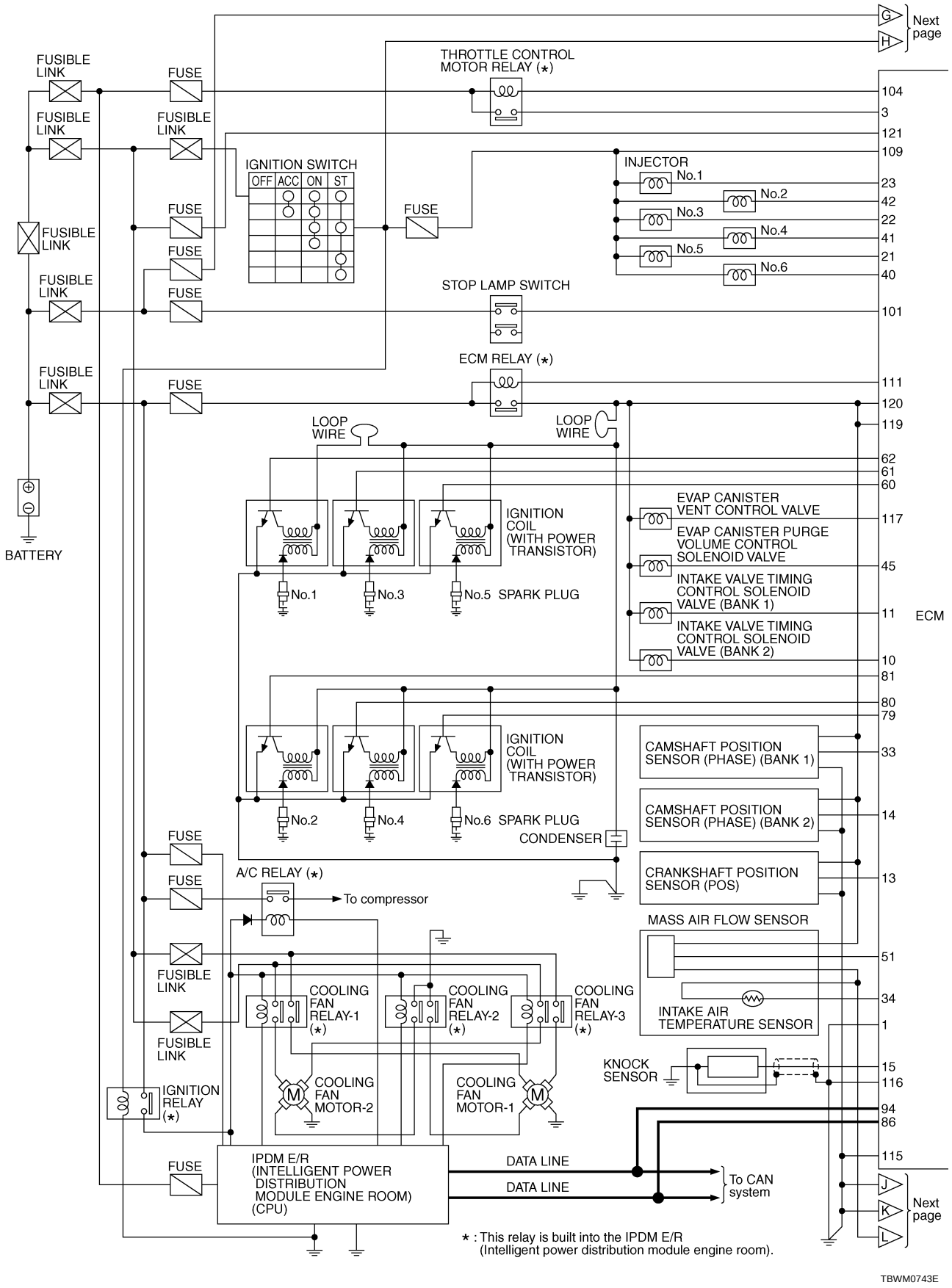
ABS00AO9

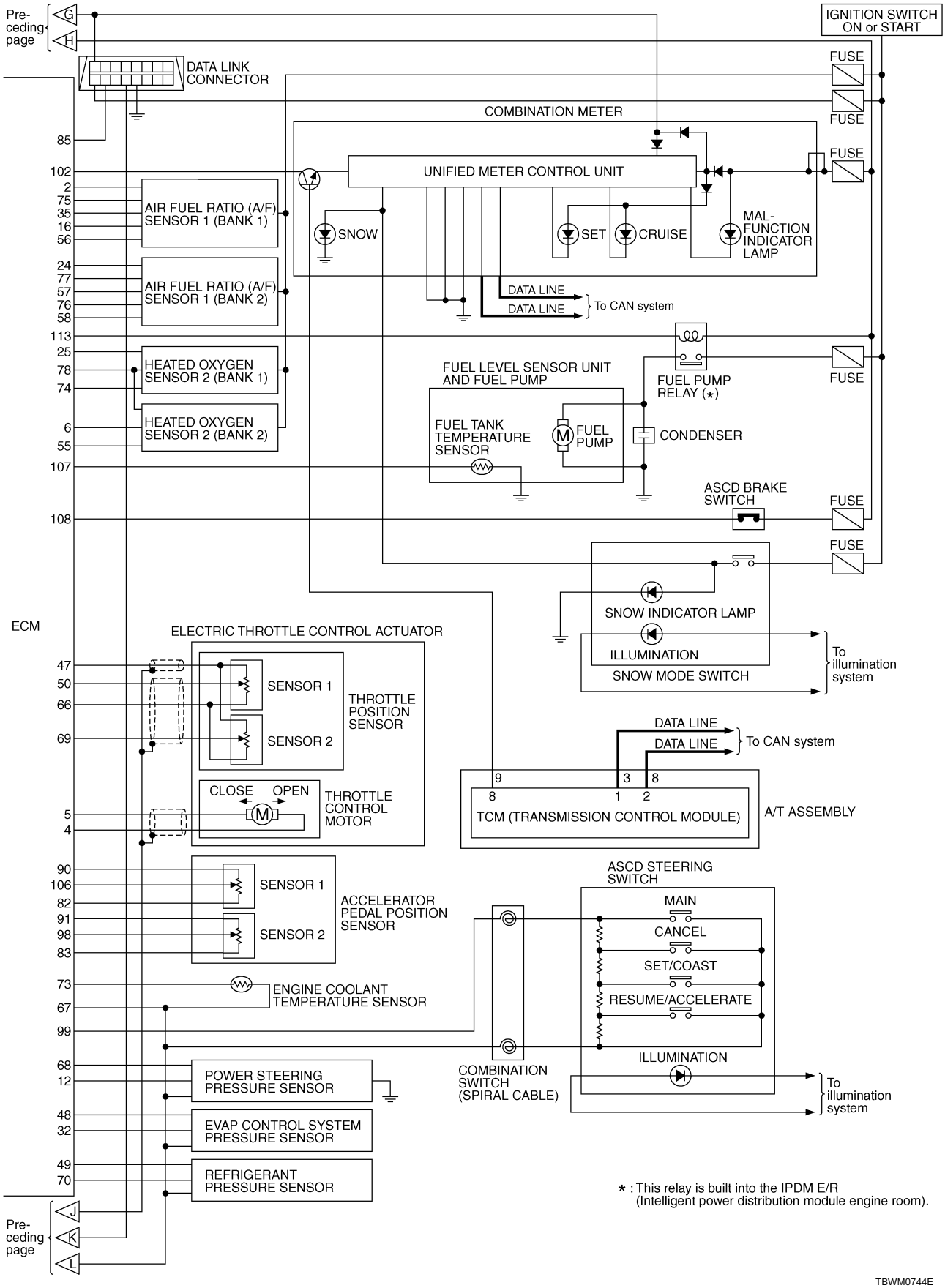



Pre-ceding page
IGNITION SWITCH ACC or ON
DATA LINK CONNECTOR
FUSE
COMBINATION METER
UNIFIED METER CONTROL UNIT
SET
CRUISE
MAL-FUNCTION INDICATOR LAMP
DATA LINE
To CAN system
AIR FUEL RATIO (A/F) SENSOR 1 (BANK 1)
AIR FUEL RATIO (A/F) SENSOR 1 (BANK 2)
HEATED OXYGEN SENSOR 2 (BANK 1)
HEATED OXYGEN SENSOR 2 (BANK 2)
FUEL LEVEL SENSOR UNIT AND FUEL PUMP
FUEL PUMP RELAY (*)
FUEL TANK TEMPERATURE SENSOR
FUEL PUMP
CONDENSER
KNOCK SENSOR
ASCD CLUTCH SWITCH : M
ASCD BRAKE SWITCH
PARK/NEUTRAL POSITION SWITCH : M
ELECTRIC THROTTLE CONTROL ACTUATOR
ECM
SENSOR 1
SENSOR 2
THROTTLE POSITION SENSOR
CLOSE
OPEN
THROTTLE CONTROL MOTOR
TCM (TRANSMISSION CONTROL MODULE)
A/T ASSEMBLY : A
ASCD STEERING SWITCH
MAIN
CANCEL
SET/COAST
RESUME/ACCELERATE
ILLUMINATION
ACCELERATOR PEDAL POSITION SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
ENGINE OIL TEMPERATURE SENSOR : M
COMBINATION SWITCH (SPIRAL CABLE)
To illumination system
POWER STEERING PRESSURE SENSOR
EVAP CONTROL SYSTEM PRESSURE SENSOR
REFRIGERANT PRESSURE SENSOR
INTAKE AIR TEMPERATURE SENSOR
MASS AIR FLOW SENSOR
A : With A/T
M : With M/T
* : This relay is built into the IPDM E/R (Intelligent power distribution module engine room).

TBWM0742E

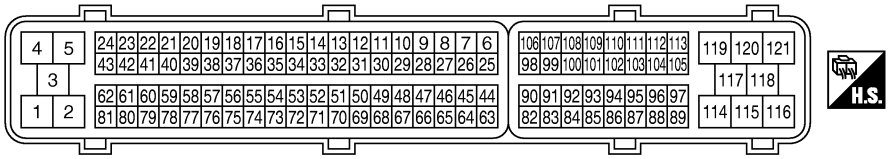
## AWD MODELS


Next page
FUSIBLE LINK
FUSE
THROTTLE CONTROL MOTOR RELAY (*)
IGNITION SWITCH
OFF ACC ON ST
INJECTOR
No.1
No.2
No.3
No.4
No.5
No.6
STOP LAMP SWITCH
ECM RELAY (*)
LOOP WIRE
BATTERY
IGNITION COIL (WITH POWER TRANSISTOR)
No.1 No.3 No.5 SPARK PLUG
No.2 No.4 No.6 SPARK PLUG
CONDENSER
EVAP CANISTER VENT CONTROL VALVE
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
INTAKE VALVE TIMING CONTROL SOLENOID VALVE (BANK 1)
INTAKE VALVE TIMING CONTROL SOLENOID VALVE (BANK 2)
CAMSHAFT POSITION SENSOR (PHASE) (BANK 1)
CAMSHAFT POSITION SENSOR (PHASE) (BANK 2)
CRANKSHAFT POSITION SENSOR (POS)
MASS AIR FLOW SENSOR
INTAKE AIR TEMPERATURE SENSOR
KNOCK SENSOR
A/C RELAY (*)
To compressor
COOLING FAN RELAY-1 (*)
COOLING FAN RELAY-2 (*)
COOLING FAN RELAY-3 (*)
COOLING FAN MOTOR-1
COOLING FAN MOTOR-2
IGNITION RELAY (*)
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) (CPU)
DATA LINE
DATA LINE
To CAN system
ECM
104
3
121
109
23
42
22
41
21
40
101
111
120
119
62
61
60
117
45
11
10
81
80
79
33
14
13
51
34
1
15
116
94
86
115
* : This relay is built into the IPDM E/R (Intelligent power distribution module engine room).
TBWM0743E


Pre-ceding page
G
H
IGNITION SWITCH ON or START
DATA LINK CONNECTOR
FUSE
COMBINATION METER
UNIFIED METER CONTROL UNIT
85
102
2
75
35
16
56
AIR FUEL RATIO (A/F) SENSOR 1 (BANK 1)
SNOW
SET
CRUISE
MAL-FUNCTION INDICATOR LAMP
24
77
57
76
58
AIR FUEL RATIO (A/F) SENSOR 1 (BANK 2)
DATA LINE
DATA LINE
To CAN system
113
25
78
74
HEATED OXYGEN SENSOR 2 (BANK 1)
FUEL LEVEL SENSOR UNIT AND FUEL PUMP
FUEL PUMP RELAY (*)
6
55
HEATED OXYGEN SENSOR 2 (BANK 2)
FUEL TANK TEMPERATURE SENSOR
FUEL PUMP
CONDENSER
107
ASCD BRAKE SWITCH
108
SNOW INDICATOR LAMP
ILLUMINATION
SNOW MODE SWITCH
To illumination system
ECM
ELECTRIC THROTTLE CONTROL ACTUATOR
47
50
66
69
SENSOR 1
SENSOR 2
THROTTLE POSITION SENSOR
DATA LINE
DATA LINE
To CAN system
CLOSE
OPEN
THROTTLE CONTROL MOTOR
5
4
9
8
3
8
1
2
TCM (TRANSMISSION CONTROL MODULE)
A/T ASSEMBLY
90
106
82
91
98
83
SENSOR 1
SENSOR 2
ACCELERATOR PEDAL POSITION SENSOR
ASCD STEERING SWITCH
MAIN
CANCEL
SET/COAST
RESUME/ACCELERATE
73
ENGINE COOLANT TEMPERATURE SENSOR
67
99
68
12
POWER STEERING PRESSURE SENSOR
COMBINATION SWITCH (SPIRAL CABLE)
ILLUMINATION
To illumination system
48
32
EVAP CONTROL SYSTEM PRESSURE SENSOR
49
70
REFRIGERANT PRESSURE SENSOR
* : This relay is built into the IPDM E/R (Intelligent power distribution module engine room).
Pre-ceding page
J
K
L
TBWM0744E

## ECM Harness Connector Terminal Layout

ABS00DEG



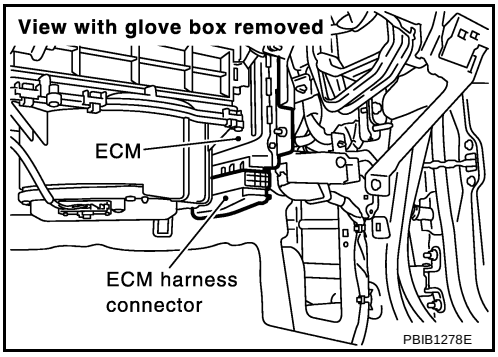

PBIB1192E

## ECM Terminals and Reference Value

ABS00AOB

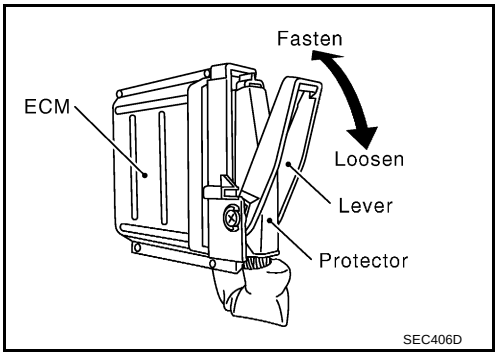
### PREPARATION

1. ECM is located behind the passenger side instrument lower panel. For this inspection, remove passenger side instrument lower panel.
2. Remove ECM harness connector.




PBIB1278E

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



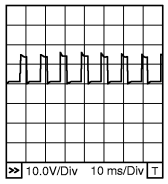

SEC406D

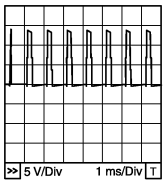
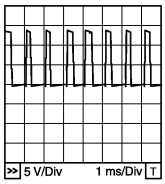
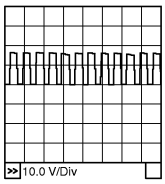
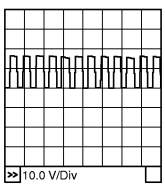
### ECM INSPECTION TABLE

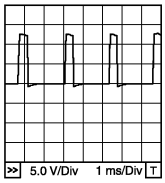
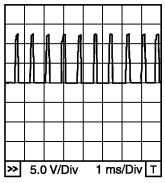
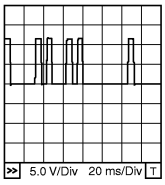
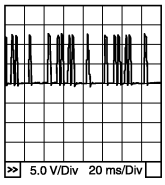
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

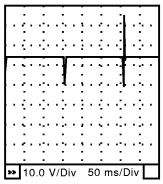
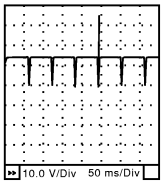
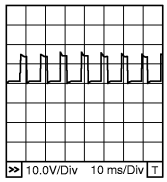
**CAUTION:**

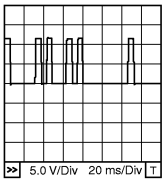
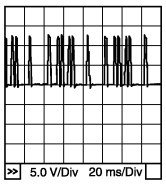
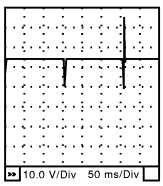
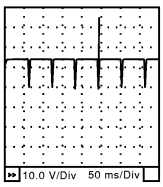
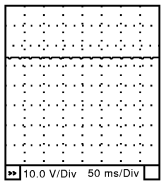
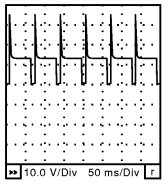
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.**

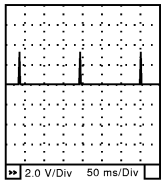
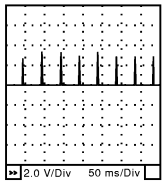
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 1 | B | ECM ground | **[Engine is running]**<br>● Idle speed | Body ground |
| 2 | OR | A/F sensor 1 heater (bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 5V★<br>  <br><br>PBIB1584E |

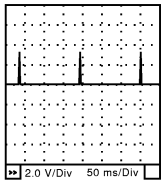
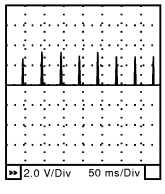
| TER-MINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 3 | W/R | Throttle control motor relay power supply | **[Ignition switch: ON]** | BATTERY VOLTAGE (11 - 14V) |
| 4 | BR | Throttle control motor (Close) | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully released | 0 - 14V★<br>  <br><br>PBIB1104E |
| 5 | G | Throttle control motor (Open) | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully depressed | 0 - 14V★<br>  <br><br>PBIB1105E |
| 6 | BR/W | Heated oxygen sensor 2 heater (bank 2) | **[Engine is running]**<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 1 minute and at idle for 1 minute under no load. | 0 - 1.0V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>**[Engine is running]**<br>● Engine speed: Above 3,600 rpm. | BATTERY VOLTAGE (11 - 14V) |
| 10 | W/G | Intake valve timing control solenoid valve (bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | BATTERY VOLTAGE (11 - 14V) |
| | | | **[Engine is running]**<br>● **Warm-up condition**<br>● When revving engine up to 2,000 rpm quickly | 7 - 12V★<br>  <br><br>PBIB1790E |
| 11 | R/W | Intake valve timing control solenoid valve (bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | BATTERY VOLTAGE (11 - 14V) |
| | | | **[Engine is running]**<br>● **Warm-up condition**<br>● When revving engine up to 2,000 rpm quickly | 7 - 12V★<br>  <br><br>PBIB1790E |

| TER-MINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 12 | L/W | Power steering pressure sensor | **[Engine is running]**<br>● Steering wheel: Being turned. | 0.5 - 4.5V |
| | | | **[Engine is running]**<br>● Steering wheel: Not being turned. | 0.4 - 0.8V |
| 13 | BR | Crankshaft position sensor (POS) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | Approximately 1.6V★<br>  <br><br>PBIB1041E |
| | | | **[Engine is running]**<br>● Engine speed: 2,000 rpm. | Approximately 1.4V★<br>  <br><br>PBIB1042E |
| 14 | Y | Camshaft position sensor (PHASE) (bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | 1.0 - 4.0V★<br>  <br><br>PBIB2493E |
| | | | **[Engine is running]**<br>● Engine speed: 2,000 rpm. | 1.0 - 4.0V★<br>  <br><br>PBIB1040E |
| 15 | W | Knock sensor | **[Engine is running]**<br>● Idle speed | Approximately 2.5V |
| 16 | W | A/F sensor 1 (Bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 3.1V |
| 35 | R | | | Approximately 2.6V |
| 56 | L | | | Approximately 2.3V |
| 75 | Y | | | Approximately 2.3V |

| TER-MINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 21<br>22<br>23 | G<br>R/Y<br>R/B | Injector No. 5<br>Injector No. 3<br>Injector No. 1 | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | BATTERY VOLTAGE<br>(11 - 14V)★<br>  <br><br>SEC984C |
| | | | **[Engine is running]**<br>● **Warm-up condition**<br>● Engine speed: 2,000 rpm. | BATTERY VOLTAGE<br>(11 - 14V)★<br>  <br><br>SEC985C |
| 24 | OR | A/F sensor 1 heater (bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 5V★<br>  <br><br>PBIB1584E |
| 25 | P/B | Heated oxygen sensor 2 heater (bank 1) | **[Engine is running]**<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 1 minute and at idle for 1 minute under no load. | 0 - 1.0V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>**[Engine is running]**<br>● Engine speed: Above 3,600 rpm. | BATTERY VOLTAGE<br>(11 - 14V) |
| 32 | P | EVAP control system pressure sensor | **[Ignition switch: ON]** | Approximately 1.8 - 4.8V |

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 33 | OR | Camshaft position sensor (PHASE) (bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | 1.0 - 4.0V★<br>  <br><br>PBIB2493E |
| | | | **[Engine is running]**<br>● Engine speed: 2,000 rpm. | 1.0 - 4.0V★<br>  <br><br>PBIB1040E |
| 34 | Y/G | Intake air temperature sensor | **[Engine is running]** | Approximately 0 - 4.8V<br>Output voltage varies with intake air temperature. |
| 40<br>41<br>42 | P<br>R/L<br>R/W | Injector No. 6<br>Injector No. 4<br>Injector No. 2 | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | BATTERY VOLTAGE<br>(11 - 14V)★<br>  <br><br>SEC984C |
| | | | **[Engine is running]**<br>● **Warm-up condition**<br>● Engine speed: 2,000 rpm | BATTERY VOLTAGE<br>(11 - 14V)★<br>  <br><br>SEC985C |
| 45 | LY | EVAP canister purge volume control solenoid valve | **[Engine is running]**<br>● Idle speed<br>● Accelerator pedal is not depressed even slightly, after engine starting. | BATTERY VOLTAGE<br>(11 - 14V)★<br>  <br><br>SEC990C |
| | | | **[Engine is running]**<br>● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine). | BATTERY VOLTAGE<br>(11 - 14V)★<br>  <br><br>SEC991C |

| TER-MINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 47 | B | Sensor power supply (Throttle position sensor) | **[Ignition switch: ON]** | Approximately 5V |
| 48 | B/Y | Sensor power supply (EVAP control system pressure sensor) | **[Ignition switch: ON]** | Approximately 5V |
| 49 | W/L | Sensor power supply (Refrigerant pressure sensor) | **[Ignition switch: ON]** | Approximately 5V |
| 50 | W | Throttle position sensor 1 | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully released | More than 0.36V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully depressed | Less than 4.75V |
| 51 | OR | Mass air flow sensor | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | 0.9 - 1.2V |
| | | | **[Engine is running]**<br>● **Warm-up condition**<br>● Engine speed: 2,500 rpm. | 1.5 - 1.9V |
| 55 | R/Y | Heated oxygen sensor 2 (bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Revving engine from idle to 3,000 rpm quickly after the following conditions are met.<br>– After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | 0 - Approximately 1.0V |
| 57 | R | A/F sensor 1 (Bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 2.6V |
| 58 | L | | | Approximately 2.3V |
| 76 | W | | | Approximately 3.1V |
| 77 | Y | | | Approximately 2.3V |
| 60<br>61<br>62 | PU/W<br>L/R<br>Y/R | Ignition signal No. 5<br>Ignition signal No. 3<br>Ignition signal No. 1 | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | 0 - 0.2V★<br>  <br><br>SEC986C |
| | | | **[Engine is running]**<br>● **Warm-up condition**<br>● Engine speed: 2,500 rpm. | 0.1 - 0.4V★<br>  <br><br>SEC987C |

| TER-MINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 66 | W/R | Sensor ground (Throttle position sensor) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 67 | B/W | Sensor ground | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 68 | Y | Sensor power supply (Power steering pressure sensor) | **[Ignition switch: ON]** | Approximately 5V |
| 69 | R/L | Throttle position sensor 2 | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully released | Less than 4.75V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully depressed | More than 0.36V |
| 70 | R/B | Refrigerant pressure sensor | **[Engine is running]**<br>● **Warm-up condition**<br>● Both A/C switch and blower switch: ON (Compressor operates.) | 1.0 - 4.0V |
| 73 | Y/B | Engine coolant temperature sensor | **[Engine is running]** | Approximately 0 - 4.8V<br>Output voltage varies with engine coolant temperature. |
| 74 | L/B | Heated oxygen sensor 2 (bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Revving engine from idle to 3,000 rpm quickly after the following conditions are met.<br>– After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | 0 - Approximately 1.0V |
| 78 | B/Y | Sensor ground (Heated oxygen sensor) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 79<br>80<br>81 | GY/R<br>GY<br>G/R | Ignition signal No. 6<br>Ignition signal No. 4<br>Ignition signal No. 2 | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | 0 - 0.2V★<br>  <br><br>SEC986C |
| | | | **[Engine is running]**<br>● **Warm-up condition**<br>● Engine speed: 2,500 rpm. | 0.1 - 0.4V★<br>  <br><br>SEC987C |

| TER-MINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 82 | GY/L | Sensor ground (Accelerator pedal position sensor 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 83 | B/R | Sensor ground (Accelerator pedal position sensor 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 85 | PU | Data link connector | **[Ignition switch: ON]**<br>● CONSULT-II or GST: Disconnected. | Approximately 5V - Battery voltage (11 - 14V) |
| 86 | P | CAN communication line | **[Ignition switch: ON]** | Approximately 1.1 - 2.3V<br>Output voltage varies with the communication status. |
| 90 | BR/Y | Sensor power supply (Accelerator pedal position sensor 1) | **[Ignition switch: ON]** | Approximately 5V |
| 91 | G | Sensor power supply (Accelerator pedal position sensor 2) | **[Ignition switch: ON]** | Approximately 5V |
| 94 | L | CAN communication line | **[Ignition switch: ON]** | Approximately 2.6 - 3.2V<br>Output voltage varies with the communication status. |
| 98 | LG/B | Accelerator pedal position sensor 2 | **[Ignition switch: ON]**<br>● Engine stopped<br>● Accelerator pedal: Fully released | 0.15 - 0.60V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>● Accelerator pedal: Fully depressed | 1.95 - 2.40V |
| 99 | G/Y | ASCD steering switch | **[Ignition switch: ON]**<br>● ASCD steering switch: OFF | Approximately 4V |
| | | | **[Ignition switch: ON]**<br>● MAIN switch: Pressed | Approximately 0V |
| | | | **[Ignition switch: ON]**<br>● CANCEL switch: Pressed | Approximately 1V |
| | | | **[Ignition switch: ON]**<br>● RESUME/ACCELERATE switch: Pressed | Approximately 3V |
| | | | **[Ignition switch: ON]**<br>● SET/COAST switch: Pressed | Approximately 2V |
| 101 | P/L | Stop lamp switch | **[Ignition switch: OFF]**<br>● Brake pedal: Fully released | Approximately 0V |
| | | | **[Ignition switch: OFF]**<br>● Brake pedal: Slightly depressed | BATTERY VOLTAGE<br>(11 - 14V) |
| 102 | G/OR | PNP switch | **[Ignition switch: ON]**<br>● Shift lever: P or N (A/T), Neutral (M/T) | Approximately 0V |
| | | | **[Ignition switch: ON]**<br>● Except above position | BATTERY VOLTAGE<br>(11 - 14V) |
| 104 | G/W | Throttle control motor relay | **[Ignition switch: OFF]** | BATTERY VOLTAGE<br>(11 - 14V) |
| | | | **[Ignition switch: ON]** | 0 - 1.0V |

| TER-MINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 106 | BR | Accelerator pedal position sensor 1 | **[Ignition switch: ON]**<br>● Engine stopped<br>● Accelerator pedal: Fully released | 0.5 - 1.0V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>● Accelerator pedal: Fully depressed | 3.9 - 4.7V |
| 107 | L/OR | Fuel tank temperature sensor | **[Engine is running]** | Approximately 0 - 4.8V<br>Output voltage varies with fuel tank temperature. |
| 108 | L | ASCD brake switch | **[Ignition switch: ON]**<br>● Brake pedal: Slightly depressed (A/T)<br>● Brake pedal and/or clutch pedal: Slightly depressed (M/T) | Approximately 0V |
| | | | **[Ignition switch: ON]**<br>● Brake pedal: Fully released (A/T)<br>● Brake pedal and clutch pedal: Fully released (M/T) | BATTERY VOLTAGE<br>(11 - 14V) |
| 109 | W/L | Ignition switch | **[Ignition switch: OFF]** | 0V |
| | | | **[Ignition switch: ON]** | BATTERY VOLTAGE<br>(11 - 14V) |
| 111 | W | ECM relay<br>(Self shut-off) | **[Engine is running]**<br>**[Ignition switch: OFF]**<br>● A few seconds after turning ignition switch OFF | 0 - 1.5V |
| | | | **[Ignition switch: OFF]**<br>● More than a few seconds after turning ignition switch OFF | BATTERY VOLTAGE<br>(11 - 14V) |
| 113 | B/OR | Fuel pump relay | **[Ignition switch: ON]**<br>● For 1 second after turning ignition switch ON<br>**[Engine is running]** | 0 - 1.5V |
| | | | **[Ignition switch: ON]**<br>● More than 1 second after turning ignition switch ON. | BATTERY VOLTAGE<br>(11 - 14V) |
| 115<br>116 | B/R<br>B | ECM ground | **[Engine is running]**<br>● Idle speed | Body ground |
| 117 | GY/L | EVAP canister vent control valve | **[Ignition switch: ON]** | BATTERY VOLTAGE<br>(11 - 14V) |
| 119<br>120 | P<br>L | Power supply for ECM | **[Ignition switch: ON]** | BATTERY VOLTAGE<br>(11 - 14V) |
| 121 | R/W | Power supply for ECM (Back-up) | **[Ignition switch: OFF]** | BATTERY VOLTAGE<br>(11 - 14V) |

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

## CONSULT-II Function (ENGINE)

ABS00AOC

### FUNCTION

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

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

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

## ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

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

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

X: Applicable

*1: This item includes 1st trip DTCs.

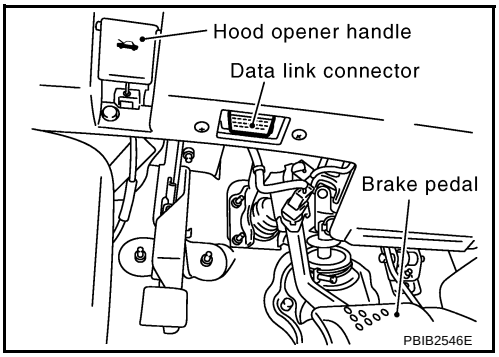
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-130, "Freeze Frame Data and 1st Trip Freeze Frame Data" .

## INSPECTION PROCEDURE

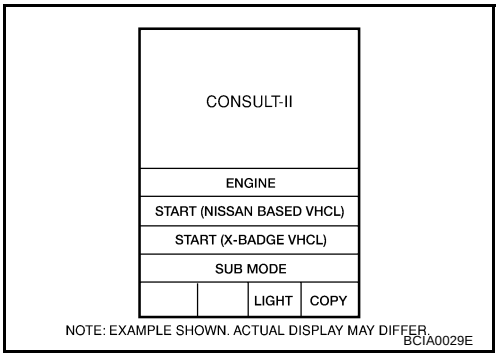
**CAUTION:**

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

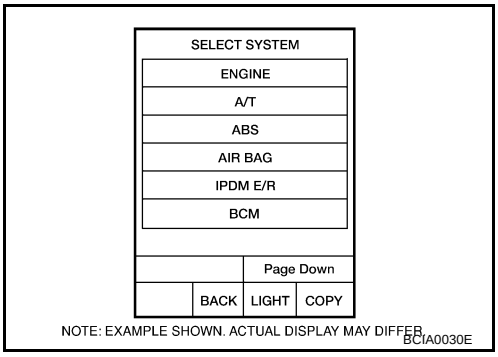
1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to data link connector, which is located under LH dash panel near the hood opener handle.
3. Turn ignition switch ON.




4. Touch “START (NISSAN BASED VHCL)”.



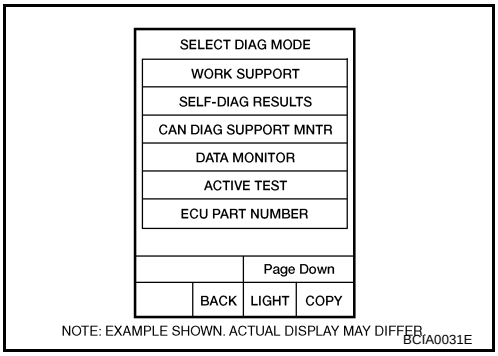
5. Touch “ENGINE”.
If “ENGINE” is not indicated, go to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0030E

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

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



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
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## WORK SUPPORT MODE

### Work Item

| WORK ITEM | CONDITION | USAGE |
|---|---|---|
| FUEL PRESSURE RELEASE | ● FUEL PUMP WILL STOP BY TOUCHING START DURING IDLING.<br>CRANK A FEW TIMES AFTER ENGINE STALLS. | When releasing fuel pressure from fuel line |
| IDLE AIR VOL LEARN | ● THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM. | When learning the idle air volume |
| SELF-LEARNING CONT | ● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT. | When clearing the coefficient of self-learning control value |
| EVAP SYSTEM CLOSE | CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS.<br>● IGN SW ON<br>● ENGINE NOT RUNNING<br>● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F).<br>● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM<br>● FUEL TANK TEMP. IS MORE THAN 0°C (32°F).<br>● WITHIN 10 MINUTES AFTER STARTING EVAP SYSTEM CLOSE<br>● WHEN TRYING TO EXECUTE EVAP SYSTEM CLOSE UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION.<br>**NOTE:**<br>**WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY “BATTERY VOLTAGE IS LOW. CHARGE BATTERY”, EVEN IN USING CHARGED BATTERY.** | When detecting EVAP vapor leak point of EVAP system |
| VIN REGISTRATION | ● IN THIS MODE, VIN IS REGISTERED IN ECM. | When registering VIN in ECM |

| WORK ITEM | CONDITION | USAGE |
|---|---|---|
| TARGET IDLE RPM ADJ* | ● IDLE CONDITION | When setting target idle speed |
| TARGET IGN TIM ADJ* | ● IDLE CONDITION | When adjusting target ignition timing |

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

## SELF-DIAG RESULTS MODE

### Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-47, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" .)

### Freeze Frame Data and 1st Trip Freeze Frame Data

| Freeze frame data item* | Description |
|---|---|
| DIAG TROUBLE CODE [PXXXX] | ● The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-8, "INDEX FOR DTC" .) |
| FUEL SYS-B1 | ● “Fuel injection system status” at the moment a malfunction is detected is displayed. |
| FUEL SYS-B2 | ● One mode in the following is displayed.<br>Mode2: Open loop due to detected system malfunction<br>Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment)<br>Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control<br>Mode5: Open loop - has not yet satisfied condition to go to closed loop |
| CAL/LD VALUE [%] | ● The calculated load value at the moment a malfunction is detected is displayed. |
| COOLANT TEMP [°C] or [°F] | ● The engine coolant temperature at the moment a malfunction is detected is displayed. |
| L-FUEL TRM-B1 [%] | ● “Long-term fuel trim” at the moment a malfunction is detected is displayed. |
| L-FUEL TRM-B2 [%] | ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim. |
| S-FUEL TRM-B1 [%] | ● “Short-term fuel trim” at the moment a malfunction is detected is displayed. |
| S-FUEL TRM-B2 [%] | ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule. |
| ENGINE SPEED [rpm] | ● The engine speed at the moment a malfunction is detected is displayed. |
| VEHICL SPEED [km/h] or [mph] | ● The vehicle speed at the moment a malfunction is detected is displayed. |
| ABSOL TH-P/S [%] | ● The throttle volve operating angle at the moment a malfunction is detected is displayed. |
| B/FUEL SCHDL [msec] | ● The base fuel schedule at the moment a malfunction is detected is displayed. |
| INT/A TEMP SE [°C] or [°F] | ● The intake air temperature at the moment a malfunction is detected is displayed. |

*: This item is the same as that of 1st trip freeze frame data.

## DATA MONITOR MODE
### Monitored Item

×: Applicable

| Monitored item [Unit] | ECM INPUT SIGNALS | MAIN SIGNALS | Description | Remarks |
|---|---|---|---|---|
| ENG SPEED [rpm] | × | × | ● Indicates the engine speed computed from the signals of the crankshaft position sensor (POS) and camshaft position sensor (PHASE). | ● Accuracy becomes poor if engine speed drops below the idle rpm.<br>● If the signal is interrupted while the engine is running, an abnormal value may be indicated. |
| MAS A/F SE-B1 [V] | × | × | ● The signal voltage of the mass air flow sensor is displayed. | ● When the engine is stopped, a certain value is indicated. |
| B/FUEL SCHDL [msec] | | × | ● "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction. | |
| A/F ALPHA-B1 [%] | | × | ● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated. | ● When the engine is stopped, a certain value is indicated.<br>● This data also includes the data for the air-fuel ratio learning control. |
| A/F ALPHA-B2 [%] | | × | | |
| COOLAN TEMP/S [°C] or [°F] | × | × | ● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed. | ● When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed. |
| A/F SEN1 (B1) [V] | × | × | ● The A/F signal computed from the input signal of the A/F sensor 1 is displayed. | |
| A/F SEN1 (B2) [V] | × | | | |
| HO2S2 (B1) [V] | × | | ● The signal voltage of the heated oxygen sensor 2 is displayed. | |
| HO2S2 (B2) [V] | × | | | |
| HO2S2 MNTR (B1) [RICH/LEAN] | × | | ● Display of heated oxygen sensor 2 signal:<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. | ● When the engine is stopped, a certain value is indicated. |
| HO2S2 MNTR (B2) [RICH/LEAN] | × | | | |
| VHCL SPEED SE [km/h] or [mph] | × | × | ● The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed. | |
| BATTERY VOLT [V] | × | × | ● The power supply voltage of ECM is displayed. | |
| ACCEL SEN 1 [V] | × | × | ● The accelerator pedal position sensor signal voltage is displayed. | ● ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal. |
| ACCEL SEN 2 [V] | × | | | |
| THRTL SEN 1 [V] | × | × | ● The throttle position sensor signal voltage is displayed. | ● THRTL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal. |
| THRTL SEN 2 [V] | × | | | |
| FUEL T/TEMP SE [°C] or [°F] | × | | ● The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed. | |
| INT/A TEMP SE [°C] or [°F] | × | × | ● The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated. | |
| EVAP SYS PRES [V] | × | | ● The signal voltage of EVAP control system pressure sensor is displayed. | |

| Monitored item [Unit] | ECM INPUT SIGNALS | MAIN SIGNALS | Description | Remarks |
|---|---|---|---|---|
| FUEL LEVEL SE [V] | × | | ● The signal voltage of the fuel level sensor is displayed. | |
| START SIGNAL [ON/OFF] | × | × | ● Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage. | ● After starting the engine, [OFF] is displayed regardless of the starter signal. |
| CLSD THL POS [ON/OFF] | × | × | ● Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal. | |
| AIR COND SIG [ON/OFF] | × | × | ● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal. | |
| P/N POSI SW [ON/OFF] | × | × | ● Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal. | |
| PW/ST SIGNAL [ON/OFF] | × | × | ● [ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal) is indicated. | |
| LOAD SIGNAL [ON/OFF] | × | × | ● Indicates [ON/OFF] condition from the electrical load signal.<br>ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position.<br>OFF: Both rear window defogger switch and lighting switch are OFF. | |
| IGNITION SW [ON/OFF] | × | | ● Indicates [ON/OFF] condition from ignition switch signal. | |
| HEATER FAN SW [ON/OFF] | × | | ● Indicates [ON/OFF] condition from the heater fan switch signal. | |
| BRAKE SW [ON/OFF] | × | | ● Indicates [ON/OFF] condition from the stop lamp switch signal. | |
| INJ PULSE-B1 [msec] | | × | ● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals. | ● When the engine is stopped, a certain computed value is indicated. |
| INJ PULSE-B2 [msec] | | | | |
| IGN TIMING [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 air flow divided by peak air flow. | |
| MASS AIRFLOW [g·m/s] | | | ● Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor. | |
| PURG VOL C/V [%] | | | ● Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals.<br>● The opening becomes larger as the value increases. | |
| INT/V TIM (B1) [°CA] | | | ● Indicates [°CA] of intake camshaft advanced angle. | |
| INT/V TIM (B2) [°CA] | | | | |

| Monitored item [Unit] | ECM INPUT SIGNALS | MAIN SIGNALS | Description | Remarks |
|---|---|---|---|---|
| INT/V SOL (B1) [%] | | | ● The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated.<br>● The advance angle becomes larger as the value increases. | |
| INT/V SOL (B2) [%] | | | | |
| AIR COND RLY [ON/OFF] | | × | ● The air conditioner relay control condition (determined by ECM according to the input signals) is indicated. | |
| FUEL PUMP RLY [ON/OFF] | | × | ● Indicates the fuel pump relay control condition determined by ECM according to the input signals. | |
| VENT CONT/V [ON/OFF] | | | ● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated.<br>ON: Closed<br>OFF: Open | |
| THRTL RELAY [ON/OFF] | | × | ● Indicates the throttle control motor relay control condition determined by the ECM according to the input signals. | |
| COOLING FAN [HI/LOW/OFF] | | × | ● The control condition of the cooling fan (determined by ECM according to the input signals) is indicated.<br>HI: High speed operation<br>LOW: Low speed operation<br>OFF: Stop | |
| HO2S2 HTR (B1) [ON/OFF] | | | ● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals. | |
| HO2S2 HTR (B2) [ON/OFF] | | | | |
| I/P PULLY SPD [rpm] | | | ● Indicates the engine speed computed from the turbine revolution sensor signal. | |
| VEHICLE SPEED [km/h] or [MPH] | | | ● Indicates the vehicle speed computed from the revolution sensor signal. | |
| IDL A/V LEARN [YET/CMPLT] | | | ● Display the condition of Idle Air Volume Learning<br>YET: Idle Air Volume Learning has not been performed yet.<br>CMPLT: Idle Air Volume Learning has already been performed successfully. | |
| TRVL AFTER MIL [km] or [mile] | | | ● Distance traveled while MIL is activated. | |
| SNOW MODE SW [ON/OFF] | | | ● Indicates [ON/OFF] condition from the snow mode switch signal. | |
| A/F S1 HTR (B1) [%] | | | ● Indicates A/F sensor 1 heater control value computed by ECM according to the input signals.<br>● The current flow to the heater becomes larger as the value increases. | |
| A/F S1 HTR (B2) [%] | | | | |
| AC PRESS SEN [V] | | | ● The signal voltage from the refrigerant pressure sensor is displayed. | |
| VHCL SPEED SE [km/h] or [mph] | | | ● The vehicle speed computed from the vehicle speed signal sent from TCM is displayed. | |

| Monitored item [Unit] | ECM INPUT SIG-NALS | MAIN SIG-NALS | Description | Remarks |
|---|---|---|---|---|
| SET VHCL SPD [km/h] or [mph] | | | ● The preset vehicle speed is displayed. | |
| MAIN SW [ON/OFF] | | | ● Indicates [ON/OFF] condition from MAIN switch signal. | |
| CANCEL SW [ON/OFF] | | | ● Indicates [ON/OFF] condition from CANCEL switch signal. | |
| RESUME/ACC SW [ON/OFF] | | | ● Indicates [ON/OFF] condition from RESUME/ ACCELERATE switch signal. | |
| SET SW [ON/OFF] | | | ● Indicates [ON/OFF] condition from SET/ COAST switch signal. | |
| BRAKE SW1 [ON/OFF] | | | ● Indicates [ON/OFF] condition from ASCD brake switch signal and ASCD clutch switch signal (M/T) | |
| BRAKE SW2 [ON/OFF] | | | ● Indicates [ON/OFF] condition of stop lamp switch signal. | |
| VHCL SPD CUT [NON/CUT] | | | ● Indicates the vehicle cruise condition.<br>NON: Vehicle speed is maintained at the ASCD set speed.<br>CUT: Vehicle speed increased to excessively high compared with the ASCD set speed, and ASCD operation is cut off. | |
| LO SPEED CUT [NON/CUT] | | | ● Indicates the vehicle cruise condition.<br>NON: Vehicle speed is maintained at the ASCD set speed.<br>CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off. | |
| AT OD MONITOR [ON/OFF] | | | ● Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM. | ● For M/T models always “OFF” is displayed. |
| AT OD CANCEL [ON/OFF] | | | ● Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM. | ● For M/T models always “OFF” is displayed. |
| CRUISE LAMP [ON/OFF] | | | ● Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals. | |
| SET LAMP [ON/OFF] | | | ● Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals. | |
| Voltage [V] | | | ● Voltage, frequency, duty cycle or pulse width measured by the probe. | ● Only “#” is displayed if item is unable to be measured.<br>● Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured. |
| Frequency [msec], [Hz] or [%] | | | | |
| DUTY-HI | | | | |
| DUTY-LOW | | | | |
| PLS WIDTH-HI | | | | |
| PLS WIDTH-LOW | | | | |

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

## DATA MONITOR (SPEC) MODE

### Monitored Item

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

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

## ACTIVE TEST MODE

### Test Item

| TEST ITEM | CONDITION | JUDGEMENT | CHECK ITEM (REMEDY) |
|---|---|---|---|
| FUEL INJECTION | ● Engine: Return to the original trouble condition<br>● Change the amount of fuel injection using CONSULT-II. | If trouble symptom disappears, see CHECK ITEM. | ● Harness and connectors<br>● Fuel injector<br>● Air fuel ratio (A/F) sensor 1 |
| IGNITION TIMING | ● Engine: Return to the original trouble condition<br>● Timing light: Set<br>● Retard the ignition timing using CONSULT-II. | If trouble symptom disappears, see CHECK ITEM. | ● Perform Idle Air Volume Learning. |
| POWER BALANCE | ● Engine: After warming up, idle the engine.<br>● A/C switch OFF<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Cut off each injector signal one at a time using CONSULT-II. | Engine runs rough or dies. | ● Harness and connectors<br>● Compression<br>● Fuel injector<br>● Power transistor<br>● Spark plug<br>● Ignition coil |
| COOLING FAN* | ● Ignition switch: ON<br>● Turn the cooling fan “HI”, “LOW” and “OFF” using CONSULT-II. | Cooling fan moves and stops. | ● Harness and connectors<br>● Cooling fan motor<br>● IPDM E/R |
| ENG COOLANT TEMP | ● Engine: Return to the original trouble condition<br>● Change the engine coolant temperature using CONSULT-II. | If trouble symptom disappears, see CHECK ITEM. | ● Harness and connectors<br>● Engine coolant temperature sensor<br>● Fuel injector |
| FUEL PUMP RELAY | ● Ignition switch: ON (Engine stopped)<br>● Turn the fuel pump relay “ON” and “OFF” using CONSULT-II and listen to operating sound. | Fuel pump relay makes the operating sound. | ● Harness and connectors<br>● Fuel pump relay |

| TEST ITEM | CONDITION | JUDGEMENT | CHECK ITEM (REMEDY) |
|---|---|---|---|
| PURG VOL CONT/V | ● Engine: After warming up, run engine at 1,500 rpm.<br>● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II. | Engine speed changes according to the opening percent. | ● Harness and connectors<br>● Solenoid valve |
| FUEL/T TEMP SEN | ● Change the fuel tank temperature using CONSULT-II. | | |
| VENT CONTROL/V | ● Ignition switch: ON (Engine stopped)<br>● Turn solenoid valve “ON” and “OFF” with the CONSULT-II and listen to operating sound. | Solenoid valve makes an operating sound. | ● Harness and connectors<br>● Solenoid valve |
| V/T ASSIGN ANGLE | ● Engine: Return to the original trouble condition<br>● Change intake valve timing using CONSULT-II. | If trouble symptom disappears, see CHECK ITEM. | ● Harness and connectors<br>● Intake valve timing control solenoid valve |

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

## DTC & SRT CONFIRMATION MODE

### SRT STATUS Mode

For details, refer to EC-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 |
|---|---|---|---|
| EVAPORATIVE SYSTEM | PURG FLOW P0441 | Refer to corresponding trouble diagnosis for DTC. | EC-314 |
| | EVP SML LEAK P0442/P1442* | | EC-319 |
| | EVP V/S LEAK P0456/P1456* | | EC-366 |
| | PURG VOL CN/V P1444 | | EC-544 |
| A/F SEN1 | A/F SEN1 (B1) P1276 | | EC-511 |
| | A/F SEN1 (B1) P1278/P1279 | | EC-520, EC-532 |
| | A/F SEN1 (B2) P1286 | | EC-511 |
| | A/F SEN1 (B2) P1288/P1289 | | EC-520, EC-532 |
| HO2S2 | HO2S2 (B1) P0139 | | EC-231 |
| | HO2S2 (B1) P1146 | | EC-431 |
| | HO2S2 (B1) P1147 | | EC-442 |
| | HO2S2 (B2) P0159 | | EC-231 |
| | HO2S2 (B2) P1166 | | EC-431 |
| | HO2S2 (B2) P1167 | | EC-442 |

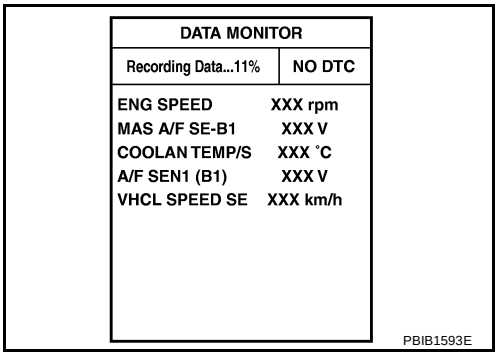
*: DTC P1442 and P1456 does not apply to V35 models but appears in DTC WORK SUPPORT Mode screens.

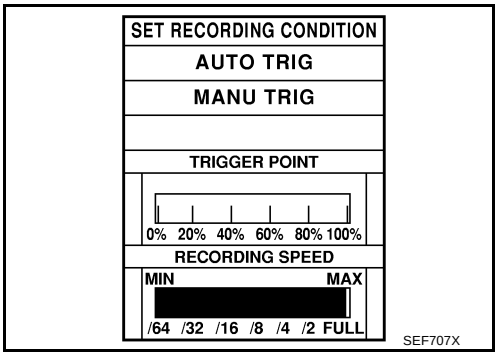
## REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

### Description

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

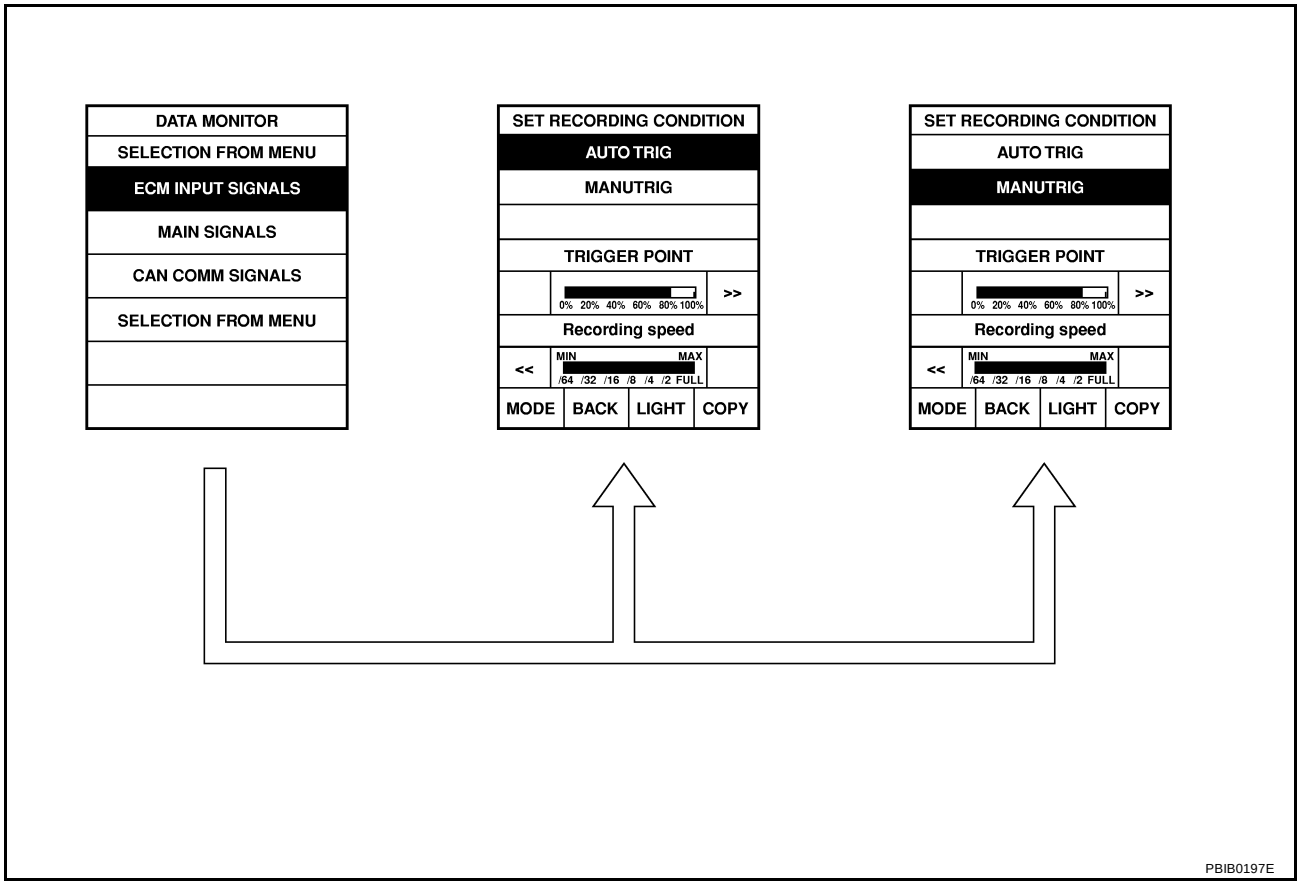
1. “AUTO TRIG” (Automatic trigger):
   - The malfunction will be identified on the CONSULT-II screen in real time.
     In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.
     At the moment a malfunction is detected by ECM, “MONITOR” in “DATA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



## Operation

1. “AUTO TRIG”
   - While trying to detect the DTC/1st trip DTC by performing the DTC Confirmation Procedure, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.
   - While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent.
     When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the DTC Confirmation Procedure, the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to INCIDENT SIMULATION TESTS in GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" .)
2. “MANU TRIG”
   - If the malfunction is displayed as soon as “DATA MONITOR” is selected, reset CONSULT-II to “MANU TRIG”. By selecting “MANU TRIG” you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.

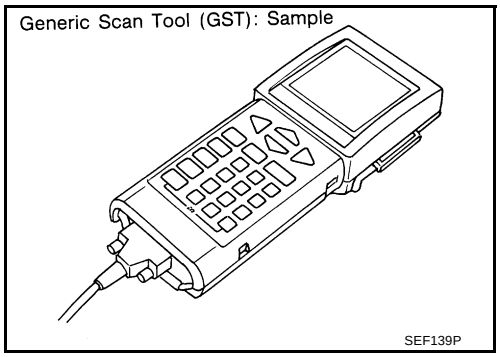



# Generic Scan Tool (GST) Function

ABS00AOD

## DESCRIPTION

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

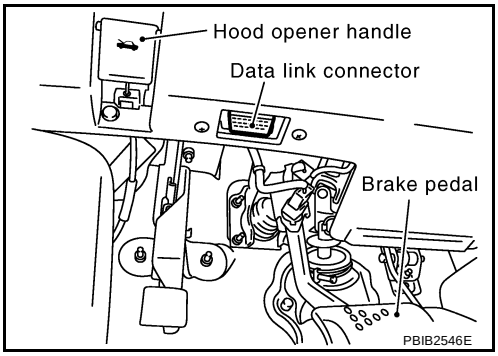


## FUNCTION

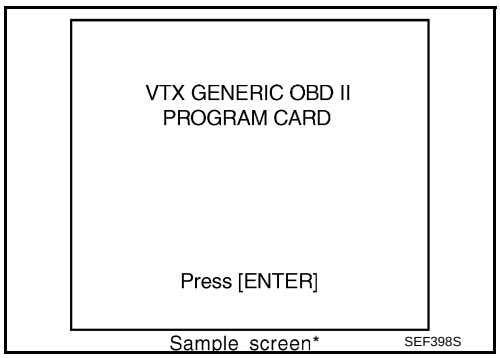
| Diagnostic test mode | | Function |
|---|---|---|
| Service $01 | READINESS TESTS | This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information. |
| Service $02 | (FREEZE DATA) | This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-130, "Freeze Frame Data and 1st Trip Freeze Frame Data" . |
| Service $03 | DTCs | This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM. |
| Service $04 | CLEAR DIAG INFO | This diagnostic service can clear all emission-related diagnostic information. This includes:<br>● Clear number of diagnostic trouble codes (Service $01)<br>● Clear diagnostic trouble codes (Service $03)<br>● Clear trouble code for freeze frame data (Service $01)<br>● Clear freeze frame data (Service $02)<br>● Reset status of system monitoring test (Service $01)<br>● Clear on board monitoring test results (Service $06 and $07) |
| Service $06 | (ON BOARD TESTS) | This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored. |
| Service $07 | (ON BOARD TESTS) | This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions. |
| Service $08 | — | This diagnostic service can close EVAP system in ignition switch ON position (Engine stopped). When this diagnostic service is performed, EVAP canitser vent control valve can be closed.<br>In the following conditions, this mode cannot function.<br>● Low ambient temperature<br>● Low battery voltage<br>● Engine running<br>● Ignition switch OFF<br>● Low fuel temperature<br>● Too much pressure is applied to EVAP system |
| Service $09 | (CALIBRATION ID) | This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs. |

## INSPECTION PROCEDURE

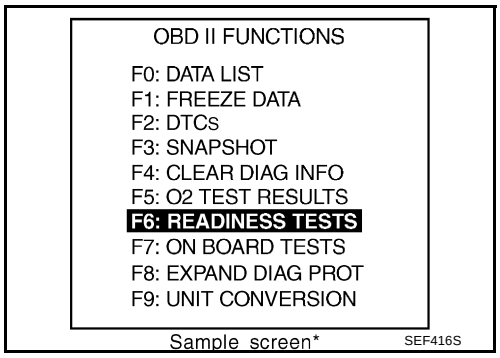
1. Turn ignition switch OFF.
2. Connect GST to data link connector, which is located under LH dash panel near the hood opener handle.



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

ABS00AOE

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 | See EC-146, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" . | | |
| B/FUEL SCHDL | See EC-146, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" . | | |
| A/F ALPHA-B1<br>A/F ALPHA-B2 | See EC-146, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" . | | |
| COOLAN TEMP/S | ● Engine: After warming up | | More than 70°C (158°F) |
| A/F SEN1 (B1)<br>A/F SEN1 (B2) | ● Engine: After warming up | Maintaining engine speed at 2,000 rpm | Fluctuates around 1.5V |
| HO2S2 (B1)<br>HO2S2 (B2) | ● Warm-up condition<br>● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | Revving engine from idle to 3,000 rpm quickly. | 0 - 0.3V ←→ Approx. 0.6 - 1.0V |
| HO2S2 MNTR (B1)<br>HO2S2 MNTR (B2) | ● Warm-up condition<br>● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | Revving engine from idle to 3,000 rpm quickly. | LEAN ←→ RICH |
| VHCL SPEED SE | ● Turn drive wheels and compare CONSULT-II value with the speedometer indication. | | Almost the same speed as the speedometer indication |
| BATTERY VOLT | ● Ignition switch: ON (Engine stopped) | | 11 - 14V |
| ACCEL SEN 1 | ● Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | 0.5 - 1.0V |
| | | Accelerator pedal: Fully depressed | 4.0 - 4.8V |

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| ACCEL SEN 2* | ● Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | 0.3 - 1.2V |
| | | Accelerator pedal: Fully depressed | 3.9 - 4.8V |
| THRTL SEN 1<br>THRTL SEN 2* | ● Ignition switch: ON (Engine stopped)<br>● Shift lever: D (A/T) or 1st (M/T) | Accelerator pedal: Fully released | More than 0.36V |
| | | Accelerator pedal: Fully depressed | Less than 4.75V |
| EVAP SYS PRES | ● Ignition switch: ON | | Approx. 1.8 - 4.8V |
| START SIGNAL | ● Ignition switch: ON → START → ON | | OFF → ON → OFF |
| CLSD THL POS | ● Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | ON |
| | | Accelerator pedal: Slightly depressed | OFF |
| AIR COND SIG | ● Engine: After warming up, idle the engine | Air conditioner switch: OFF | OFF |
| | | Air conditioner switch: ON (Compressor operates.) | ON |
| P/N POSI SW | ● Ignition switch: ON | Shift lever: P or N (A/T), Neutral (M/T) | ON |
| | | Shift lever: Except above position | OFF |
| PW/ST SIGNAL | ● Engine: After warming up, idle the engine | Steering wheel: Not being turned. (Forward direction) | OFF |
| | | Steering wheel: Being turned. | ON |
| LOAD SIGNAL | ● Ignition switch: ON | Rear window defogger switch is ON and/or lighting switch is in 2nd. | ON |
| | | Rear window defogger switch is OFF and lighting switch is OFF. | OFF |
| IGNITION SW | ● Ignition switch: ON → OFF → ON | | ON → OFF → ON |
| HEATER FAN SW | ● Engine: After warming up, idle the engine | Heater fan: Operating. | ON |
| | | Heater fan: Not operating | OFF |
| BRAKE SW | ● Ignition switch: ON | Brake pedal: Fully released | OFF |
| | | Brake pedal: Slightly depressed | ON |
| INJ PULSE-B1<br>INJ PULSE-B2 | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle | 2.0 - 3.0 msec |
| | | 2,000 rpm | 1.9 - 2.9 msec |
| IGN TIMING | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle | 13° - 18° BTDC |
| | | 2,000 rpm | 25° - 45° BTDC |
| CAL/LD VALUE | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle | 5% - 35% |
| | | 2,500 rpm | 5% - 35% |
| MASS AIRFLOW | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle | 2.0 - 6.0 g·m/s |
| | | 2,500 rpm | 7.0 - 20.0 g·m/s |

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| PURG VOL C/V | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle<br>(Accelerator pedal is not depressed even slightly, after engine starting) | 0% |
| | | 2,000 rpm | — |
| INT/V TIM (B1)<br>INT/V TIM (B2) | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle | –5° - 5°CA |
| | | When revving engine up to 2,000 rpm quickly | Approx. 0° - 30°CA |
| INT/V SOL (B1)<br>INT/V SOL (B2) | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle | 0% - 2% |
| | | When revving engine up to 2,000 rpm quickly | Approx. 0% - 50% |
| AIR COND RLY | ● Engine: After warming up, idle the engine | Air conditioner switch: OFF | OFF |
| | | Air conditioner switch: ON<br>(Compressor operates) | ON |
| FUEL PUMP RLY | ● For 1 second after turning ignition switch ON<br>● Engine running or cranking | | ON |
| | ● Except above conditions | | OFF |
| VENT CONT/V | ● Ignition switch: ON | | OFF |
| THRTL RELAY | ● Ignition switch: ON | | ON |
| COOLING FAN | ● Engine: After warming up, idle the engine<br>● Air conditioner switch: OFF | Engine coolant temperature is 97°C (206°F) or less | OFF |
| | | Engine coolant temperature is between 98°C (208°F) and 99°C (210°F) | LOW |
| | | Engine coolant temperature is 100°C (212°F) or more | HI |
| HO2S2 HTR (B1)<br>HO2S2 HTR (B2) | ● 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 1 minute and at idle for 1 minute under no load | | ON |
| | ● Engine speed: Above 3,600 rpm | | OFF |
| I/P PULLY SPD | ● Vehicle speed: More than 20 km/h (12 MPH) | | Almost the same speed as the tachometer indication |
| VEHICLE SPEED | ● Turn drive wheels and compare CONSULT-II value with the speedometer indication. | | Almost the same speed as the speedometer indication |
| TRVL AFTER MIL | ● Ignition switch: ON | Vehicle has traveled after MIL has turned ON. | 0 - 65,535 km<br>(0 - 40,723 mile) |
| SNOW MODE SW | ● Ignition switch: ON | Snow mode switch: ON | ON |
| | | Snow mode switch: OFF | OFF |
| A/F S1 HTR (B1)<br>A/F S1 HTR (B2) | ● Engine: After warming up, idle the engine | | 0 - 100% |
| AC PRESS SEN | ● Ignition switch: ON (Engine stopped) | | Approx. 0V |
| | ● Engine: Idle<br>● Air conditioner switch: OFF | | 1.0 - 4.0V |
| VEH SPEED SE | ● Turn drive wheels and compare speedometer indication with the CONSULT-II value. | | Almost the same speed as the CONSULT-II value |

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| SET VHCL SPD | ● Engine: Running | ASCD: Operating | The preset vehicle speed is displayed. |
| MAIN SW | ● Ignition switch: ON | MAIN switch: Pressed | ON |
| | | MAIN switch: Released | OFF |
| CANCEL SW | ● Ignition switch: ON | CANCEL switch: Pressed | ON |
| | | CANCEL switch: Released | OFF |
| RESUME/ACC SW | ● Ignition switch: ON | RESUME/ACCELERATE switch: Pressed | ON |
| | | RESUME/ACCELERATE switch: Released | OFF |
| SET SW | ● Ignition switch: ON | SET/COAST switch: Pressed | ON |
| | | SET/COAST switch: Released | OFF |
| BRAKE SW1 | ● Ignition switch: ON | ● Brake pedal: Fully released (A/T)<br>● Brake pedal and clutch pedal: Fully released (M/T) | ON |
| | | ● Brake pedal: Slightly depressed (A/T)<br>● Brake pedal and/or clutch pedal: Slightly depressed (M/T) | OFF |
| BRAKE SW2 | ● Ignition switch: ON | Brake pedal: Fully released | OFF |
| | | Brake pedal: Slightly depressed | ON |
| CRUISE LAMP | ● Ignition switch: ON | MAIN switch: Pressed at the 1st time → at the 2nd time | ON → OFF |
| SET LAMP | ● MAIN switch: ON<br>● When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89MPH) | ASCD: Operating | ON |
| | | ASCD: Not operating | OFF |

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

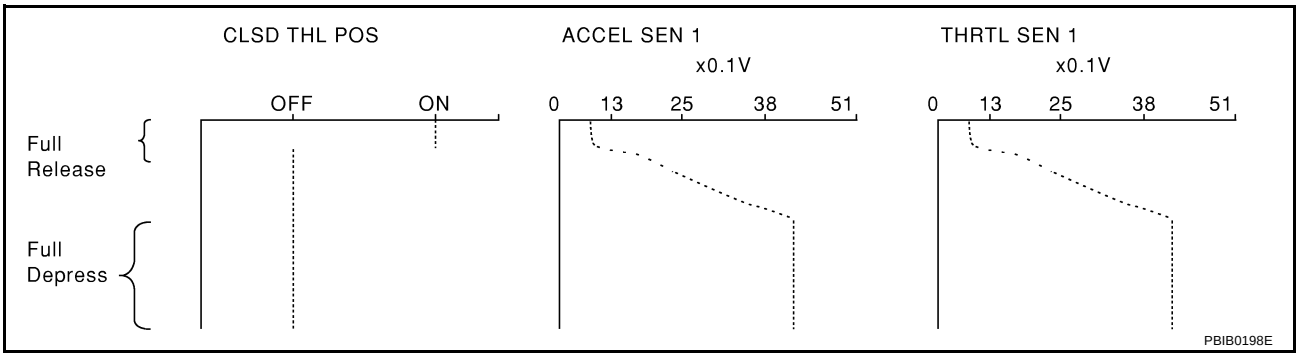
## Major Sensor Reference Graph in Data Monitor Mode

ABS00AOF

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

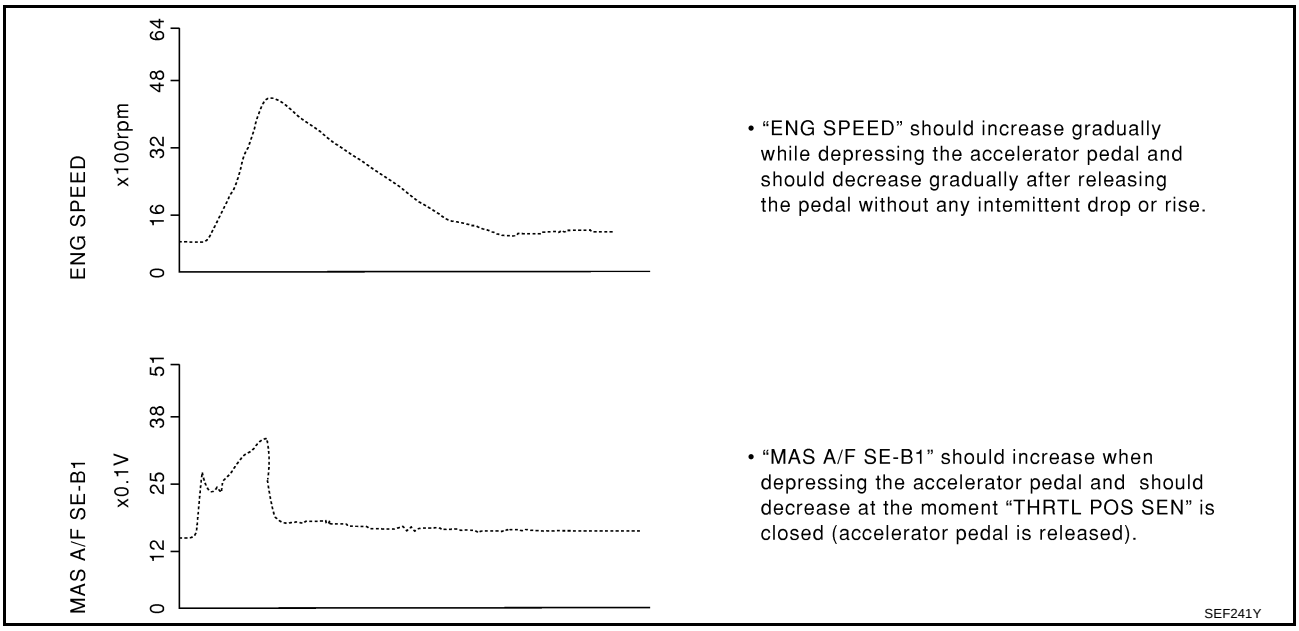
### CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

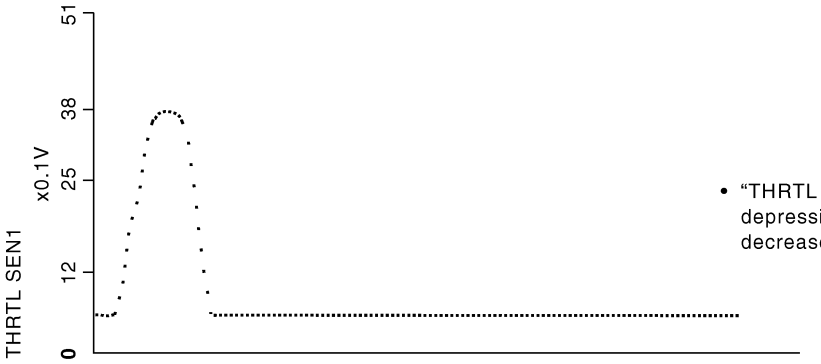
Below is the data for “CLSD THL POS”, “ACCEL SEN 1” and “THRTL SEN 1” when depressing the accelerator pedal with the ignition switch ON and with shift lever in D (A/T) or 1st (M/T) position.
The signal of “ACCEL SEN 1” and “THRTL SEN 1” should rise gradually without any intermittent drop or rise after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



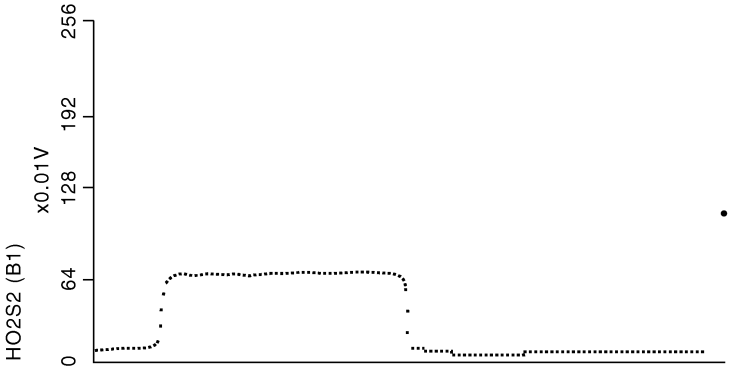
## ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), INJ PULSE-B1

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

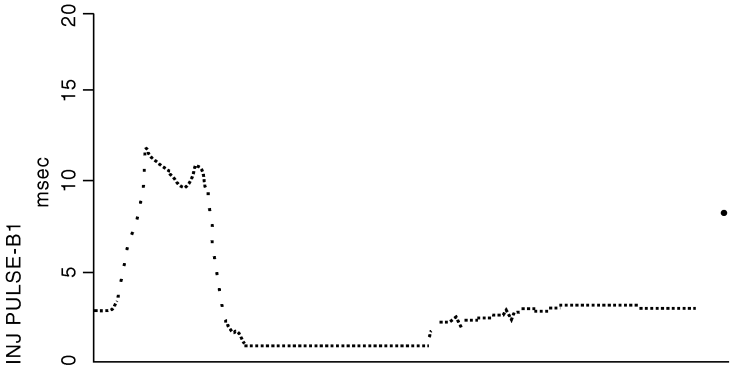





- "THRTL SEN1" should increase while depressing the accelerator pedal and should decrease while releasing it.




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




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

PBIB2099E

# TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

## Description

ABS00DEH

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

ABS00DEI

- Vehicle driven distance: More than 5,000 km (3,017 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm$^2$ , 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up*1
- Electrical load: Not applied*2
- Engine speed: Idle

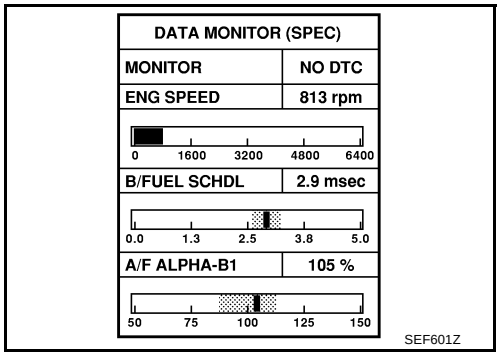
*1: After the engine is warmed up to normal operating temperature, drive vehicle until “ATF TEMP 1” (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
For M/T models, after the engine is warmed up to normal operating temperature, drive for 5 minutes.
*2: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

## Inspection Procedure

ABS00DEJ

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

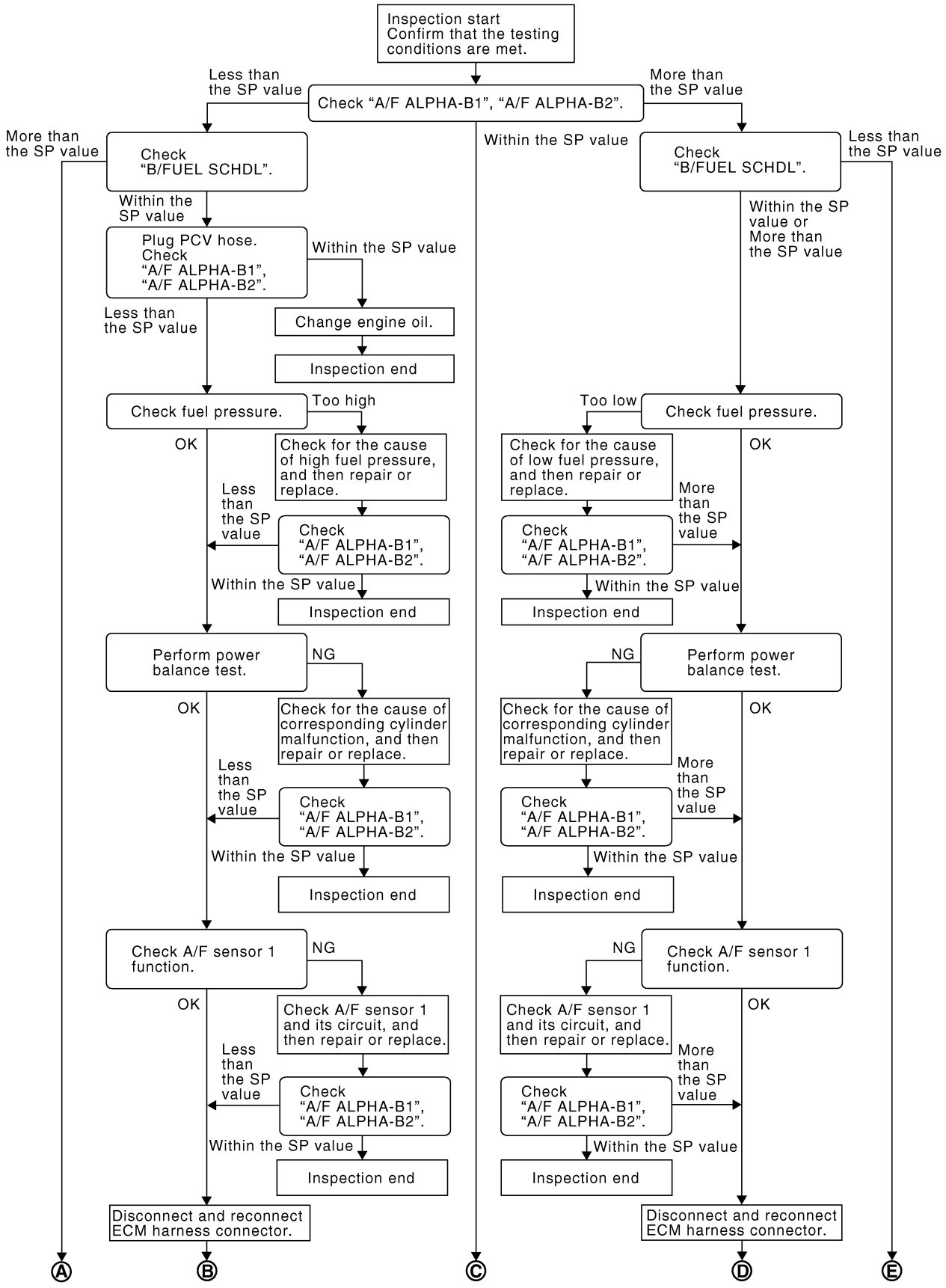
1. Perform EC-71, "Basic Inspection" .
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-147, "Diagnostic Procedure" .



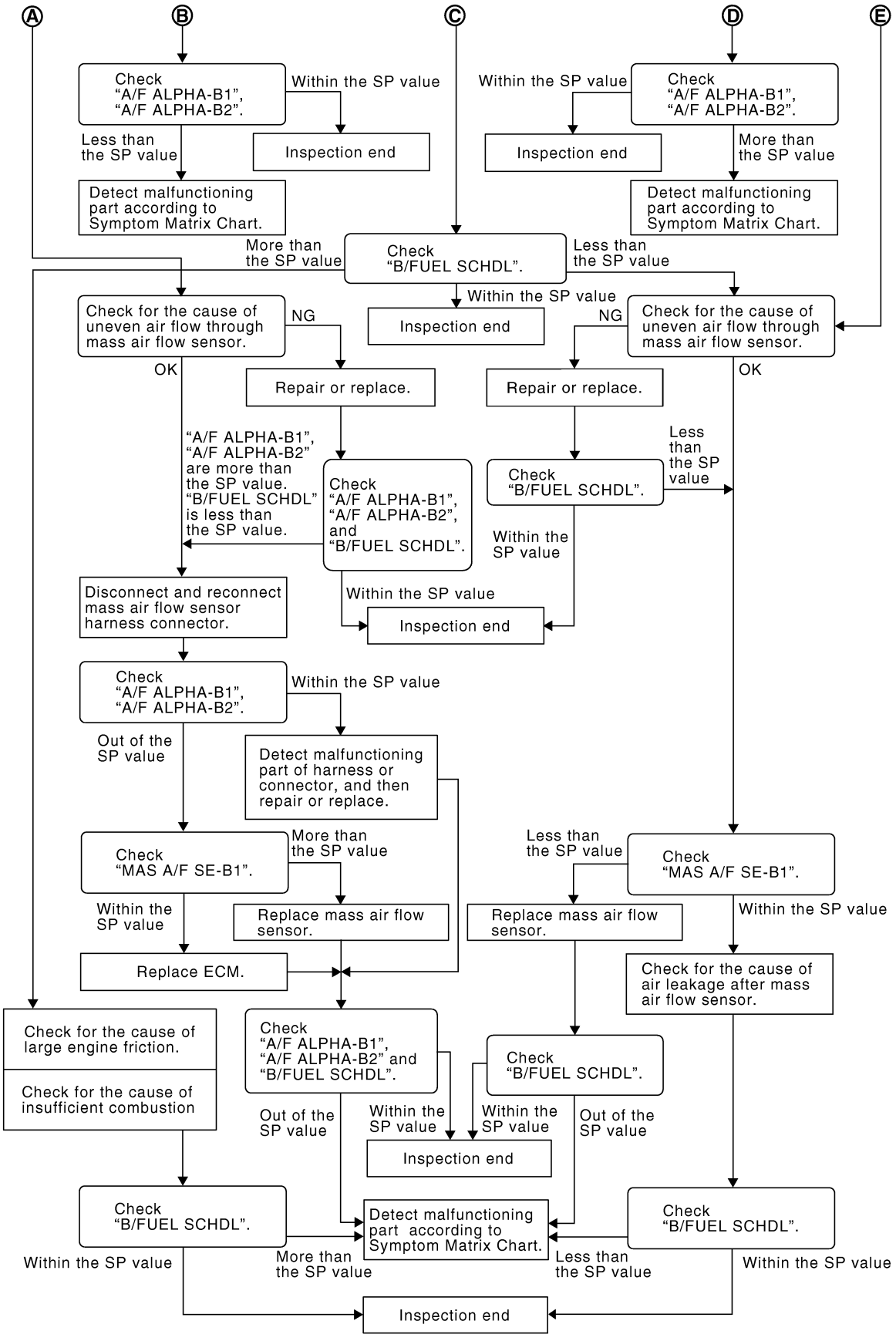
## Diagnostic Procedure

ABS00DEK

### OVERALL SEQUENCE




PBIB2268E


Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Check "A/F ALPHA-B1", "A/F ALPHA-B2".
Within the SP value
Inspection end
Less than the SP value
Detect malfunctioning part according to Symptom Matrix Chart.
Within the SP value
Check "A/F ALPHA-B1", "A/F ALPHA-B2".
Inspection end
More than the SP value
Detect malfunctioning part according to Symptom Matrix Chart.
More than the SP value
Check "B/FUEL SCHDL".
Less than the SP value
Within the SP value
Inspection end
Check for the cause of uneven air flow through mass air flow sensor.
NG
OK
Repair or replace.
NG
Check for the cause of uneven air flow through mass air flow sensor.
OK
Repair or replace.
"A/F ALPHA-B1", "A/F ALPHA-B2" are more than the SP value. "B/FUEL SCHDL" is less than the SP value.
Check "A/F ALPHA-B1", "A/F ALPHA-B2", and "B/FUEL SCHDL".
Within the SP value
Inspection end
Check "B/FUEL SCHDL".
Less than the SP value
Within the SP value
Disconnect and reconnect mass air flow sensor harness connector.
Check "A/F ALPHA-B1", "A/F ALPHA-B2".
Within the SP value
Out of the SP value
Detect malfunctioning part of harness or connector, and then repair or replace.
Check "MAS A/F SE-B1".
More than the SP value
Within the SP value
Replace mass air flow sensor.
Replace ECM.
Less than the SP value
Check "MAS A/F SE-B1".
Within the SP value
Replace mass air flow sensor.
Check for the cause of air leakage after mass air flow sensor.
Check for the cause of large engine friction.
Check for the cause of insufficient combustion
Check "A/F ALPHA-B1", "A/F ALPHA-B2" and "B/FUEL SCHDL".
Out of the SP value
Within the SP value
Inspection end
Within the SP value
Check "B/FUEL SCHDL".
Out of the SP value
Check "B/FUEL SCHDL".
Within the SP value
Detect malfunctioning part according to Symptom Matrix Chart.
More than the SP value
Less than the SP value
Check "B/FUEL SCHDL".
Within the SP value
Inspection end

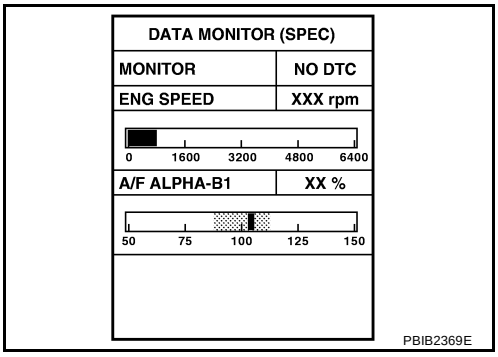
PBIB2548E

## DETAILED PROCEDURE

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

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-146, "Testing Condition" .
3. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “DATA MONITOR (SPEC)” mode, and make sure that the each indication is within the SP value.

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

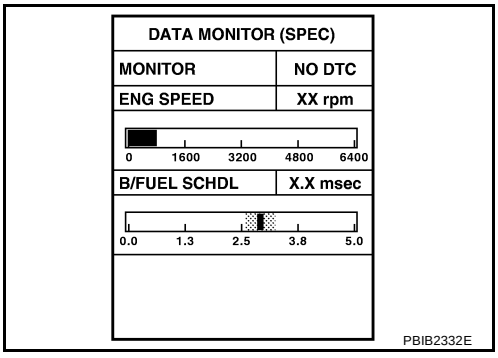



OK or NG

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

### 2. CHECK “B/FUEL SCHDL”

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

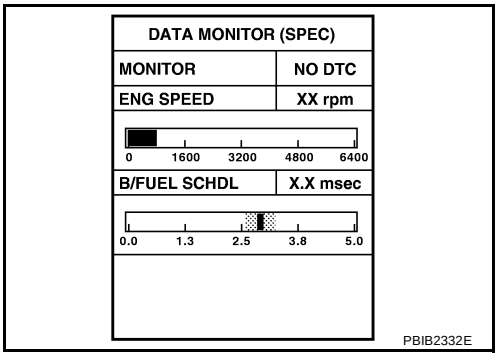



OK or NG

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

### 3. CHECK “B/FUEL SCHDL”

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




OK or NG

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

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

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

OK or NG

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

## 5. CHANGE ENGINE OIL

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

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

>> **INSPECTION END**

## 6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-91, "Fuel Pressure Check" .)

OK or NG

OK >> GO TO 9.
NG (Fuel pressure is too high)>>Replace fuel pressure regulator, refer to EC-91, "Fuel Pressure Check" . GO TO 8.
NG (Fuel pressure is too low)>>GO TO 7.

## 7. DETECT MALFUNCTIONING PART

1. Check the following.

- Clogged and bent fuel hose and fuel tube
- Clogged fuel filter
- Fuel pump and its circuit (Refer to EC-647, "FUEL PUMP CIRCUIT" .)

2. If NG, repair or replace the malfunctioning part. (Refer to EC-91, "Fuel Pressure Check" .)
If OK, replace fuel pressure regulator.

>> GO TO 8.

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

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

OK or NG

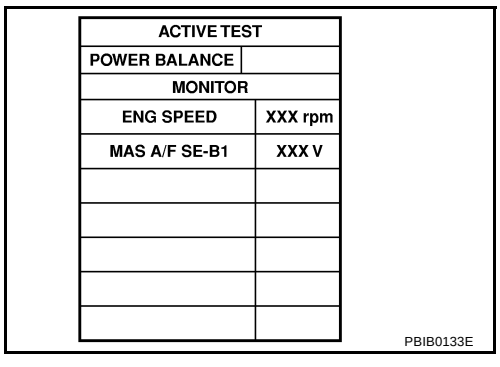
OK >> **INSPECTION END**
NG >> GO TO 9.

## 9. PERFORM POWER BALANCE TEST

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

OK or NG

OK >> GO TO 12.
NG >> GO TO 10.



## 10. DETECT MALFUNCTIONING PART

1. Check the following.
- Ignition coil and its circuit (Refer to EC-627, "IGNITION SIGNAL" .)
- Fuel injector and its circuit (Refer to EC-640, "INJECTOR CIRCUIT" .)
- Intake air leakage
- Low compression pressure (Refer to EM-101, "CHECKING COMPRESSION PRESSURE" .)
2. If NG, repair or replace the malfunctioning part.
   If OK, replace fuel injector. (It may be caused by leakage from fuel injector or clogging.)

>> GO TO 11.

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

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

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 12.

## 12. CHECK A/F SENSOR 1 FUNCTION

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

- For DTC P1271, P1281, refer to EC-477, "DTC Confirmation Procedure" .
- For DTC P1272, P1282, refer to EC-485, "DTC Confirmation Procedure" .
- For DTC P1273, P1283, refer to EC-493, "DTC Confirmation Procedure" .
- For DTC P1274, P1284, refer to EC-502, "DTC Confirmation Procedure" .
- For DTC P1276, P1286, refer to EC-511, "DTC Confirmation Procedure" .
- For DTC P1278, P1288, refer to EC-521, "DTC Confirmation Procedure" .
- For DTC P1279, P1289, refer to EC-533, "DTC Confirmation Procedure" .

OK or NG

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

## 13. CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnostic Procedure according to corresponding DTC.

>> GO TO 14.

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

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

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 15.

## 15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

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

>> GO TO 16.

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

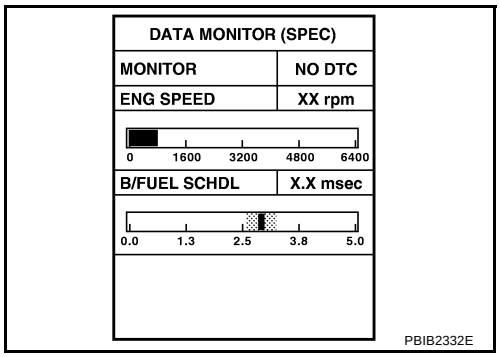
1. Start engine.
2. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “DATA MONITOR (SPEC)” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-102, "Symptom Matrix Chart" .

## 17. CHECK “B/FUEL SCHDL”

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




OK or NG

OK >> **INSPECTION END**
NG (More than the SP value)>>GO TO 18.
NG (Less than the SP value)>>GO TO 25.

## 18. DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.

- Engine oil level is too high
- Engine oil viscosity
- Belt tension of power steering, alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.

2. Check for the cause of insufficient combustion. Refer to the following.

- Valve clearance malfunction
- Intake valve timing control function malfunction
- Camshaft sprocket installation malfunction, etc.

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

## 19. CHECK INTAKE SYSTEM

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

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

OK or NG

OK >> GO TO 21.
NG >> Repair or replace malfunctioning part, and then GO TO 20.

## 20. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”, AND “B/FUEL SCHDL”

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

OK or NG

OK >> **INSPECTION END**

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

## 21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

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

>> GO TO 22.

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

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

OK or NG

OK >> 1. Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-191, "DTC P0102, P0103 MAF SENSOR" .
2. GO TO 29.

NG >> GO TO 23.

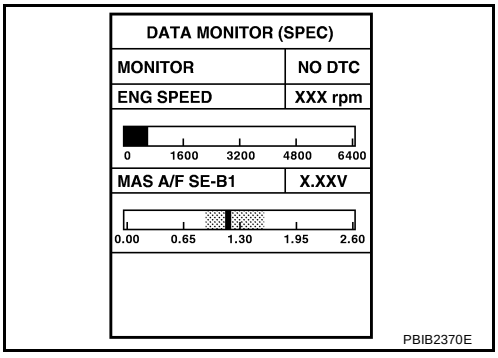
## 23. CHECK “MAS A/F SE-B1”

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

OK or NG

OK >> GO TO 24.

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




## 24. REPLACE ECM

1. Replace ECM.
2. Perform initialization of IVIS(NATS) system and registration of all IVIS(NATS) ignition key IDs. Refer to BL-228, "ECM Re-communicating Function" .
3. Perform EC-88, "VIN Registration" .
4. Perform EC-88, "Accelerator Pedal Released Position Learning" .
5. Perform EC-88, "Throttle Valve Closed Position Learning" .
6. Perform EC-89, "Idle Air Volume Learning" .

>> GO TO 29.

## 25. CHECK INTAKE SYSTEM

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

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

OK or NG

OK >> GO TO 27.
NG >> Repair or replace malfunctioning part, and then GO TO 26.

## 26. CHECK “B/FUEL SCHDL”

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

OK or NG

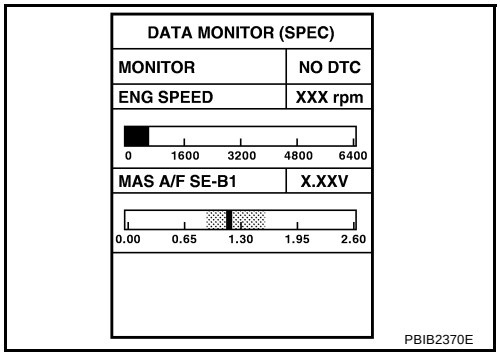
OK >> **INSPECTION END**
NG (Less than the SP value)>>GO TO 27.

## 27. CHECK “MAS A/F SE-B1”

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

OK or NG

OK >> GO TO 28.
NG (Less than the SP value)>>Replace mass air flow sensor, and then GO TO 30.




## 28. CHECK INTAKE SYSTEM

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

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

>> GO TO 30.

## 29. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”, AND “B/FUEL SCHDL”

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

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-102, "Symptom Matrix Chart" .

## 30. CHECK “B/FUEL SCHDL”

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

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-102, "Symptom Matrix Chart" .

# TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

## Description

ABS00DEL

Intermittent incidents may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of 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 intermittent incidents Report Situations**

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

## Diagnostic Procedure

ABS00AOL

### 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 EC-164, "Ground Inspection" .

OK or NG

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

### 3. SEARCH FOR ELECTRICAL INCIDENT

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

OK or NG

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

### 4. CHECK CONNECTOR TERMINALS

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

OK or NG

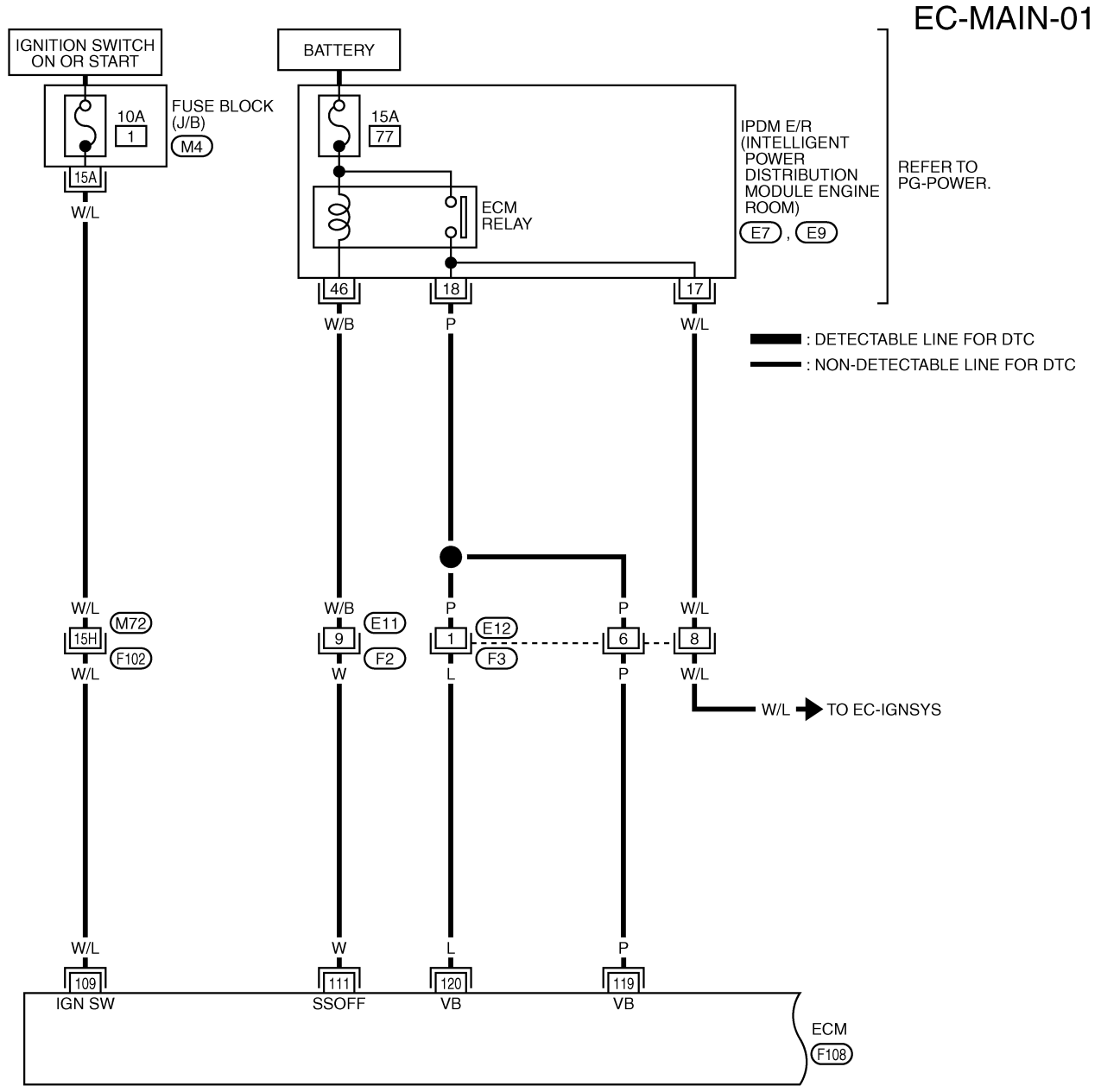
OK >> **INSPECTION END**
NG >> Repair or replace connector.

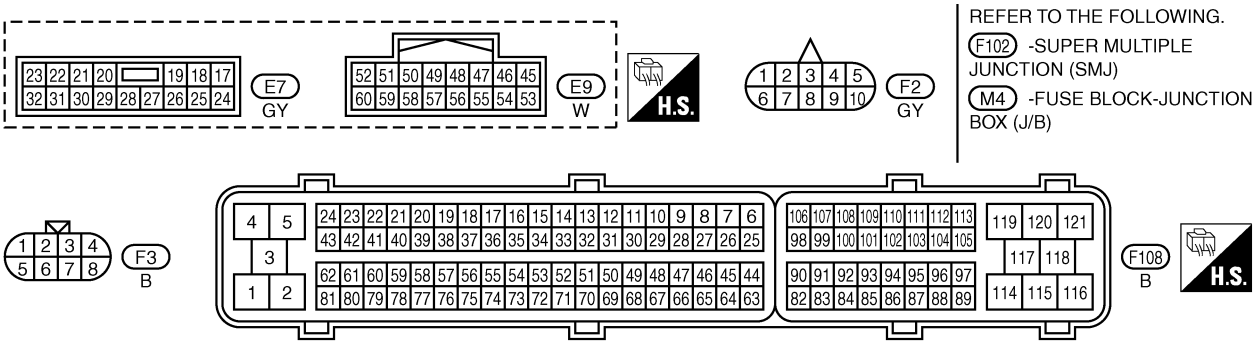
# POWER SUPPLY AND GROUND CIRCUIT

PFP:24110

## Wiring Diagram

ABS00AOM




TBWT0640E

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

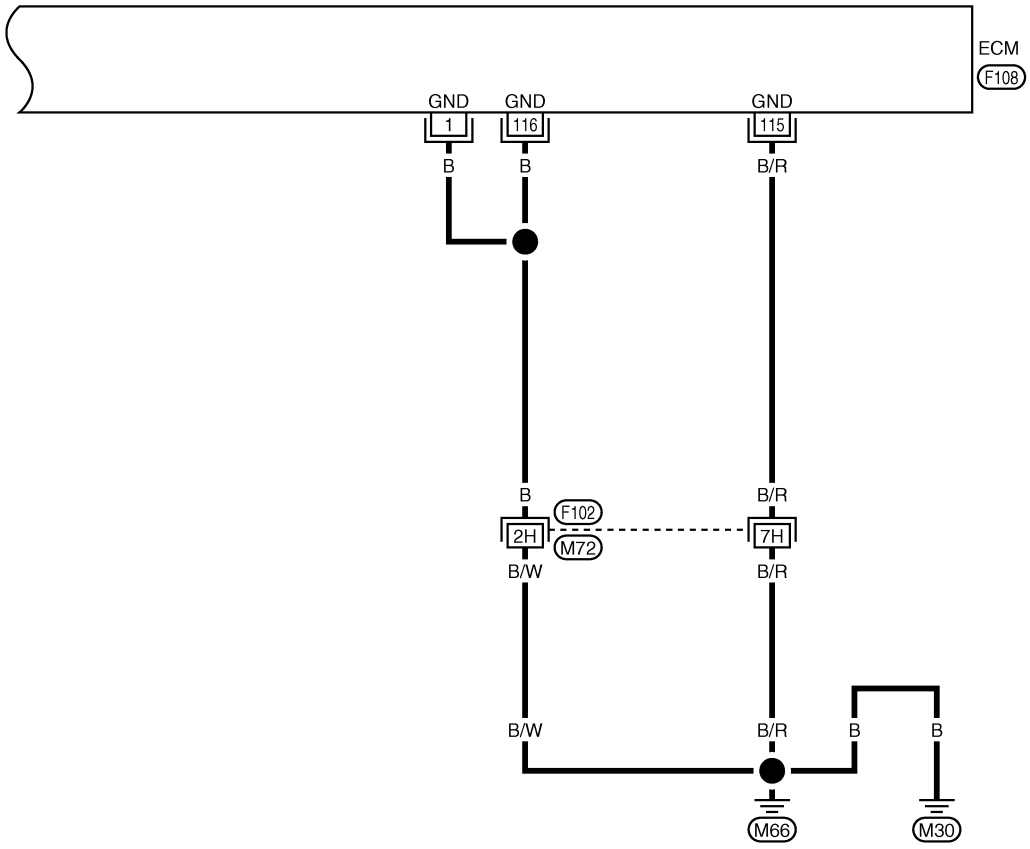
**CAUTION:**

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

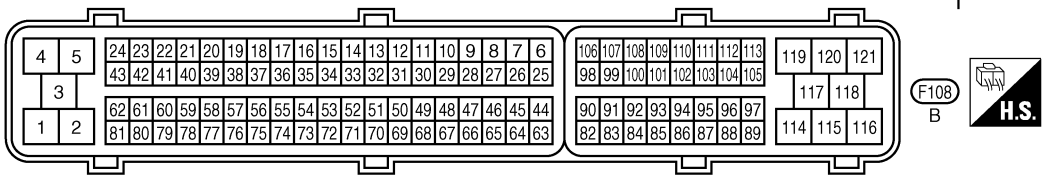
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 109 | W/L | Ignition switch | **[Ignition switch: OFF]** | 0V |
| | | | **[Ignition switch: ON]** | BATTERY VOLTAGE (11 - 14V) |
| 111 | W | ECM relay (Self shut-off) | **[Engine is running]**<br>**[Ignition switch: OFF]**<br>● A few seconds after turning ignition switch OFF | 0 - 1.5V |
| | | | **[Ignition switch: OFF]**<br>● More than a few seconds after turning ignition switch OFF | BATTERY VOLTAGE (11 - 14V) |
| 119<br>120 | P<br>L | Power supply for ECM | **[Ignition switch: ON]** | BATTERY VOLTAGE (11 - 14V) |

EC-MAIN-02

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




REFER TO THE FOLLOWING.
F102 -SUPER MULTIPLE JUNCTION (SMJ)




TBWT0641E

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

**CAUTION:**

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

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 1 | B | ECM ground | **[Engine is running]**<br>● Idle speed | Body ground |
| 115<br>116 | B/R<br>B | ECM ground | **[Engine is running]**<br>● Idle speed | Body ground |

## Diagnostic Procedure

ABS00AON

### 1. INSPECTION START

Start engine.

**Is engine running?**

Yes or No

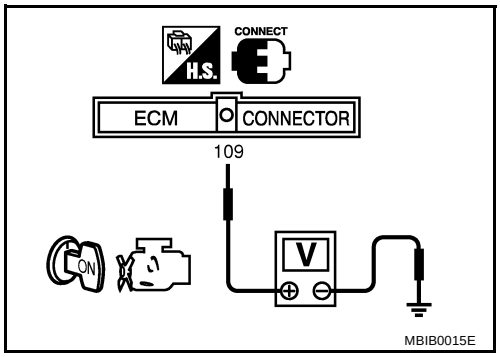
Yes >> GO TO 8.

No >> GO TO 2.

### 2. CHECK ECM POWER SUPPLY CIRCUIT-I

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

**Voltage: Battery voltage**




OK or NG

OK >> GO TO 4.

NG >> GO TO 3.

### 3. DETECT MALFUNCTIONING PART

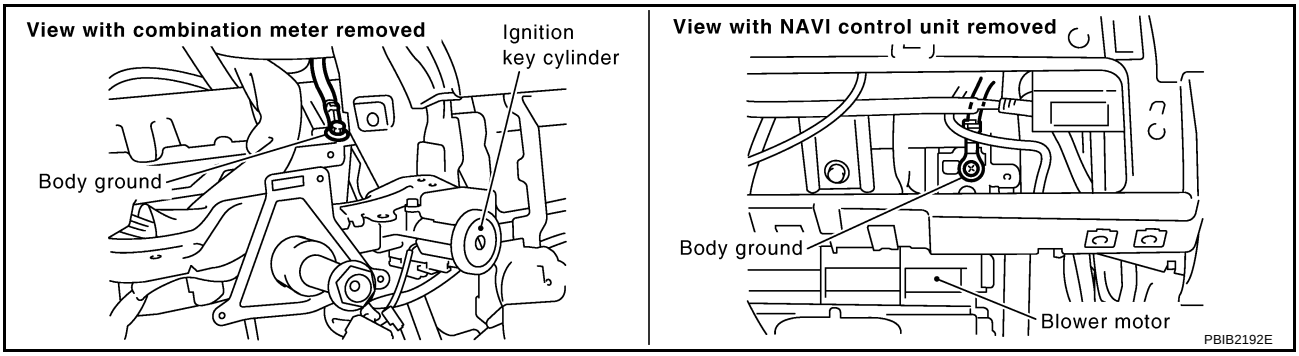
Check the following.

- Harness connectors M72, F102
- Fuse block (J/B) connector M4
- 10A fuse
- Harness for open or short between ECM and fuse

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

## 4. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .




OK or NG

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

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

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

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

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

## 6. DETECT MALFUNCTIONING PART

Check the following.

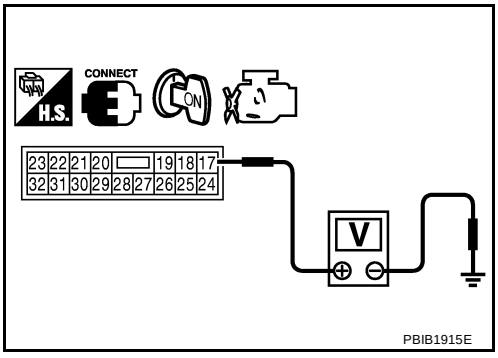
- Harness connectors F102, M72
- Harness for open or short between ECM and ground

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

## 7. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connector disconnected.
2. Turn ignition switch ON.
3. Check voltage between IPDM E/R terminal 17 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**



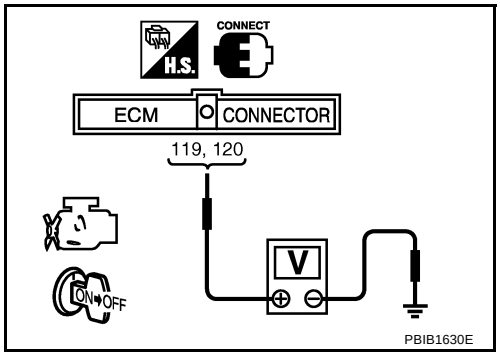

OK or NG

OK >> Go to EC-627, "IGNITION SIGNAL" .
NG >> GO TO 8.

## 8. CHECK ECM POWER SUPPLY CIRCUIT-III

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

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



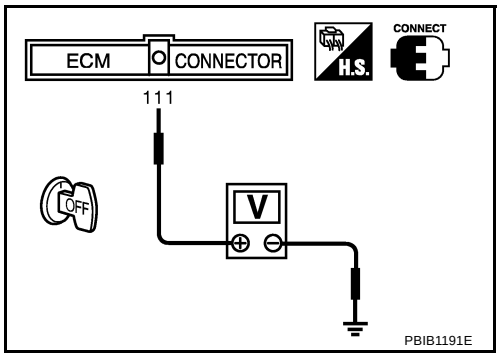

OK or NG

OK >> GO TO 15.
NG (Battery voltage does not exist.)>>GO TO 9.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 12.

## 9. CHECK ECM POWER SUPPLY CIRCUIT-IV

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

**Voltage: Battery voltage**




OK or NG

OK >> GO TO 10.
NG >> GO TO 12.

## 10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E7.
3. Check harness continuity between ECM terminals 119, 120 and IPDM E/R terminal 18. 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 18.
NG >> GO TO 11.

## 11. DETECT MALFUNCTIONING PART

Check the following.

- Harness or connectors E12, F3
- Harness for open or short between ECM and IPDM E/R

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

## 12. CHECK ECM POWER SUPPLY CIRCUIT-VI

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E9.
3. Check harness continuity between ECM terminal 111 and IPDM E/R terminal 46. 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 14.
NG >> GO TO 13.

## 13. DETECT MALFUNCTIONING PART

Check the following.

- Harness or connectors E11, F2
- Harness for open or short between ECM and IPDM E/R

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

## 14. CHECK 15A FUSE

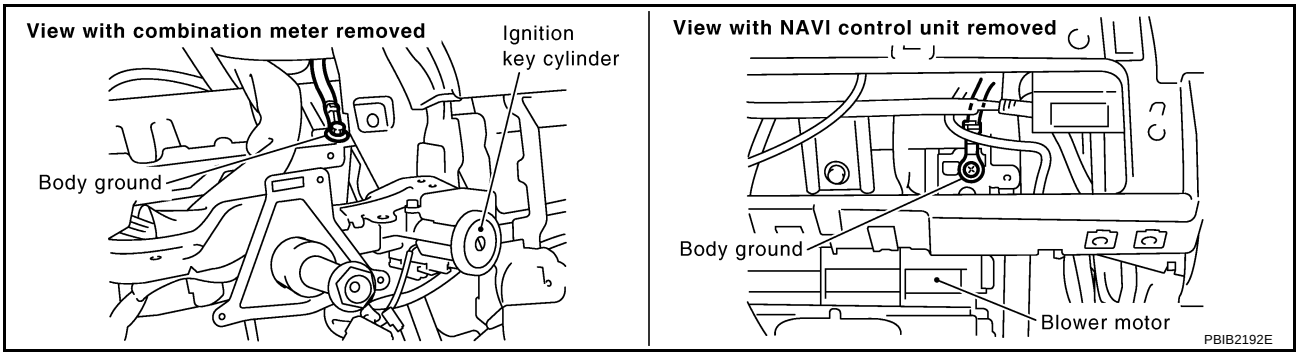
1. Disconnect 15A fuse from IPDM E/R.
2. Check 15A fuse.

OK or NG

OK >> GO TO 18.
NG >> Replace 15A fuse.

## 15. CHECK GROUND CONNECTIONS

1. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .




OK or NG

OK >> GO TO 16.
NG >> Repair or replace ground connections.

## 16. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

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

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

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

## 17. DETECT MALFUNCTIONING PART

Check the following.

- Harness or connectors F102, M72
- Harness for open or short between ECM and ground

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

## 18. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R. Refer to PG-16, "IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)" .
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## Ground Inspection

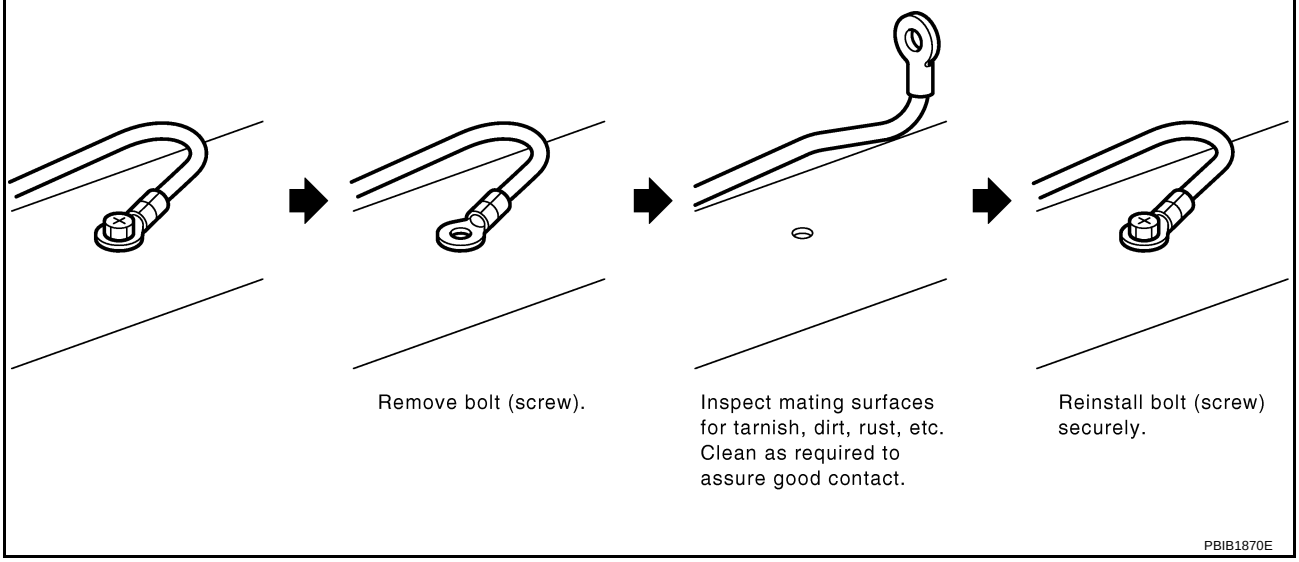
ABS00AOO

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

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

For detailed ground distribution information, refer to PG-29, "Ground Distribution" .

**Ground Inspection**



# DTC U1000, U1001 CAN COMMUNICATION LINE

PFP:23710

## Description

ABS00AOP

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

## On Board Diagnosis Logic

ABS00AOQ

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

*1: **This self-diagnosis has the one trip detection logic (A/T models).**
*2: **The MIL will not light up for this diagnosis (M/T models).**
*3: **The MIL will not light up for this diagnosis.**

## DTC Confirmation Procedure

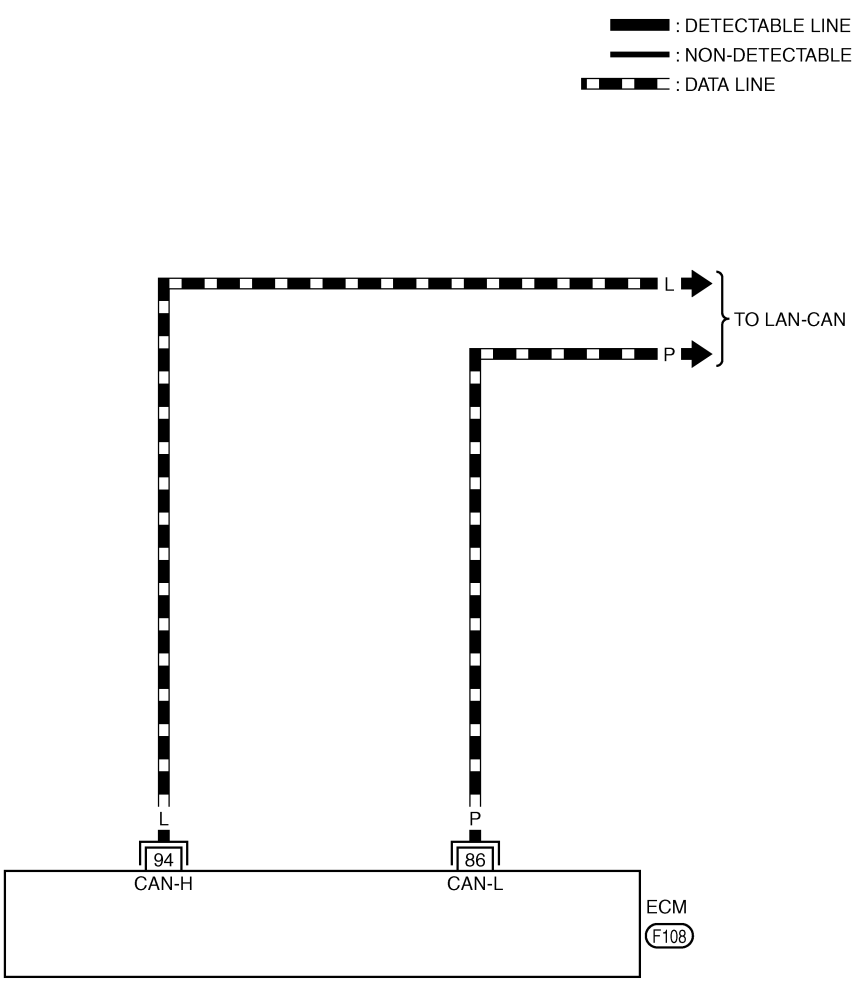
ABS00AOR

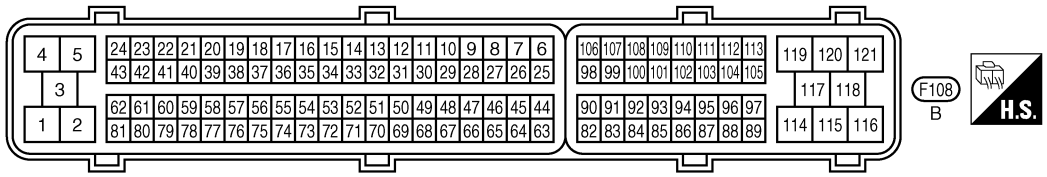
1. Turn ignition switch ON and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-168, "Diagnostic Procedure" .

## Wiring Diagram

ABS00AOS

EC-CAN-01




TBWM0745E

## Diagnostic Procedure

ABS00AOT

Go to LAN-3, "Precautions When Using CONSULT-II"

# DTC P0011, P0021 IVT CONTROL

PFP:23796

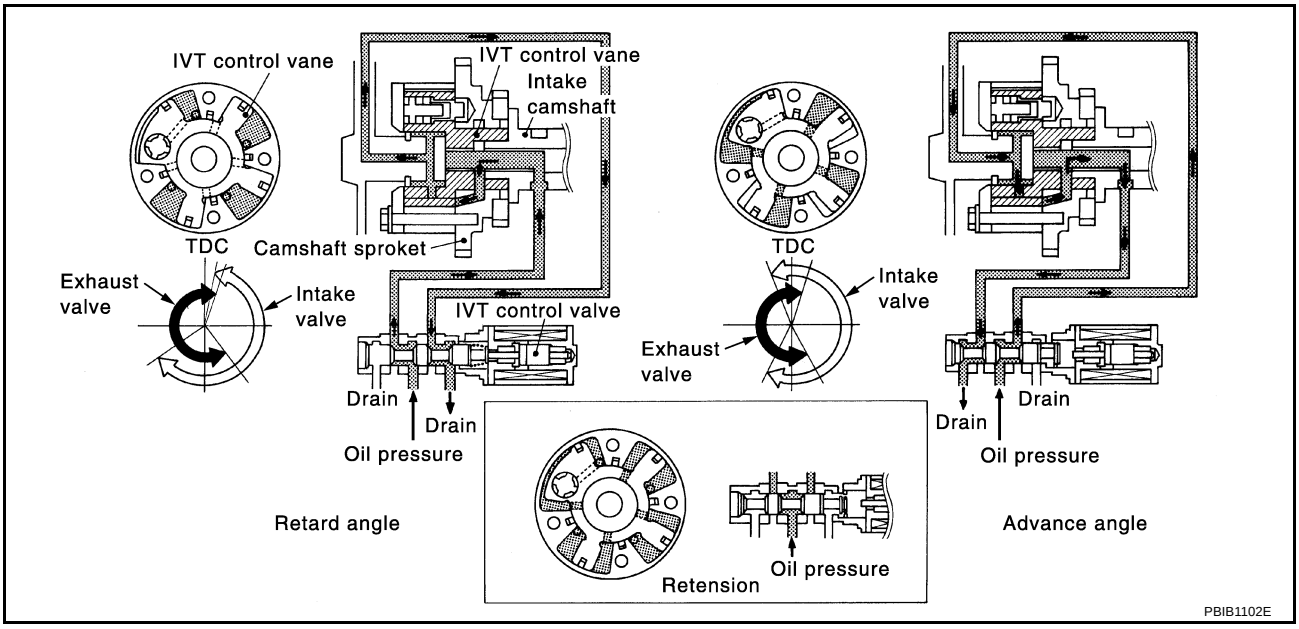
## Description

ABS00DEM

### SYSTEM DESCRIPTION

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

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




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

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

## CONSULT-II Reference Value in Data Monitor Mode

ABS00DEN

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| INT/V TIM (B1)<br>INT/V TIM (B2) | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle | –5° - 5°CA |
| | | When revving engine up to 2,000 rpm quickly | Approx. 0° - 30°CA |
| INT/V SOL (B1)<br>INT/V SOL (B2) | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle | 0% - 2% |
| | | When revving engine up to 2,000 rpm quickly | Approx. 0% - 50% |

## On Board Diagnosis Logic

ABS00DEO

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

### FAIL-SAFE MODE

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

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

## DTC Confirmation Procedure

ABS00DEP

**CAUTION:**

**Always drive at a safe speed.**

**NOTE:**

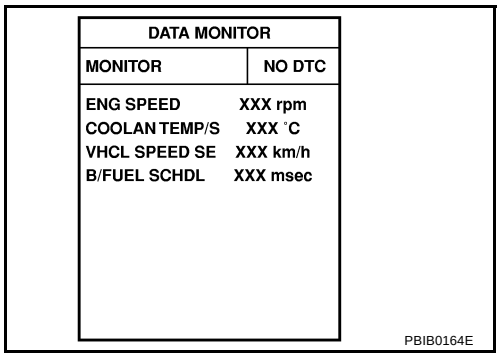
- **If DTC P0011 or P0021 is displayed with DTC P1111 or P1136, first perform trouble diagnosis for DTC P1111 or P1136. Refer to EC-406, "DTC P1111, P1136 IVT CONTROL SOLENOID VALVE" .**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**

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

### WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds.
   Hold the accelerator pedal as steady as possible.




| | |
|---|---|
| VHCL SPEED SE | 100 - 120 km/h (63 - 75 MPH) |
| ENG SPEED | 2,000 - 4,000 rpm (A constant rotation is maintained.) |
| COOLAN TEMPS | 60 - 120°C (140 - 248°F) |
| B/FUEL SCHDL | More than 7.26 msec |
| Shift lever | D position (A/T)<br>5th position (M/T) |

4. Let engine idle for 10 seconds.
5. If the 1st trip DTC is detected, go to EC-171, "Diagnostic Procedure" .
   If the 1st trip DTC is not detected, go to next step.
6. Maintain the following conditions for at least 20 consecutive seconds.

| | |
|---|---|
| ENG SPEED | 1,700 - 3,175 rpm (A constant rotation is maintained.) |
| COOLAN TEMPS | 70 - 105°C (158 - 221°F) |

| | |
|---|---|
| Shift lever | 1st or 2nd position |
| Driving location uphill | Driving vehicle uphill<br>(Increased engine load will help maintain the driving conditions required for this test.) |

7. If the 1st trip DTC is detected, go to EC-171, "Diagnostic Procedure" .

### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Diagnostic Procedure

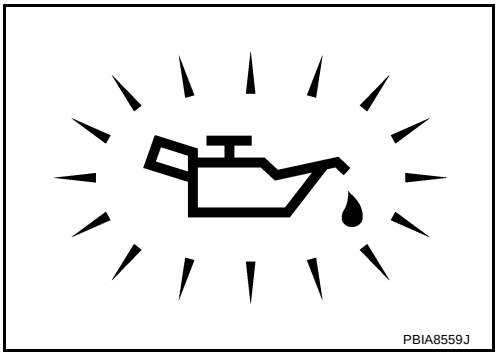
ABS00DEQ

### 1. CHECK OIL PRESSURE WARNING LAMP

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

OK or NG

OK >> GO TO 2.
NG >> Go to LU-7, "OIL PRESSURE CHECK" .


PBIA8559J

### 2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-172, "Component Inspection" .

OK or NG

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

### 3. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-298, "Component Inspection" .

OK or NG

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

### 4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-307, "Component Inspection" .

OK or NG

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

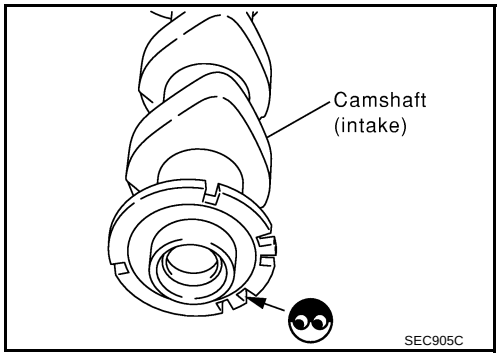
## 5. CHECK CAMSHAFT (INT)

Check the following.

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

OK or NG

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




## 6. CHECK TIMING CHAIN INSTALLATION

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

OK or NG

OK >> Check timing chain installation. Refer to EM-64, "TIMING CHAIN" .
NG >> GO TO 7.

## 7. CHECK LUBRICATION CIRCUIT

Refer to EM-86, "INSPECTION AFTER REMOVAL" .

OK or NG

OK >> GO TO 8.
NG >> Clean lubrication line.

## 8. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For Wiring Diagram, refer to EC-294 for CKP sensor (POS) and EC-301 for CMP sensor (PHASE).

>> **INSPECTION END**

# Component Inspection

ABS00DER

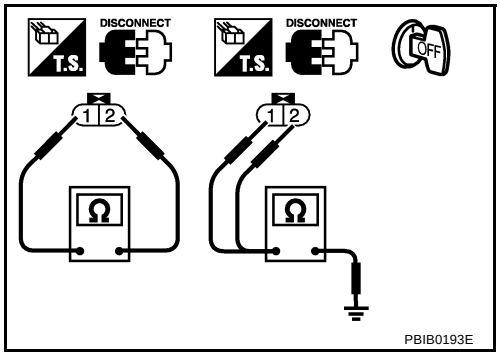
## INTAKE VALVE TIMING CONTROL SOLENOID VALVE

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

| Terminal | Resistance |
|---|---|
| 1 and 2 | 7.0 - 7.5Ω [at 20°C (68°F)] |
| 1 or 2 and ground | ∞Ω (Continuity should not exist.) |

If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.

3. Remove intake valve timing control solenoid valve.



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

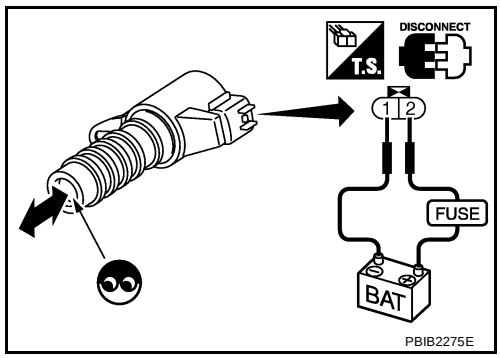
**CAUTION:**

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

If NG, replace intake valve timing control solenoid valve.

**NOTE:**

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




ABS00DES

## Removal and Installation

### INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-64, "TIMING CHAIN" .

# DTC P0037, P0038, P0057, P0058 HO2S2 HEATER

PFP:226A0

## Description

ABS00AOZ

### SYSTEM DESCRIPTION

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

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

### OPERATION

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

## CONSULT-II Reference Value in Data Monitor Mode

ABS00AP0

Specification data are reference values.

| MONITOR ITEM | CONDITION | SPECIFICATION |
|---|---|---|
| HO2S2 HTR (B1)<br>HO2S2 HTR (B2) | ● 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 1 minute and at idle for 1 minute under no load | ON |
| | ● Engine speed: Above 3,600 rpm | OFF |

## On Board Diagnosis Logic

ABS00AP1

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0037<br>0037<br>(Bank 1) | 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.<br>(An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.) | ● Harness or connectors<br>(The heated oxygen sensor 2 heater circuit is open or shorted.)<br>● Heater oxygen sensor 2 heater |
| P0057<br>0057<br>(Bank 2) | | | |
| P0038<br>0038<br>(Bank 1) | 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.<br>(An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.) | ● Harness or connectors<br>(The heated oxygen sensor 2 heater circuit is shorted.)<br>● Heater oxygen sensor 2 heater |
| P0058<br>0058<br>(Bank 2) | | | |

## DTC Confirmation Procedure

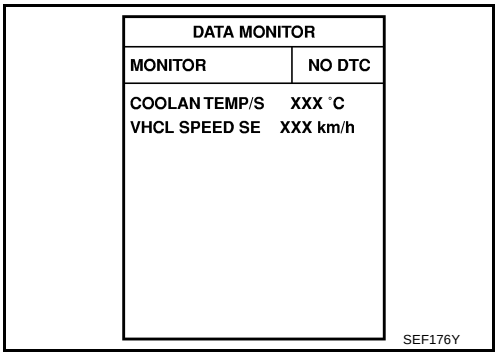
ABS00AP2

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

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

### WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start the engine and keep the engine speed between 3,500 rpm and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. If 1st trip DTC is detected, go to EC-179, "Diagnostic Procedure" .

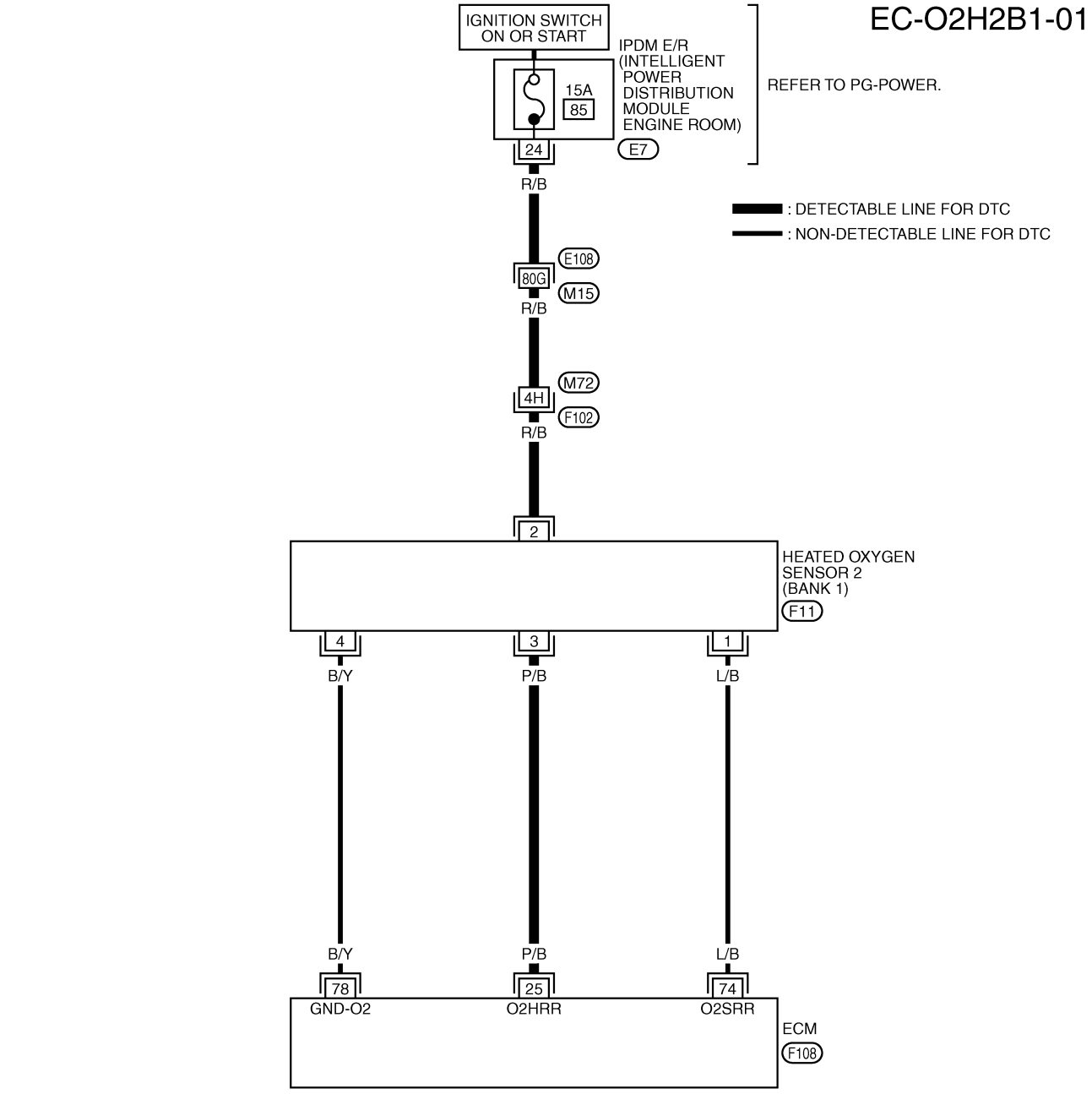


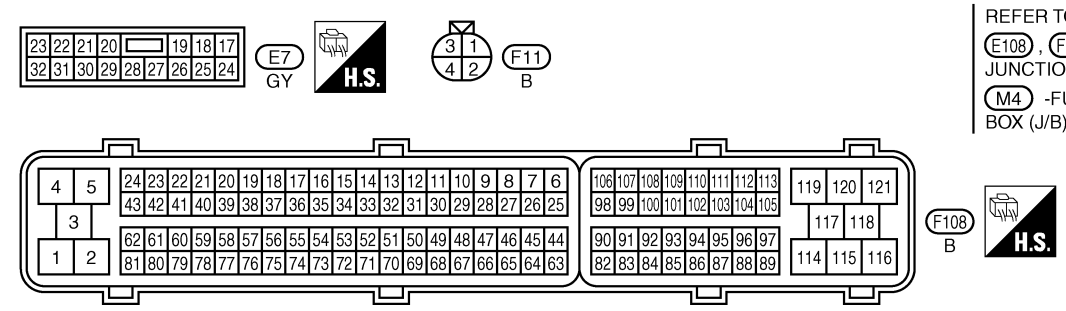

### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram
### BANK 1

ABS00AP3




TBWM0746E

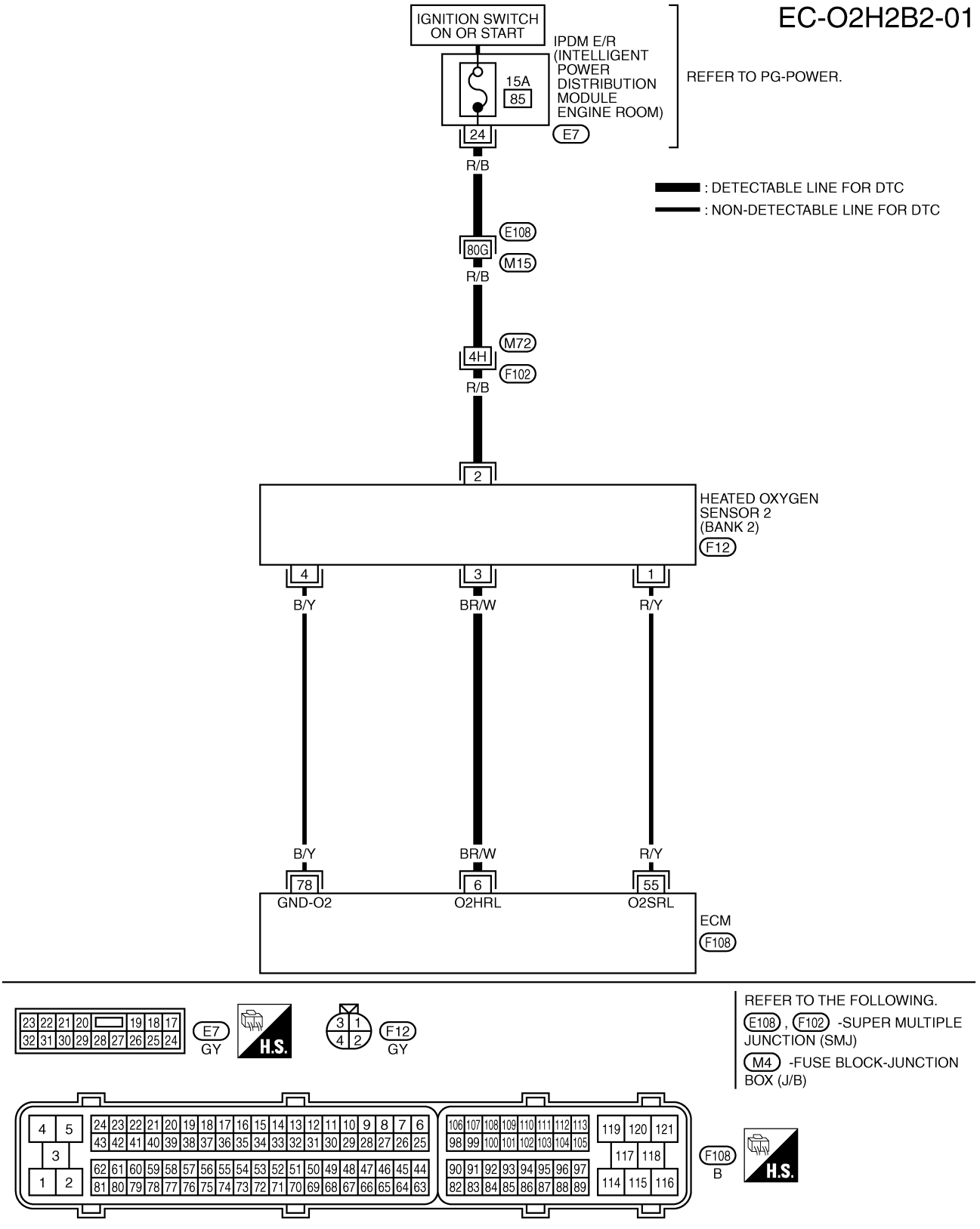
Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

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

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 25 | P/B | Heated oxygen sensor 2 heater (bank 1) | **[Engine is running]**<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 1 minute and at idle for 1 minute under no load. | 0 - 1.0V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>**[Engine is running]**<br>● Engine speed: Above 3,600 rpm. | BATTERY VOLTAGE<br>(11 - 14V) |

## BANK 2




TBWM0747E

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

**CAUTION:**

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

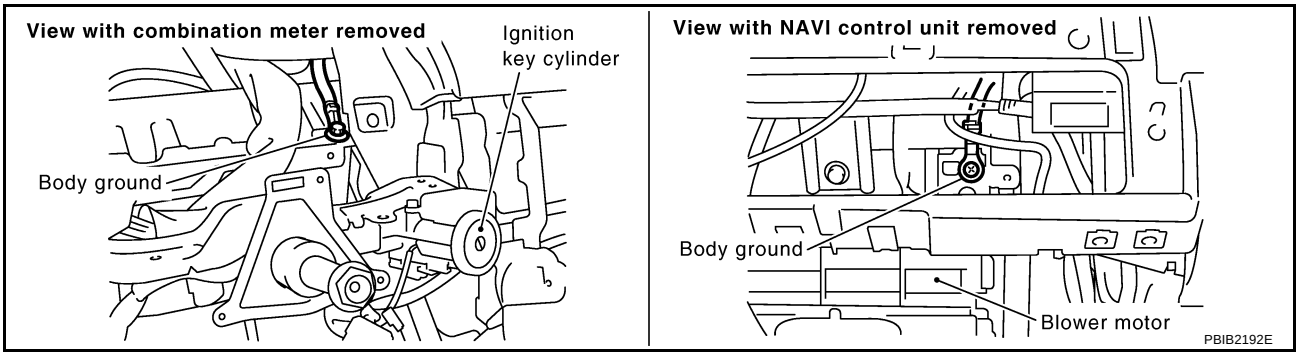
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 6 | BR/W | Heated oxygen sensor 2 heater (bank 2) | **[Engine is running]**<br>● Engine speed is below 3,600 rpm after the following conditions are met.<br>– Engine: after warming up<br>– Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | 0 - 1.0V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>**[Engine is running]**<br>● Engine speed: Above 3,600 rpm. | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

ABS00AP4

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

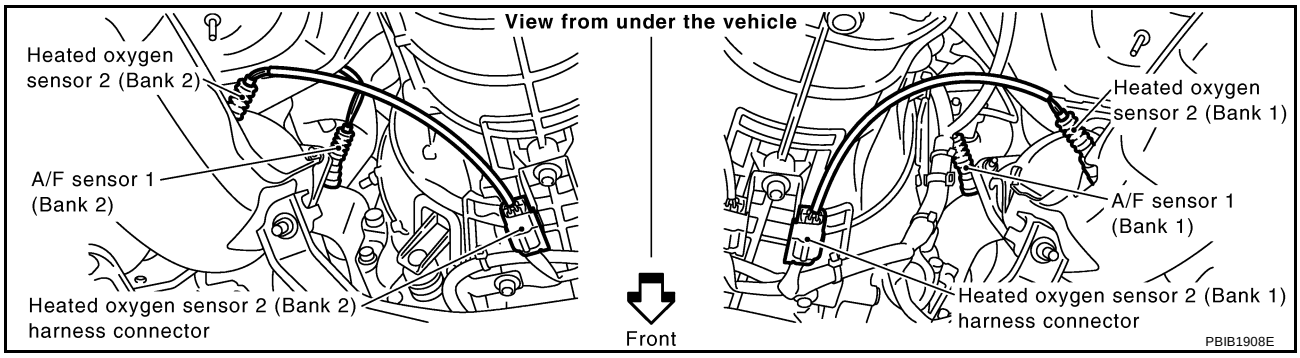



OK or NG

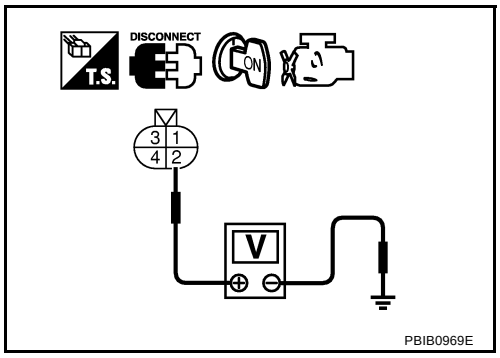
OK >> GO TO 2.
NG >> Repair or replace ground connections.

## 2. CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 2 harness connector.




2. Turn ignition switch ON.
3. Check voltage between HO2S2 terminal 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 M72, F102
- Harness connectors E108, M15
- IPDM E/R harness connector E7
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

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

## 4. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

| DTC | Terminals | | Bank |
|---|---|---|---|
| | ECM | Sensor | |
| P0037, P0038 | 25 | 3 | 1 |
| P0057, P0058 | 6 | 3 | 2 |

**Continuity should exist.**

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

OK or NG

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

## 5. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-181, "Component Inspection" .

OK or NG

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

## 6. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

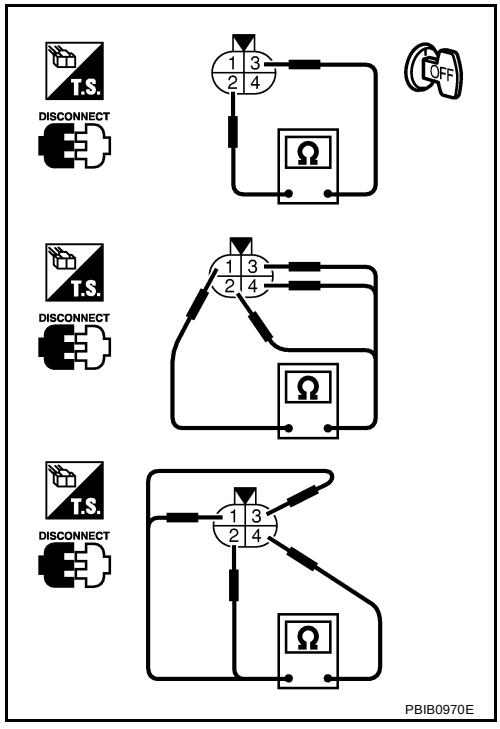
# Component Inspection

ABS00AP5

## HEATED OXYGEN SENSOR 2 HEATER

1. Check resistance between HO2S2 terminals as follows.

| Terminal No. | Resistance |
|---|---|
| 2 and 3 | 5.0 - 7.0 Ω [at 25°C (77°F)] |
| 1 and 2, 3, 4 | ∞ Ω (Continuity should not exist) |
| 4 and 1, 2, 3 | |



PBIB0970E

2. If NG, replace heated oxygen sensor 2.

**CAUTION:**

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

# Removal and Installation

ABS00AP6

## HEATED OXYGEN SENSOR 2

Refer to EM-26, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

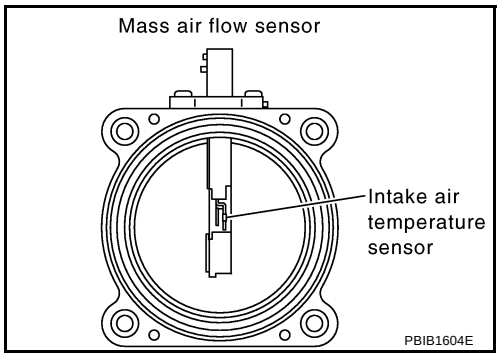
# DTC P0101 MAF SENSOR

PFP:22680

## Component Description

ABS00DET

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




## CONSULT-II Reference Value in Data Monitor Mode

ABS00DEU

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| MAS A/F SE-B1 | See EC-146, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" . | | |
| CAL/LD VALUE | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle | 5% - 35% |
| | | 2,500 rpm | 5% - 35% |
| MASS AIRFLOW | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle | 2.0 - 6.0 g·m/s |
| | | 2,500 rpm | 7.0 - 20.0 g·m/s |

## On Board Diagnosis Logic

ABS00DEV

| DTC No. | Trouble diagnosis name | DTC detecting condition | | Possible cause |
|---|---|---|---|---|
| P0101<br>0101 | Mass air flow sensor circuit range/performance problem | A) | A high voltage from the sensor is sent to ECM under light load driving condition. | ● Harness or connectors (The sensor circuit is open or shorted.)<br>● Mass air flow sensor<br>● EVAP control system pressure sensor<br>● Intake air temperature sensor |
| | | B) | A low voltage from the sensor is sent to ECM under heavy load driving condition. | ● Harness or connectors (The sensor circuit is open or shorted.)<br>● Intake air leaks<br>● Mass air flow sensor<br>● EVAP control system pressure sensor<br>● Intake air temperature sensor |

## DTC Confirmation Procedure

ABS00APA

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

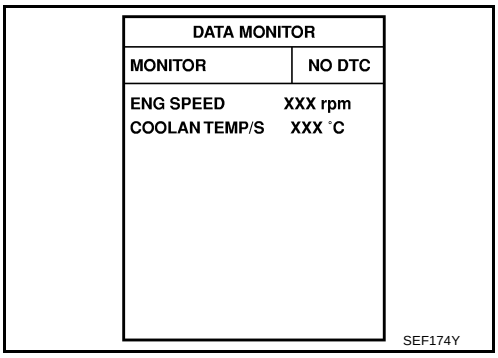
**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

### 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-186, "Diagnostic Procedure" .




#### With GST

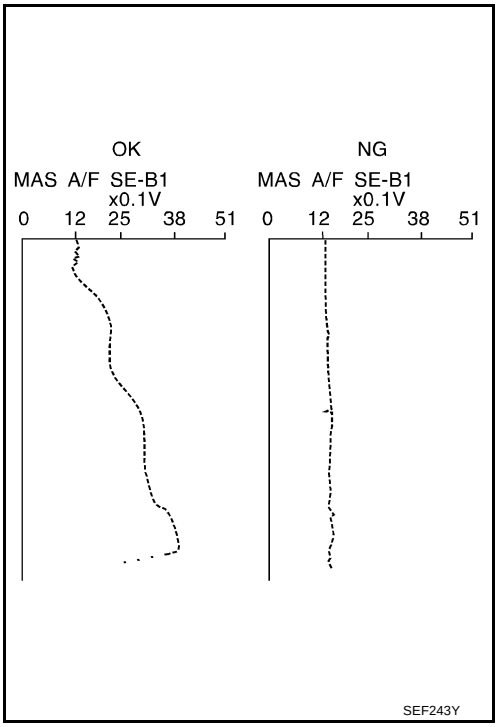
Follow the procedure “With CONSULT-II” above.

### PROCEDURE FOR MALFUNCTION B

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

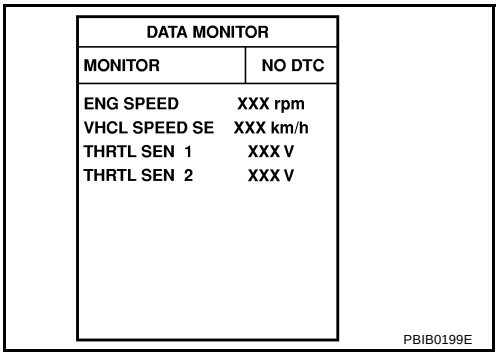
#### With CONSULT-II

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
   **If engine cannot be started, go to EC-186, "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-186, "Diagnostic Procedure" .
   If OK, go to following step.



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

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




8. If 1st trip DTC is detected, go to EC-186, "Diagnostic Procedure" .

## Overall Function Check

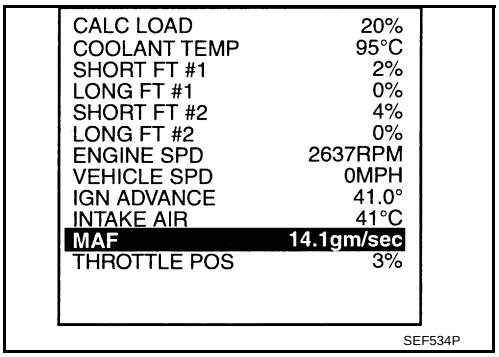
ABS00APB

### PROCEDURE FOR MALFUNCTION B

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

### With GST

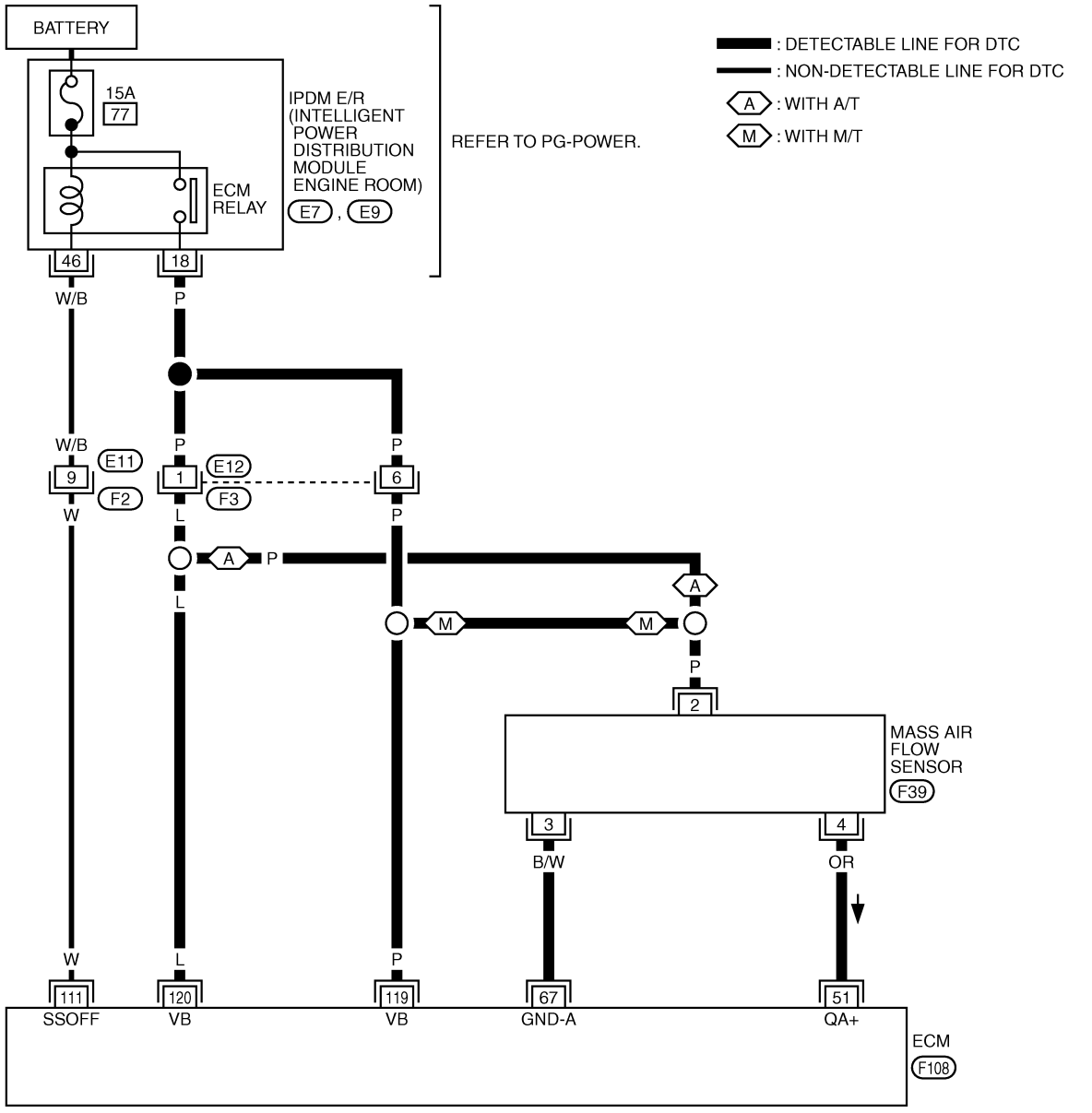
1. Start engine and warm it up to normal operating temperature.
2. Select Service $01 with GST.
3. Check the mass air flow sensor signal with Service $01.
4. Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
5. If NG, go to EC-186, "Diagnostic Procedure" .

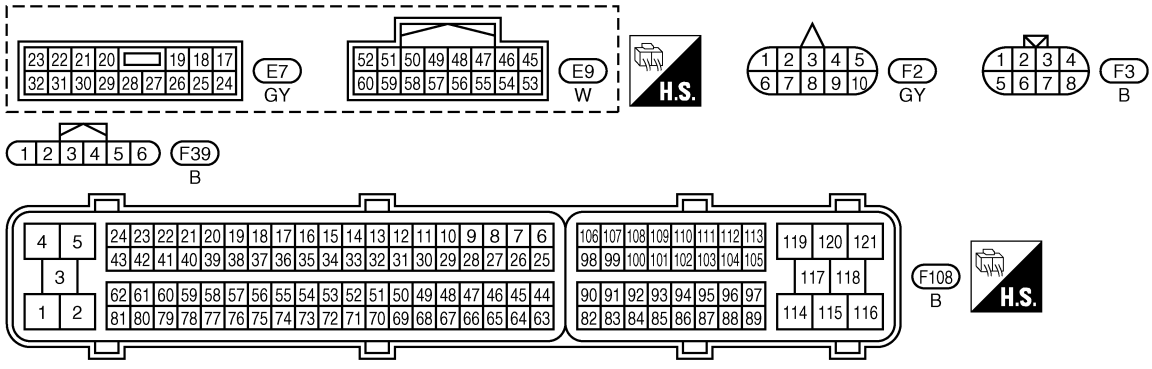


## Wiring Diagram

ABS00APC

EC-MAFS-01




TBWM0748E

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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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) |
|---|---|---|---|---|
| 51 | OR | Mass air flow sensor | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | 0.9 - 1.2V |
| | | | **[Engine is running]**<br>● **Warm-up condition**<br>● Engine speed: 2,500 rpm. | 1.5 - 1.9V |
| 67 | B/W | Sensor ground | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 111 | W | ECM relay<br>(Self shut-off) | **[Engine is running]**<br>**[Ignition switch: OFF]**<br>● A few seconds after turning ignition switch OFF | 0 - 1.5V |
| | | | **[Ignition switch: OFF]**<br>● More than a few seconds after turning ignition switch OFF | BATTERY VOLTAGE<br>(11 - 14V) |
| 119<br>120 | P<br>L | Power supply for ECM | **[Ignition switch: ON]** | BATTERY VOLTAGE<br>(11 - 14V) |

## Diagnostic Procedure

ABS00DEW

### 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.

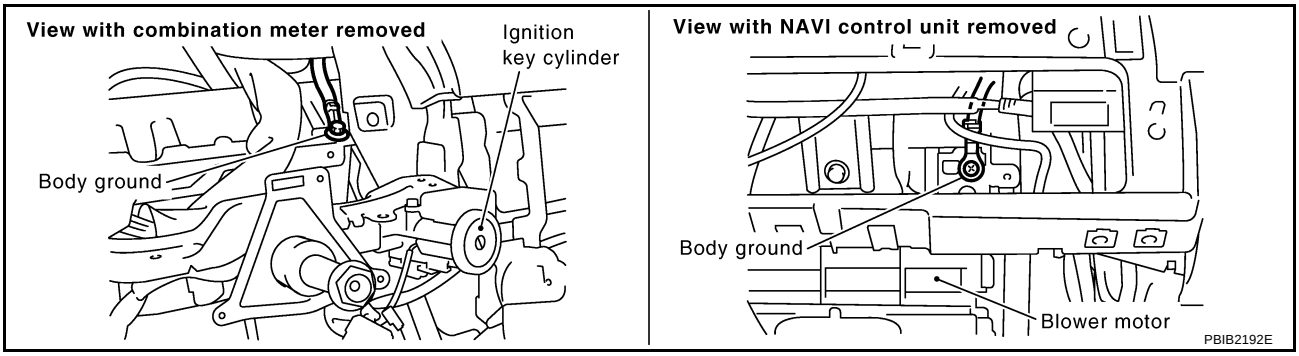
- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

OK or NG

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

## 3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

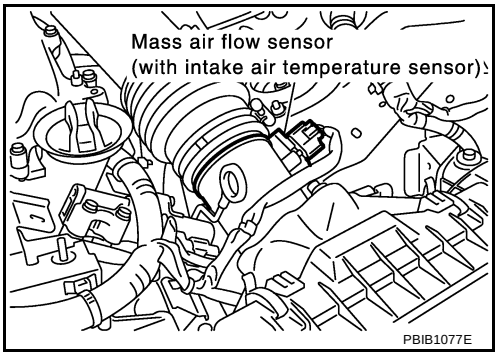



OK or NG

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

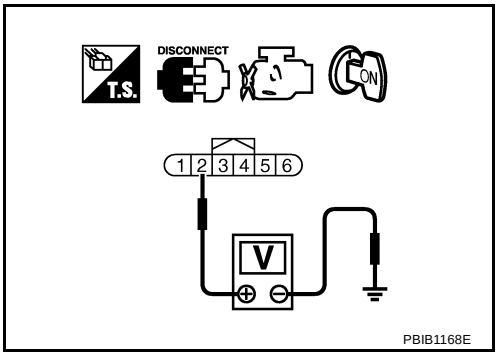
## 4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

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




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

**Voltage: Battery voltage**




OK or NG

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

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- Harness for open or short between IPDM E/R and MAF sensor
- Harness for open or short between MAF sensor and ECM

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

## 6. CHECK 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 67.
   Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

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

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 51.
   Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 8. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-201, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace intake air temperature sensor.

## 9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-343, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

## 10. CHECK MASS AIR FLOW SENSOR

Refer to EC-188, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace MAF sensor.

## 11. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

# Component Inspection

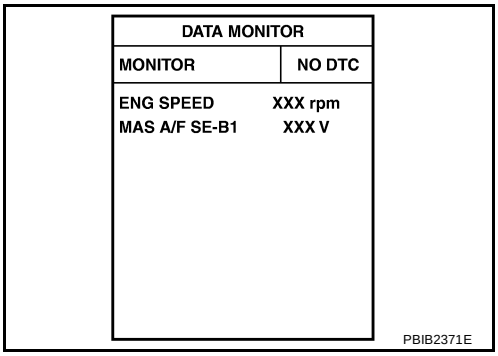
ABS00DEX

## MASS AIR FLOW SENSOR

### With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-II and select “DATA MONITOR” mode.

4. Select “MAS A/F SE-B1” and check indication under the following conditions.




| Condition | MAS A/F SE-B1 (V) |
|---|---|
| Ignition switch ON (Engine stopped.) | Approx. 0.4 |
| Idle (Engine is warmed-up to normal operating temperature.) | 0.9 - 1.2 |
| 2,500 rpm (Engine is warmed-up to normal operating temperature.) | 1.5 - 1.9 |
| Idle to about 4,000 rpm* | 0.9 - 1.2 to Approx. 2.4 |

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

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

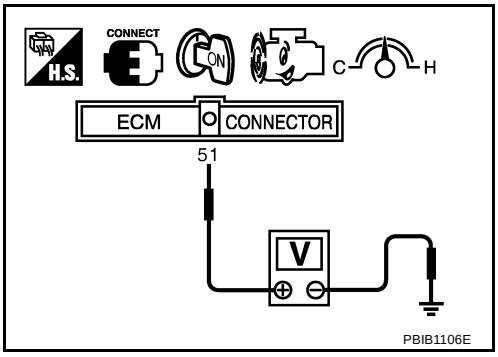
a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

### Without CONSULT-II

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




| Condition | Voltage V |
|---|---|
| Ignition switch ON (Engine stopped.) | Approx. 0.4 |
| Idle (Engine is warmed-up to normal operating temperature.) | 0.9 - 1.2 |
| 2,500 rpm (Engine is warmed-up to normal operating temperature.) | 1.5 - 1.9 |
| Idle to about 4,000 rpm* | 0.9 - 1.2 to Approx. 2.4 |

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

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

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 3 again.
   If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

## Removal and Installation

ABS00APF

### MASS AIR FLOW SENSOR

Refer to EM-17, "AIR CLEANER AND AIR DUCT" .

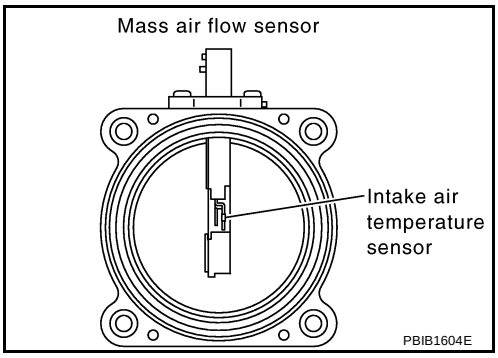
# DTC P0102, P0103 MAF SENSOR

PFP:22680

## Component Description

ABS00APG

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




## CONSULT-II Reference Value in Data Monitor Mode

ABS00APH

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| MAS A/F SE-B1 | See EC-146, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" . | | |
| CAL/LD VALUE | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle | 5% - 35% |
| | | 2,500 rpm | 5% - 35% |
| MASS AIRFLOW | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle | 2.0 - 6.0 g·m/s |
| | | 2,500 rpm | 7.0 - 20.0 g·m/s |

## On Board Diagnosis Logic

ABS00API

**These self-diagnoses have the one trip detection logic.**

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

### FAIL-SAFE MODE

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

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

## DTC Confirmation Procedure

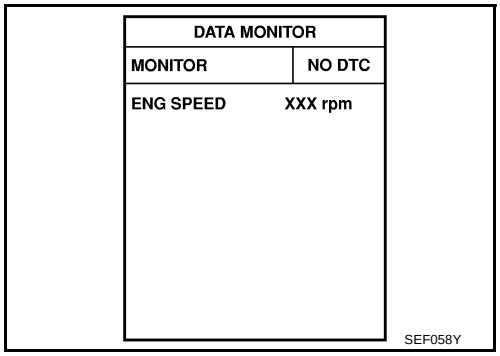
ABS00APJ

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

### PROCEDURE FOR DTC P0102

#### With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 5 seconds.
4. If DTC is detected, go to EC-194, "Diagnostic Procedure" .



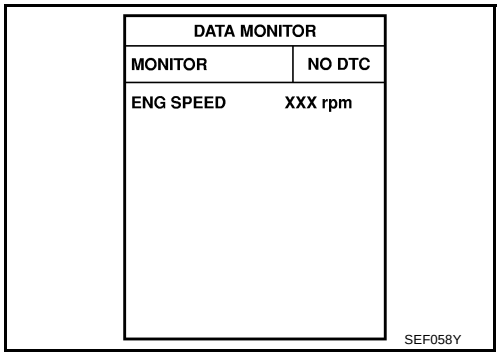

#### With GST

Follow the procedure “With CONSULT-II” above.

### PROCEDURE FOR DTC P0103

#### With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-194, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Start engine and wait at least 5 seconds.
6. If DTC is detected, go to EC-194, "Diagnostic Procedure" .



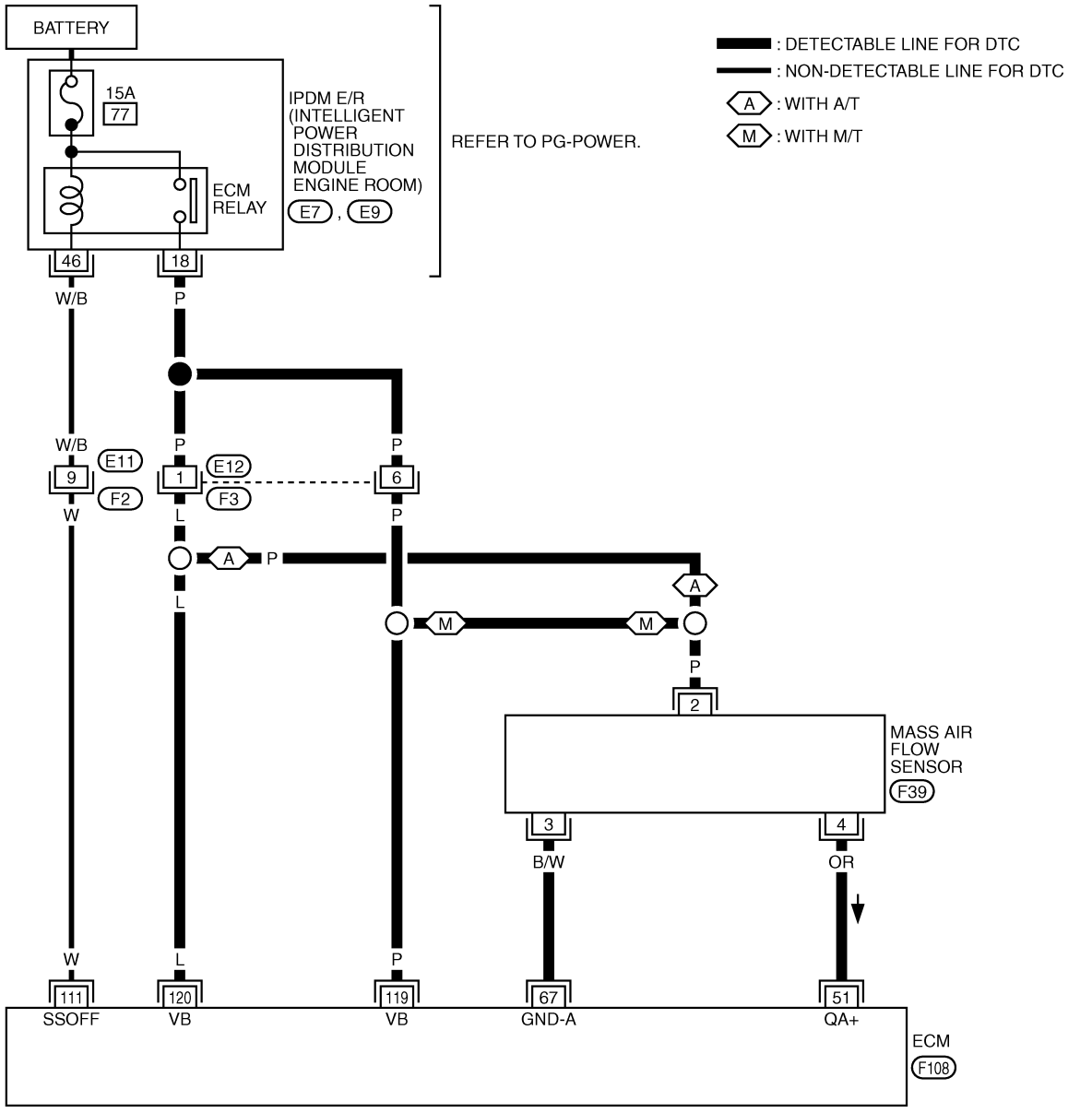

#### With GST

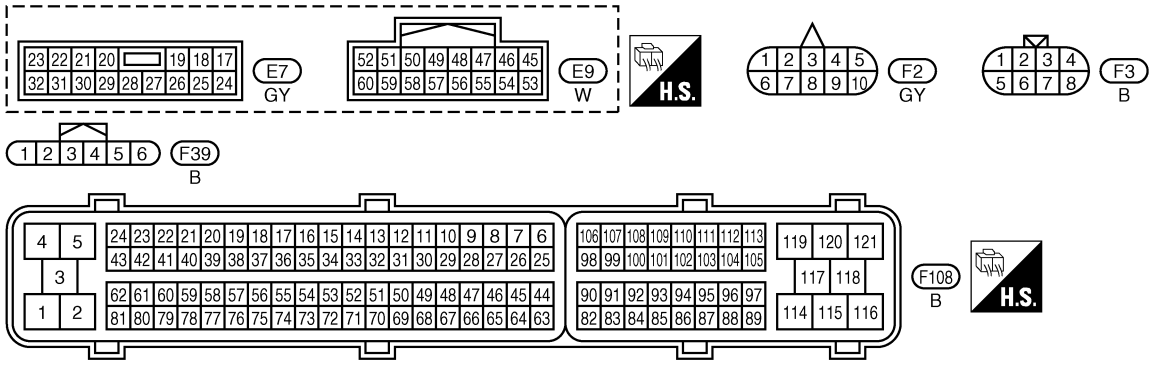
Follow the procedure “With CONSULT-II” above.

## Wiring Diagram

ABS00APK

EC-MAFS-01




TBWM0748E

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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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) |
|---|---|---|---|---|
| 51 | OR | Mass air flow sensor | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | 0.9 - 1.2V |
| | | | **[Engine is running]**<br>● **Warm-up condition**<br>● Engine speed: 2,500 rpm. | 1.5 - 1.9V |
| 67 | B/W | Sensor ground | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 111 | W | ECM relay<br>(Self shut-off) | **[Engine is running]**<br>**[Ignition switch: OFF]**<br>● A few seconds after turning ignition switch OFF | 0 - 1.5V |
| | | | **[Ignition switch: OFF]**<br>● More than a few seconds after turning ignition switch OFF | BATTERY VOLTAGE<br>(11 - 14V) |
| 119<br>120 | P<br>L | Power supply for ECM | **[Ignition switch: ON]** | BATTERY VOLTAGE<br>(11 - 14V) |

## Diagnostic Procedure

ABS00APL

### 1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

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

### 2. CHECK INTAKE SYSTEM

Check the following for connection.

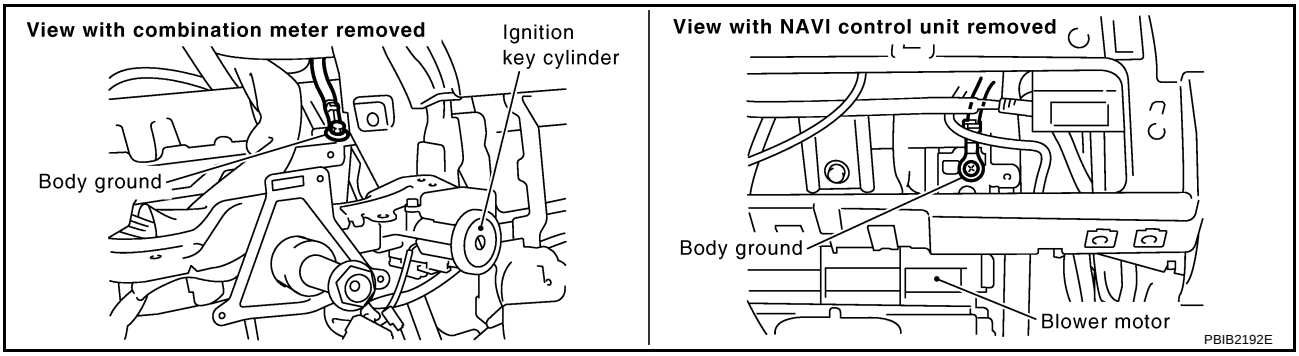
- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

OK or NG

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

## 3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

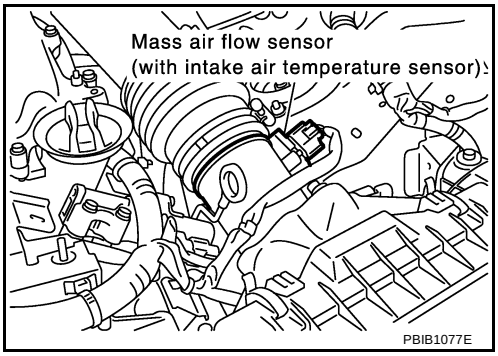



OK or NG

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

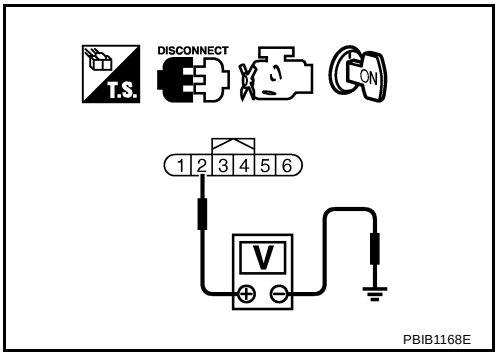
## 4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

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




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

**Voltage: Battery voltage**




OK or NG

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

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- Harness for open or short between IPDM E/R and MAF sensor
- Harness for open or short between MAF sensor and ECM

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

## 6. CHECK 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 67.
   Refer to Wiring Diagram.

   **Continuity should exist.**

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

OK or NG

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

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

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 51.
   Refer to Wiring Diagram.

   **Continuity should exist.**

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

OK or NG

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

## 8. CHECK MASS AIR FLOW SENSOR

Refer to EC-196, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace MAF sensor.

## 9. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

# Component Inspection

ABS00DEY

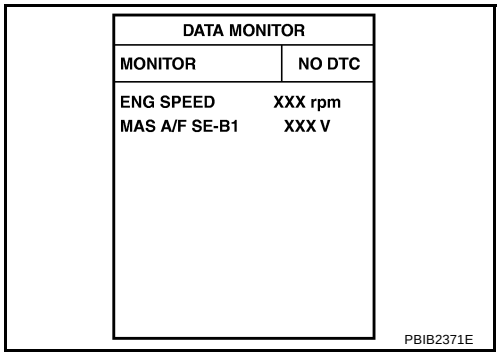
## MASS AIR FLOW SENSOR

### With CONSULT-II

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

| Condition | MAS A/F SE-B1 (V) |
|---|---|
| Ignition switch ON (Engine stopped.) | Approx. 0.4 |
| Idle (Engine is warmed-up to normal operating temperature.) | 0.9 - 1.2 |
| 2,500 rpm (Engine is warmed-up to normal operating temperature.) | 1.5 - 1.9 |
| Idle to about 4,000 rpm* | 0.9 - 1.2 to Approx. 2.4 |

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




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

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

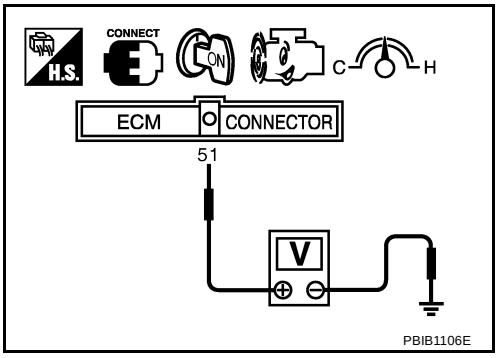
6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

### Without CONSULT-II

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

| Condition | Voltage V |
|---|---|
| Ignition switch ON (Engine stopped.) | Approx. 0.4 |
| Idle (Engine is warmed-up to normal operating temperature.) | 0.9 - 1.2 |
| 2,500 rpm (Engine is warmed-up to normal operating temperature.) | 1.5 - 1.9 |
| Idle to about 4,000 rpm* | 0.9 - 1.2 to Approx. 2.4 |

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




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

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 3 again.
   If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

## Removal and Installation

ABS00APN

### MASS AIR FLOW SENSOR

Refer to EM-17, "AIR CLEANER AND AIR DUCT" .

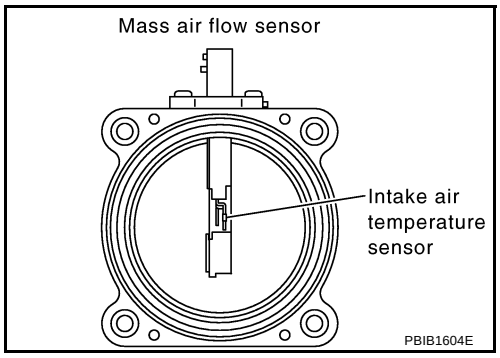
# DTC P0112, P0113 IAT SENSOR

PFP:22630

## Component Description

ABS00APO

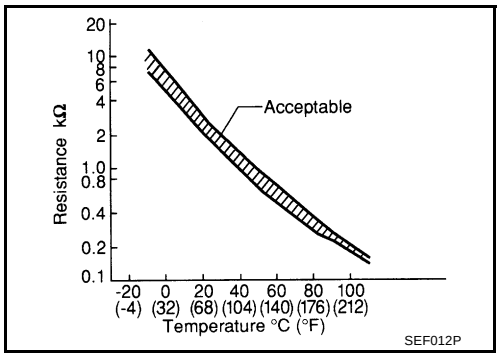
The intake air temperature sensor is built-into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response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




**<Reference data>**

| Intake air temperature °C (°F) | Voltage* V | Resistance kΩ |
|---|---|---|
| 25 (77) | 3.32 | 1.94 - 2.06 |
| 80 (176) | 1.23 | 0.295 - 0.349 |

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




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

## On Board Diagnosis Logic

ABS00APP

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

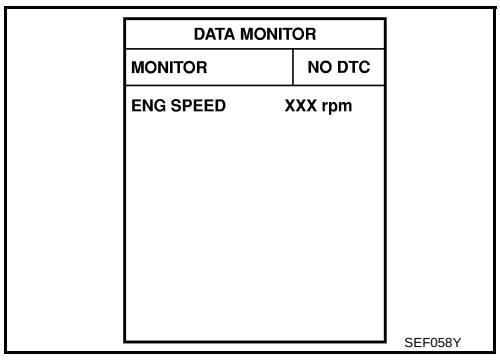
## DTC Confirmation Procedure

ABS00APQ

**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-200, "Diagnostic Procedure" .



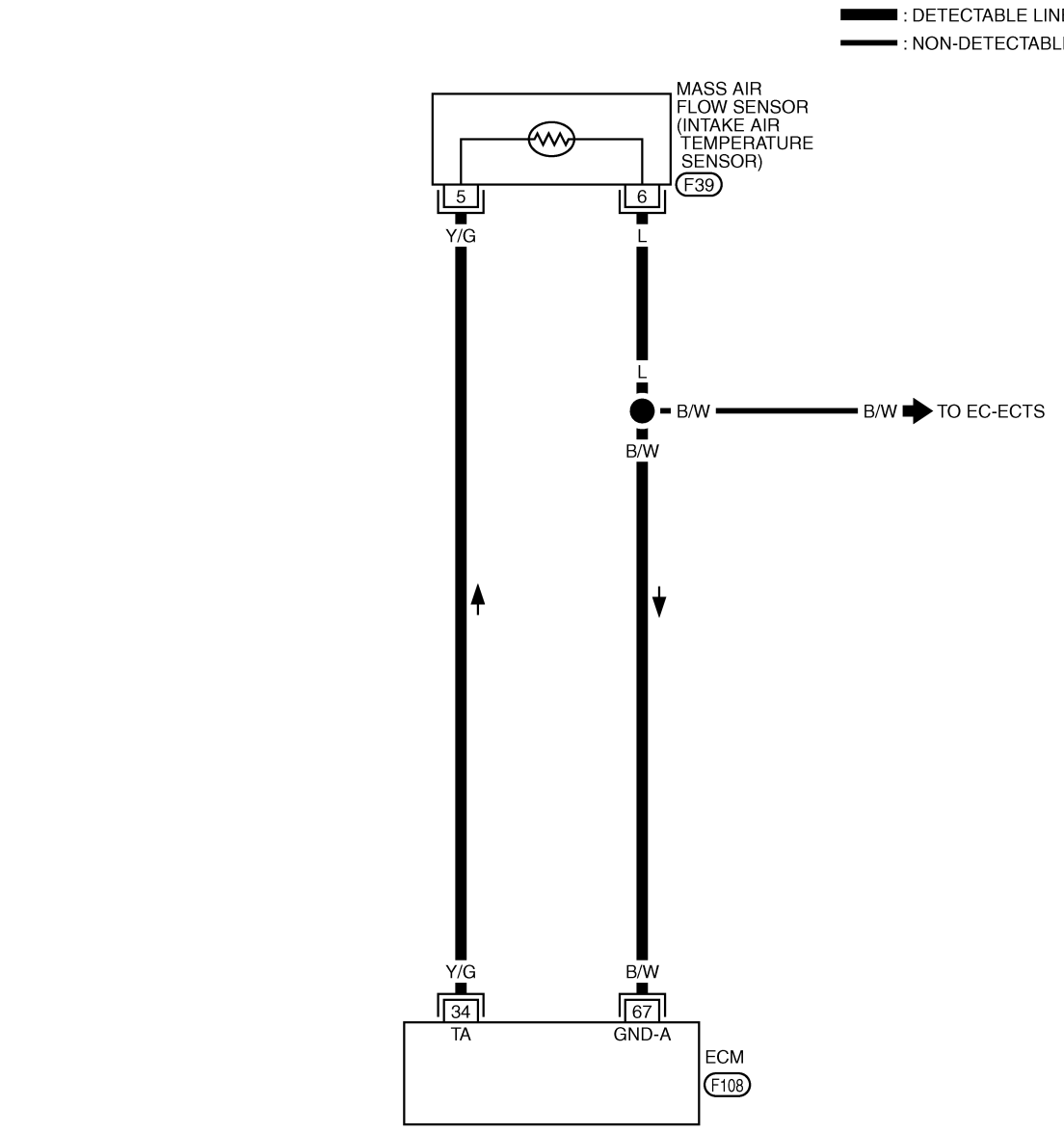

### WITH GST

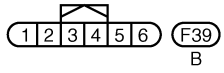
Follow the procedure “WITH CONSULT-II” above.

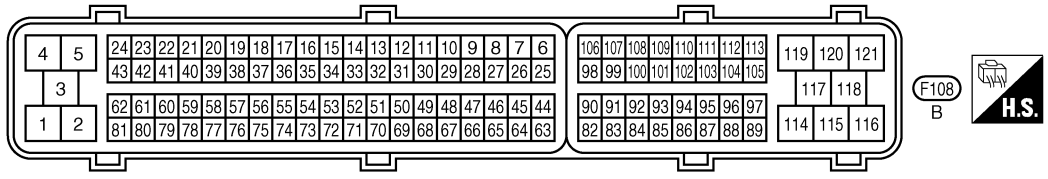
## Wiring Diagram

ABS00APR

EC-IATS-01



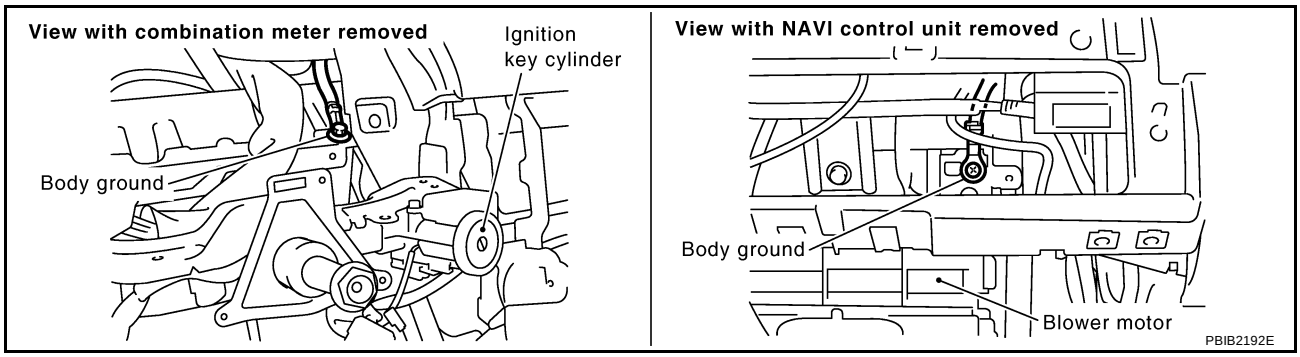

TBWT0263E

## Diagnostic Procedure

ABS00APS

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

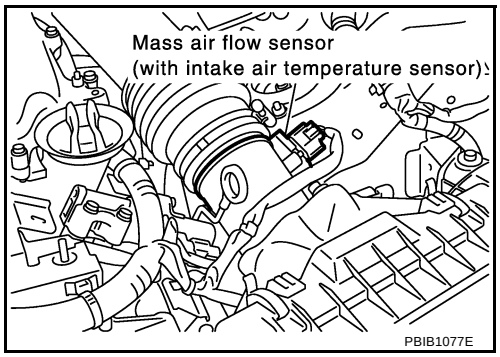



OK or NG

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

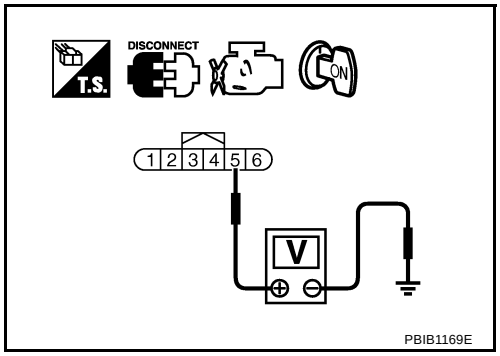
### 2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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




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

**Voltage: Approximately 5V**




OK or NG

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

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 6 and ECM terminal 67. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-201, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

## 5. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

# Component Inspection

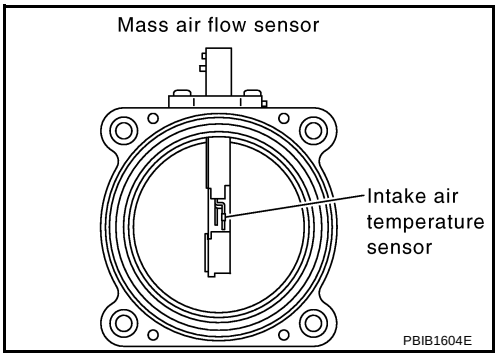
ABS00APT

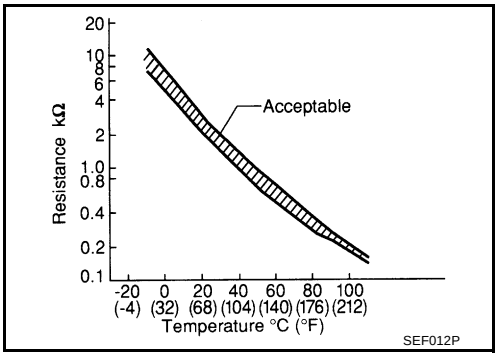
## INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor terminals 5 and 6 under the following conditions.

| Intake air temperature °C (°F) | Resistance kΩ |
|---|---|
| 25 (77) | 1.94 - 2.06 |

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




# Removal and Installation

ABS00APU

## MASS AIR FLOW SENSOR

Refer to EM-17, "AIR CLEANER AND AIR DUCT" .

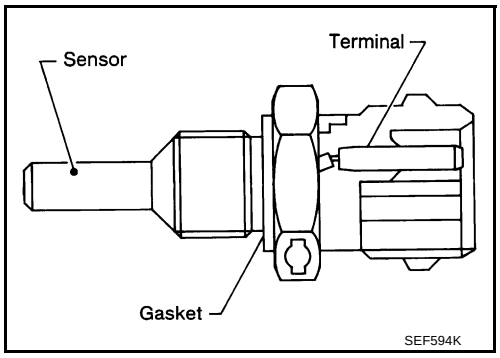
# DTC P0117, P0118 ECT SENSOR

PFP:22630

## Component Description

ABS00APV

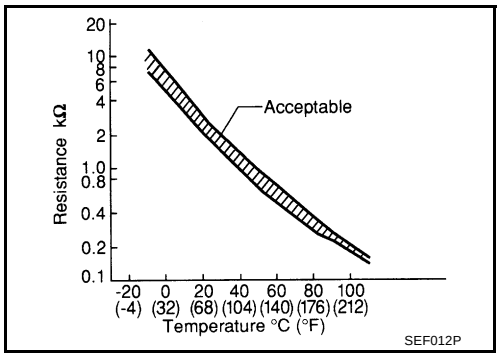
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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




**<Reference data>**

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

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




**CAUTION:**

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

## On Board Diagnosis Logic

ABS00APW

**These self-diagnoses have the one trip detection logic.**

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

### FAIL-SAFE MODE

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

| 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) (Depends on the time) |
| | When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running. | |

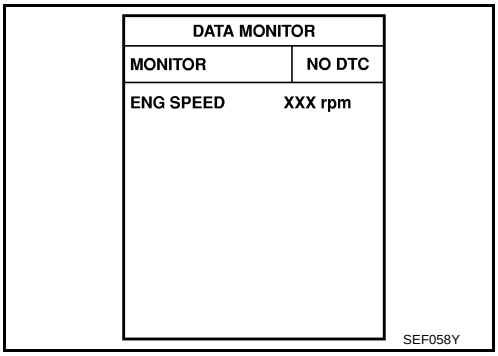
## DTC Confirmation Procedure

ABS00APX

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

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-205, "Diagnostic Procedure" .



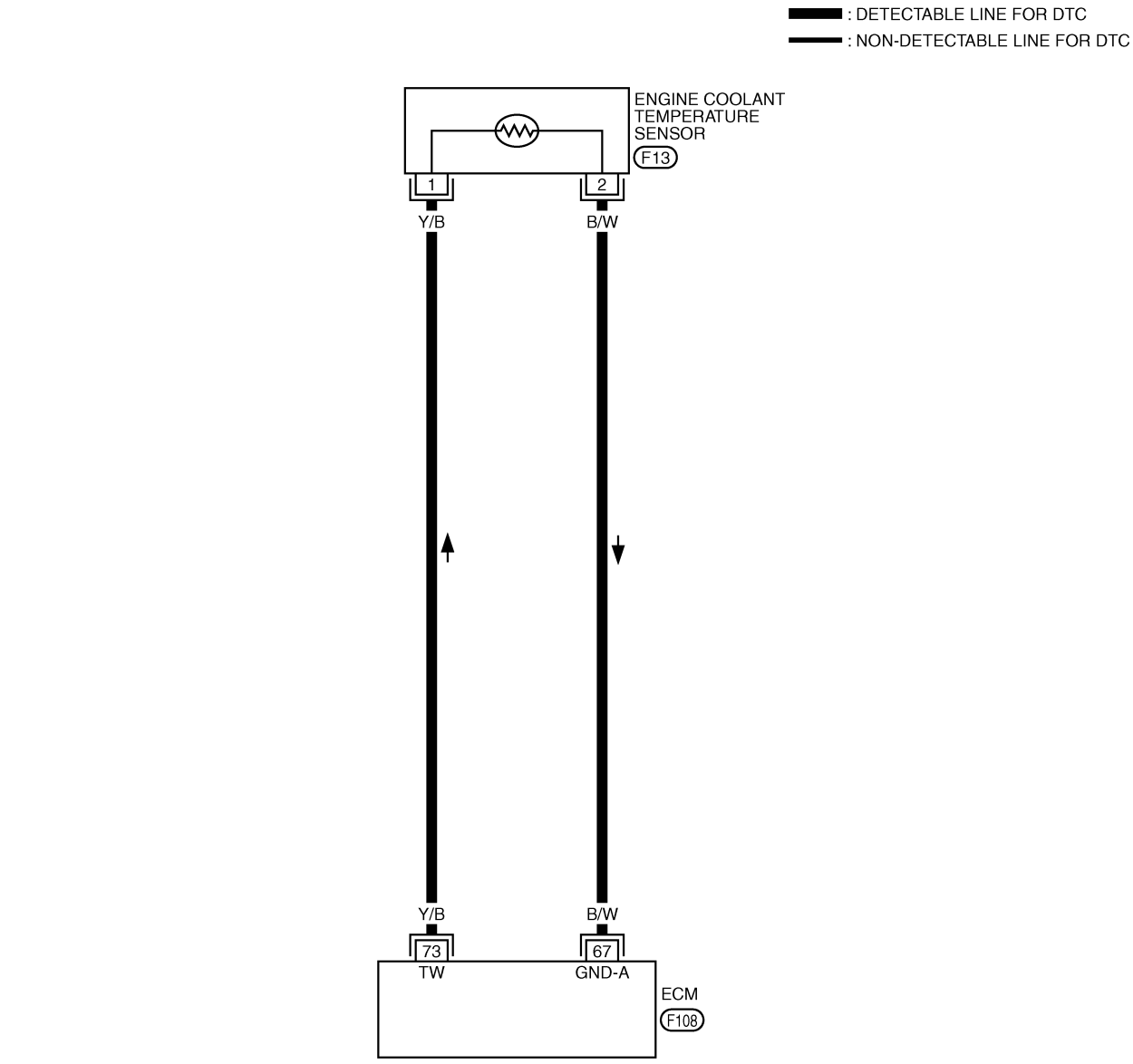

### WITH GST

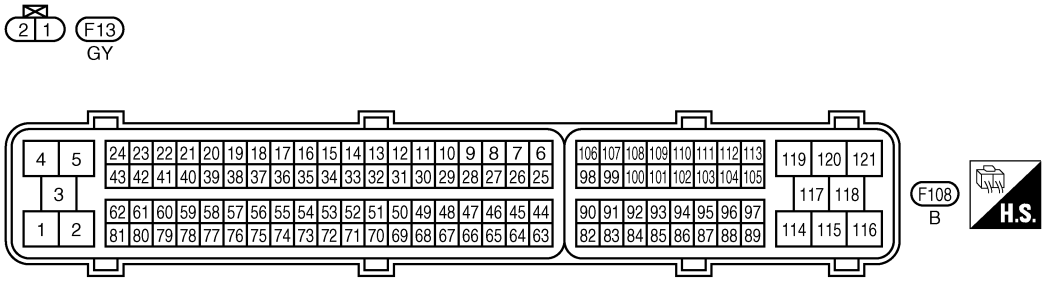
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

ABS00APY

EC-ECTS-01



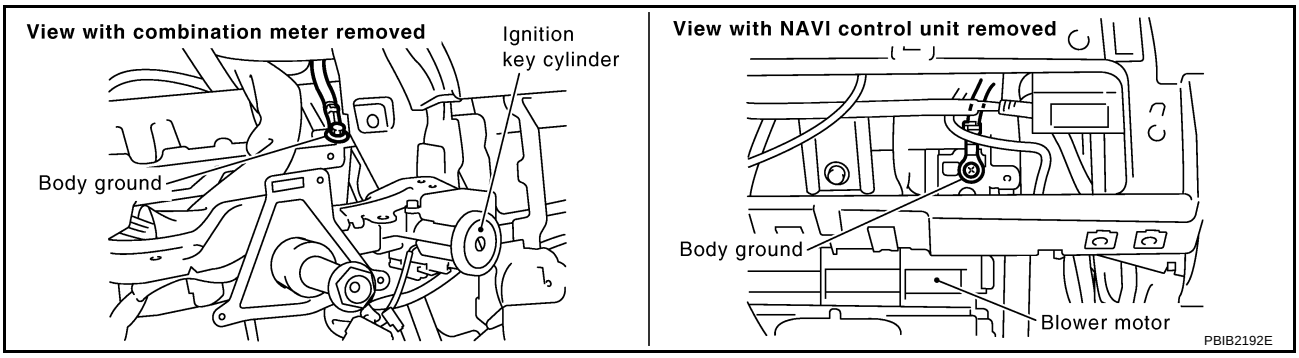

TBWT0647E

## Diagnostic Procedure

ABS00APZ

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

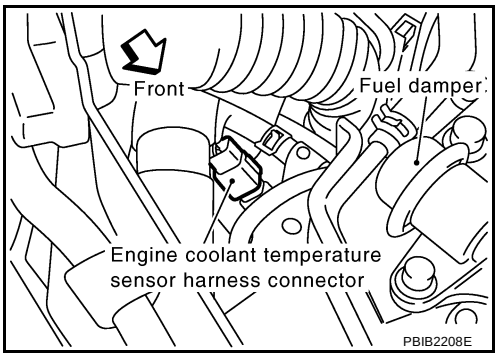



OK or NG

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

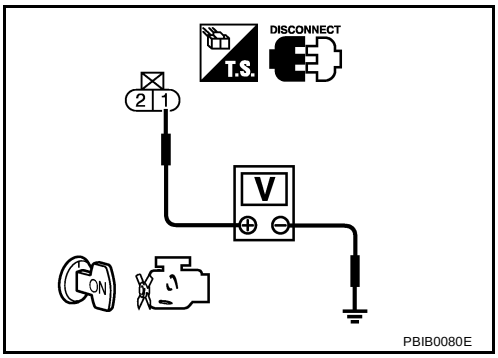
### 2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

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




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

**Voltage: Approximately 5V**




OK or NG

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

## 3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

**Continuity should exist.**

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

OK or NG

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

## 4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-206, "Component Inspection" .

OK or NG

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

## 5. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

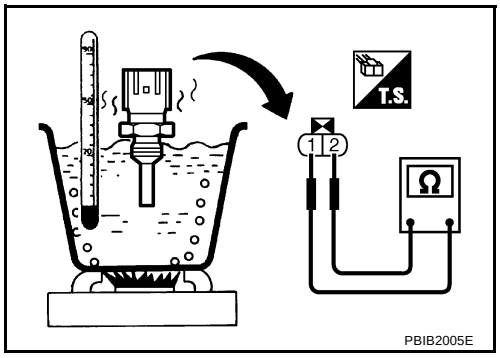
>> **INSPECTION END**

# Component Inspection

ABS00AQ0

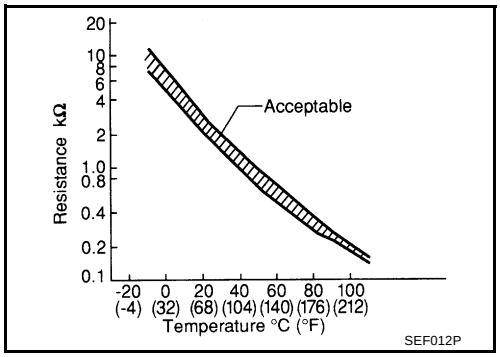
### ENGINE COOLANT TEMPERATURE SENSOR

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




**<Reference data>**

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




2. If NG, replace engine coolant temperature sensor.

# Removal and Installation

ABS00AQ1

### ENGINE COOLANT TEMPERATURE SENSOR

Refer to CO-28, "WATER INLET AND THERMOSTAT ASSEMBLY"

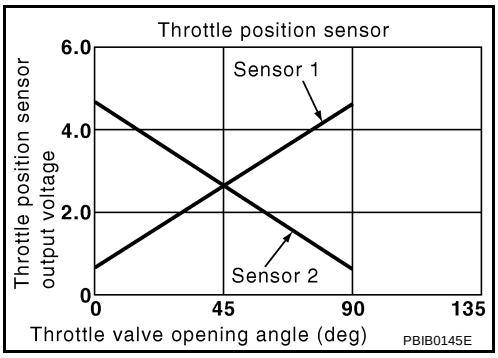
# DTC P0122, P0123 TP SENSOR

PFP:16119

## Component Description

ABS00AQ2

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




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AQ3

Specification data are reference values.

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

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

## On Board Diagnosis Logic

ABS00AQ4

**These self-diagnoses have the one trip detection logic.**

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

### FAIL-SAFE MODE

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

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

## DTC Confirmation Procedure

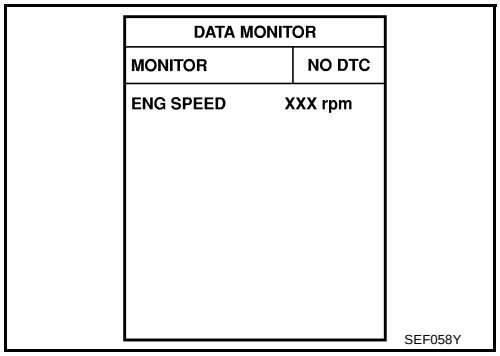
ABS00AQ5

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

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

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-211, "Diagnostic Procedure" .



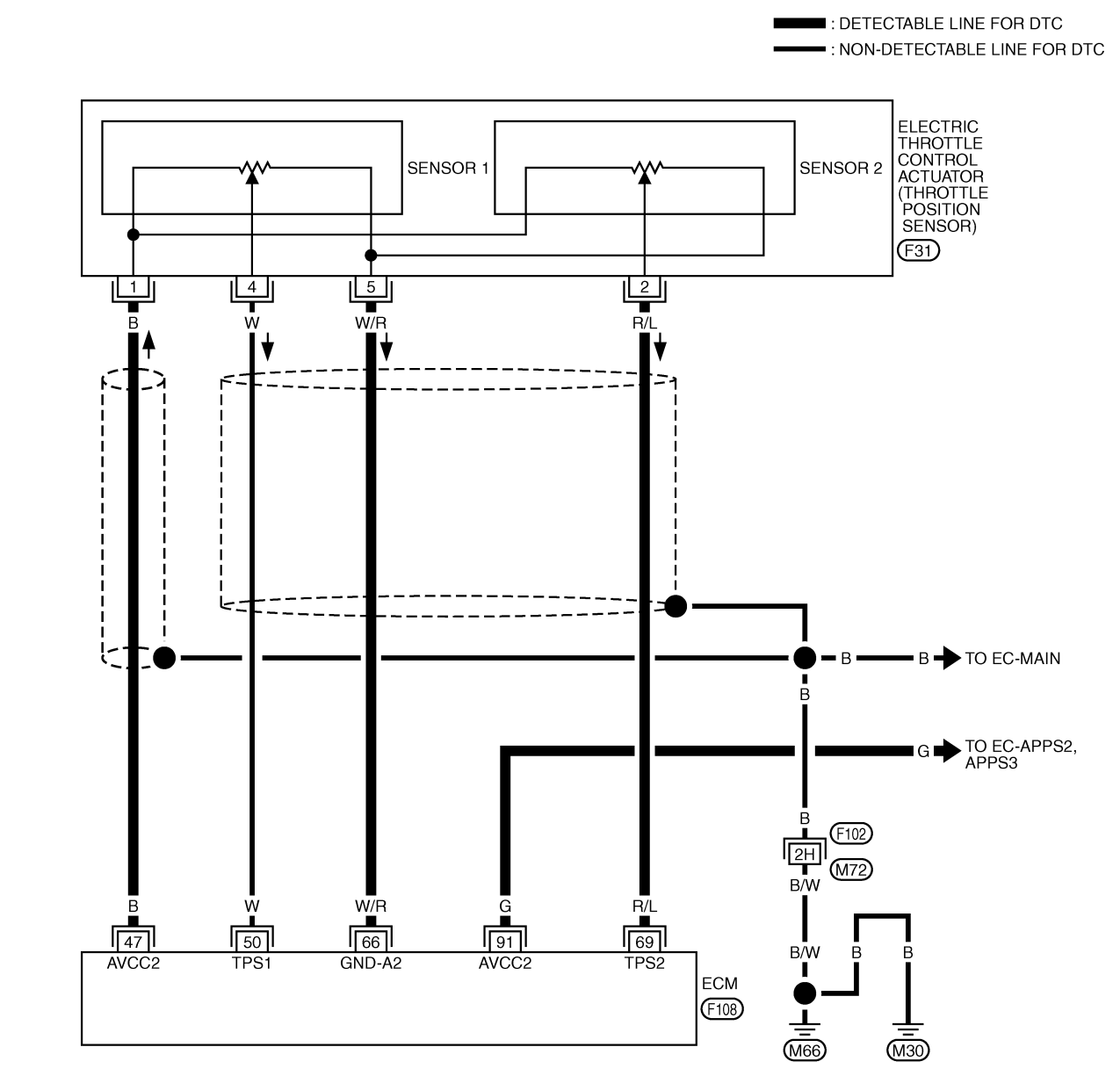

### WITH GST

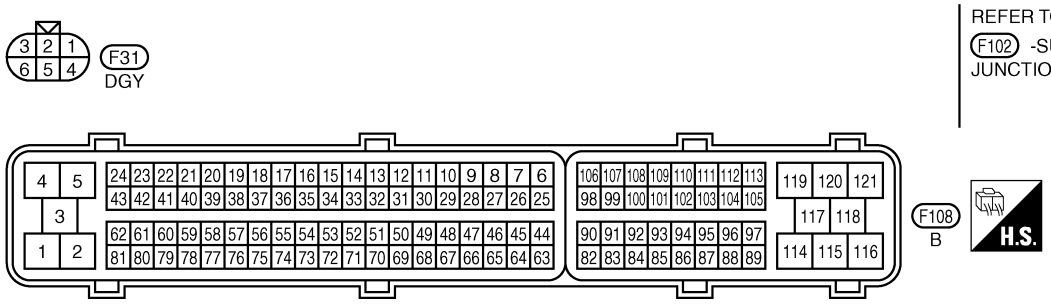
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

ABS00AQ6

EC-TPS2-01




REFER TO THE FOLLOWING.
F102 -SUPER MULTIPLE JUNCTION (SMJ)

TBWM0749E

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

**CAUTION:**

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

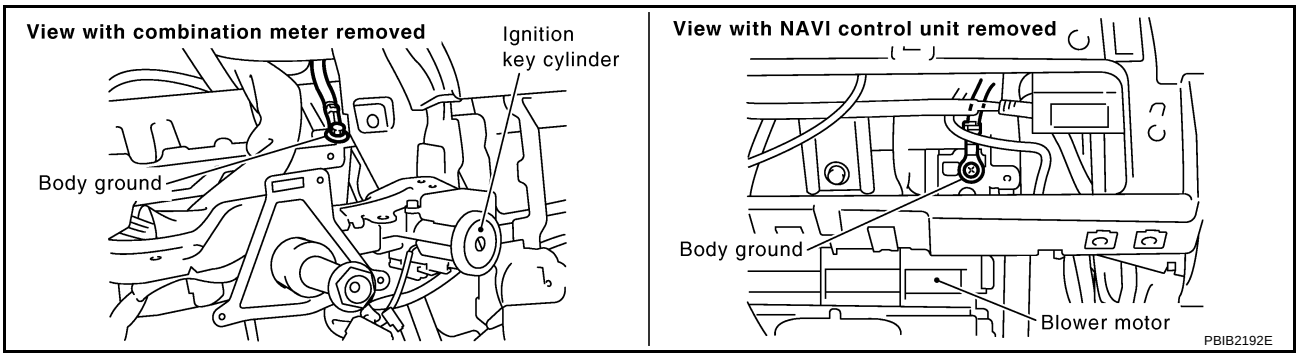
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 47 | B | Sensor power supply (Throttle position sensor) | **[Ignition switch: ON]** | Approximately 5V |
| 50 | W | Throttle position sensor 1 | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully released | More than 0.36V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully depressed | Less than 4.75V |
| 66 | W/R | Sensor ground (Throttle position sensor) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 69 | R/L | Throttle position sensor 2 | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully released | Less than 4.75V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully depressed | More than 0.36V |
| 91 | G | Sensor power supply (Accelerator pedal position sensor 2) | **[Ignition switch: ON]** | Approximately 5V |

## Diagnostic Procedure

ABS00AQ7

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

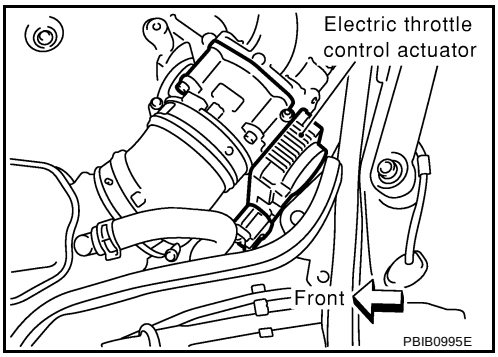



OK or NG

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

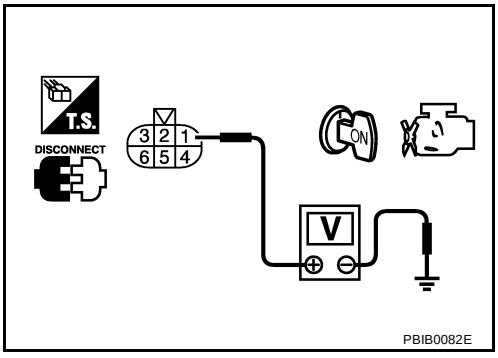
### 2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

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




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

**Voltage: Approximately 5V**




OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

### 3. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

**Continuity should exist.**

OK or NG

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

## 4. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

| ECM terminal | Sensor terminal | Reference Wiring Diagram |
|---|---|---|
| 47 | Electric throttle control actuator terminal 1 | EC-209 |
| 91 | APP sensor terminal 4 | EC-607 |

OK or NG

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

## 5. CHECK APP SENSOR

Refer to EC-611, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

## 6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-88, "Accelerator Pedal Released Position Learning" .
3. Perform EC-88, "Throttle Valve Closed Position Learning" .
4. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

## 7. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 5 and ECM terminal 66. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 8. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 69 and electric throttle control actuator terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 9. CHECK THROTTLE POSITION SENSOR

Refer to EC-213, "Component Inspection" .

OK or NG

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

## 10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-88, "Throttle Valve Closed Position Learning" .
3. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

## 11. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

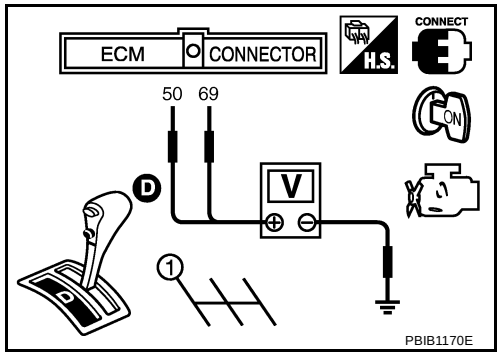
# Component Inspection

ABS00AQ8

### THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-88, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set shift lever to D (A/T) or 1st (M/T) position.
5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

| Terminal | Accelerator pedal | Voltage |
|---|---|---|
| 50 (Throttle position sensor 1) | Fully released | More than 0.36V |
| | Fully depressed | Less than 4.75V |
| 69 (Throttle position sensor 2) | Fully released | Less than 4.75V |
| | Fully depressed | More than 0.36V |




6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-88, "Throttle Valve Closed Position Learning" .
8. Perform EC-89, "Idle Air Volume Learning" .

# Removal and Installation

ABS00AQ9

### ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-19, "INTAKE MANIFOLD COLLECTOR" .

# DTC P0125 ECT SENSOR

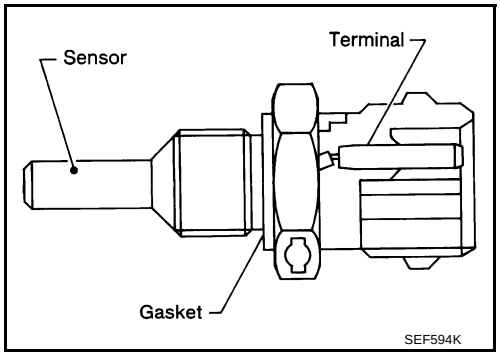
PFP:22630

## Component Description

ABS00AQA

**NOTE:**
**If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to EC-202, "DTC P0117, P0118 ECT SENSOR" .**

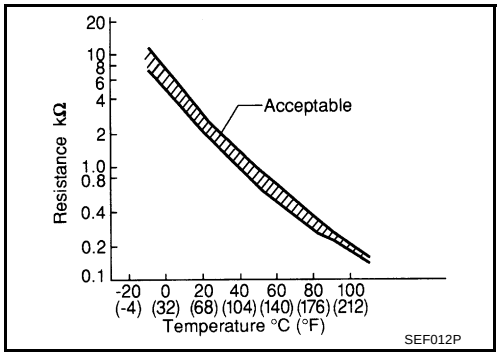
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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




**<Reference data>**

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

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




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

## On Board Diagnosis Logic

ABS00AQB

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

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0125<br>0125 | Insufficient engine coolant temperature for closed loop fuel control | ● Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine.<br>● Engine coolant temperature is insufficient for closed loop fuel control. | ● Harness or connectors (High resistance in the circuit)<br>● Engine coolant temperature sensor<br>● Thermostat |

## DTC Confirmation Procedure

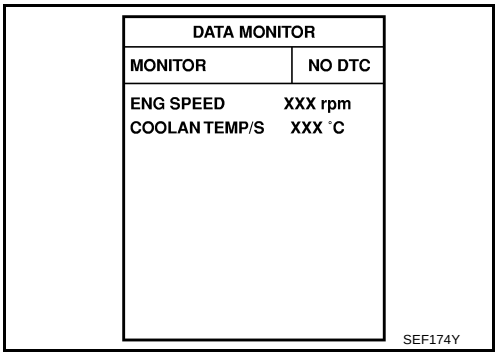
ABS00AQC

**CAUTION:**
**Be careful not to overheat engine.**

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

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Check that “COOLAN TEMP/S” is above 10°C (50°F).
   **If it is above 10°C (50°F), the test result will be OK.**
   **If it is below 10°C (50°F), go to following step.**
4. Start engine and run it for 65 minutes at idle speed.
   **If “COOLAN TEMP/S” increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.**
5. If DTC is detected, go to EC-215, "Diagnostic Procedure" .




### WITH GST

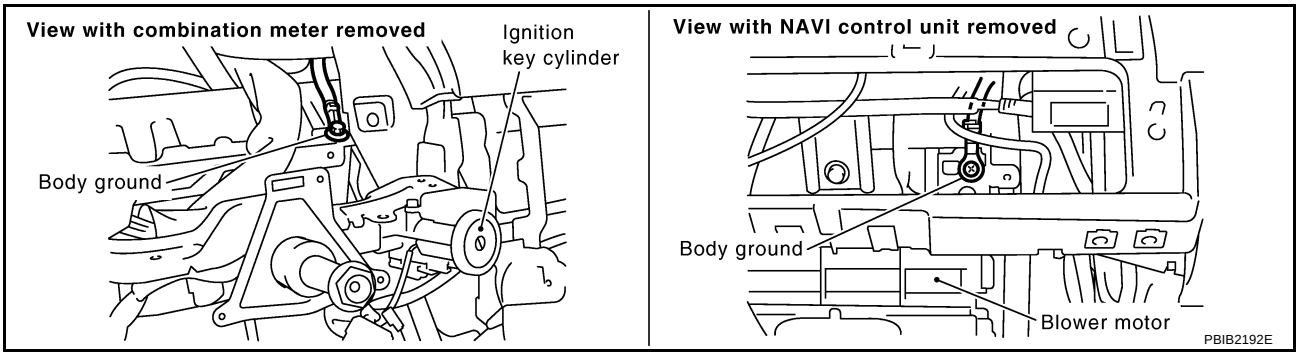
Follow the procedure “WITH CONSULT-II” above.

## Diagnostic Procedure

ABS00AQD

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .




OK or NG

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

### 2. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-216, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace engine coolant temperature sensor.

## 3. CHECK THERMOSTAT OPERATION

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

OK or NG

OK >> GO TO 4.
NG >> Repair or replace thermostat. Refer to CO-28, "WATER INLET AND THERMOSTAT ASSEMBLY" .

## 4. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
Refer to EC-204, "Wiring Diagram" .

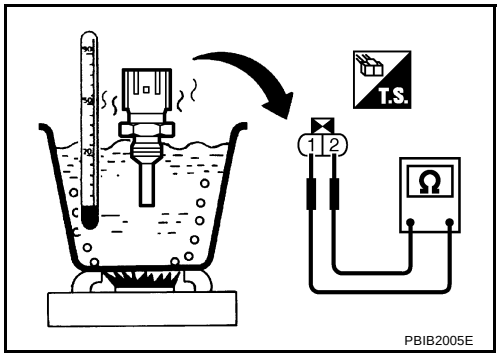
>> **INSPECTION END**

# Component Inspection

ABS00AQE

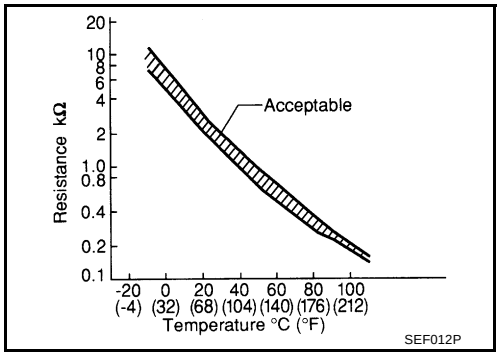
## ENGINE COOLANT TEMPERATURE SENSOR

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




**<Reference data>**

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




2. If NG, replace engine coolant temperature sensor.

# Removal and Installation

ABS00AQF

## ENGINE COOLANT TEMPERATURE SENSOR

Refer to CO-30, "WATER OUTLET AND WATER PIPING" .

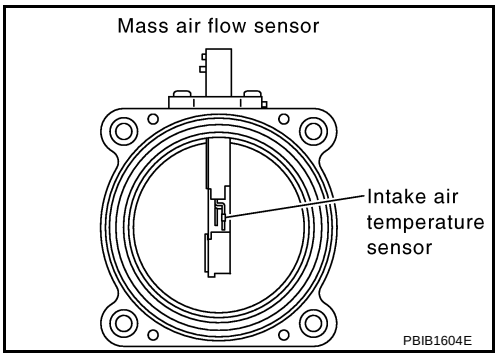
# DTC P0127 IAT SENSOR

PFP:22630

## Component Description

ABS00AQG

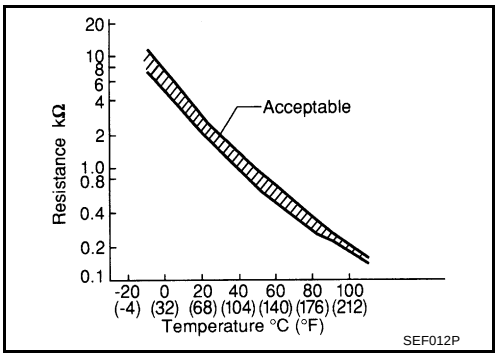
The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response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




**<Reference data>**

| Intake air temperature °C (°F) | Voltage* V | Resistance kΩ |
|---|---|---|
| 25 (77) | 3.32 | 1.94 - 2.06 |
| 80 (176) | 1.23 | 0.295 - 0.349 |

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




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

## On Board Diagnosis Logic

ABS00AQH

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0127<br>0127 | Intake air temperature too high | Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor. | ● Harness or connectors (The sensor circuit is open or shorted)<br>● Intake air temperature sensor |

## DTC Confirmation Procedure

ABS00AQI

**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.

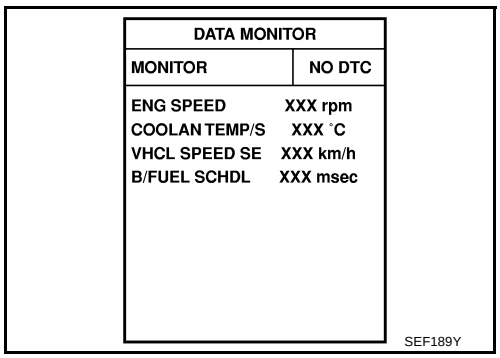
**CAUTION:**
**Always drive vehicle at a safe speed.**
**TESTING CONDITION:**
**This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.**

**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-218, "Diagnostic Procedure" .




### WITH GST

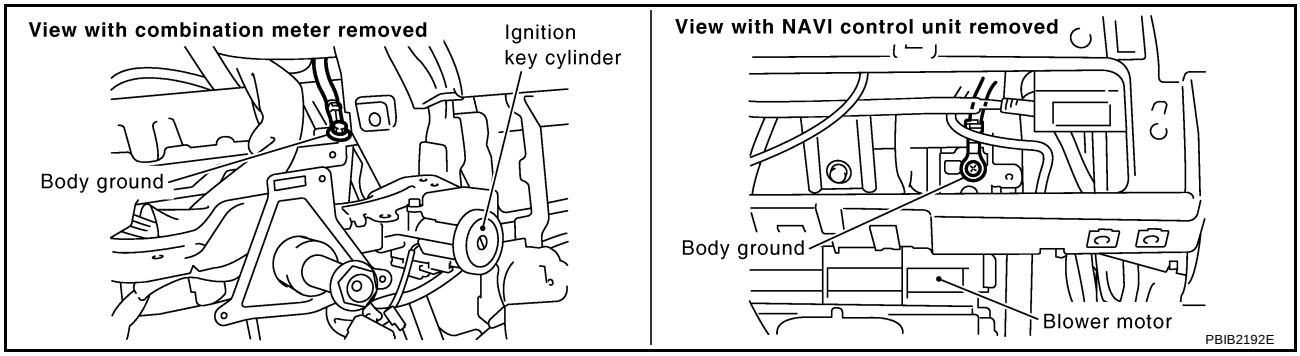
Follow the procedure “WITH CONSULT-II” above.

## Diagnostic Procedure

ABS00AQJ

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .




OK or NG

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

### 2. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-201, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

### 3. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
Refer to EC-199, "Wiring Diagram" .

>> **INSPECTION END**

## Component Inspection

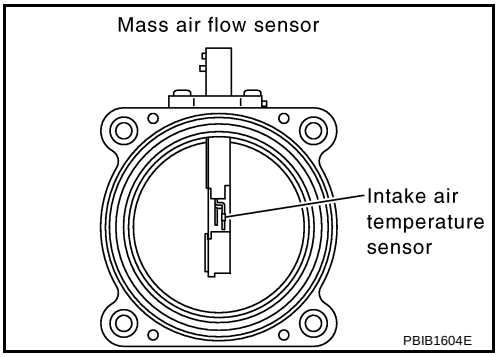
ABS00AQK

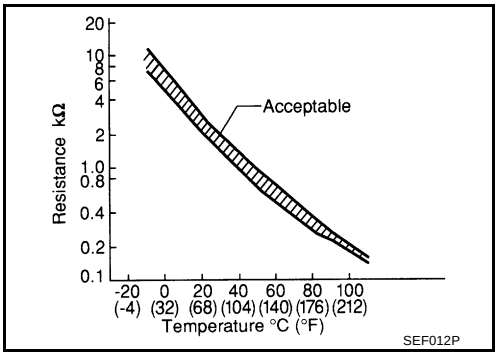
### INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between intake air temperature sensor terminals 5 and 6 under the following conditions.

| Intake air temperature °C (°F) | Resistance kΩ |
|---|---|
| 25 (77) | 1.94 - 2.06 |

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




## Removal and Installation

ABS00AQL

### MASS AIR FLOW SENSOR

Refer to EM-17, "AIR CLEANER AND AIR DUCT" .

# DTC P0128 THERMOSTAT FUNCTION

PFP:21200

## On Board Diagnosis Logic

ABS00AQM

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<br>0128 | Thermostat function | The engine coolant temperature does not reach to specified temperature even though the engine has run long enough. | ● Thermostat<br>● Leakage from sealing portion of thermostat<br>● Engine coolant temperature sensor |

## DTC Confirmation Procedure

ABS00AQN

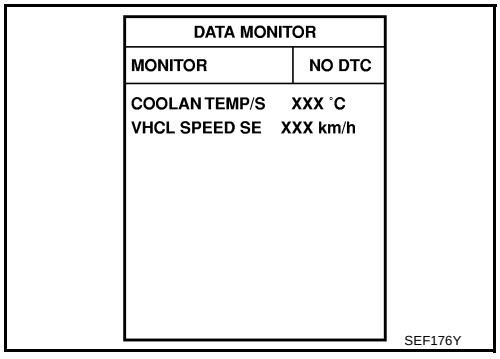
**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
**TESTING CONDITION:**

- **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-28, "WATER INLET AND THERMOSTAT ASSEMBLY" . 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), cool down the engine to less than 60°C (140°F), then retry from step 1.
5. Drive vehicle for 10 consecutive minutes under the following conditions.

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




If 1st trip DTC is detected, go to EC-220, "Diagnostic Procedure" .

### WITH GST

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

## Diagnostic Procedure

ABS00AQO

### 1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-221, "Component Inspection" .

OK or NG

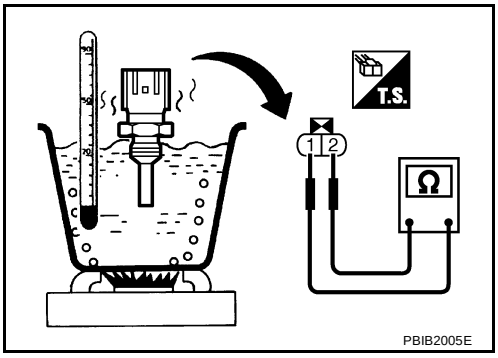
OK >> **INSPECTION END**
NG >> Replace engine coolant temperature sensor.

## Component Inspection

ABS00AQP

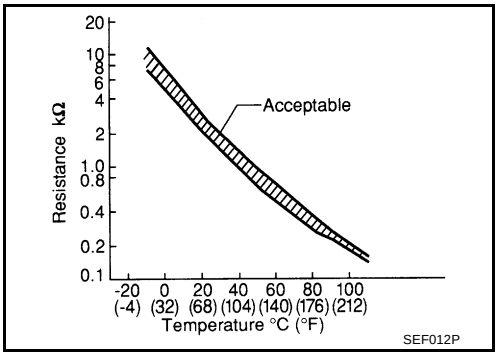
### ENGINE COOLANT TEMPERATURE SENSOR

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




**<Reference data>**

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




2. If NG, replace engine coolant temperature sensor.

## Removal and Installation

ABS00AQQ

### ENGINE COOLANT TEMPERATURE SENSOR

Refer to CO-30, "WATER OUTLET AND WATER PIPING" .

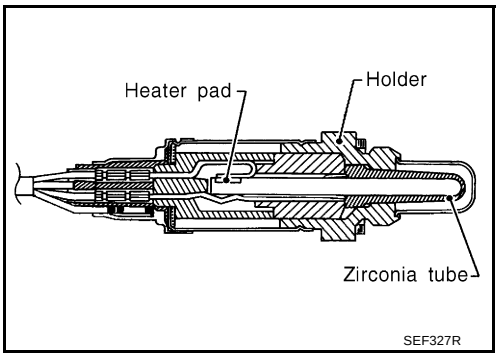
# DTC P0138, P0158 HO2S2

PFP:226A0

## Component Description

ABS00AQR

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




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AQS

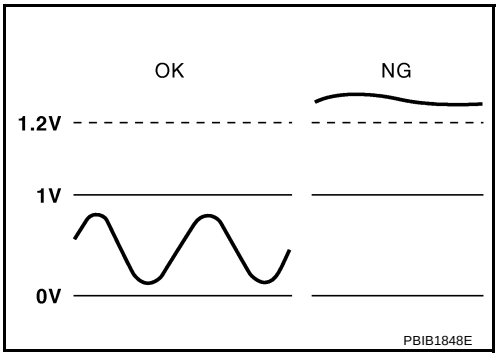
Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| HO2S2 (B1)<br>HO2S2 (B2) | ● Warm-up condition<br>● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | Revving engine from idle 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

ABS00AQT

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the three way catalyst 1 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<br>0138<br>(Bank 1) | Heated oxygen sensor 2 circuit high voltage | An excessively high voltage from the sensor is sent to ECM. | ● Harness or connectors<br>(The sensor circuit is open or shorted)<br>● Heated oxygen sensor 2 |
| P0158<br>0158<br>(Bank 2) | | | |

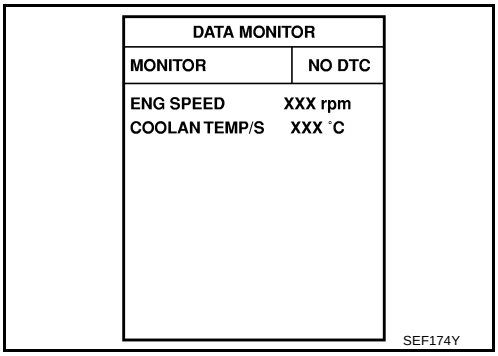
## DTC Confirmation Procedure

ABS00AQU

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

### WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-227, "Diagnostic Procedure" .

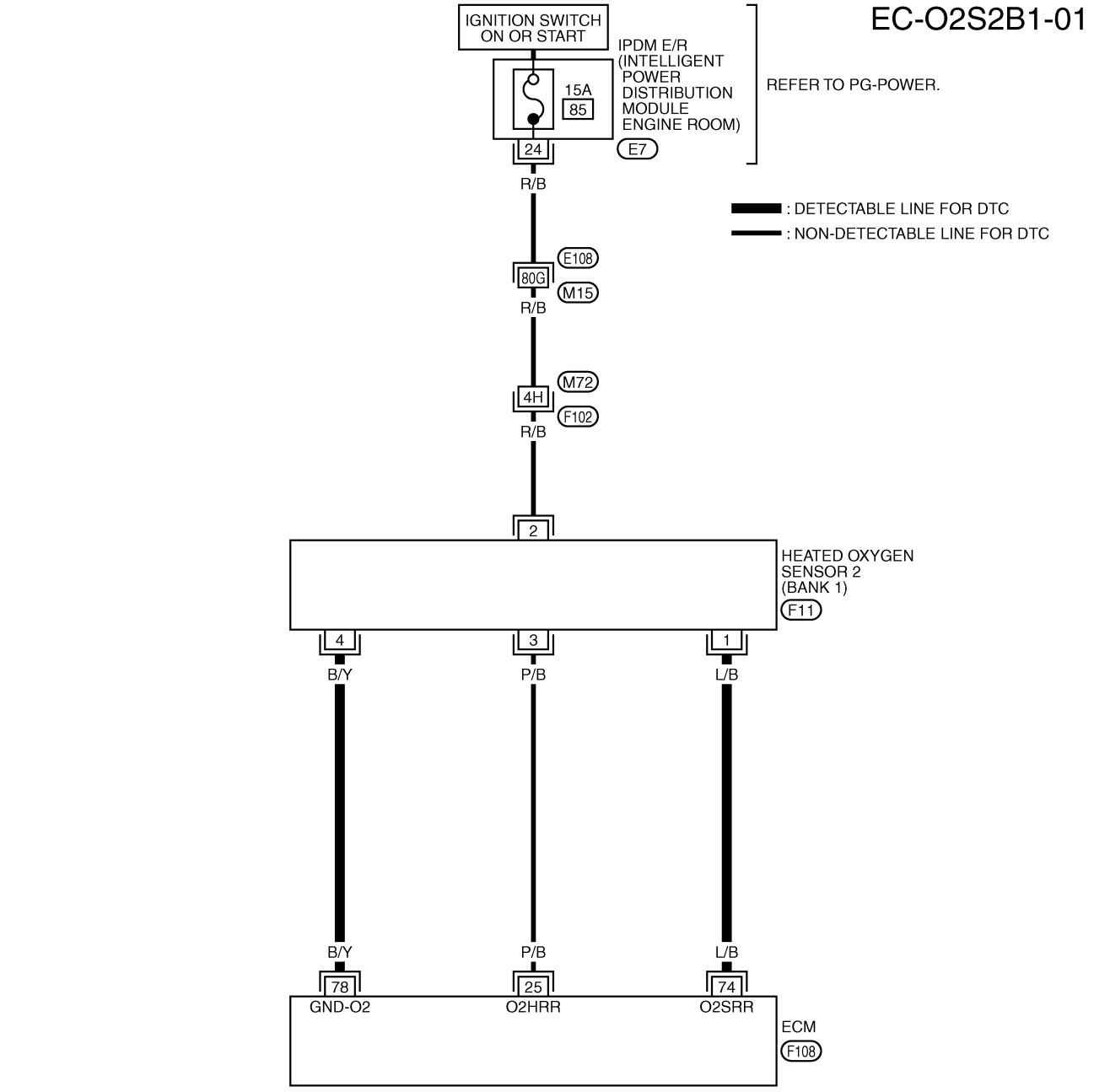



### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram
### BANK 1

ABS00AQV




TBWM0750E

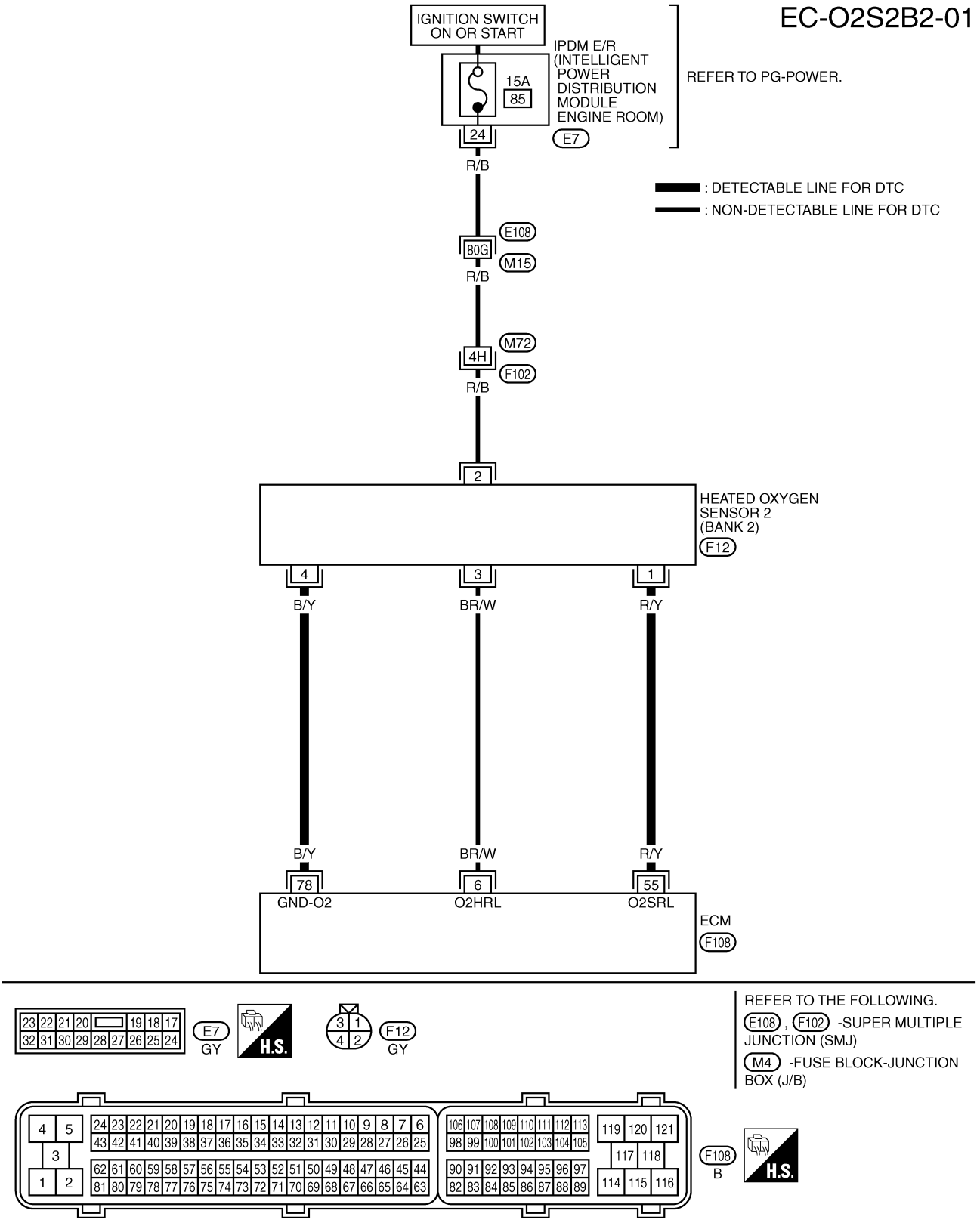
Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

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

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 74 | L/B | Heated oxygen sensor 2 (bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Revving engine from idle to 3,000 rpm quickly after the following conditions are met.<br>– After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | 0 - Approximately 1.0V |
| 78 | B/Y | Sensor ground (Heated oxygen sensor) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |

## BANK 2




TBWM0751E

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

**CAUTION:**

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

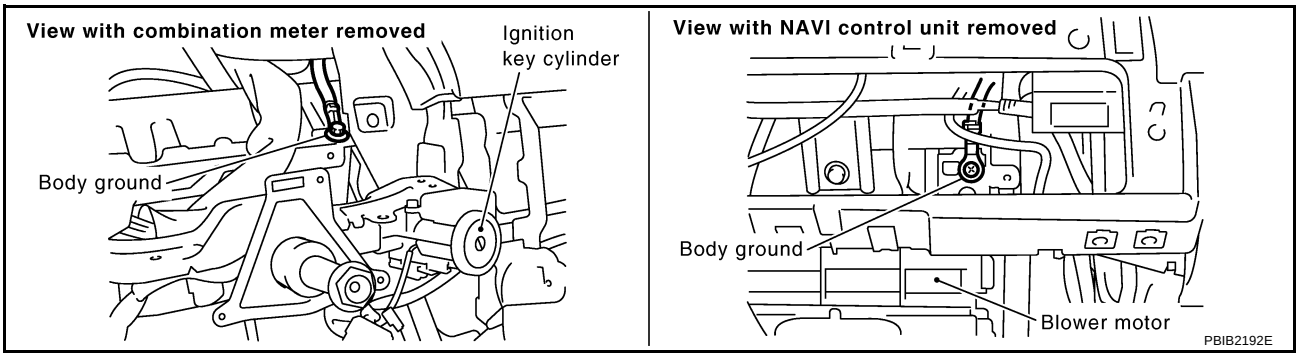
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 55 | R/Y | Heated oxygen sensor 2 (bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Revving engine from idle to 3,000 rpm quickly after the following conditions are met.<br>– After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | 0 - Approximately 1.0V |
| 78 | B/Y | Sensor ground (Heated oxygen sensor) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |

## Diagnostic Procedure

ABS00AQW

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

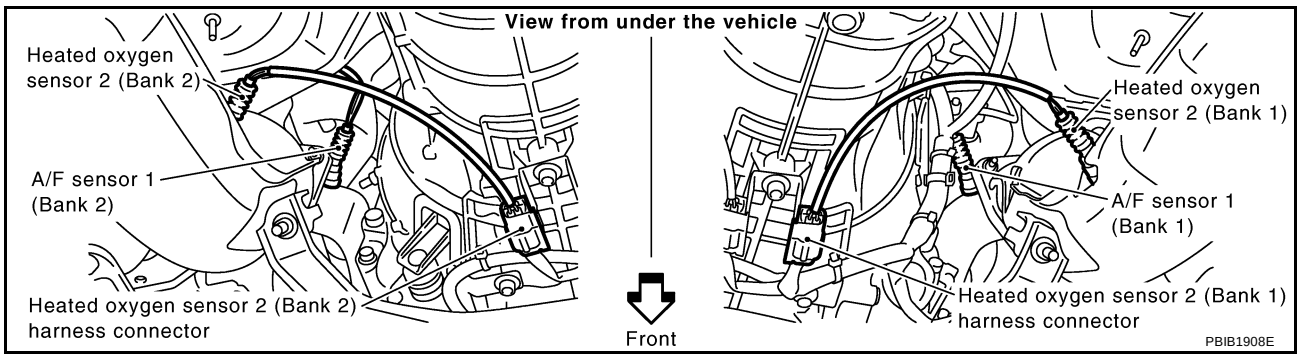



OK or NG

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

## 2. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect heated oxygen sensor 2 harness connector.




3. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78.
   Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 3. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows.
   Refer to Wiring Diagram.

| DTC | Terminals | | Bank |
|---|---|---|---|
| | ECM | Sensor | |
| P0138 | 74 | 1 | 1 |
| P0158 | 55 | 1 | 2 |

**Continuity should exist.**

2. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

| DTC | Terminals | | Bank |
|---|---|---|---|
| | ECM | Sensor | |
| P0138 | 74 | 1 | 1 |
| P0158 | 55 | 1 | 2 |

**Continuity should not exist.**

3. Also check harness for short to power.

OK or NG

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

## 4. CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

**Water should not exist.**

OK or NG

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

## 5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-229, "Component Inspection" .

OK or NG

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

## 6. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

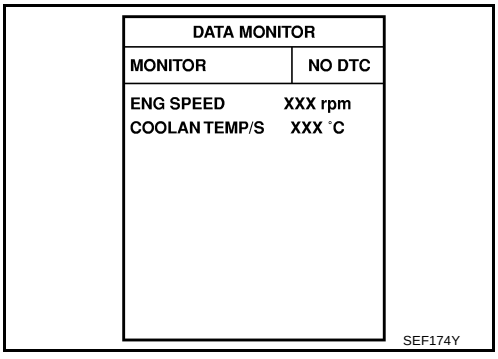
# Component Inspection

ABS00AQX

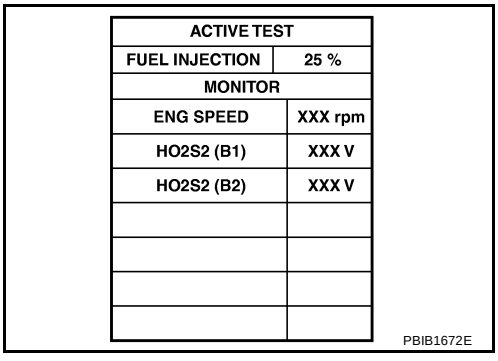
## HEATED OXYGEN SENSOR 2

### With CONSULT-II

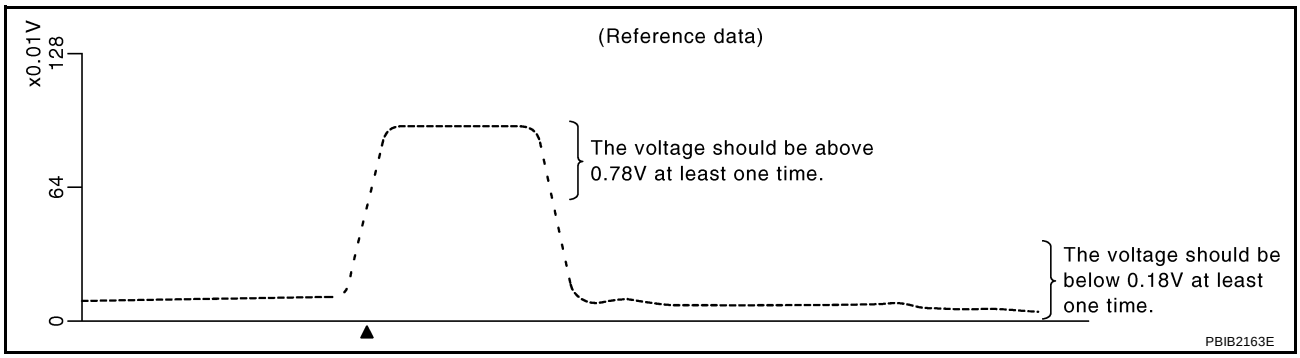
1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.




6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-II.



7. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



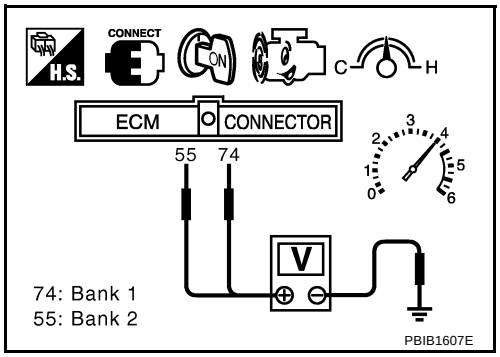

**“HO2S2 (B1)/(B2)” should be above 0.78V at least once when the “FUEL INJECTION” is +25%.**
**“HO2S2 (B1)/(B2)” should be below 0.18V at least once when the “FUEL INJECTION” is –25%.**

**CAUTION:**

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

### Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   **The voltage should be above 0.78V at least once during this procedure.**
   **If the voltage is above 0.78V at step 6, step 7 is not necessary.**
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T).
   **The voltage should be below 0.18V at least once during this procedure.**




8. If NG, replace heated oxygen sensor 2.

**CAUTION:**

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

## Removal and Installation

ABS00AQY

### HEATED OXYGEN SENSOR 2

Refer to EM-26, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

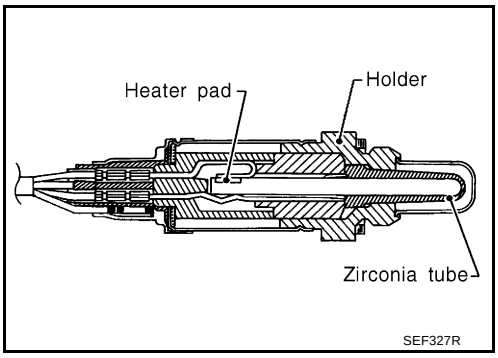
# DTC P0139, P0159 HO2S2

PFP:226A0

## Component Description

ABS00AQZ

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




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AR0

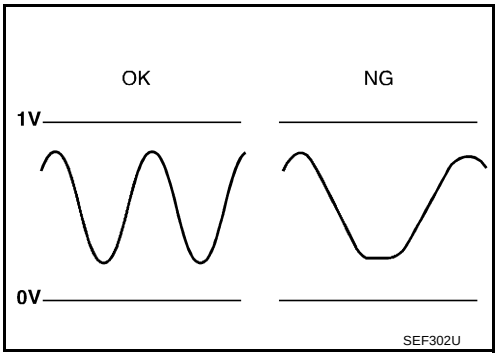
Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| HO2S2 (B1)<br>HO2S2 (B2) | ● Warm-up condition<br>● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | Revving engine from idle 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

ABS00AR1

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the three way catalyst 1 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<br>0139<br>(Bank 1) | Heated oxygen sensor 2 circuit slow response | It takes more time for the sensor to respond between rich and lean than the specified time. | ● Harness or connectors (The sensor circuit is open or shorted)<br>● Heated oxygen sensor 2<br>● Fuel pressure<br>● Fuel injector<br>● Intake air leaks |
| P0159<br>0159<br>(Bank 2) | | | |

## DTC Confirmation Procedure

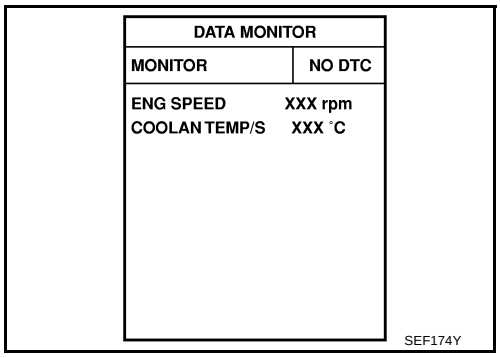
ABS00AR2

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

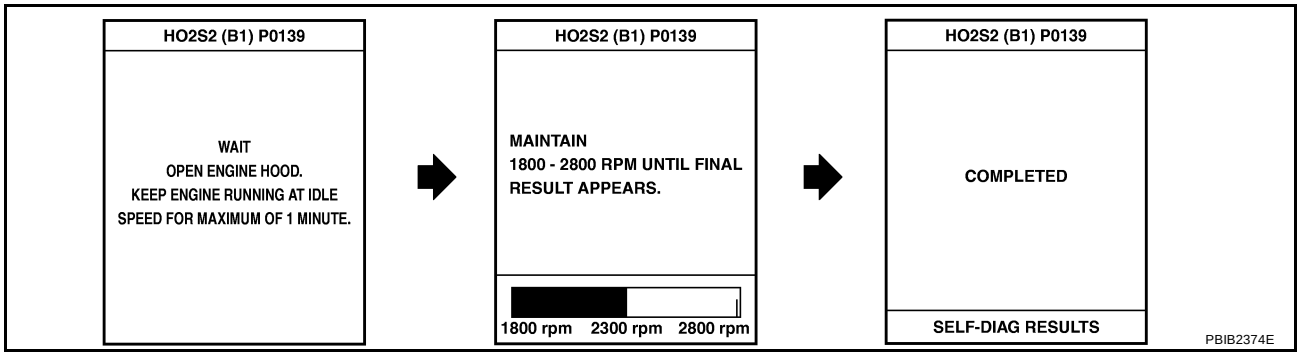
### WITH CONSULT-II

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

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




7. Select “HO2S2 (B1) P0139” or “HO2S2 (B2) P0159” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
8. Start engine and following the instruction of CONSULT-II.




**NOTE:**
It will take at most 10 minutes until “COMPLETED” is displayed.

9. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-237, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

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

## Overall Function Check

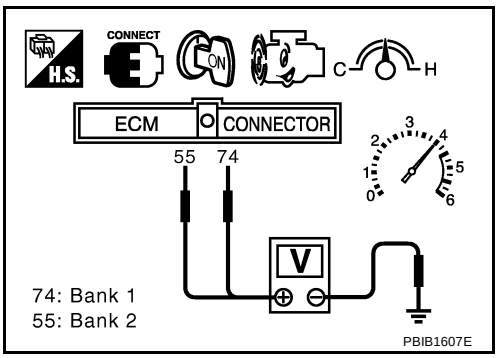
ABS00AR3

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

### WITH GST

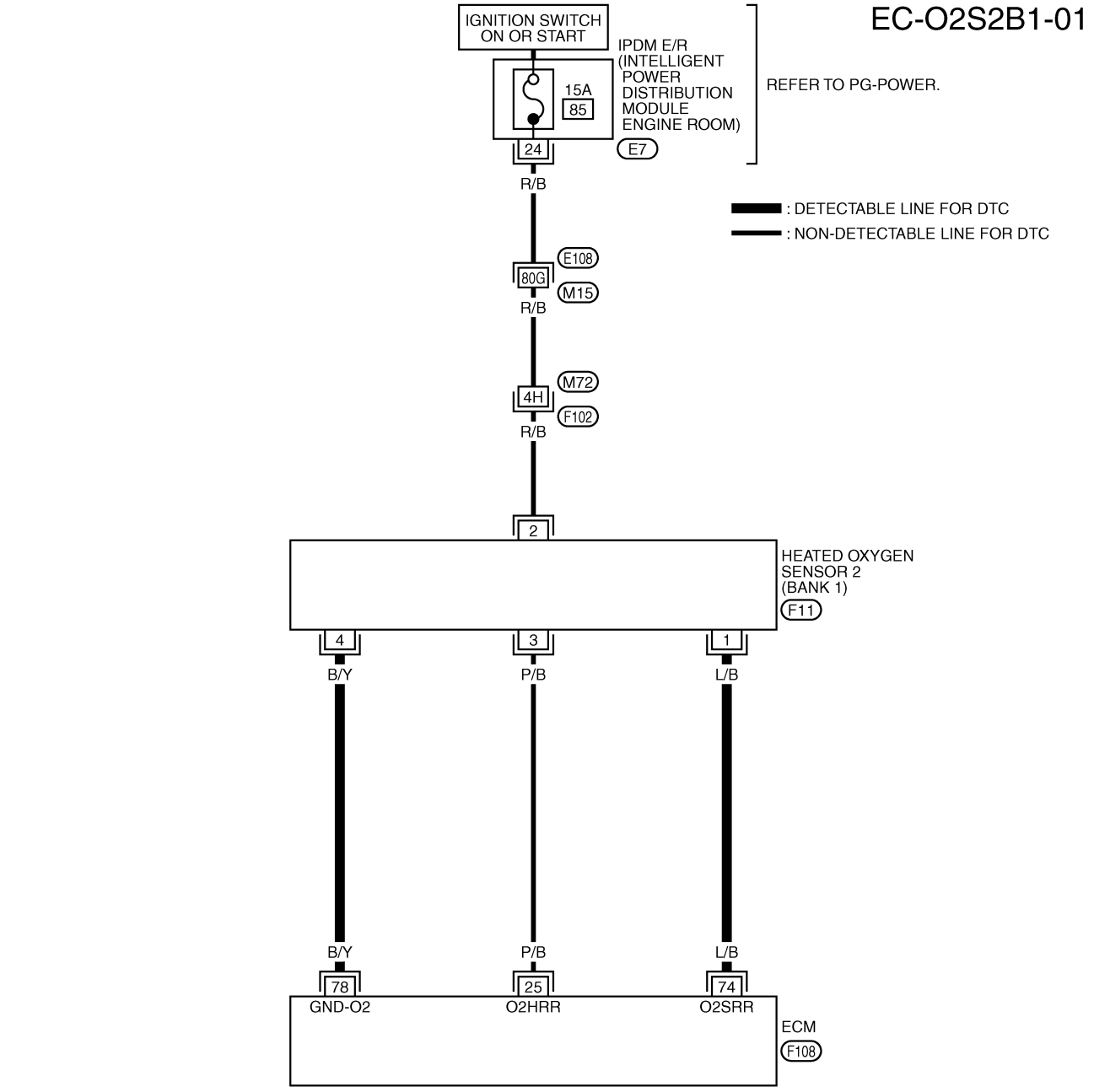
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.

6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
**A change of voltage should be more than 0.06V for 1 second during this procedure.**
**If the voltage can be confirmed in step 6, step 7 is not necessary.**
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T).
**A change of voltage should be more than 0.06V for 1 second during this procedure.**
8. If NG, go to EC-237, "Diagnostic Procedure" .



## Wiring Diagram
### BANK 1

ABS00AR4




TBWM0750E

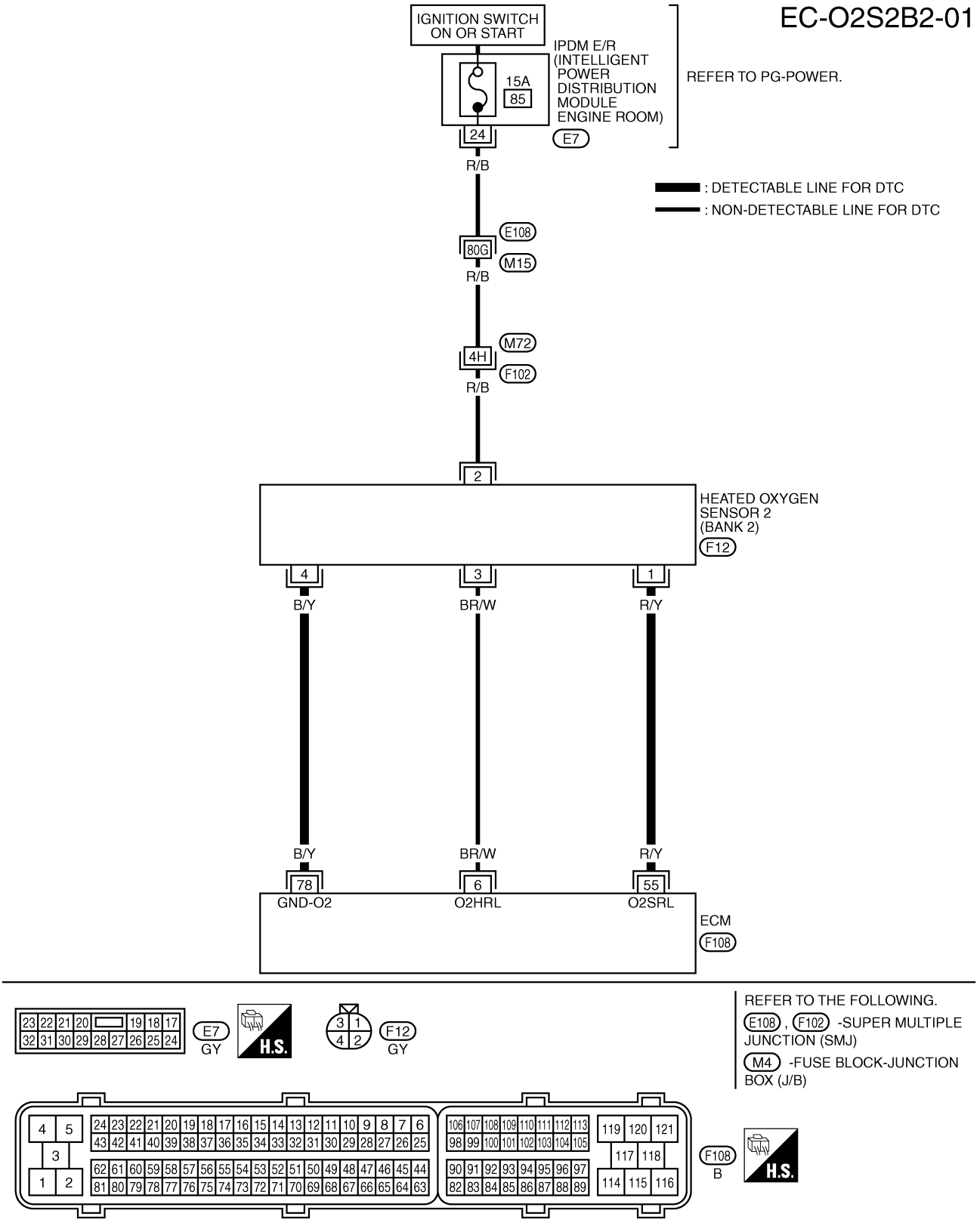
Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

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

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 74 | L/B | Heated oxygen sensor 2 (bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Revving engine from idle to 3,000 rpm quickly after the following conditions are met.<br>– After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | 0 - Approximately 1.0V |
| 78 | B/Y | Sensor ground (Heated oxygen sensor) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |

## BANK 2




TBWM0751E

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

**CAUTION:**

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

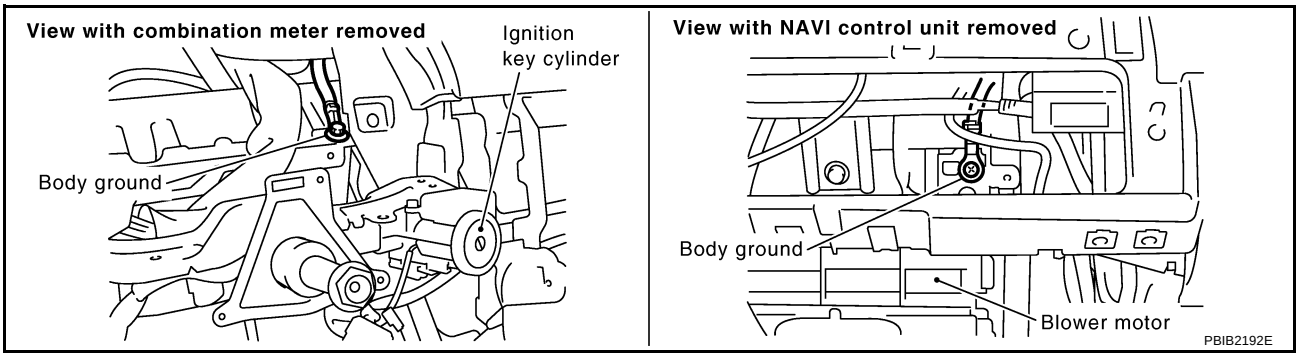
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 55 | R/Y | Heated oxygen sensor 2 (bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Revving engine from idle to 3,000 rpm quickly after the following conditions are met.<br>– After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | 0 - Approximately 1.0V |
| 78 | B/Y | Sensor ground (Heated oxygen sensor) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |

## Diagnostic Procedure

ABS00AR5

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .



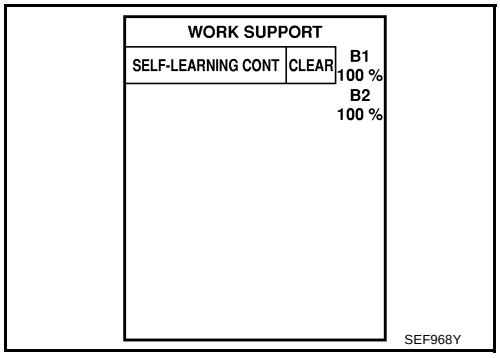

OK or NG

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

## 2. CLEAR THE SELF-LEARNING DATA

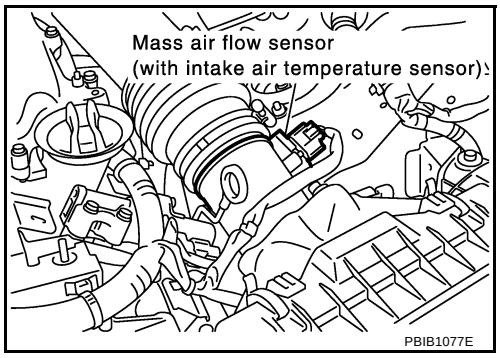
**With CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   **Is the 1st trip DTC P0171, 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-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, P0172, P0174 or P0175 detected?**
   **Is it difficult to start engine?**



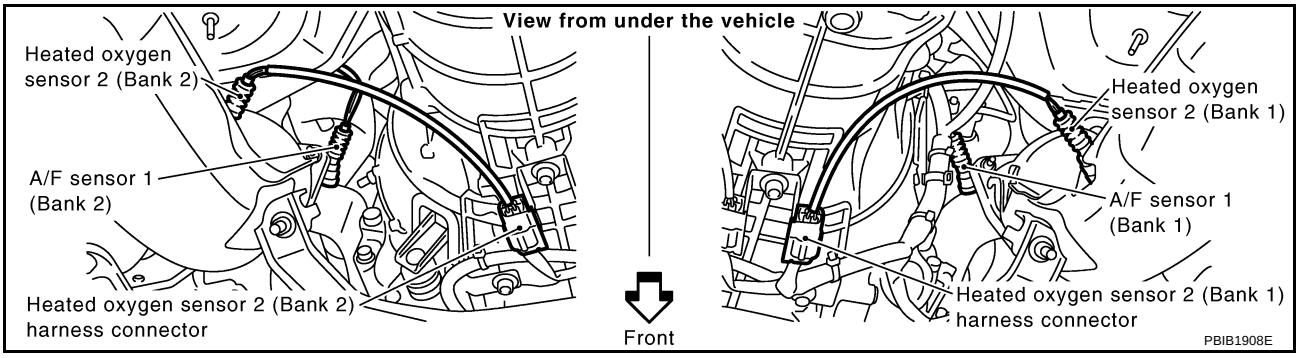

Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-242, "DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION" or EC-252, "DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 3.

## 3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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




4. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

| DTC | Terminals | | Bank |
|---|---|---|---|
| | ECM | Sensor | |
| P0139 | 74 | 1 | 1 |
| P0159 | 55 | 1 | 2 |

**Continuity should exist.**

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

| DTC | Terminals | | Bank |
|---|---|---|---|
| | ECM | Sensor | |
| P0139 | 74 | 1 | 1 |
| P0159 | 55 | 1 | 2 |

**Continuity should not exist.**

3. Also check harness for short to power.

OK or NG

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

## 5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-240, "Component Inspection" .

OK or NG

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

## 6. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

# Component Inspection

ABS00AR6

## 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 1 minute under no load.
5. Let engine idle for 1 minute.

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

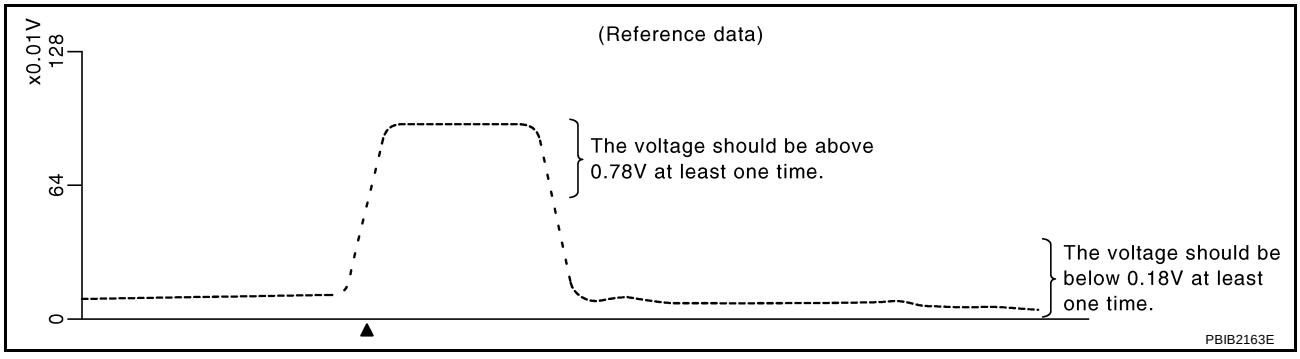
SEF174Y

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 |
| HO2S2 (B1) | XXX V |
| HO2S2 (B2) | XXX V |
| | |
| | |
| | |
| | |

PBIB1672E

7. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.




**“HO2S2 (B1)/(B2)” should be above 0.78V at least once when the “FUEL INJECTION” is +25%.**
**“HO2S2 (B1)/(B2)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.**

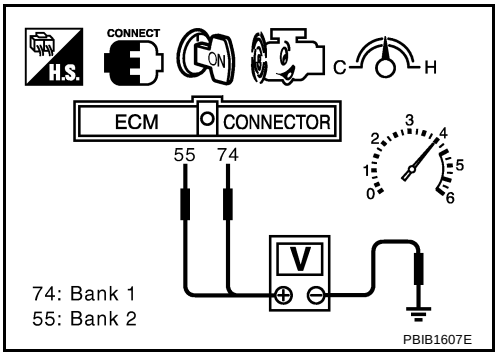
**CAUTION:**

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

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

### Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   **The voltage should be above 0.78V at least once during this procedure.**
   **If the voltage is above 0.78V at step 6, step 7 is not necessary.**
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T).
   **The voltage should be below 0.18V at least once during this procedure.**
8. If NG, replace heated oxygen sensor 2.




**CAUTION:**

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

## Removal and Installation

ABS00AR7

### HEATED OXYGEN SENSOR 2

Refer to EM-26, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

# DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

## On Board Diagnosis Logic

ABS00DEZ

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the air fuel ratio (A/F) 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 lights up the MIL (2 trip detection logic).

| Sensor | Input signal to ECM | ECM function | Actuator |
|---|---|---|---|
| Air fuel ratio (A/F) sensor 1 | Density of oxygen in exhaust gas (Mixture ratio feedback signal) | Fuel injection control | Fuel injector |

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0171<br>0171<br>(Bank 1) | Fuel injection system too lean | ● Fuel injection system does not operate properly.<br>● The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.) | ● Intake air leaks<br>● Air fuel ratio (A/F) sensor 1<br>● Fuel injector<br>● Exhaust gas leaks<br>● Incorrect fuel pressure<br>● Lack of fuel<br>● Mass air flow sensor<br>● Incorrect PCV hose connection |
| P0174<br>0174<br>(Bank 2) | | | |

## DTC Confirmation Procedure

ABS00DF0

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

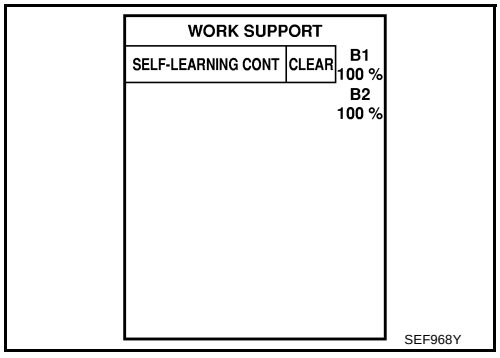
**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

### WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to EC-246, "Diagnostic Procedure" .

   **NOTE:**
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
   **Hold the accelerator pedal as steady as possible.**




The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

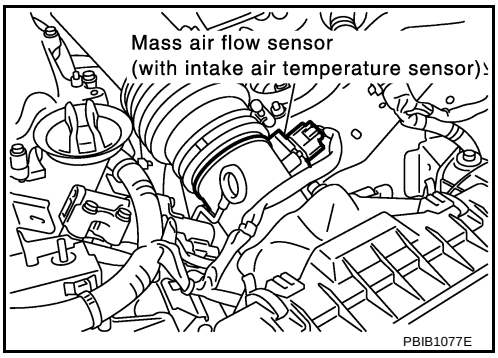
| | |
|---|---|
| Engine speed | Engine speed in the freeze frame data ± 400 rpm |
| Vehicle speed | Vehicle speed in the freeze frame data ± 10 km/h (6 MPH) |

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

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-246, "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 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service $03 with GST. Make sure DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine again and let it idle for at least 10 minutes.
9. Select Service $07 with GST. The 1st trip DTC P0171 or P0174 should be detected at this stage, if a malfunction exists. If so, go to EC-246, "Diagnostic Procedure" .




**NOTE:**
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
**Hold the accelerator pedal as steady as possible.**

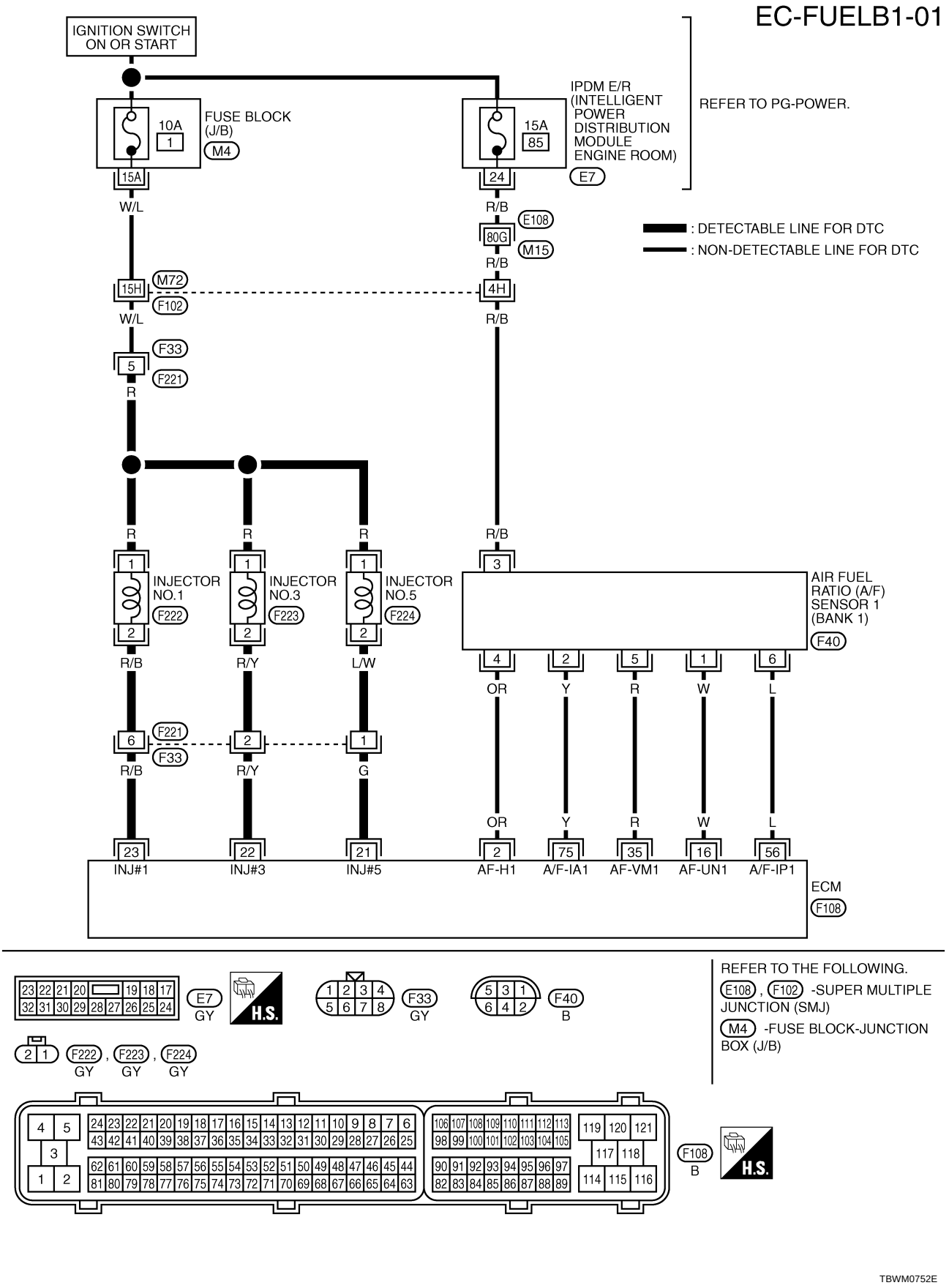
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

| | |
|---|---|
| Engine speed | Engine speed in the freeze frame data ± 400 rpm |
| Vehicle speed | Vehicle speed in the freeze frame data ± 10 km/h (6 MPH) |
| Engine coolant temperature (T) condition | When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F). |
| | When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F). |

10. If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
11. Crank engine while depressing accelerator pedal. If engine starts, go to EC-246, "Diagnostic Procedure" . If engine does not start, check exhaust and intake air leak visually.

## Wiring Diagram
**BANK 1**

ABS00DF1

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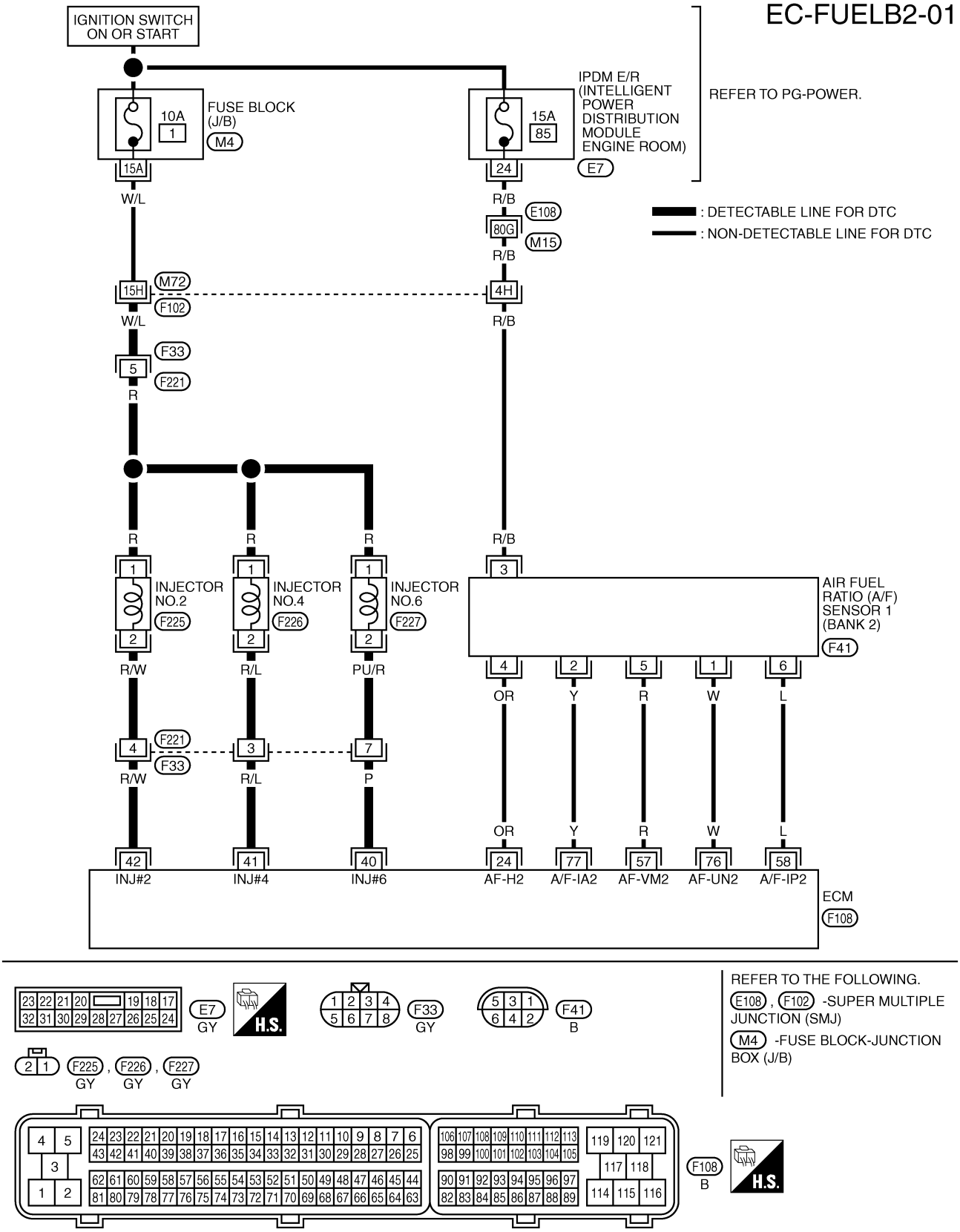
## BANK 2



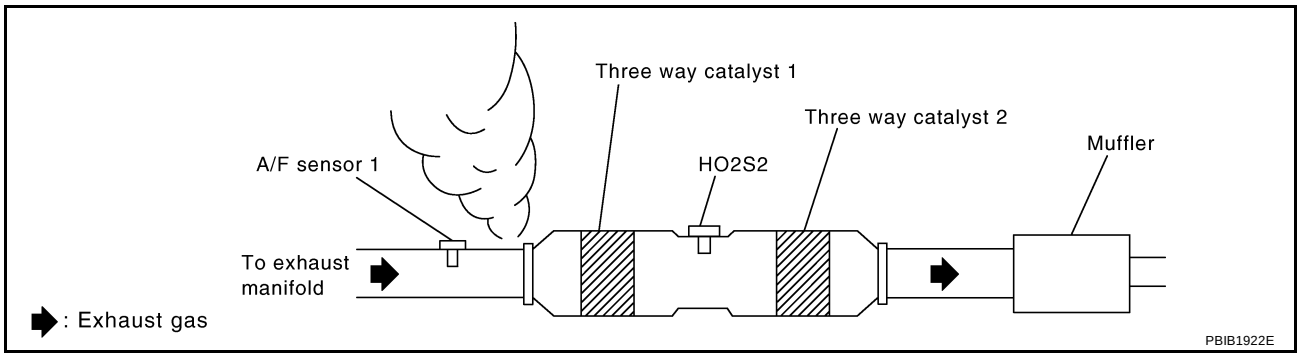

TBWM0753E

## Diagnostic Procedure

ABS00DF2

### 1. CHECK EXHAUST GAS LEAK

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




OK or NG

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

### 2. CHECK FOR INTAKE AIR LEAK

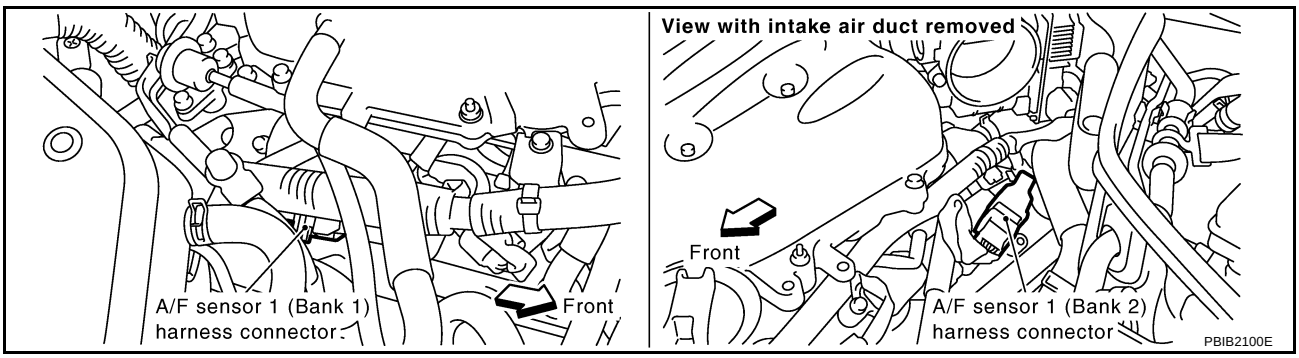
1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

OK or NG

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

## 3. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding A/F sensor 1 harness connector.




3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.

| | A/F sensor 1 terminal | ECM terminal |
|---|---|---|
| Bank 1 | 1 | 16 |
| | 2 | 75 |
| | 5 | 35 |
| | 6 | 56 |
| Bank 2 | 1 | 76 |
| | 2 | 77 |
| | 5 | 57 |
| | 6 | 58 |

**Continuity should exist.**

5. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

| Bank 1 | | Bank 2 | |
|---|---|---|---|
| A/F sensor 1 terminal | ECM terminal | A/F sensor 1 terminal | ECM terminal |
| 1 | 16 | 1 | 76 |
| 2 | 75 | 2 | 77 |
| 5 | 35 | 5 | 57 |
| 6 | 56 | 6 | 58 |

**Continuity should not exist.**

6. Also check harness for short to power.

OK or NG

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

## 4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-91, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-91, "FUEL PRESSURE CHECK" .

**At idling: Approximately 350 kPa (3.57 kg/cm$^2$ , 51 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-647, "FUEL PUMP CIRCUIT" .)
- Fuel pressure regulator (Refer to EC-91, "FUEL PRESSURE CHECK" )
- Fuel lines (Refer to FL-3, "Checking Fuel Lines" .)
- Fuel filter for clogging

>> Repair or replace.

## 6. CHECK MASS AIR FLOW SENSOR

**With CONSULT-II**

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

**2.0 - 6.0 g·m/sec: at idling**
**7.0 - 20.0 g·m/sec: at 2,500 rpm**

**With GST**

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

**2.0 - 6.0 g·m/sec: at idling**
**7.0 - 20.0 g·m/sec: at 2,500 rpm**

OK or NG

OK (With CONSULT-II)>>GO TO 7.
OK (Without COUSULT-II)>>GO TO 8.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-182, "DTC P0101 MAF SENSOR" .

## 7. CHECK FUNCTION OF INJECTOR

**With CONSULT-II**

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

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

PBIB0133E

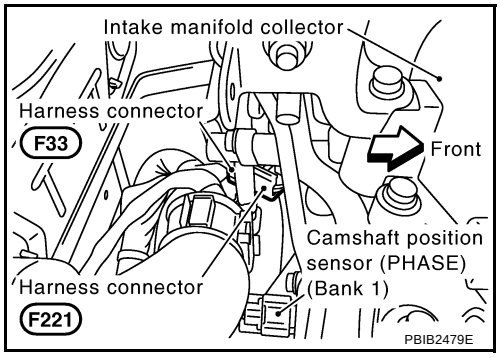
OK or NG

OK >> GO TO 10.
NG >> Perform trouble diagnosis for INJECTOR CIRCUIT, refer to EC-640, "INJECTOR CIRCUIT" .

## 8. CHECK FUNCTION OF INJECTOR-I

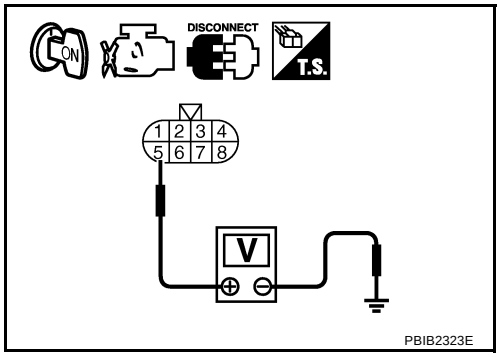
**Without CONSULT-II**

1. Stop engine.
2. Disconnect harness connectors F33, F221
3. Turn ignition switch ON.




4. Check voltage between harness connector F33 terminal 5 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**




5. Turn ignition switch OFF.
6. Disconnect ECM harness connector.
7. Check harness continuity between harness connector F33 and ECM as follows.
   Refer to Wiring Diagram.

| Cylinder | Harness connector F33 terminal | ECM terminal |
|---|---|---|
| 1 | 6 | 23 |
| 2 | 4 | 42 |
| 3 | 2 | 22 |
| 4 | 3 | 41 |
| 5 | 1 | 21 |
| 6 | 7 | 40 |

**Continuity should exist.**

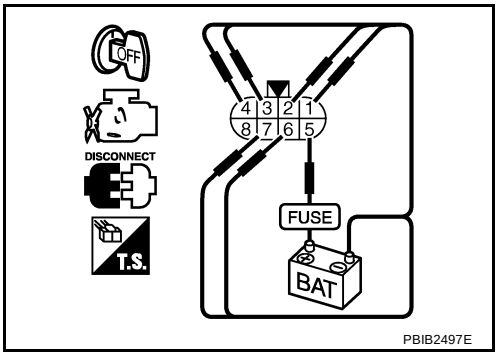
8. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Perform trouble diagnosis for INJECTOR CIRCUIT, refer to EC-640, "INJECTOR CIRCUIT" .

## 9. CHECK FUNCTION OF INJECTOR-II

Provide battery voltage between harness connector F221 as follows and then interrupt it. Listen to each injector operating sound.




| Cylinder | Harness connector F221 terminal | |
|---|---|---|
| | (+) | (–) |
| 1 | 5 | 6 |
| 2 | 5 | 4 |
| 3 | 5 | 2 |
| 4 | 5 | 3 |
| 5 | 5 | 1 |
| 6 | 5 | 7 |

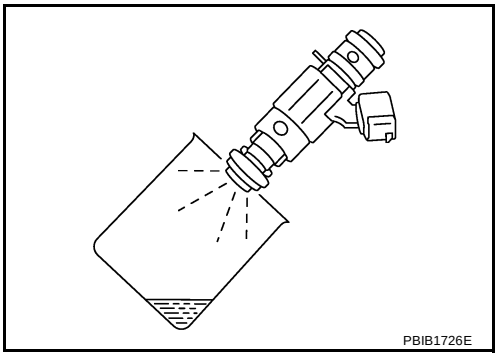
**Operating sound should exist.**

OK or NG

OK >> GO TO 10.
NG >> Perform trouble diagnosis for INJECTOR CIRCUIT, refer to EC-640, "INJECTOR CIRCUIT" .

## 10. 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. Reconnect all harness connectors disconnected.
4. Disconnect all injector harness connectors.
5. Remove injector gallery assembly. Refer to EM-46, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
6. For DTC P0171, reconnect injector harness connectors on bank 1.
   For DTC P0174, reconnect injector harness connectors on bank 2.
7. Disconnect all ignition coil harness connectors.
8. Prepare pans or saucers under each injector.
9. Crank engine for about 3 seconds.
   For DTC P0171, make sure that fuel sprays out from injectors on bank 1.
   For DTC P0174, make sure that fuel sprays out from injectors on bank 2.




**Fuel should be sprayed evenly for each injector.**

OK or NG

OK >> GO TO 11.
NG >> Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

## 11. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

# DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

## On Board Diagnosis Logic

ABS00DF3

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the air fuel ratio (A/F) 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 lights up the MIL (2 trip detection logic).

| Sensor | Input signal to ECM | ECM function | Actuator |
|---|---|---|---|
| Air fuel ratio (A/F) sensor 1 | Density of oxygen in exhaust gas (Mixture ratio feedback signal) | Fuel injection control | Fuel injector |

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0172<br>0172<br>(Bank 1)<br>P0175<br>0175<br>(Bank 2) | Fuel injection system too rich | ● Fuel injection system does not operate properly.<br>● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.) | ● Air fuel ratio (A/F) sensor 1<br>● Fuel injector<br>● Exhaust gas leaks<br>● Incorrect fuel pressure<br>● Mass air flow sensor |

## DTC Confirmation Procedure

ABS00DF4

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

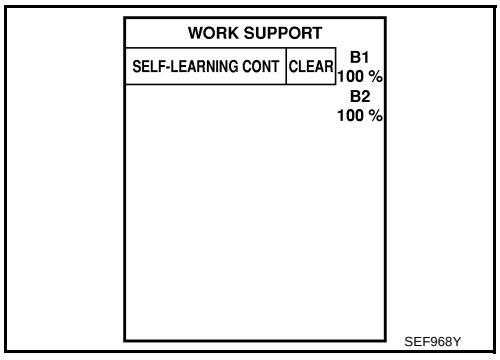
**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

### WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172, P0175 should be detected at this stage, if a malfunction exists. If so, go to EC-256, "Diagnostic Procedure" .

   **NOTE:**
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
   **Hold the accelerator pedal as steady as possible.**



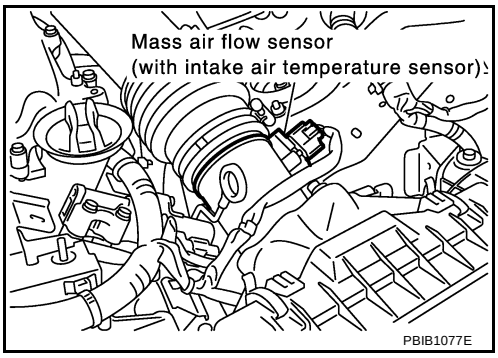

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

| | |
|---|---|
| Engine speed | Engine speed in the freeze frame data ± 400 rpm |
| Vehicle speed | Vehicle speed in the freeze frame data ± 10 km/h (6 MPH) |
| Engine coolant temperature (T) condition | When the freeze frame data shows lower than 70 °C (158 °F),<br>T should be lower than 70 °C (158 °F). |
| | When the freeze frame data shows higher than or equal to 70 °C (158 °F),<br>T should be higher than or equal to 70 °C (158 °F). |

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-256, "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 10 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select Service $03 with GST. Make sure DTC P0102 is detected.
6. Select Service $04 with GST and erase the DTC P0102.
7. Start engine again and let it idle for at least 10 minutes.
8. Select Service $07 with GST. The 1st trip DTC P0172 or P0175 should be detected at this stage, if a malfunction exists. If so, go to EC-256, "Diagnostic Procedure" .




**NOTE:**
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
   **Hold the accelerator pedal as steady as possible.**

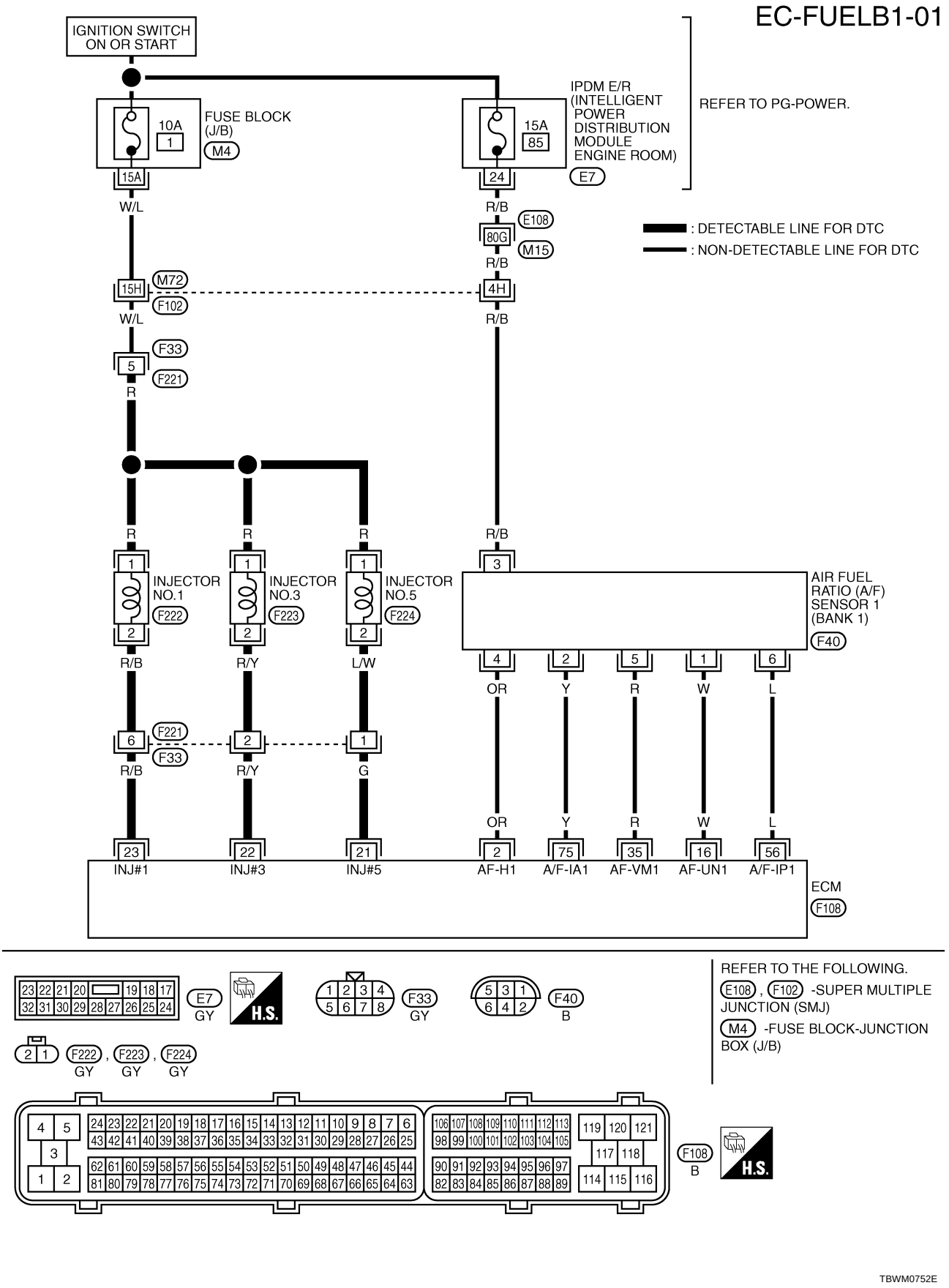
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

| | |
|---|---|
| Engine speed | Engine speed in the freeze frame data ± 400 rpm |
| Vehicle speed | Vehicle speed in the freeze frame data ± 10 km/h (6 MPH) |
| Engine coolant temperature (T) condition | When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F). |
| | When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F). |

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-256, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.

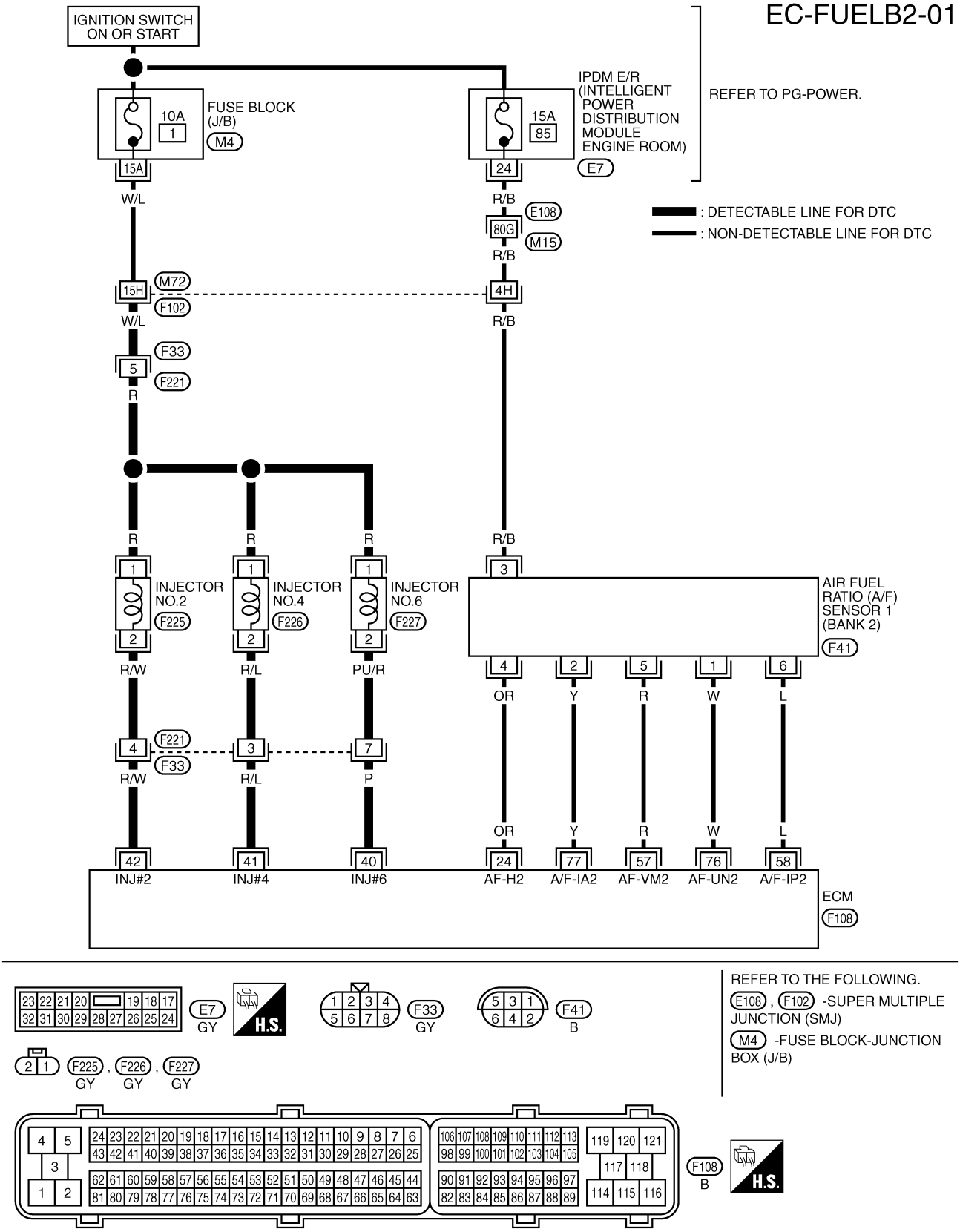
## Wiring Diagram
**BANK 1**

ABS00DF5




TBWM0752E

## BANK 2



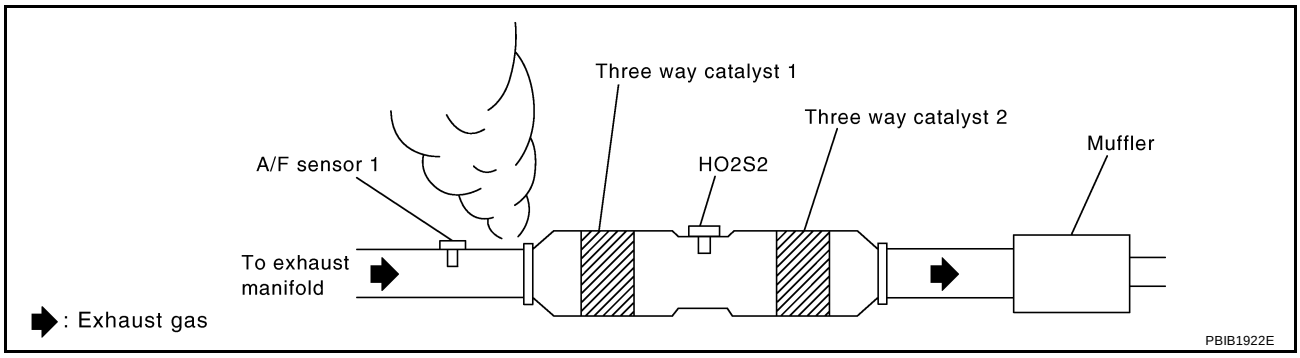

TBWM0753E

## Diagnostic Procedure

ABS00DF6

### 1. CHECK EXHAUST GAS LEAK

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




OK or NG

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

### 2. CHECK FOR INTAKE AIR LEAK

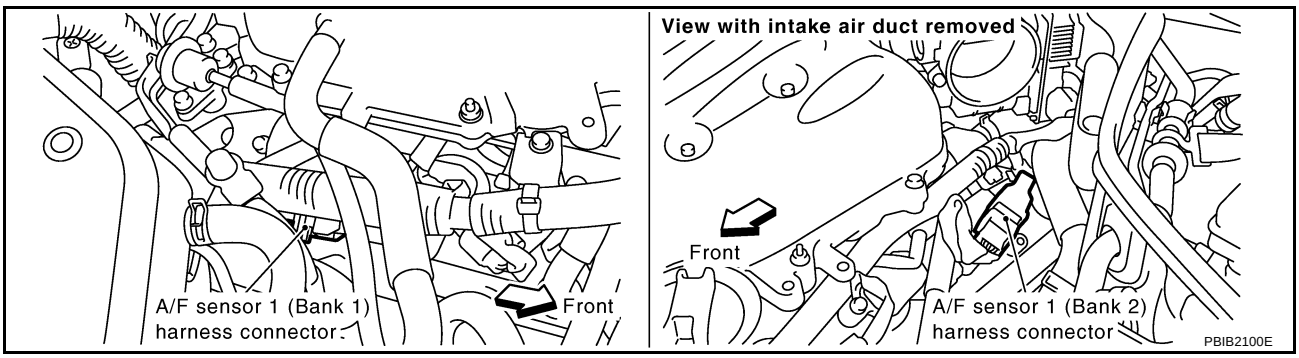
Listen for an intake air leak after the mass air flow sensor.

OK or NG

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

## 3. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding A/F sensor 1 harness connector.




3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.

| | A/F sensor 1 terminal | ECM terminal |
|---|---|---|
| Bank 1 | 1 | 16 |
| | 2 | 75 |
| | 5 | 35 |
| | 6 | 56 |
| Bank 2 | 1 | 76 |
| | 2 | 77 |
| | 5 | 57 |
| | 6 | 58 |

**Continuity should exist.**

5. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

| Bank 1 | | Bank 2 | |
|---|---|---|---|
| A/F sensor 1 terminal | ECM terminal | A/F sensor 1 terminal | ECM terminal |
| 1 | 16 | 1 | 76 |
| 2 | 75 | 2 | 77 |
| 5 | 35 | 5 | 57 |
| 6 | 56 | 6 | 58 |

**Continuity should not exist.**

6. Also check harness for short to power.

OK or NG

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

## 4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-91, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-91, "FUEL PRESSURE CHECK" .

**At idling: Approximately 350 kPa (3.57 kg/cm$^2$ , 51 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-647, "FUEL PUMP CIRCUIT" .)
- Fuel pressure regulator (Refer to EC-91, "FUEL PRESSURE CHECK" .)

>> Repair or replace.

## 6. CHECK MASS AIR FLOW SENSOR

**With CONSULT-II**

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

**2.0 - 6.0 g·m/sec: at idling**
**7.0 - 20.0 g·m/sec: at 2,500 rpm**

**With GST**

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

**2.0 - 6.0 g·m/sec: at idling**
**7.0 - 20.0 g·m/sec: at 2,500 rpm**

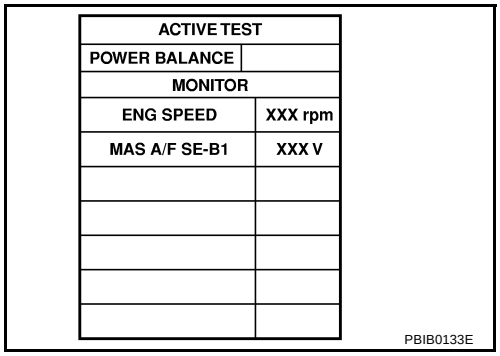
OK or NG

OK (With CONSULT-II)>>GO TO 7.
OK (Without CONSULT-II)>>GO TO 8.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-182, "DTC P0101 MAF SENSOR" .

## 7. CHECK FUNCTION OF INJECTOR

**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.



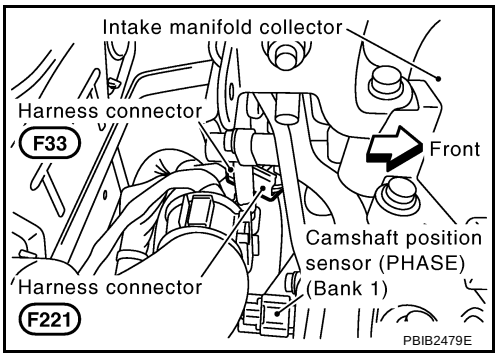
OK or NG

OK >> GO TO 10.
NG >> Perform trouble diagnosis for INJECTOR CIRCUIT, EC-640, "INJECTOR CIRCUIT" .

## 8. CHECK FUNCTION OF INJECTOR-I

**Without CONSULT-II**

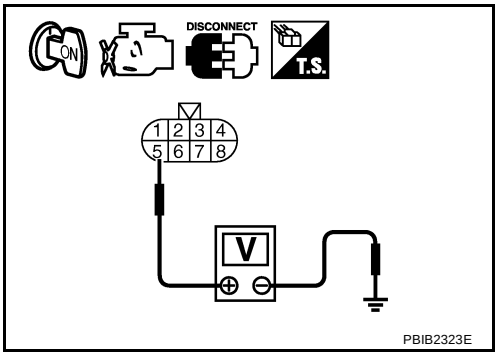
1. Stop engine.
2. Disconnect harness connector F33, F221
3. Turn ignition switch ON.




4. Check voltage between harness connector F33 terminal 5 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

5. Turn ignition switch OFF.
6. Disconnect ECM harness connector.
7. Check harness continuity between harness connector F33 and ECM as follows.
   Refer to Wiring Diagram.




| Cylinder | Harness connector F33 terminal | ECM terminal |
|---|---|---|
| 1 | 6 | 23 |
| 2 | 4 | 42 |
| 3 | 2 | 22 |
| 4 | 3 | 41 |
| 5 | 1 | 21 |
| 6 | 7 | 40 |

**Continuity should exist.**

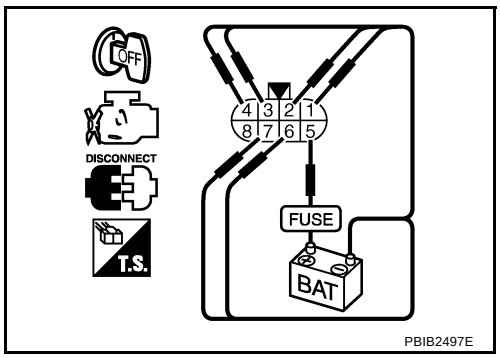
8. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Perform trouble diagnosis for INJECTOR CIRCUIT, refer to EC-640, "INJECTOR CIRCUIT" .

## 9. CHECK FUNCTION OF INJECTOR-II

Provide battery voltage between harness connector F221 as follows and then interrupt it. Listen to each injector operating sound.




| Cylinder | Harness connector F221 terminal | |
|---|---|---|
| | (+) | (–) |
| 1 | 5 | 6 |
| 2 | 5 | 4 |
| 3 | 5 | 2 |
| 4 | 5 | 3 |
| 5 | 5 | 1 |
| 6 | 5 | 7 |

**Operating sound should exist.**

OK or NG

OK >> GO TO 10.
NG >> Perform trouble diagnosis for INJECTOR CIRCUIT, refer to EC-640, "INJECTOR CIRCUIT" .

## 10. CHECK INJECTOR

1. Remove injector assembly. Refer to EM-46, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Reconnect all harness connectors disconnected.
4. Disconnect all injector harness connectors.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each injectors.
7. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)>>GO TO 11.
NG (Drips.)>>Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

## 11. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

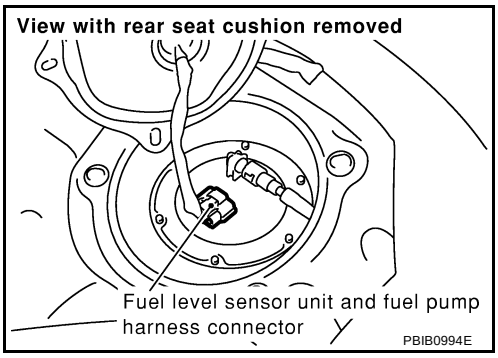
# DTC P0181 FTT SENSOR

PFP:22630

## Component Description

ABS00ARG

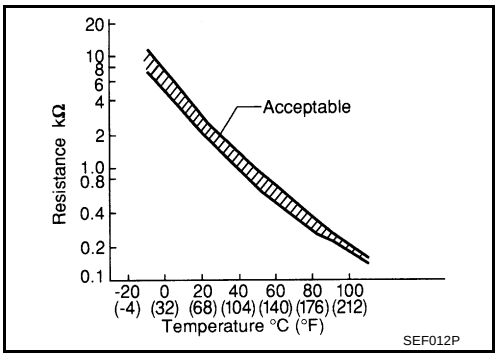
The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical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




**<Reference data>**

| Fluid temperature °C (°F) | Voltage* V | Resistance kΩ |
|---|---|---|
| 20 (68) | 3.5 | 2.3 - 2.7 |
| 50 (122) | 2.2 | 0.79 - 0.90 |

*: This data is reference value and is measured between ECM terminal 107 (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

ABS00ARH

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0181<br>0181 | Fuel tank temperature sensor circuit range/ performance | Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor. | ● Harness or connectors (The sensor circuit is open or shorted)<br>● Fuel tank temperature sensor |

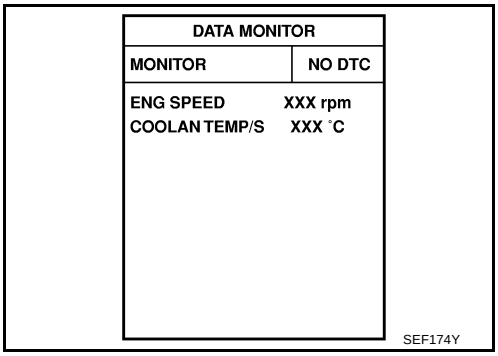
## DTC Confirmation Procedure

ABS00ARI

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

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
   If the result is NG, go to EC-264, "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-264, "Diagnostic Procedure" .



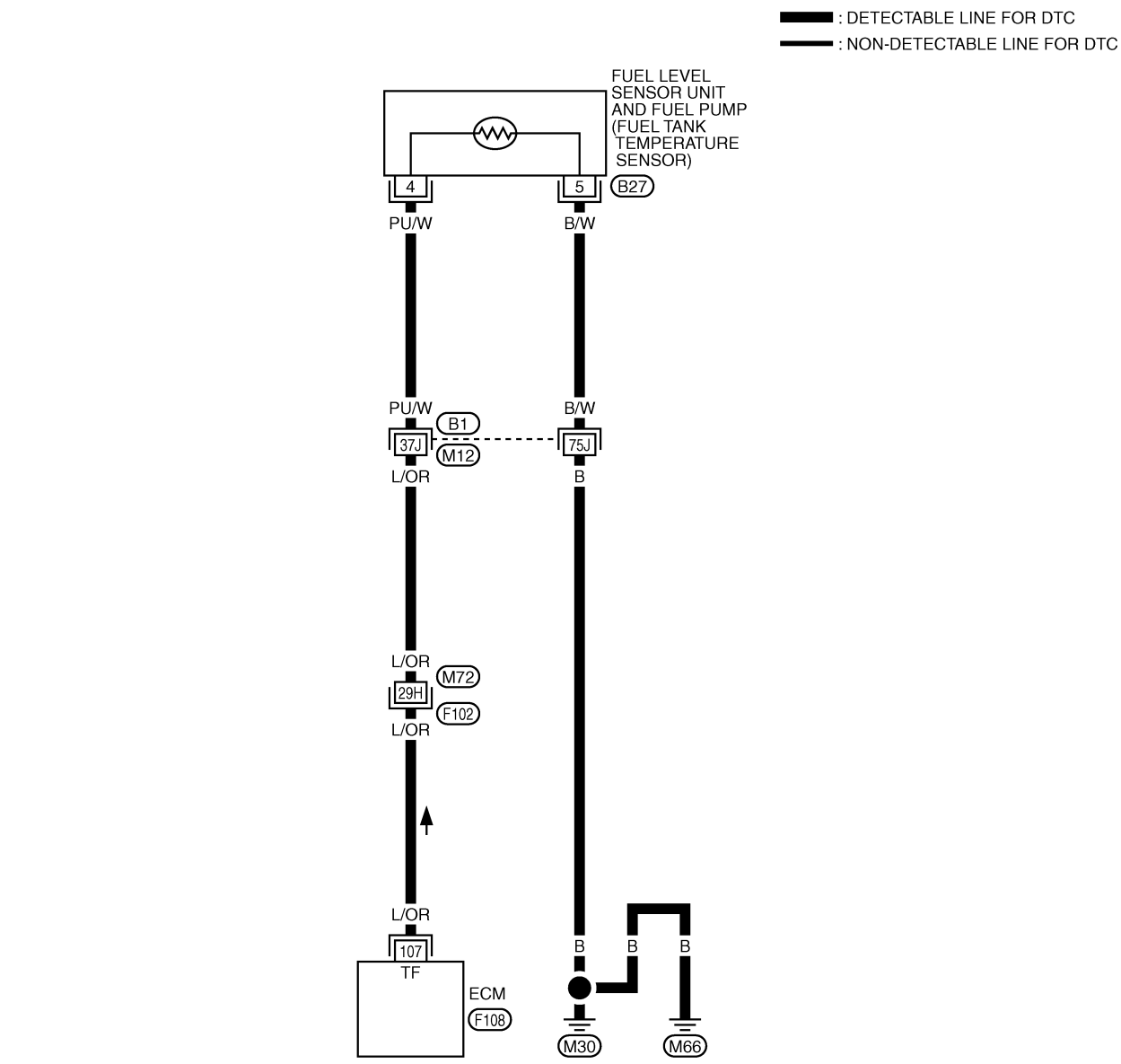
**WITH GST**

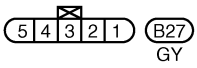
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

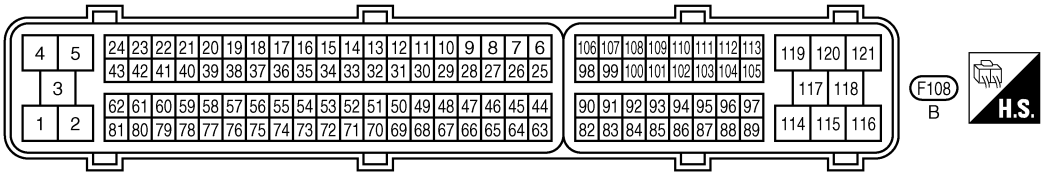
ABS00ARJ

EC-FTTS-01




REFER TO THE FOLLOWING.
F102 , B1 -SUPER MULTIPLE JUNCTION (SMJ)



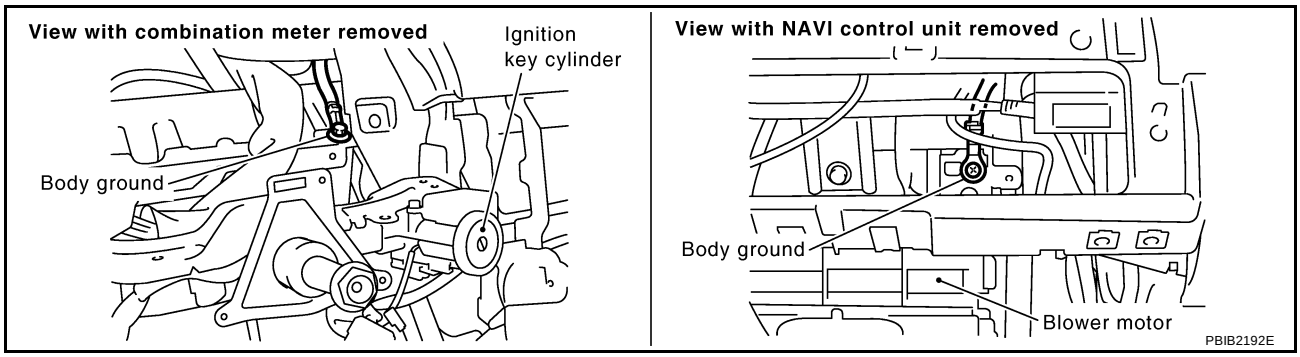

TBWM0754E

## Diagnostic Procedure

ABS00ARK

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

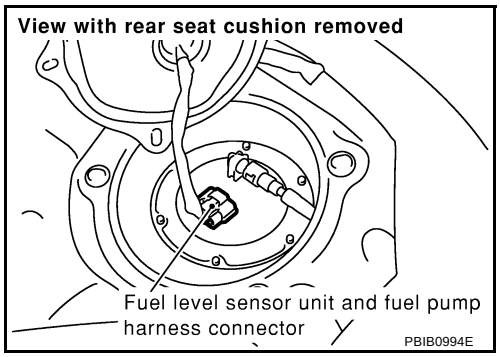



OK or NG

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

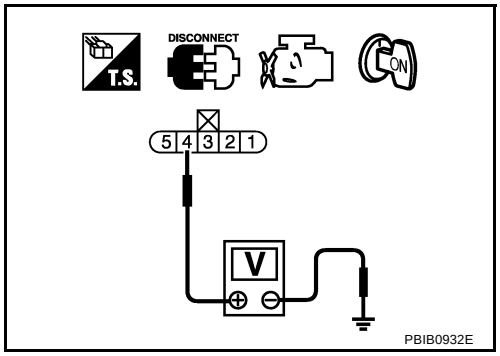
### 2. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect “fuel level sensor unit and fuel pump” harness connector.
2. Turn ignition switch ON.




3. Check voltage between “fuel level sensor unit and fuel pump” terminal 4 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**




OK or NG

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

### 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M72, F102
- Harness connectors B1, M12
- Harness for open or short between ECM and “fuel level sensor unit and fuel pump”

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

## 4. CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 5 and ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

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

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M12
- Harness for open or short between “fuel level sensor unit and fuel pump” and ground.

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

## 6. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-265, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace fuel level sensor unit.

## 7. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

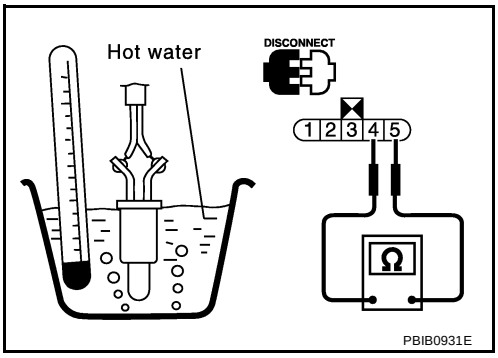
# Component Inspection

ABS00ARL

## FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between “fuel level sensor unit and fuel pump” terminals 4 and 5 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

ABS00ARM

## FUEL TANK TEMPERATURE SENSOR

Refer to FL-4, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

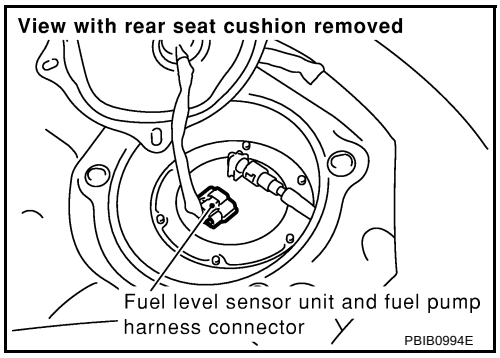
# DTC P0182, P0183 FTT SENSOR

PFP:22630

## Component Description

ABS00ARN

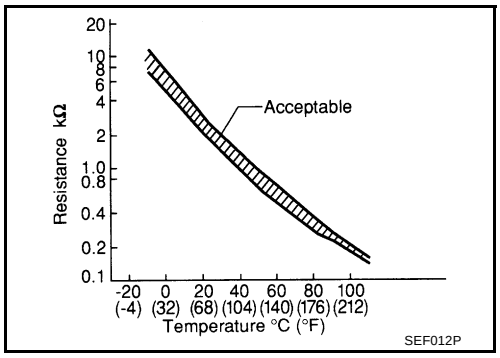
The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical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




**<Reference data>**

| Fluid temperature °C (°F) | Voltage* V | Resistance kΩ |
|---|---|---|
| 20 (68) | 3.5 | 2.3 - 2.7 |
| 50 (122) | 2.2 | 0.79 - 0.90 |

*: This data is reference value and is measured between ECM terminal 107 (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

ABS00ARO

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0182<br>0182 | Fuel tank temperature sensor circuit low input | An excessively low voltage from the sensor is sent to ECM. | ● Harness or connectors (The sensor circuit is open or shorted.)<br>● Fuel tank temperature sensor |
| P0183<br>0183 | Fuel tank temperature sensor circuit high input | An excessively high voltage from the sensor is sent to ECM. | |

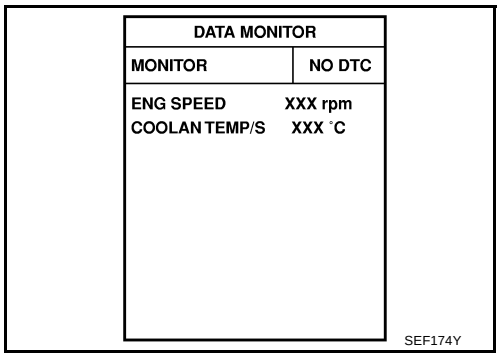
## DTC Confirmation Procedure

ABS00ARP

**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-268, "Diagnostic Procedure" .



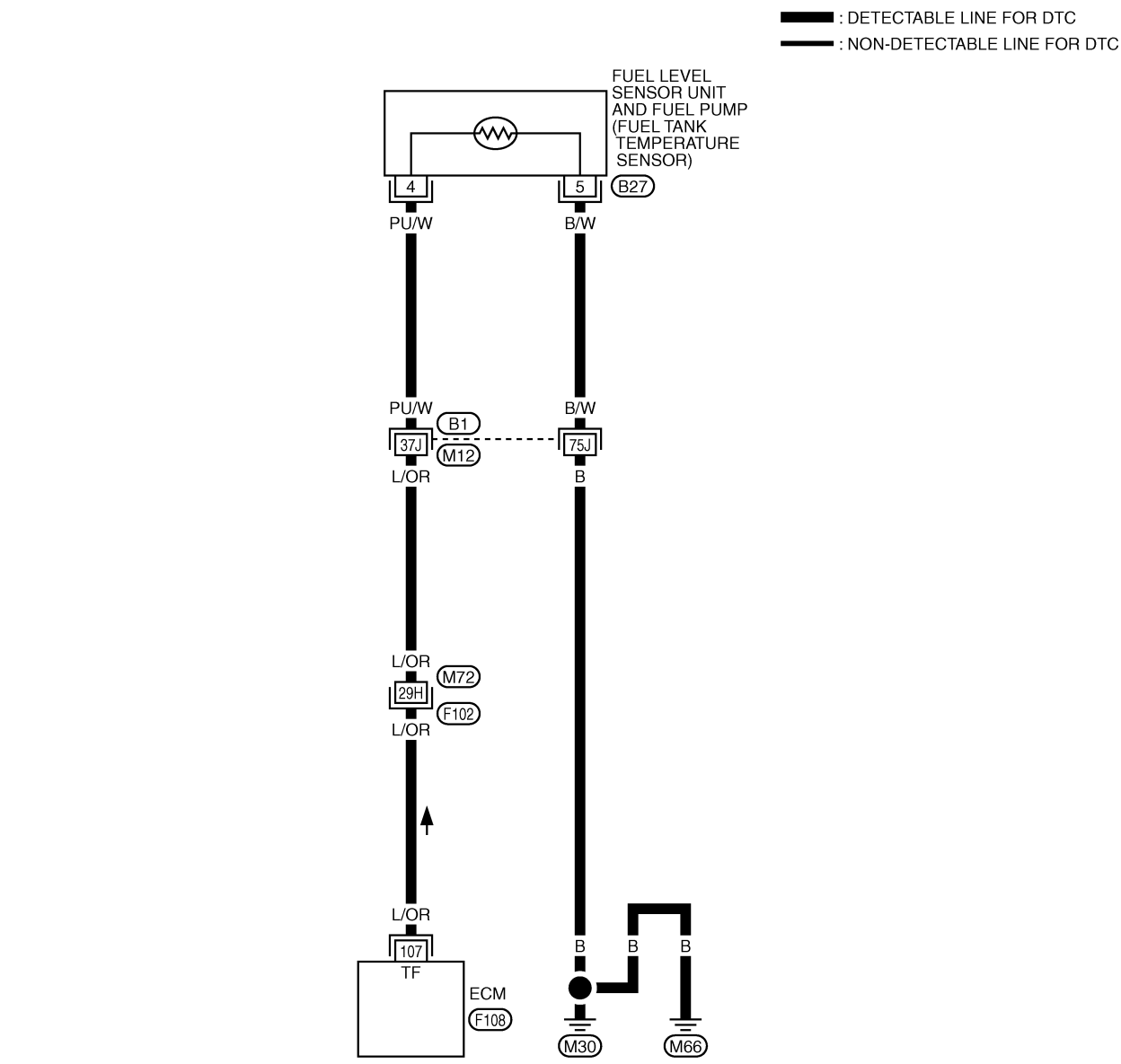

### WITH GST

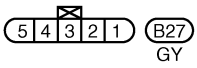
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

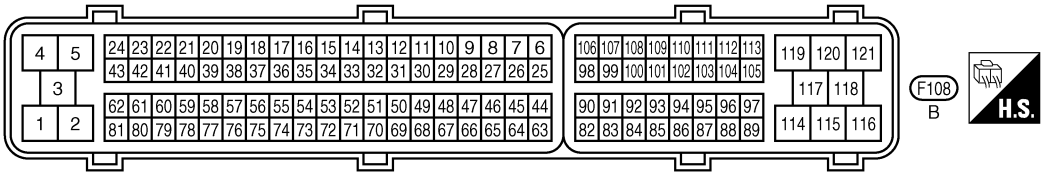
ABS00ARQ

EC-FTTS-01




REFER TO THE FOLLOWING.
F102 , B1 -SUPER MULTIPLE JUNCTION (SMJ)



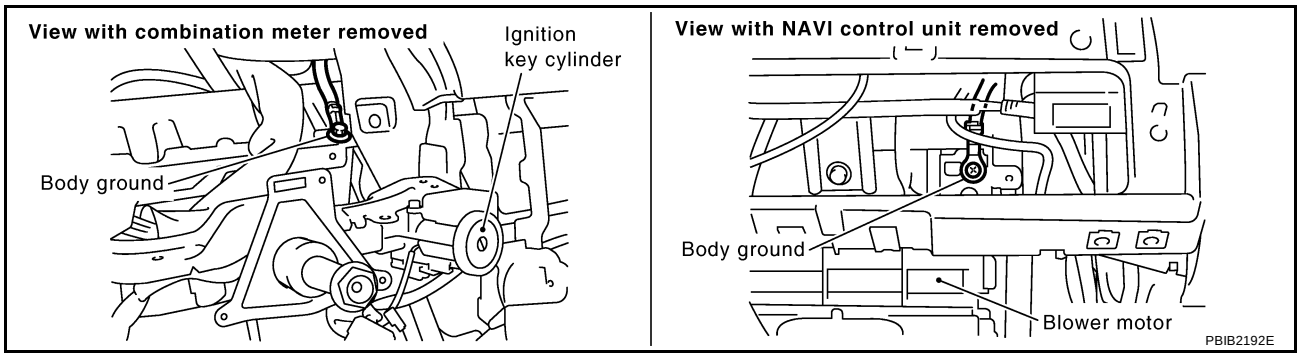

TBWM0754E

## Diagnostic Procedure

ABS00ARR

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

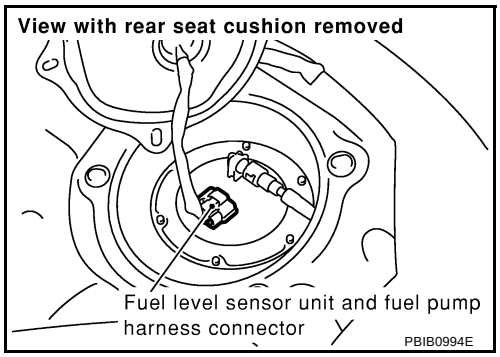



OK or NG

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

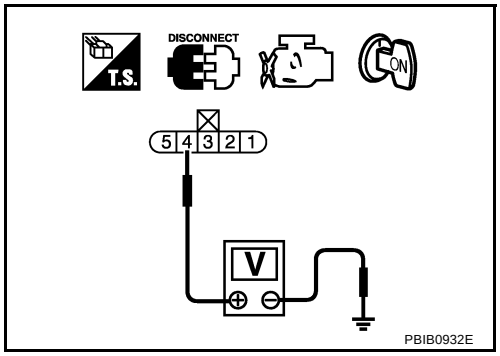
### 2. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect “fuel level sensor unit and fuel pump” harness connector.
2. Turn ignition switch ON.




3. Check voltage between “fuel level sensor unit and fuel pump” terminal 4 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**




OK or NG

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

### 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M72, F102
- Harness connectors B1, M12
- Harness for open or short between ECM and “fuel level sensor unit and fuel pump”

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

## 4. CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 5 and ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

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

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M12
- Harness for open or short between “fuel level sensor unit and fuel pump” and ground.

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

## 6. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-265, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace fuel level sensor unit.

## 7. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

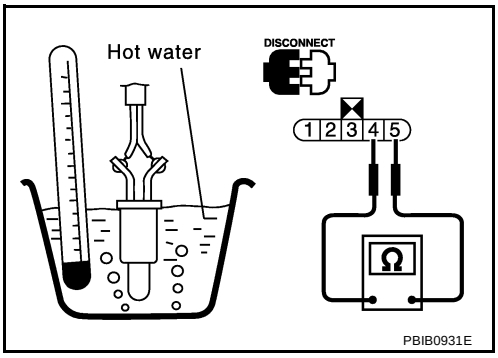
# Component Inspection

ABS00ARS

### FUEL TANK TEMPERATURE SENSOR

1. Remove fuel level sensor unit.
2. Check resistance between “fuel level sensor unit and fuel pump” terminals 4 and 5 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

ABS00ART

### FUEL TANK TEMPERATURE SENSOR

Refer to FL-4, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

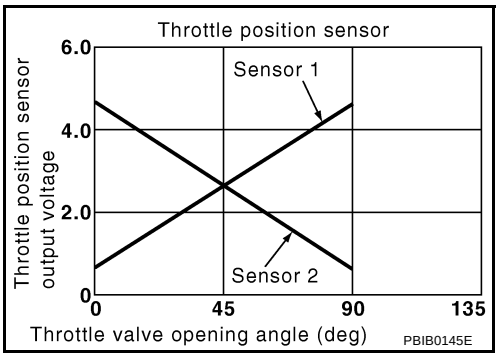
# DTC P0222, P0223 TP SENSOR

PFP:16119

## Component Description

ABS00ARU

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




## CONSULT-II Reference Value in Data Monitor Mode

ABS00ARV

Specification data are reference values.

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

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

## On Board Diagnosis Logic

ABS00ARW

**These self-diagnoses have the one trip detection logic.**

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0222<br>0222 | Throttle position sensor 1 circuit low input | An excessively low voltage from the TP sensor 1 is sent to ECM. | ● Harness or connectors (The TP sensor 1 circuit is open or shorted.) (The APP sensor 2 circuit is shorted.)<br>● Electric throttle control actuator (TP sensor 1)<br>● Accelerator pedal position sensor (APP sensor 2) |
| P0223<br>0223 | Throttle position sensor 1 circuit high input | An excessively high voltage from the TP sensor 1 is sent to ECM. | |

### FAIL-SAFE MODE

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

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

## DTC Confirmation Procedure

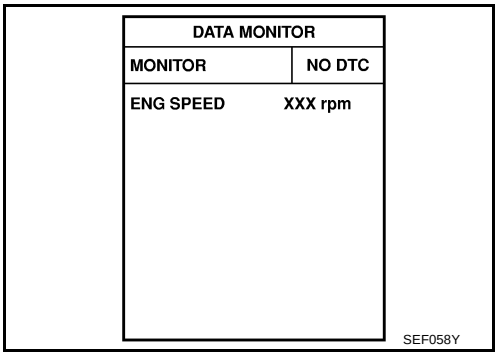
ABS00ARX

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

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

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-274, "Diagnostic Procedure" .



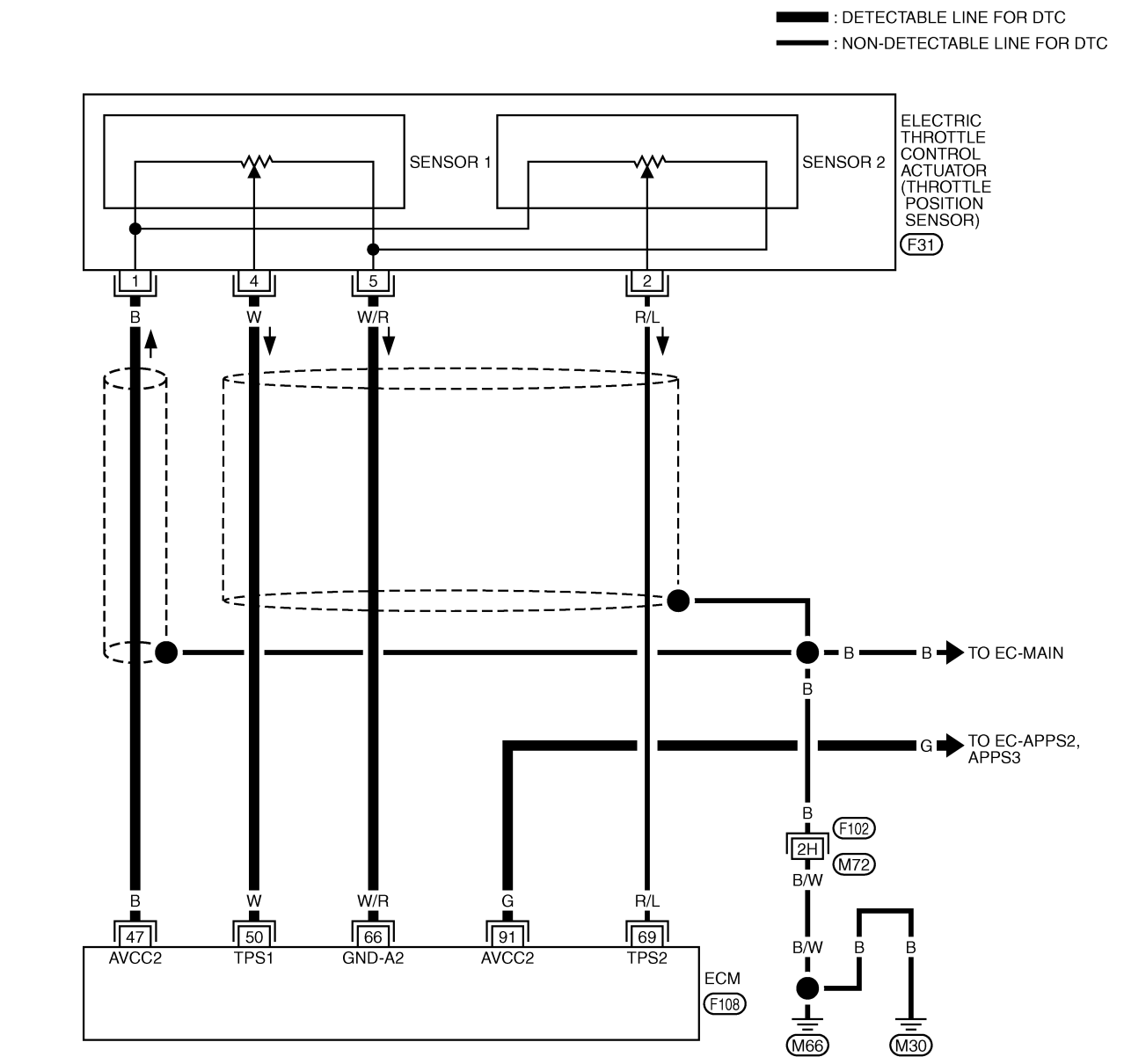

### WITH GST

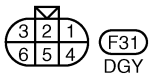
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

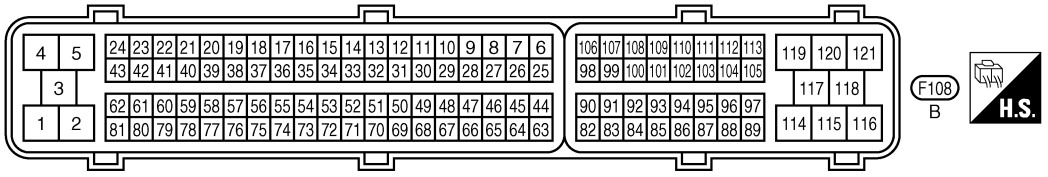
ABS00ARY

EC-TPS1-01




REFER TO THE FOLLOWING.
F102 -SUPER MULTIPLE JUNCTION (SMJ)




TBWM0755E

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

**CAUTION:**

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

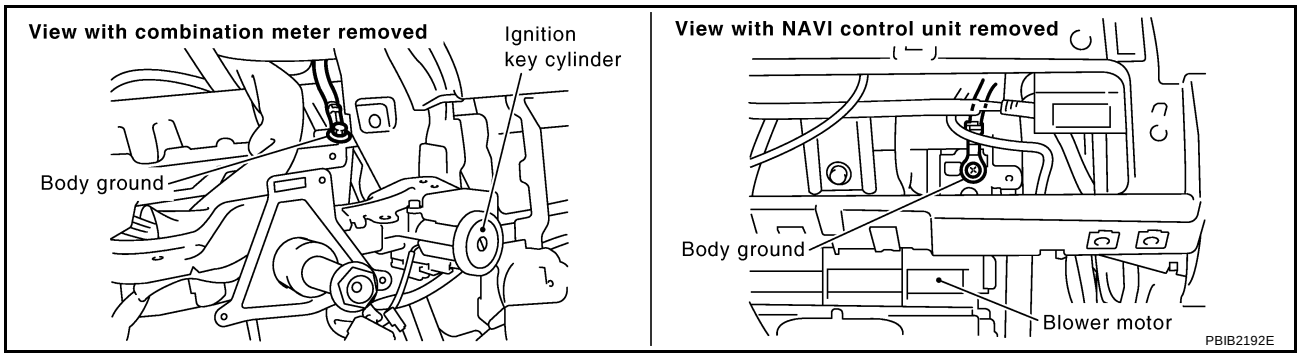
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 47 | B | Sensor power supply (Throttle position sensor) | **[Ignition switch: ON]** | Approximately 5V |
| 50 | W | Throttle position sensor 1 | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully released | More than 0.36V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully depressed | Less than 4.75V |
| 66 | W/R | Sensor ground (Throttle position sensor) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 69 | R/L | Throttle position sensor 2 | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully released | Less than 4.75V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully depressed | More than 0.36V |
| 91 | G | Sensor power supply (Accelerator pedal position sensor 2) | **[Ignition switch: ON]** | Approximately 5V |

## Diagnostic Procedure

ABS00ARZ

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

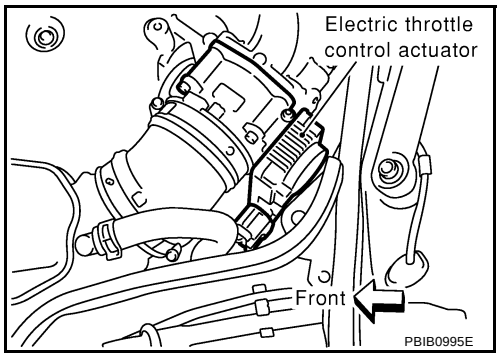



OK or NG

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

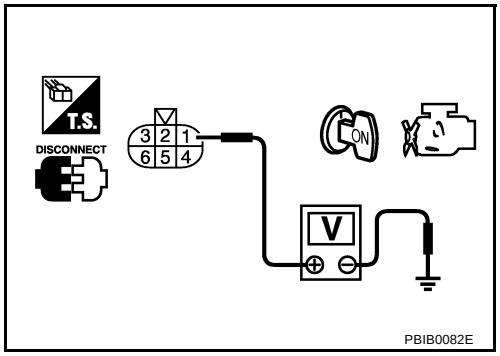
### 2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

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




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

**Voltage: Approximately 5V**




OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

### 3. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

**Continuity should exist.**

OK or NG

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

## 4. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

| ECM terminal | Sensor terminal | Reference Wiring Diagram |
|---|---|---|
| 47 | Electric throttle control actuator terminal 1 | EC-272 |
| 91 | APP sensor terminal 4 | EC-607 |

OK or NG

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

## 5. CHECK APP SENSOR

Refer to EC-611, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

## 6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-88, "Accelerator Pedal Released Position Learning" .
3. Perform EC-88, "Throttle Valve Closed Position Learning" .
4. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

## 7. CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 5 and ECM terminal 66. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 8. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 4. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK >> GO TO 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-276, "Component Inspection" .

OK or NG

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

## 10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-88, "Throttle Valve Closed Position Learning" .
3. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

## 11. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

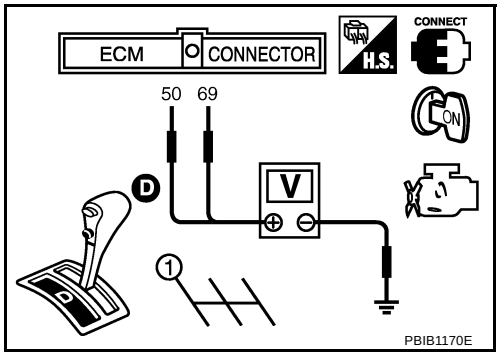
# Component Inspection

ABS00AS0

### THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-88, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set shift lever to D (A/T) or 1st (M/T) position.
5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

| Terminal | Accelerator pedal | Voltage |
|---|---|---|
| 50 (Throttle position sensor 1) | Fully released | More than 0.36V |
| | Fully depressed | Less than 4.75V |
| 69 (Throttle position sensor 2) | Fully released | Less than 4.75V |
| | Fully depressed | More than 0.36V |




6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-88, "Throttle Valve Closed Position Learning" .
8. Perform EC-89, "Idle Air Volume Learning" .

# Removal and Installation

ABS00AS1

### ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-19, "INTAKE MANIFOLD COLLECTOR" .

# DTC P0300 - P0306 MULTIPLE CYLINDER MISFIRE, NO. 1 - 6 CYLINDER MISFIRE

PFP:00000

## On Board Diagnosis Logic

ABS00DF7

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

| Sensor | Input Signal to ECM | ECM function |
|---|---|---|
| Crankshaft position sensor (POS) | Engine speed | On board diagnosis of misfire |

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the 1st 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 2nd 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. | ● Improper spark plug<br>● Insufficient compression<br>● Incorrect fuel pressure<br>● The injector circuit is open or shorted<br>● Fuel injector<br>● Intake air leak<br>● The ignition signal circuit is open or shorted<br>● Lack of fuel<br>● Signal plate<br>● Air fuel ratio (A/F) sensor 1<br>● Incorrect PCV hose connection |
| 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. | |
| P0305<br>0305 | No. 5 cylinder misfire detected | No. 5 cylinder misfires. | |
| P0306<br>0306 | No. 6 cylinder misfire detected | No. 6 cylinder misfires. | |

## DTC Confirmation Procedure

ABS00DF8

**CAUTION:**

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

**NOTE:**

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

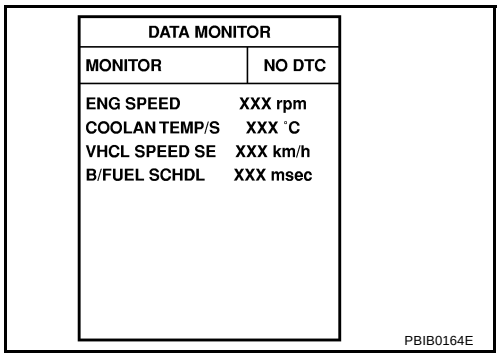
### WITH CONSULT-II

1. Turn ignition switch ON, and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Restart engine and let it idle for about 15 minutes.
5. If 1st trip DTC is detected, go to EC-278, "Diagnostic Procedure" .

**NOTE:**
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.

b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
**Hold the accelerator pedal as steady as possible.**




The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

| | |
|---|---|
| Engine speed | Engine speed in the freeze frame data ± 400 rpm |
| Vehicle speed | Vehicle speed in the freeze frame data ± 10 km/h (6 MPH) |
| Engine coolant temperature (T) condition | When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F). |
| | When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F). |

The time to driving varies according to the engine speed in the freeze frame data.

| Engine speed | Time |
|---|---|
| Around 1,000 rpm | Approximately 10 minutes |
| Around 2,000 rpm | Approximately 5 minutes |
| More than 3,000 rpm | Approximately 3.5 minutes |

### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Diagnostic Procedure

ABS00DF9

### 1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

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

OK or NG

OK >> GO TO 2.
NG >> Discover air leak location and repair.

### 2. CHECK FOR EXHAUST SYSTEM CLOGGING

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

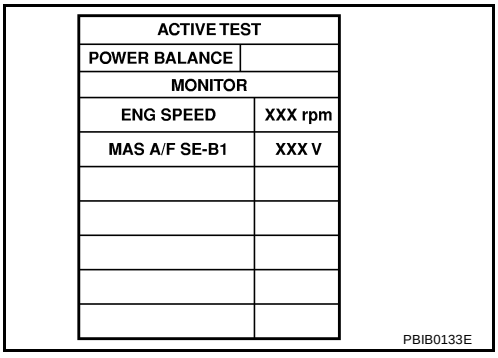
OK or NG

OK (With CONSULT-II)>>GO TO 3.
OK (Without CONSULT-II)>>GO TO 4.
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?



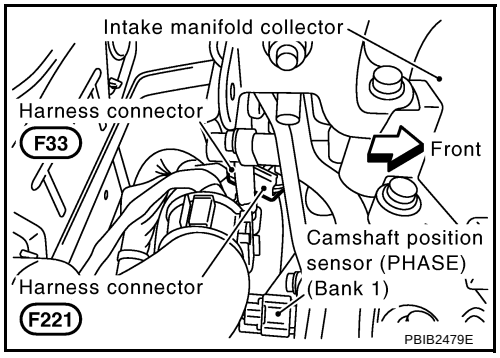

Yes or No

Yes >> GO TO 4.
No >> GO TO 10.

## 4. CHECK FUNCTION OF INJECTOR-I

**Without CONSULT-II**

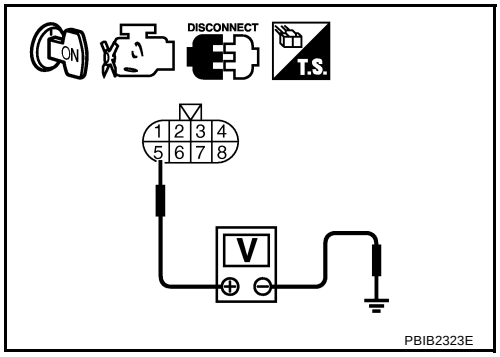
1. Turn ignition switch OFF.
2. Disconnect harness connectors F33, F221
3. Turn ignition switch ON.




4. Check voltage between harness connector F33 terminal 5 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

5. Turn ignition switch OFF.
6. Disconnect ECM harness connector.
7. Check harness continuity between harness connector F33 and ECM as follows.
   Refer to Wiring Diagram.




| Cylinder | Harness connector F33 terminal | ECM terminal |
|---|---|---|
| 1 | 6 | 23 |
| 2 | 4 | 42 |
| 3 | 2 | 22 |
| 4 | 3 | 41 |
| 5 | 1 | 21 |
| 6 | 7 | 40 |

**Continuity should exist.**

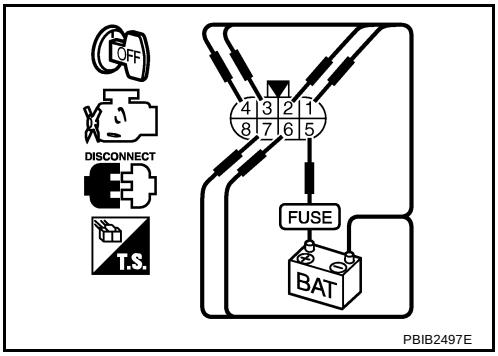
8. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Perform trouble diagnosis for INJECTOR CITCUIT, refer to EC-640, "INJECTOR CIRCUIT" .

## 5. CHECK FUNCTION OF INJECTOR-II

Provide battery voltage between harness connector F221 as follows and then interrupt it. Listen to each injector operating sound.




| Cylinder | Harness connector F221 terminal | |
|---|---|---|
| | (+) | (–) |
| 1 | 5 | 6 |
| 2 | 5 | 4 |
| 3 | 5 | 2 |
| 4 | 5 | 3 |
| 5 | 5 | 1 |
| 6 | 5 | 7 |

**Operating sound should exist.**

OK or NG

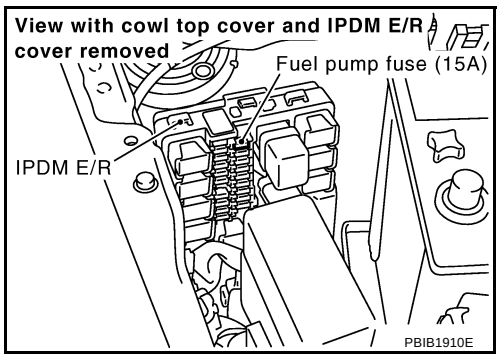
OK >> GO TO 6.
NG >> Perform trouble diagnosis for INJECTOR CIRCUIT, refer to EC-640, "INJECTOR CIRCUIT" .

## 6. CHECK FUNCTION OF IGNITION COIL-I

**CAUTION:**
**Do the following procedure in the place where ventilation is good without the combustible.**

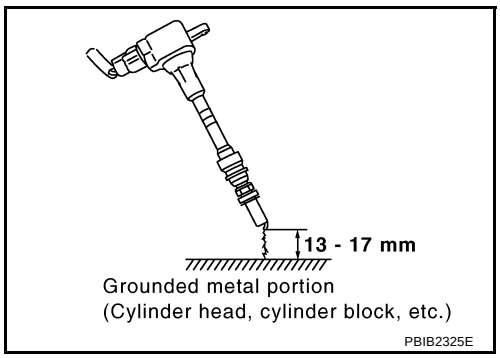
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

   **NOTE:**
   Do not use CONSULT-II to release fuel pressure, or fuel pressure applies again during the following procedure.
4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.
7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
8. Remove ignition coil and spark plug of the cylinder to be checked.




9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
10. Connect spark plug and harness connector to ignition coil.
11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

    **Spark should be generated.**




**CAUTION:**

- **Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm is taken.**

**NOTE:**
**When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.**

OK or NG

OK >> GO TO 10.
NG >> GO TO 7.

## 7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

   **Spark should be generated.**

OK or NG

OK >> GO TO 8.
NG >> Check ignition coil, power transistor and their circuits. Refer to EC-627, "IGNITION SIGNAL" .

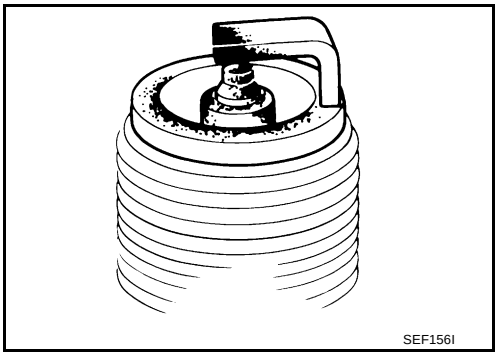
## 8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

OK or NG

OK >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-19, "Changing Spark Plugs (Platinum-Tipped Type)" .

NG >> 1. Repair or clean spark plug.
2. GO TO 9.




## 9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

**Spark should be generated.**

OK or NG

OK >> **INSPECTION END**

NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-19, "Changing Spark Plugs (Platinum-Tipped Type)" .

## 10. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-101, "CHECKING COMPRESSION PRESSURE" .

| | |
|---|---|
| **Standard:** | **1,275 kPa (13.0 kg/cm$^2$ , 185 psi)/300 rpm** |
| **Minimum:** | **981 kPa (10.0 kg/cm$^2$ , 142 psi)/300 rpm** |
| **Difference between each cylinder:** | **98 kPa (1.0 kg/cm$^2$ , 14 psi)/300 rpm** |

OK or NG

OK >> GO TO 11.

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

## 11. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-91, "FUEL PRESSURE RELEASE" .
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-91, "FUEL PRESSURE CHECK" .

**At idle: Approximately 350 kPa (3.57 kg/cm$^2$ , 51 psi)**

OK or NG

OK >> GO TO 13.

NG >> GO TO 12.

## 12. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-647, "FUEL PUMP CIRCUIT" .)
- Fuel pressure regulator (Refer to EC-91, "FUEL PRESSURE CHECK" .)
- Fuel lines (Refer tor FL-3, "Checking Fuel Lines" .)
- Fuel filter for clogging

>> Repair or replace.

## 13. CHECK IGNITION TIMING

Check the following items. Refer to EC-71, "Basic Inspection" .

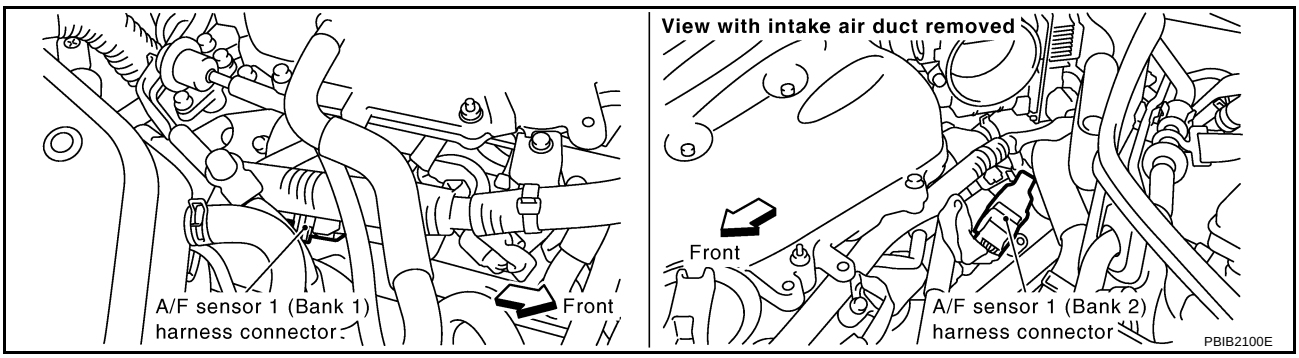
| Items | Specifications |
|---|---|
| Target idle speed | A/T: 650 ± 50 rpm (in P or N position)<br>M/T: 650 ± 50 rpm (in Neutral position) |
| Ignition timing | A/T: 15 ± 5° BTDC (in P or N position)<br>M/T: 15 ± 5° BTDC (in Neutral position) |

OK or NG

OK >> GO TO 14.
NG >> Follow the EC-71, "Basic Inspection" .

## 14. CHECK A/F SENSOR 1 INPUT SIGNAL

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.




3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

| | A/F sensor 1 terminal | ECM terminal |
|---|---|---|
| Bank 1 | 1 | 16 |
| | 2 | 75 |
| | 5 | 35 |
| | 6 | 56 |
| Bank 2 | 1 | 76 |
| | 2 | 77 |
| | 5 | 57 |
| | 6 | 58 |

**Continuity should exist.**

5. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

| Bank 1 | | Bank 2 | |
|---|---|---|---|
| A/F sensor 1 terminal | ECM terminal | A/F sensor 1 terminal | ECM terminal |
| 1 | 16 | 1 | 76 |
| 2 | 75 | 2 | 77 |
| 5 | 35 | 5 | 57 |
| 6 | 56 | 6 | 58 |

**Continuity should not exist.**

6. Also check harness for short to power.

OK or NG

OK >> GO TO 15.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 15. CHECK A/F SENSOR 1 HEATER

Refer to EC-401, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Replace (malfunctioning) A/F sensor 1.

## 16. CHECK MASS AIR FLOW SENSOR

**With CONSULT-II**
Check mass air flow sensor signal in “DATA MONITOR” mode with CONSULT-II.

**2.0 - 6.0 g·m/sec: at idling**
**7.0 - 20.0 g·m/sec: at 2,500 rpm**

**With GST**
Check mass air flow sensor signal in Service $01 with GST.

**2.0 - 6.0 g·m/sec: at idling**
**7.0 - 20.0 g·m/sec: at 2,500 rpm**

OK or NG

OK >> GO TO 17.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-182, "DTC P0101 MAF SENSOR" .

## 17. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-102, "Symptom Matrix Chart" .

OK or NG

OK >> GO TO 18.
NG >> Repair or replace.

## 18. 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 19.

## 19. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

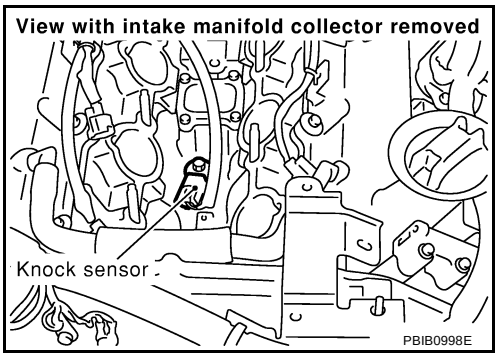
# DTC P0327, P0328 KS

PFP:22060

## Component Description

ABS00AS5

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

ABS00AS6

**The MIL will not light up for these diagnoses.**

| DTC No. | Trouble diagnosis name | DTC detected condition | Possible cause |
|---|---|---|---|
| P0327<br>0327 | Knock sensor circuit low input | An excessively low voltage from the sensor is sent to ECM. | ● Harness or connectors (The sensor circuit is open or shorted.)<br>● Knock sensor |
| P0328<br>0328 | Knock sensor circuit high input | An excessively high voltage from the sensor is sent to ECM. | |

## DTC Confirmation Procedure

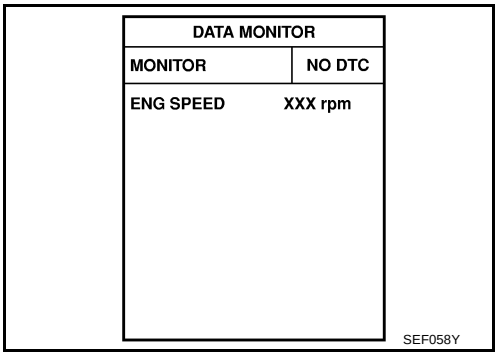
ABS00AS7

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

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

### WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-289, "Diagnostic Procedure" .



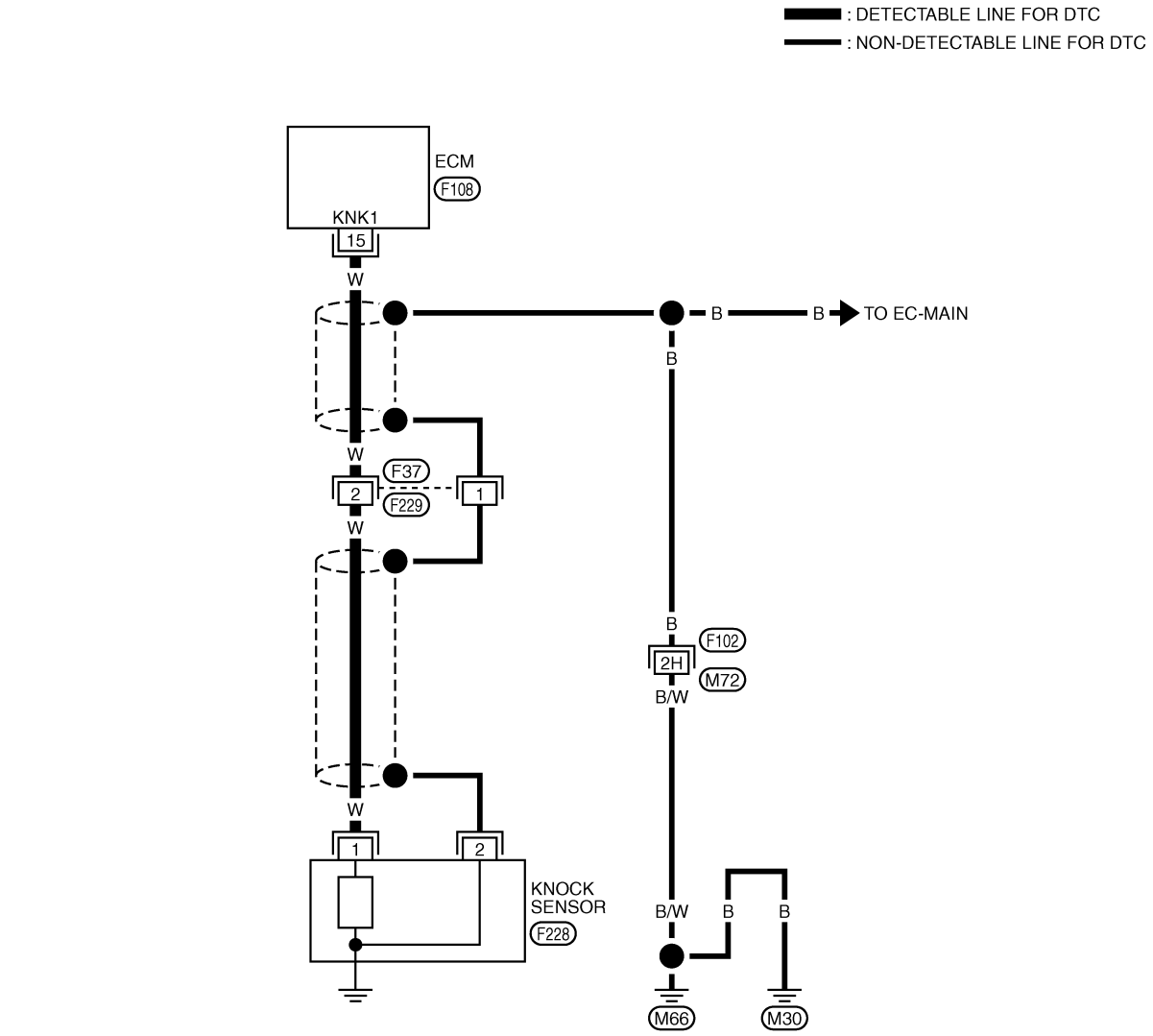

### WITH GST

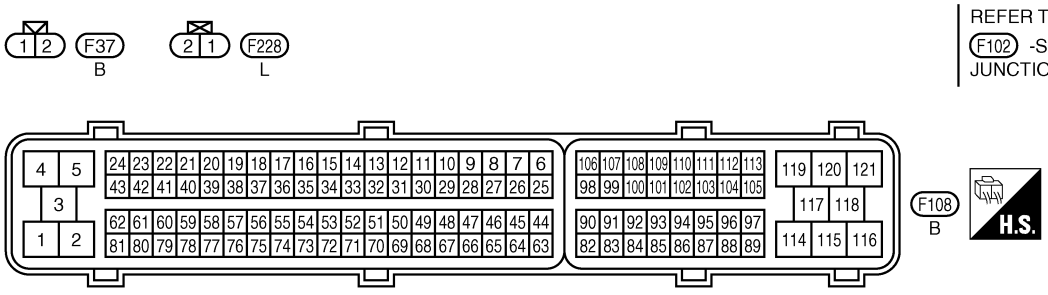
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

ABS00AS8

EC-KS-01




TBWM0756E

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

**CAUTION:**
**Do not use ECM ground terminals when measuring input/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) |
|---|---|---|---|---|
| 15 | W | Knock sensor | **[Engine is running]**<br>● Idle speed | Approximately 2.5V |

## Diagnostic Procedure

ABS00AS9

### 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 15 and ground. Refer to Wiring Diagram.

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

   **Resistance: Approximately 532 - 588 kΩ [at 20°C (68°F)]**

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

OK or NG

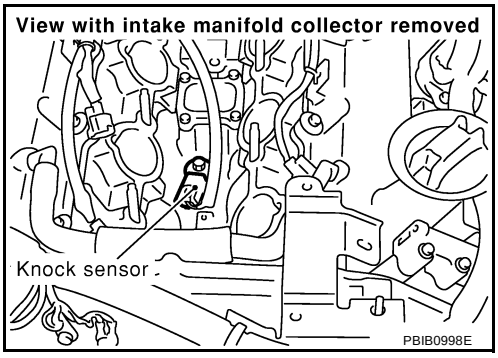
OK >> GO TO 4.
NG >> GO TO 2.

### 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 15 and knock sensor terminal 1.
   Refer to Wiring Diagram.

   **Continuity should exist.**

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




OK or NG

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

### 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F37, F229
- Harness for open or short between ECM and knock sensor

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

### 4. CHECK KNOCK SENSOR

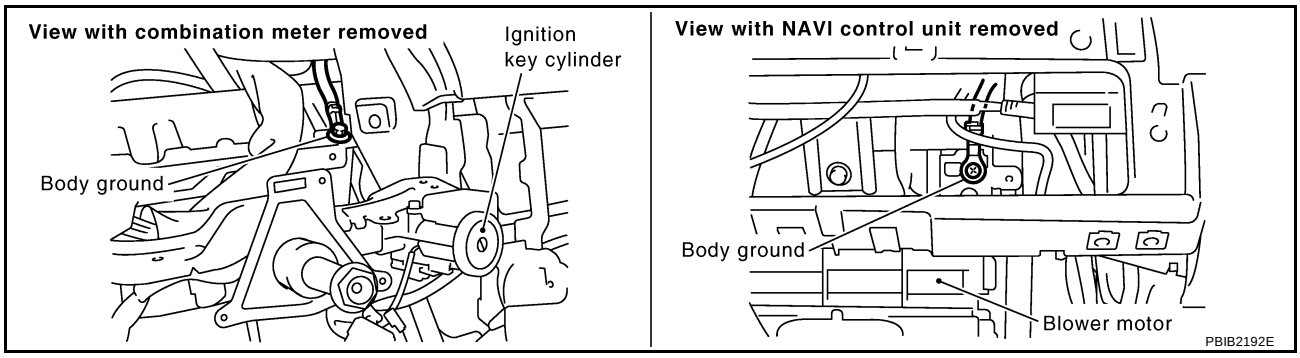
Refer to EC-290, "Component Inspection" .

OK or NG

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

## 5. CHECK GROUND CONNECTIONS

Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .




OK or NG

OK >> GO TO 6.
NG >> Repair or replace ground connections.

## 6. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

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

**Continuity should exist.**

OK or NG

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

## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F37, F229
- Harness connectors F102, M72
- Harness for open or short between knock sensor terminal 2 and ground

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

## 8. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

# Component Inspection

ABS00ASA

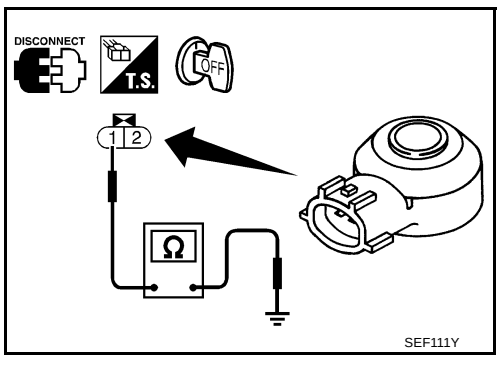
## KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

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

**Resistance: Approximately 532 - 588 kΩ [at 20°C (68°F)]**

**CAUTION:**
**Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.**



## Removal and Installation

ABS00ASB

### KNOCK SENSOR

Refer to EM-123, "CYLINDER BLOCK" .

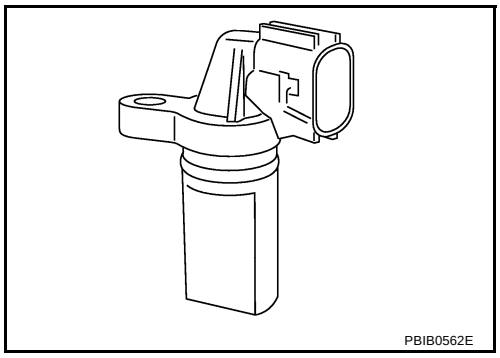
# DTC P0335 CKP SENSOR (POS)

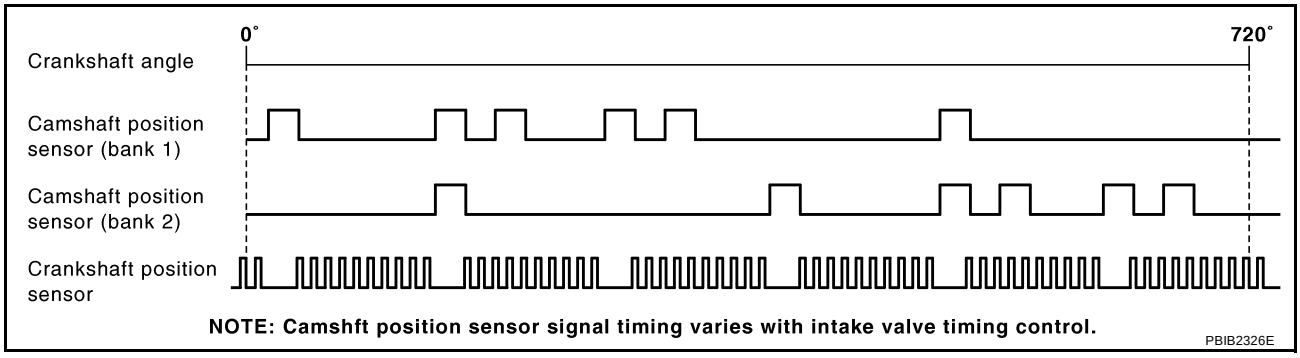
PFP:23731

## Component Description

ABS00ASC

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
ECM receives the signals as shown in the figure.


PBIB0562E




## CONSULT-II Reference Value in Data Monitor Mode

ABS00ASD

Specification data are reference values.

| MONITOR ITEM | CONDITION | SPECIFICATION |
|---|---|---|
| ENG SPEED | ● Run engine and compare CONSULT-II value with the tachometer indication. | Almost the same speed as the tachometer indication. |

## On Board Diagnosis Logic

ABS00ASE

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0335<br>0335 | Crankshaft position sensor (POS) circuit | ● The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking.<br>● The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running.<br>● The crankshaft position sensor (POS) signal is not in the normal pattern during engine running. | ● Harness or connectors (The sensor circuit is open or shorted)<br>● Crankshaft position sensor (POS)<br>● Signal plate |

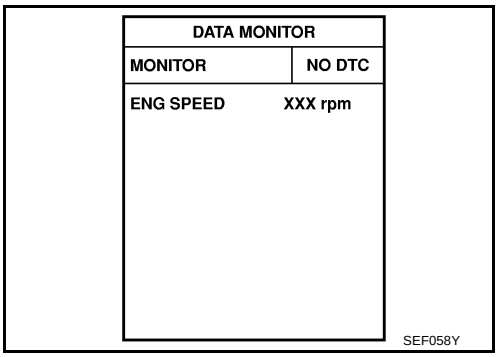
## DTC Confirmation Procedure

ABS00ASF

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
**TESTING CONDITION:**
**Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.**

## WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-295, "Diagnostic Procedure" .

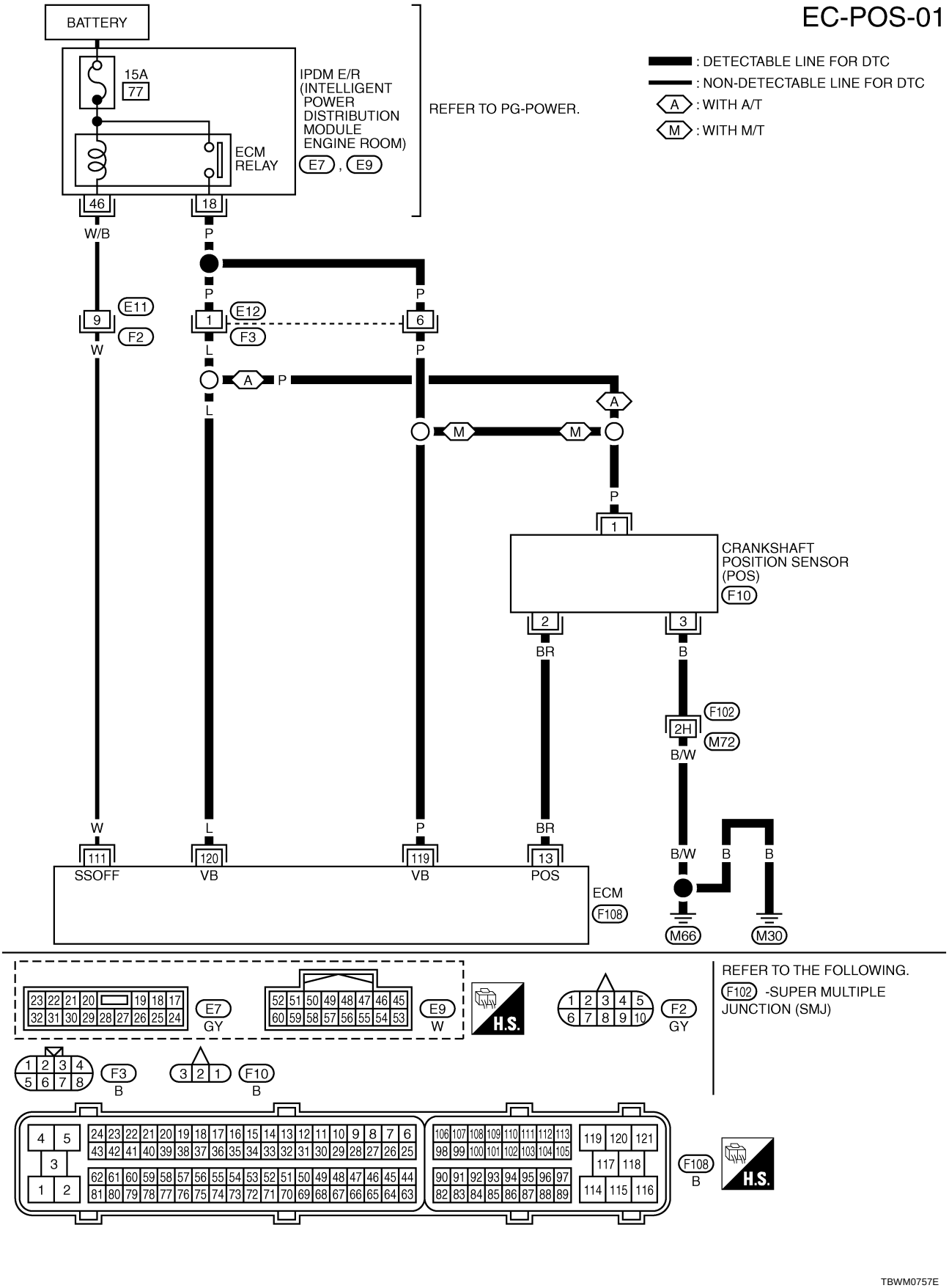



## WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

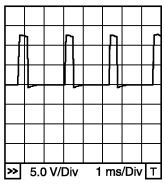
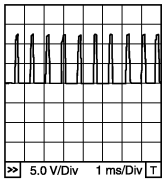
ABS00ASG




TBWM0757E

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

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

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 13 | BR | Crankshaft position sensor (POS) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | Approximately 1.6V★<br>  <br><br>PBIB1041E |
| | | | **[Engine is running]**<br>● Engine speed: 2,000 rpm. | Approximately 1.4V★<br>  <br><br>PBIB1042E |

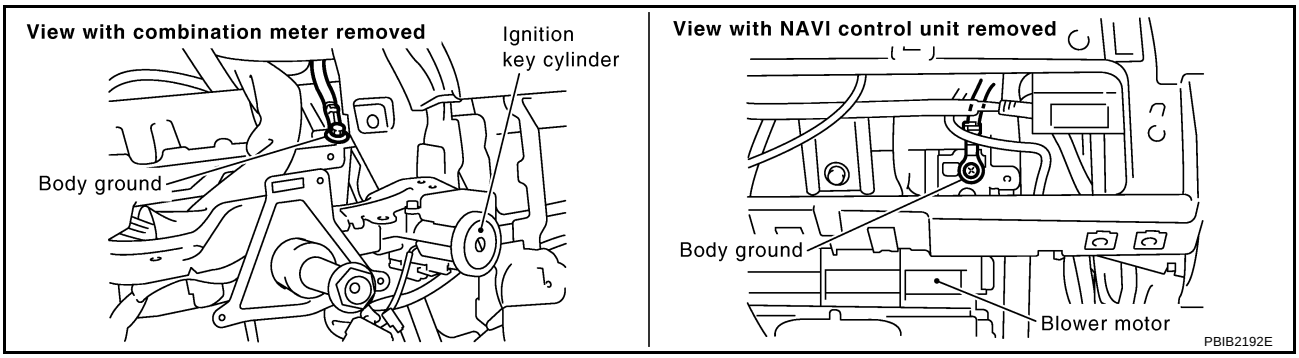
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnostic Procedure

ABS00ASH

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

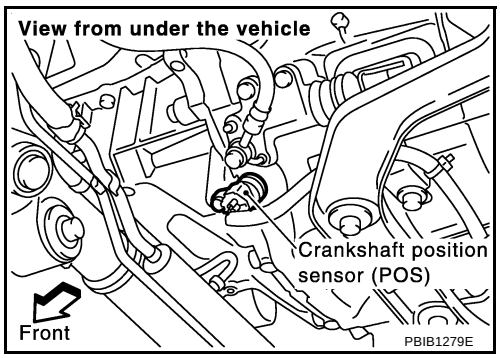



OK or NG

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

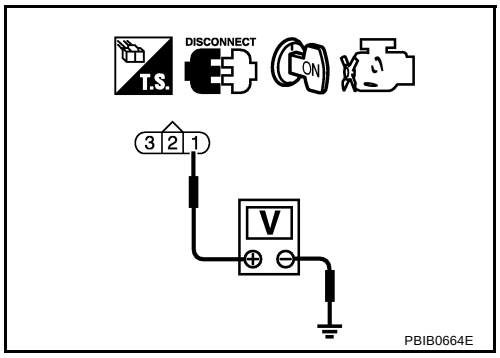
## 2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.




3. Check voltage between CKP sensor (POS) terminal 1 and ground with CONSULT-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 E12, F3
- Harness for open or short between CKP sensor (POS) and ECM
- Harness for open or short between CKP sensor (POS) and IPDM E/R

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

## 4. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between CKP sensor (POS) terminal 3 and ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

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

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F102, M72
- Harness for open or short between CKP sensor (POS) and ground

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

## 6. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 and CKP sensor (POS) terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 7. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-298, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace CKP position sensor (POS).

## 8. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 9.
NG >> Replace the signal plate.

## 9. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

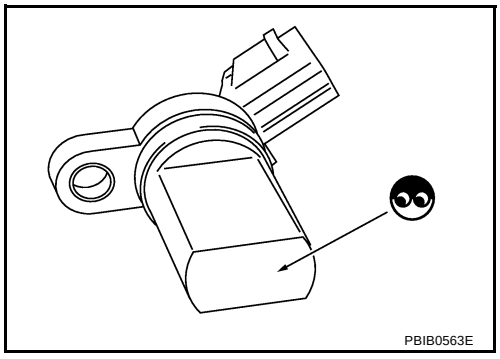
>> **INSPECTION END**

## Component Inspection

ABS00ASI

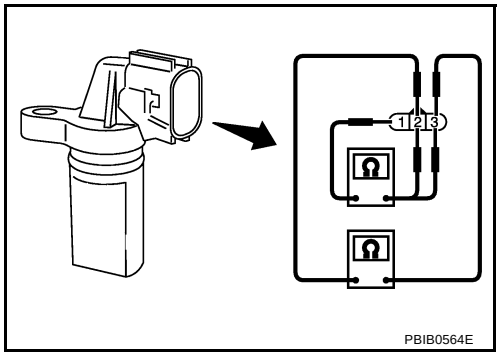
### CRANKSHAFT POSITION SENSOR (POS)

1. Loosen the fixing bolt of the sensor.
2. Disconnect CKP sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.




5. Check resistance as shown in the figure.

| Terminal No. (Polarity) | Resistance Ω [at 25°C (77°F)] |
|---|---|
| 1 (+) - 2 (-) | Except 0 or ∞ |
| 1 (+) - 3 (-) | |
| 2 (+) - 3 (-) | |




## Removal and Installation

ABS00ASJ

### CRANKSHAFT POSITION SENSOR (POS)

Refer to EM-30, "OIL PAN AND OIL STRAINER" .

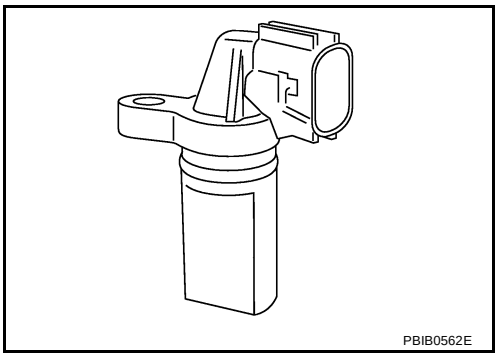
# DTC P0340, P0345 CMP SENSOR (PHASE)

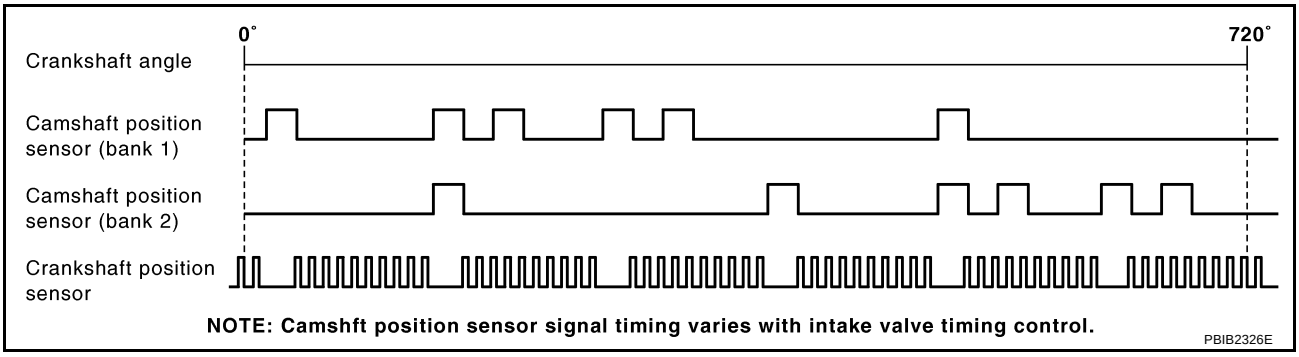
PFP:23731

## Component Description

ABS00ASK

The camshaft position sensor (PHASE) senses the retraction of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
ECM receives the signals as shown in the figure.


PBIB0562E




## CONSULT-II Reference Value in Data Monitor Mode

ABS00ASL

Specification data are reference values.

| MONITOR ITEM | CONDITION | SPECIFICATION |
|---|---|---|
| ENG SPEED | ● Run engine and compare CONSULT-II value with the tachometer indication. | Almost the same speed as the tachometer indication. |

## On Board Diagnosis Logic

ABS00ASM

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0340<br>0340<br>(Bank 1) | Camshaft position sensor (PHASE) circuit | ● The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking.<br>● The cylinder No. signal is not sent to ECM during engine running.<br>● The cylinder No. signal is not in the normal pattern during engine running. | ● Harness or connectors (The sensor circuit is open or shorted)<br>● Camshaft position sensor (PHASE)<br>● Camshaft (INT)<br>● Starter motor (Refer to SC-9, "STARTING SYSTEM" .)<br>● Starting system circuit (Refer to SC-9, "STARTING SYSTEM" .)<br>● Dead (Weak) battery |
| P0345<br>0345<br>(Bank 2) | | | |

## DTC Confirmation Procedure

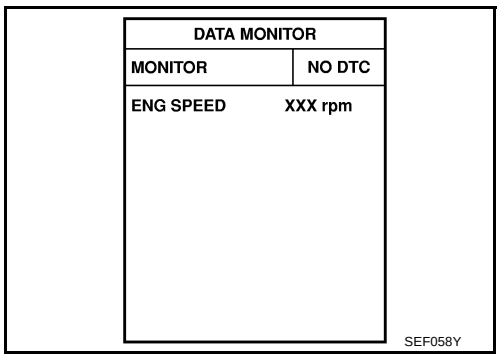
ABS00ASN

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
**TESTING CONDITION:**
**Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.**

### WITH CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
4. If 1st trip DTC is detected, go to EC-304, "Diagnostic Procedure".
   If 1st trip DTC is not detected, go to next step.
5. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
6. If 1st trip DTC is detected, go to EC-304, "Diagnostic Procedure".

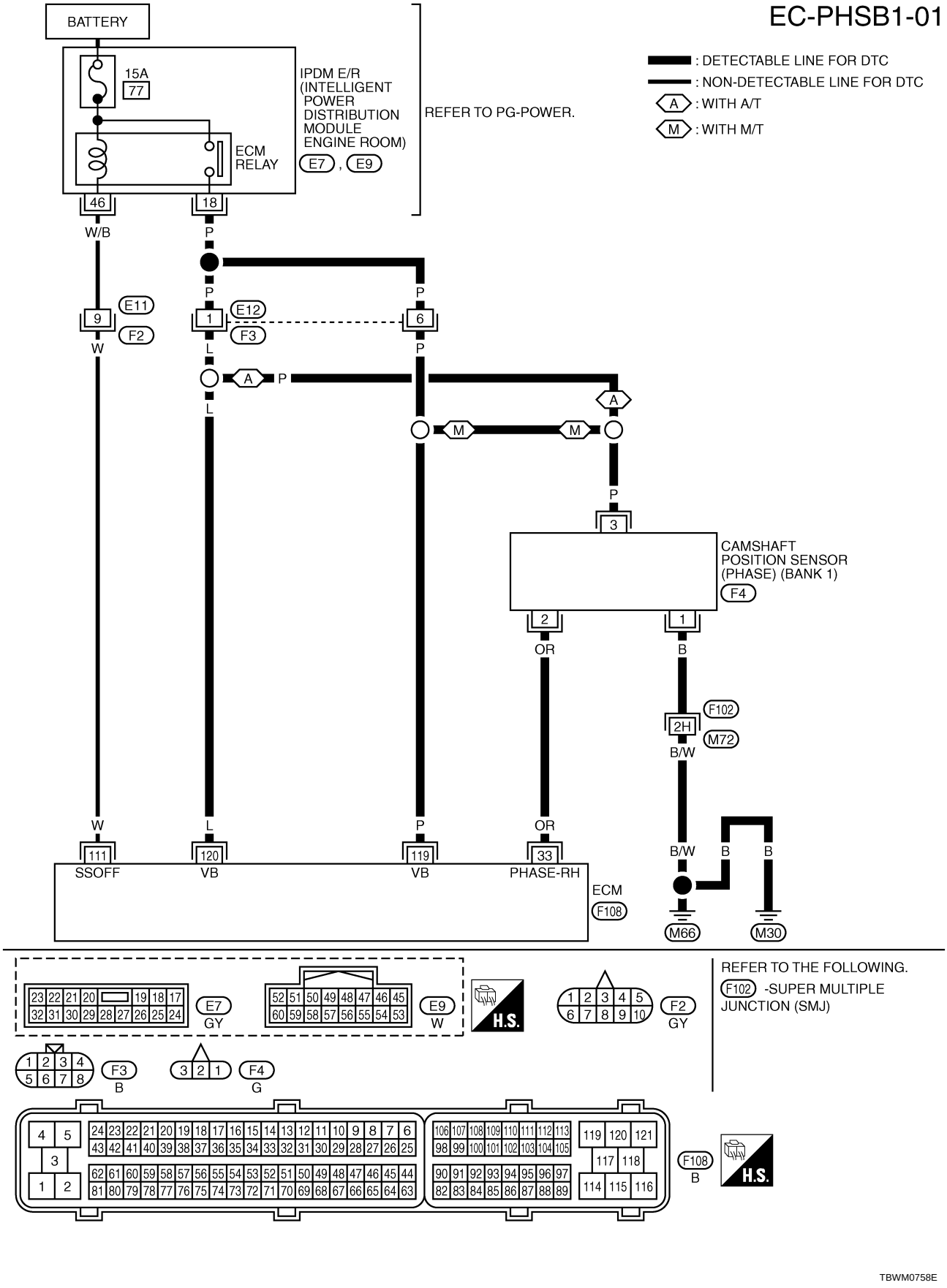



### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram
### BANK 1

ABS00ASO

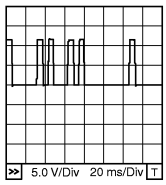
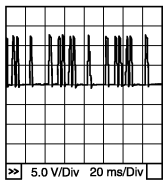



TBWM0758E

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

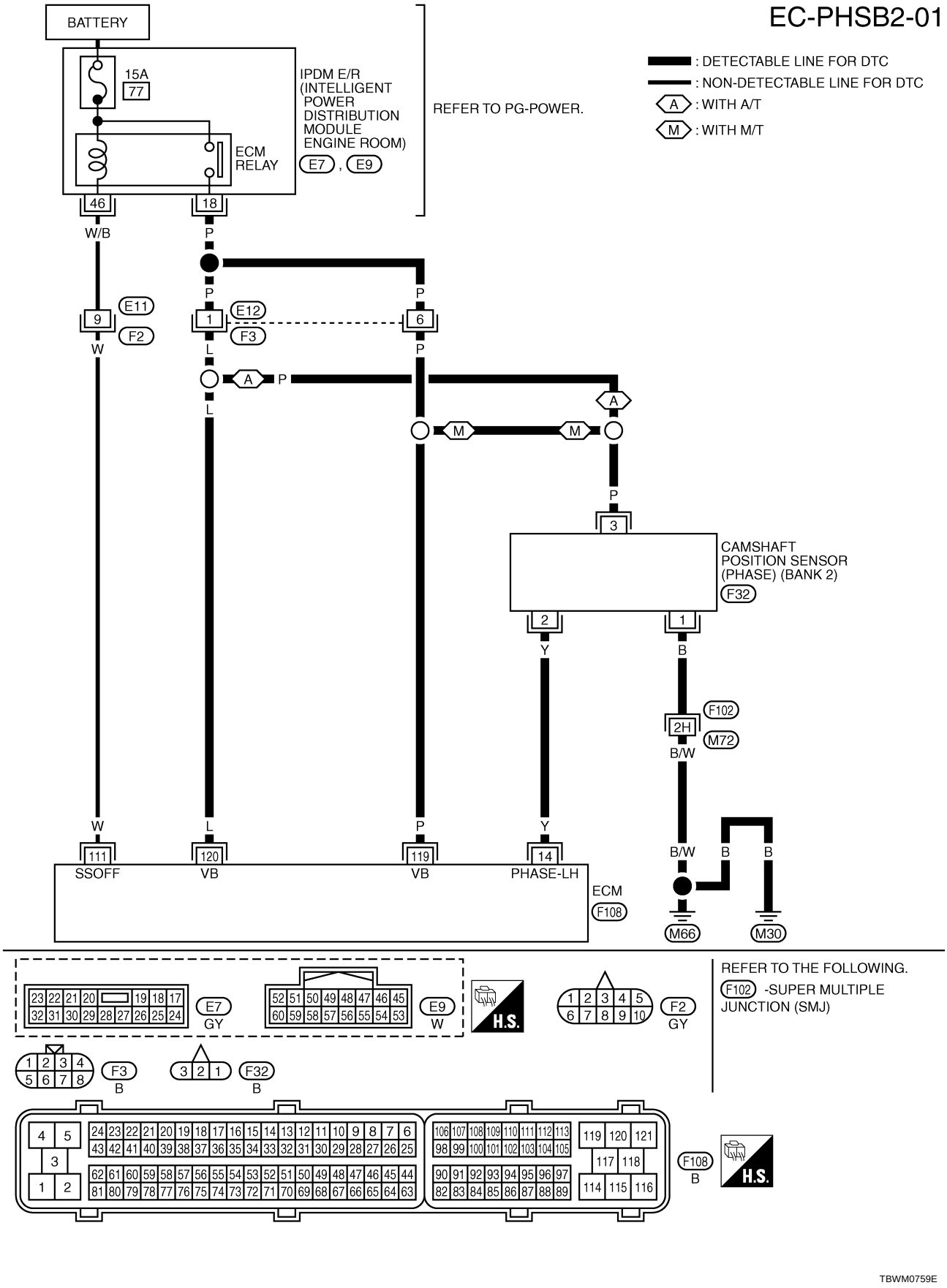
**CAUTION:**

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

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 33 | OR | Camshaft position sensor (PHASE) (bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | 1.0 - 4.0V★<br>  <br><br>PBIB2493E |
| | | | **[Engine is running]**<br>● Engine speed: 2,000 rpm. | 1.0 - 4.0V★<br>  <br><br>PBIB1040E |

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

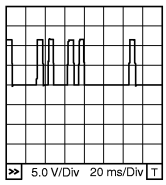
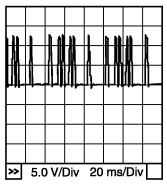
## BANK 2




TBWM0759E

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

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

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 14 | Y | Camshaft position sensor (PHASE) (bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | 1.0 - 4.0V★<br>  <br>PBIB2493E |
| | | | **[Engine is running]**<br>● Engine speed: 2,000 rpm. | 1.0 - 4.0V★<br>  <br>PBIB1040E |

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

## Diagnostic Procedure

ABS00ASP

### 1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

**Does the engine turn over?**

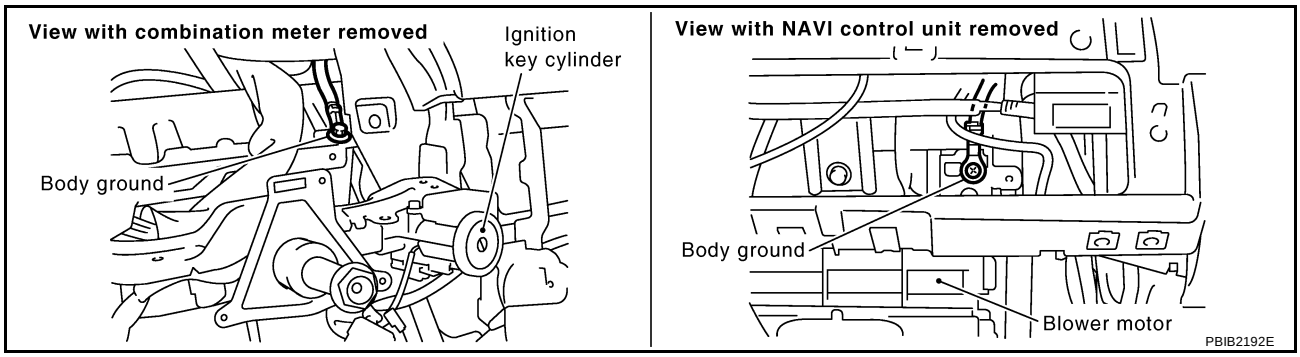
**Does the starter motor operate?**

Yes or No

Yes >> GO TO 2.
No >> Check starting system. (Refer to SC-9, "STARTING SYSTEM" .)

### 2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

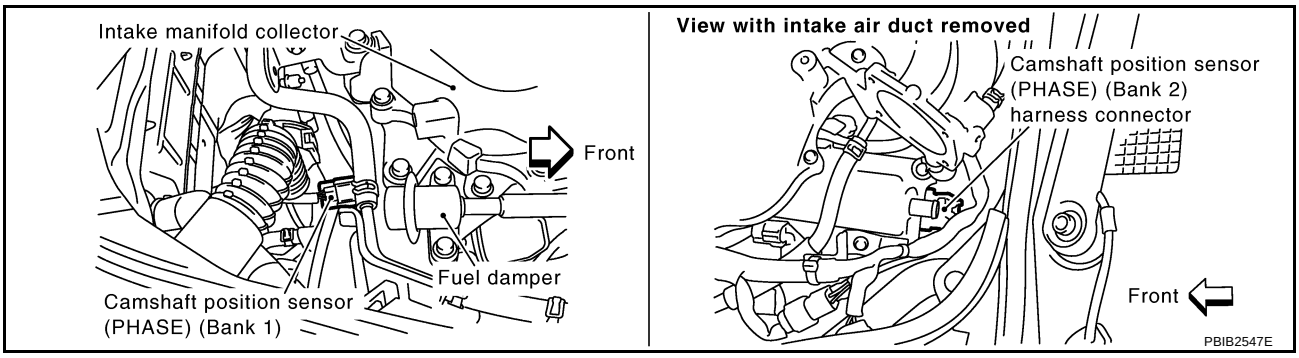



OK or NG

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

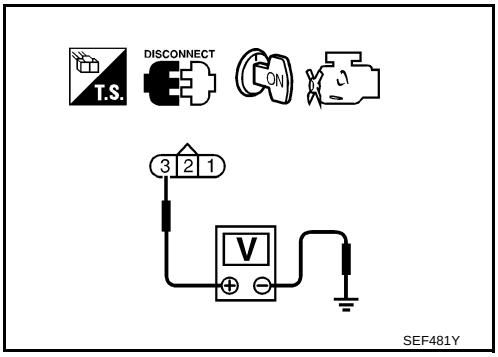
## 3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.




2. Turn ignition switch ON.
3. Check voltage between CMP sensor (PHASE) terminal 3 and ground with CONSULT-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 E12, F3
- Harness for open or short between CMP sensor (PHASE) and ECM
- Harness for open or short between CMP sensor (PHASE) and IPDM E/R

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

## 5. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between CMP sensor (PHASE) terminal 1 and ground. 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 F102, M72
- Harness for open or short between CMP sensor (PHASE) and ground

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

## 7. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 33 (Bank 1) or 14 (Bank 2) and CMP sensor (PHASE) terminal 2.
   Refer to Wiring Diagram.

   **Continuity should exist.**

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

OK or NG

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

## 8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-307, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace CMP sensor (PHASE).

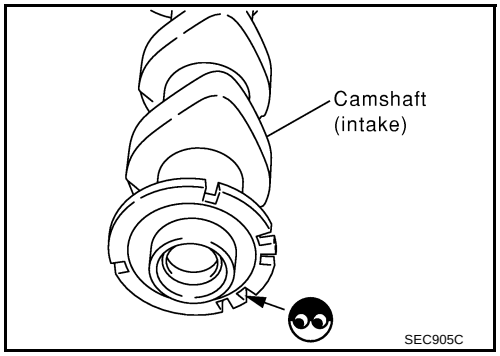
## 9. CHECK CAMSHAFT (INT)

Check the following.

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

OK or NG

OK >> GO TO 10.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.




## 10. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

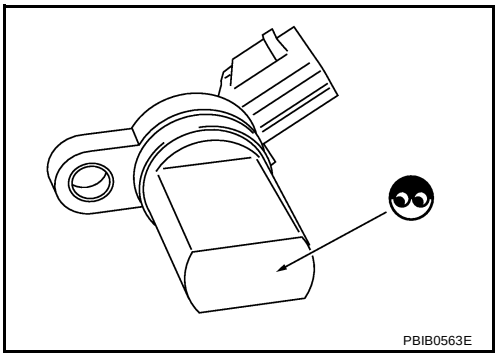
>> **INSPECTION END**

## Component Inspection

ABS00ASQ

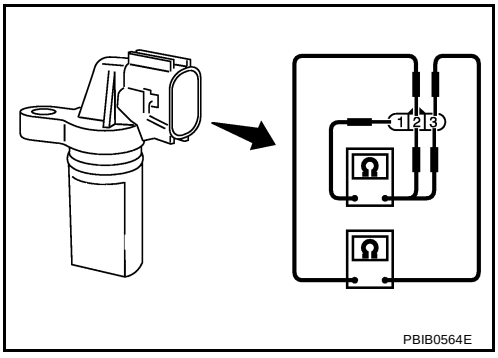
### CAMSHAFT POSITION SENSOR (PHASE)

1. Loosen the fixing bolt of the sensor.
2. Disconnect CMP sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.




5. Check resistance as shown in the figure.

| Terminal No. (Polarity) | Resistance Ω [at 25°C (77°F)] |
|---|---|
| 1 (+) - 2 (-) | Except 0 or ∞ |
| 1 (+) - 3 (-) | |
| 2 (+) - 3 (-) | |




## Removal and Installation

ABS00ASR

### CAMSHAFT POSITION SENSOR (PHASE)

Refer to EM-84, "CAMSHAFT" .

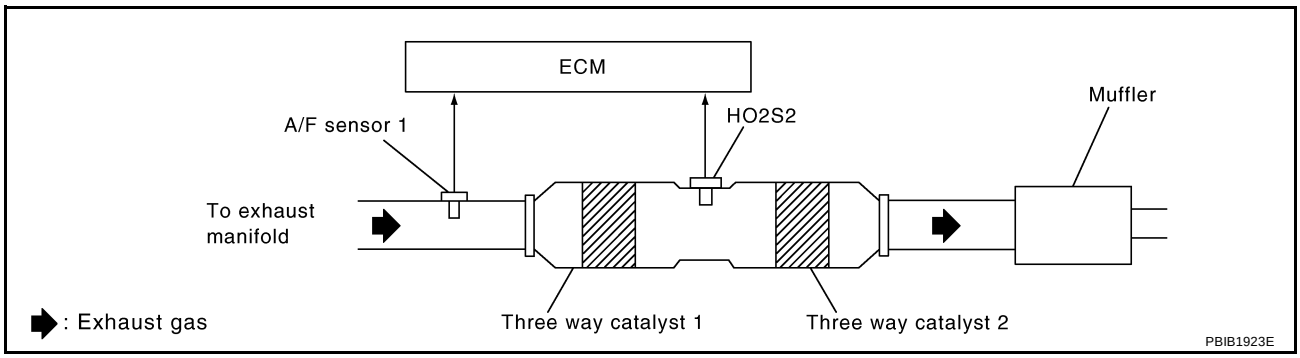
# DTC P0420, P0430 THREE WAY CATALYST FUNCTION

PFP:20905

## On Board Diagnosis Logic

ABS00ASS

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2. A three way catalyst 1 with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst 1 malfunction is diagnosed.




| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0420<br>0420<br>(Bank 1) | Catalyst system efficiency below threshold | ● Three way catalyst 1 does not operate properly.<br>● Three way catalyst 1 does not have enough oxygen storage capacity. | ● Three way catalyst 1<br>● Exhaust tube<br>● Intake air leaks<br>● Fuel injector<br>● Fuel injector leaks<br>● Spark plug<br>● Improper ignition timing |
| P0430<br>0430<br>(Bank 2) | | | |

## DTC Confirmation Procedure

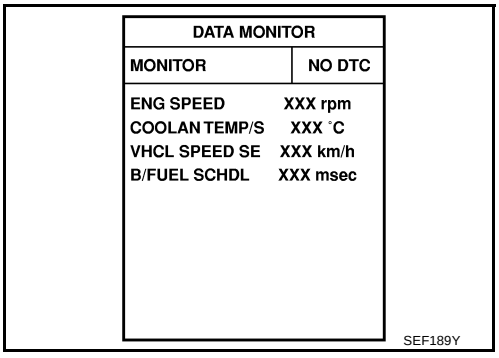
ABS00AST

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



8. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
   If “INCMP” of “CATALYST” changed to “CMPLT”, go to step 12.
10. 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 |
| B/FUEL SCHDL | XXX msec |
| A/F ALPHA-B1 | XXX V |
| COOLAN TEMP/S | XX °C |
| A/F SEN1 (B1) | XXX V |

PBIB1784E

11. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).
    If not “CMPLT”, stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.

| SRT WORK SUPPORT | |
|---|---|
| CATALYST | CMPLT |
| EVAP SYSTEM | INCMP |
| HO2S HTR | CMPLT |
| HO2S | INCMP |
| **MONITOR** | |
| ENG SPEED | XXX rpm |
| MAS A/F SE-B1 | XXX V |
| B/FUEL SCHDL | XXX msec |
| A/F ALPHA-B1 | XXX V |
| COOLAN TEMP/S | XX °C |
| A/F SEN1 (B1) | XXX V |

PBIB1785E

12. Select “SELF-DIAG RESULTS” mode with CONSULT-II.
13. Confirm that the 1st trip DTC is not detected.
    If the 1st trip DTC is detected, go to EC-310, "Diagnostic Procedure" .

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

SEF535Z

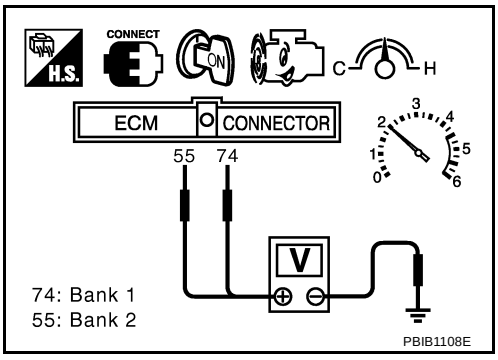
## Overall Function Check

ABS00ASU

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

### WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Set voltmeter probe between ECM terminals 74 [HO2S2 (bank 1) signal], 55 [HO2S2 (bank 2) signal] and ground.
7. Keep engine speed at 2,500 rpm constant under no load.
8. Make sure that the voltage does not vary for more than 5 seconds.
   If the voltage fluctuation cycle takes less than 5 seconds, go to EC-310, "Diagnostic Procedure" .
   - 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0



## Diagnostic Procedure

ABS00ASV

### 1. CHECK EXHAUST SYSTEM

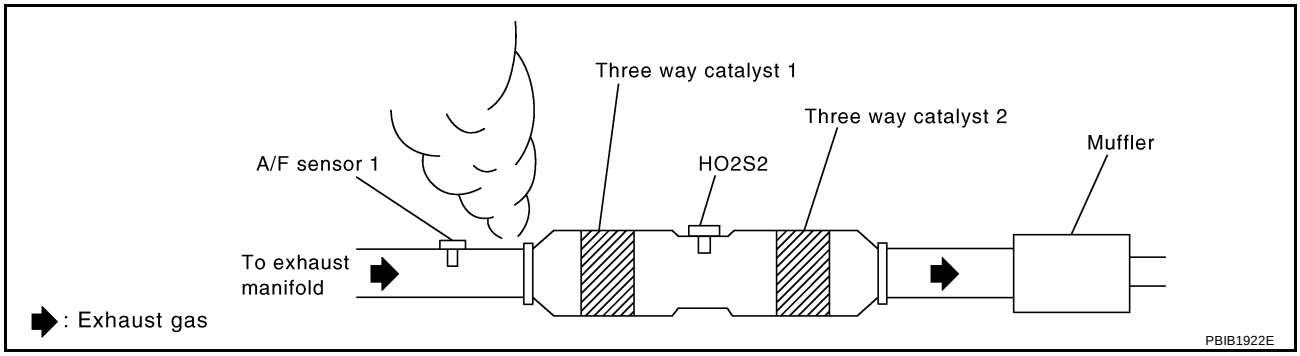
Visually check exhaust tubes and muffler for dent.

OK or NG

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

### 2. CHECK EXHAUST GAS LEAK

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




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-71, "Basic Inspection" .

| Items | Specifications |
|---|---|
| Target idle speed | A/T: 650 ± 50 rpm (in P or N position)<br>M/T: 650 ± 50 rpm (in Neutral position) |
| Ignition timing | A/T: 15 ± 5° BTDC (in P or N position)<br>M/T: 15 ± 5° BTDC (in Neutral position) |

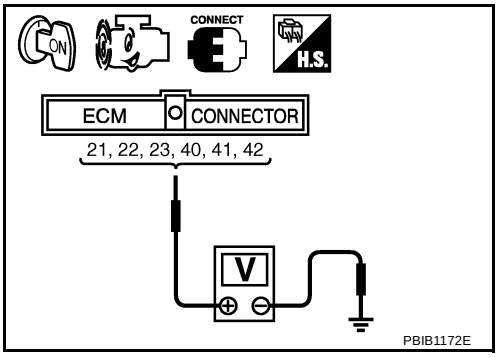
OK or NG

OK >> GO TO 5.
NG >> Follow the EC-71, "Basic Inspection" .

## 5. CHECK INJECTOR

1. Stop engine and then turn ignition switch ON.
2. Check voltage between ECM terminals 21, 22, 23, 40, 41, 42 and ground with CONSULT-II or tester.
   Refer to EC-641, "Wiring Diagram" .

   **Voltage: Battery voltage**




OK or NG

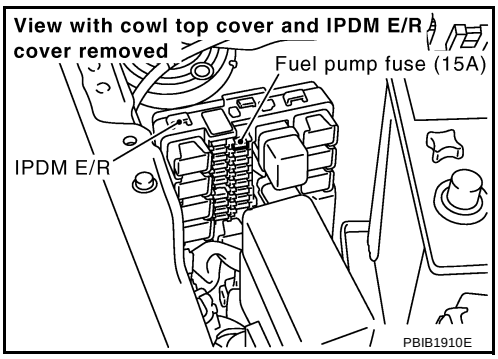
OK >> GO TO 6.
NG >> Perform EC-642, "Diagnostic Procedure" .

## 6. CHECK FUNCTION OF IGNITION COIL-I

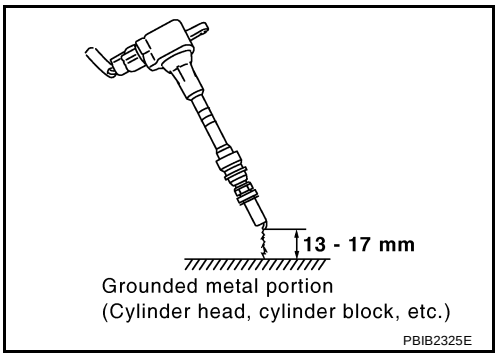
**CAUTION:**
**Do the following procedure in the place where ventilation is good without the combustible.**

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

   **NOTE:**
   Do not use CONSULT-II to release fuel pressure, or fuel pressure applies again during the following procedure.




3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.




**Spark should be generated.**

**CAUTION:**

- **Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm is taken.**

**NOTE:**
**When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.**

OK or NG

OK >> GO TO 10.
NG >> GO TO 7.

## 7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

**Spark should be generated.**

OK or NG

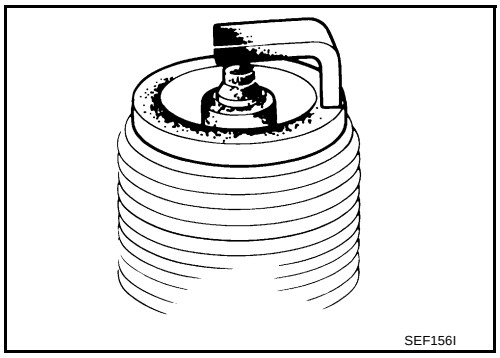
OK >> GO TO 8.
NG >> Check ignition coil, power transistor and their circuits. Refer to EC-627, "IGNITION SIGNAL" .

## 8. CHECK SPARK PLUG

1. Turn ignition switch OFF.
2. Check 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 ignition coil. Refer to MA-19, "Changing Spark Plugs (Platinum-Tipped Type)" .




## 9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

**Spark should be generated.**

OK or NG

OK >> **INSPECTION END**
NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-19, "Changing Spark Plugs (Platinum-Tipped Type)" .

## 10. CHECK INJECTOR

1. Turn ignition switch OFF.
2. Remove injector assembly.
   Refer to EM-46, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect all ignition coil harness connectors.
4. Reconnect all injector harness connectors disconnected.
5. Turn ignition switch ON.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)>>GO TO 11.
NG (Drips.)>>Replace the injector(s) from which fuel is dripping.

## 11. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Trouble is fixed.>>**INSPECTION END**
Trouble is not fixed.>>Replace three way catalyst assembly.

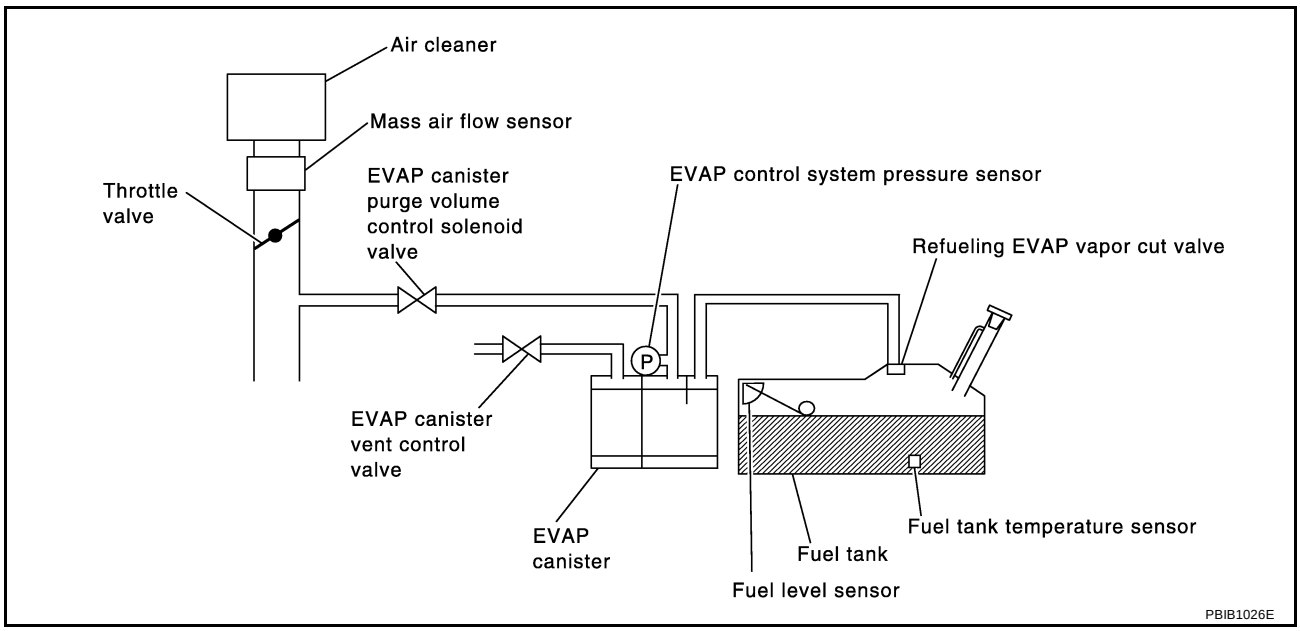
# DTC P0441 EVAP CONTROL SYSTEM

PFP:14950

## System Description

ABS00ASW

**NOTE:**
**If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128 or P2138, first perform trouble diagnosis for other DTC.**




In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

## On Board Diagnosis Logic

ABS00ASX

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<br>0441 | EVAP control system incorrect purge flow | EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor. | ● EVAP canister purge volume control solenoid valve stuck closed<br>● EVAP control system pressure sensor and the circuit<br>● Loose, disconnected or improper connection of rubber tube<br>● Blocked rubber tube<br>● Cracked EVAP canister<br>● EVAP canister purge volume control solenoid valve circuit<br>● Accelerator pedal position sensor<br>● Blocked purge port<br>● EVAP canister vent control valve |

## DTC Confirmation Procedure

ABS00ASY

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

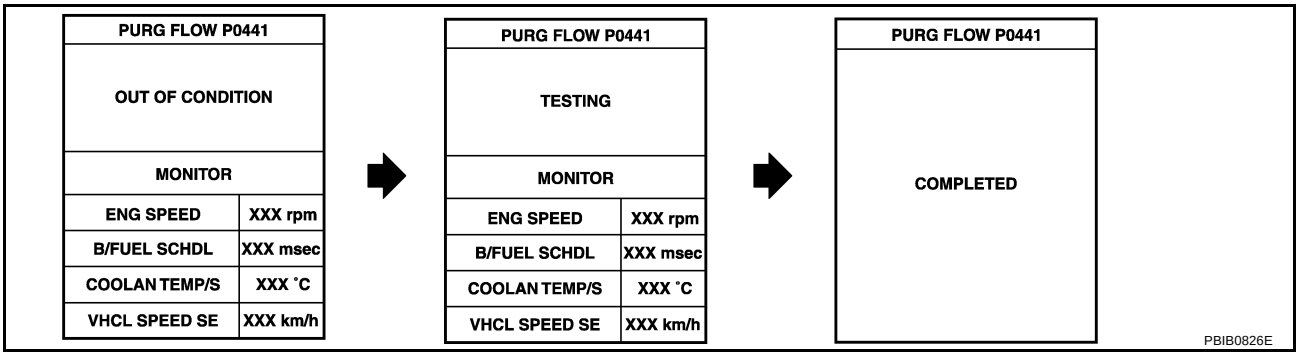
**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**
**Always perform test at a temperature of 5°C (41°F) or more.**

### WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 70 seconds.
4. Select “PURG FLOW P0441” of “EVAPORATIVE SYSTEM” in “DTC CONFIRMATION” mode with CONSULT-II.
5. Touch “START”.
   If “COMPLETED” is displayed, go to step 7.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 35 seconds.)

| | |
|---|---|
| Shift lever | Suitable position |
| VHCL SPEED SE | 32 - 120 km/h (20 - 75 MPH) |
| ENG SPEED | 500 - 3,000 rpm |
| B/FUEL SCHDL | 1.3 - 9.0 msec |
| COOLAN TEMP/S | 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-316, "Diagnostic Procedure" .

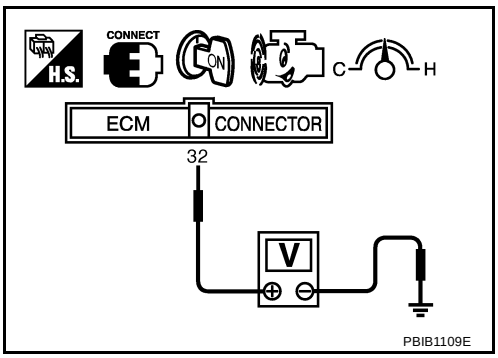
## Overall Function Check

ABS00ASZ

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

### WITH GST

1. Lift up drive wheels.
2. Start engine (VDC switch OFF) and warm it up to normal operating temperature.
3. Turn ignition switch OFF, wait at least 10 seconds.
4. Start engine and wait at least 70 seconds.
5. Set voltmeter probes to ECM terminals 32 (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 |
| Shift lever | 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-316, "Diagnostic Procedure" .

## Diagnostic Procedure

ABS00AT0

### 1. CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

OK or NG

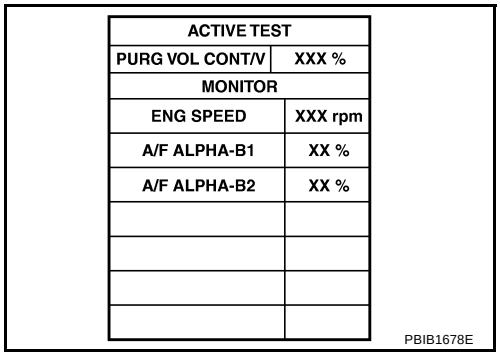
OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> Replace EVAP canister.

### 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. For the location of EVAP service port, refer to EC-32, "EVAPORATIVE EMISSION LINE DRAWING" .
2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
4. Rev engine up to 2,000 rpm.
5. Touch “Qd” and “Qu” on CONSULT-II screen to adjust “PURG VOL CONT/V” opening and check vacuum existence.

| PURG VOL CONT/V | Vacuum |
|---|---|
| 100% | Should exist. |
| 0% | Should not exist. |




OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

### 3. CHECK PURGE FLOW

**Without CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-32, "EVAPORATIVE EMISSION LINE DRAWING" .
4. Start engine and let it idle.
   **Do not depress accelerator pedal even slightly.**
5. Check vacuum gauge indication before 60 seconds passed after starting engine.

   **Vacuum should not exist.**

6. Revving engine up to 2,000 rpm after 100 seconds passed after starting engine.

   **Vacuum should exist.**

OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

## 4. CHECK EVAP PURGE LINE

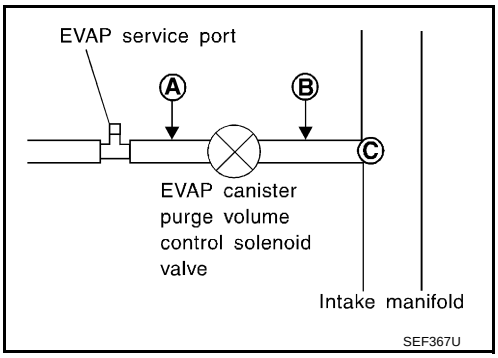
1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection. Refer to EC-32, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 5.
NG >> Repair it.

## 5. CHECK EVAP PURGE HOSE AND PURGE PORT

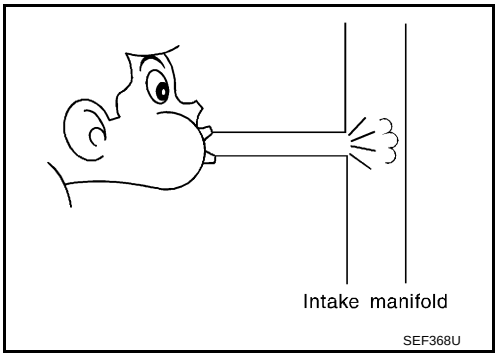
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B** .
2. Blow air into each hose and EVAP purge port **C** .




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 | XX % |
| A/F ALPHA-B2 | XX % |
| | |
| | |
| | |
| | |

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## 7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-332, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.

## 8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

**Water should not exist.**

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP control system pressure sensor.

## 9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to EC-345, "DTC Confirmation Procedure" for DTC P0452, EC-351, "DTC Confirmation Procedure" for DTC P0453.

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

## 10. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 11.
NG >> Clean the rubber tube using an air blower.

## 11. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-339, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP canister vent control valve.

## 12. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to EC-32, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 13.
NG >> Replace it.

## 13. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 14.

## 14. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

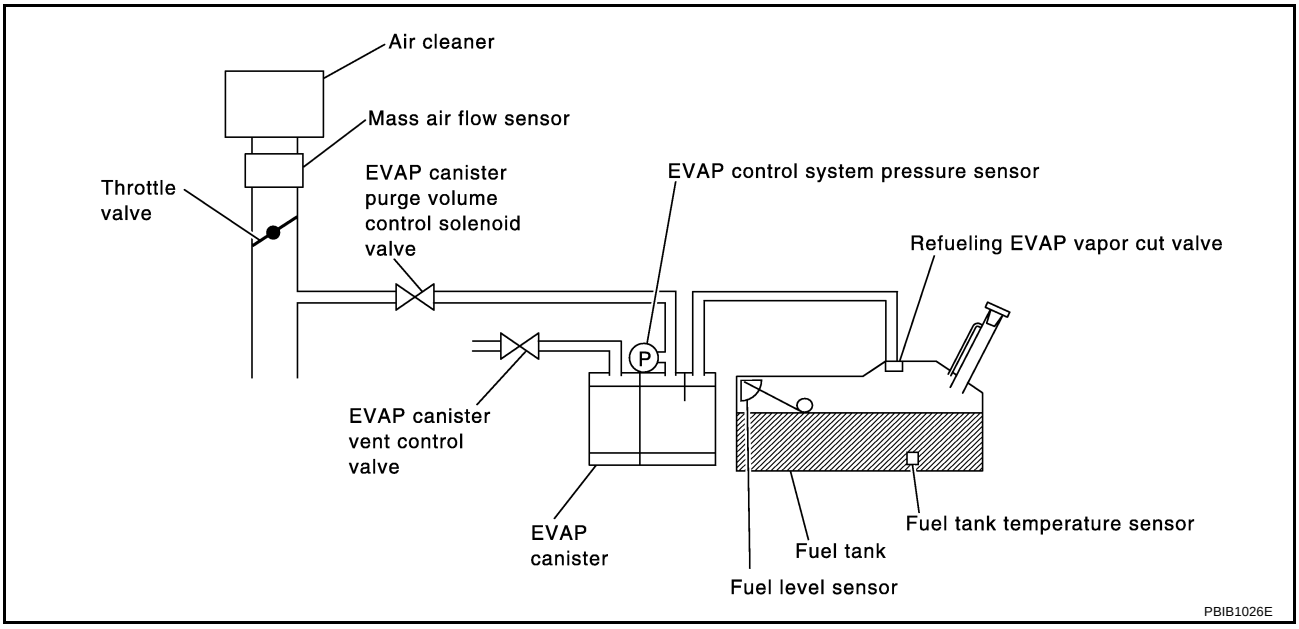
# DTC P0442 EVAP CONTROL SYSTEM

PFP:14950

## On Board Diagnosis Logic

ABS00AT1

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 EVAP canister vent control valve is closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve will then be opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.




| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0442<br>0442 | EVAP control system small leak detected (negative pressure) | EVAP control system has a leak, EVAP control system does not operate properly. | ● Incorrect fuel tank vacuum relief valve<br>● Incorrect fuel filler cap used<br>● Fuel filler cap remains open or fails to close.<br>● Foreign matter caught in fuel filler cap.<br>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.<br>● Foreign matter caught in EVAP canister vent control valve.<br>● EVAP canister or fuel tank leaks<br>● EVAP purge line (pipe and rubber tube) leaks<br>● EVAP purge line rubber tube bent<br>● Loose or disconnected rubber tube<br>● EVAP canister vent control valve and the circuit<br>● EVAP canister purge volume control solenoid valve and the circuit<br>● Fuel tank temperature sensor<br>● O-ring of EVAP canister vent control valve is missing or damaged<br>● EVAP canister is saturated with water<br>● EVAP control system pressure sensor<br>● Fuel level sensor and the circuit<br>● Refueling EVAP vapor cut valve<br>● ORVR system leaks |

**CAUTION:**

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

## DTC Confirmation Procedure

ABS00AT2

**NOTE:**

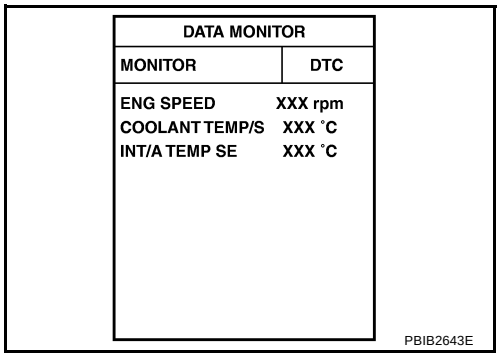
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**

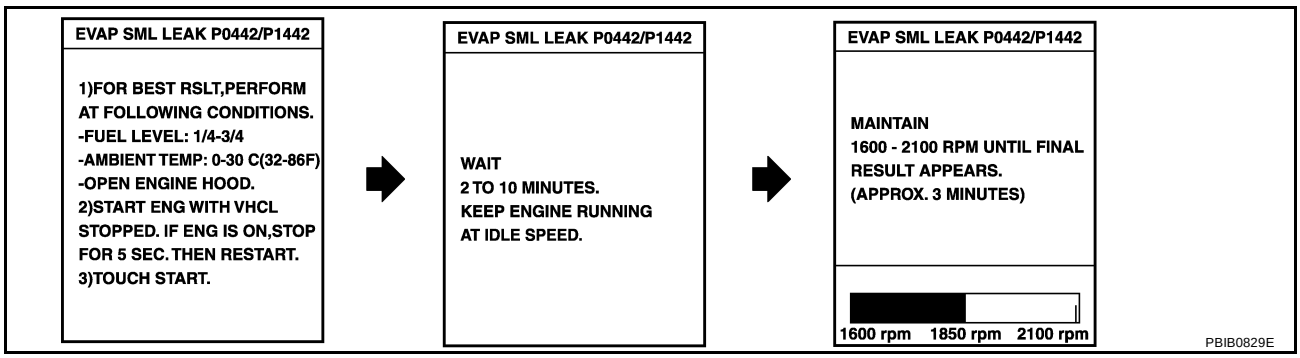
- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.




4. Make sure that the following conditions are met.
   **COOLAN TEMP/S: 0 - 70°C (32 - 158°F)**
   **INT/A TEMP SE: 0 - 30°C (32 - 86°F)**
5. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.

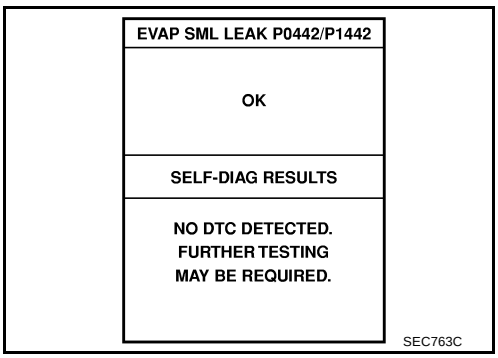



**NOTE:**

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-71, "Basic Inspection" .

6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-321, "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-57, "Driving Pattern" before driving vehicle.

1. Start engine.
2. Drive vehicle according to EC-57, "Driving Pattern" .
3. Stop vehicle.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Select Service $07 with GST.

- If P0442 is displayed on the screen, go to EC-321, "Diagnostic Procedure" .
- If P0441 is displayed on the screen, go to EC-316, "Diagnostic Procedure" .

## Diagnostic Procedure

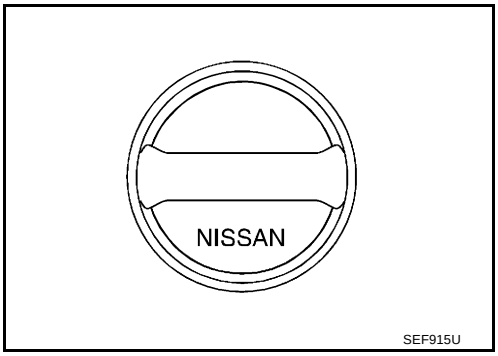
ABS00AT3

### 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-34, "FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)" .

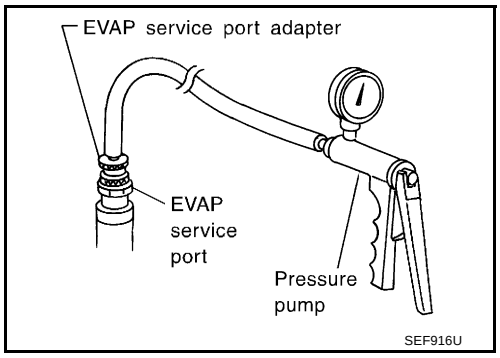
OK or NG

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. For the location of EVAP service port, refer to EC-32, "EVAPORATIVE EMISSION LINE DRAWING" .

**NOTE:**
**Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.**



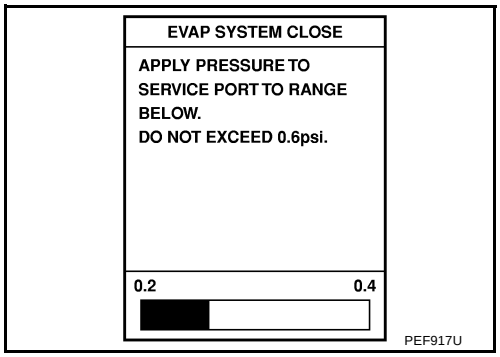

With CONSULT-II>>GO TO 6.
Without CONSULT-II>>GO TO 7.

## 6. CHECK FOR EVAP LEAK

**With CONSULT-II**

1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

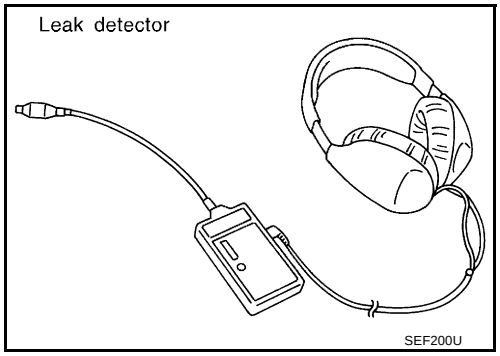
   **CAUTION:**
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm$^2$ , 0.6 psi) of pressure in the system.**




4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-32, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

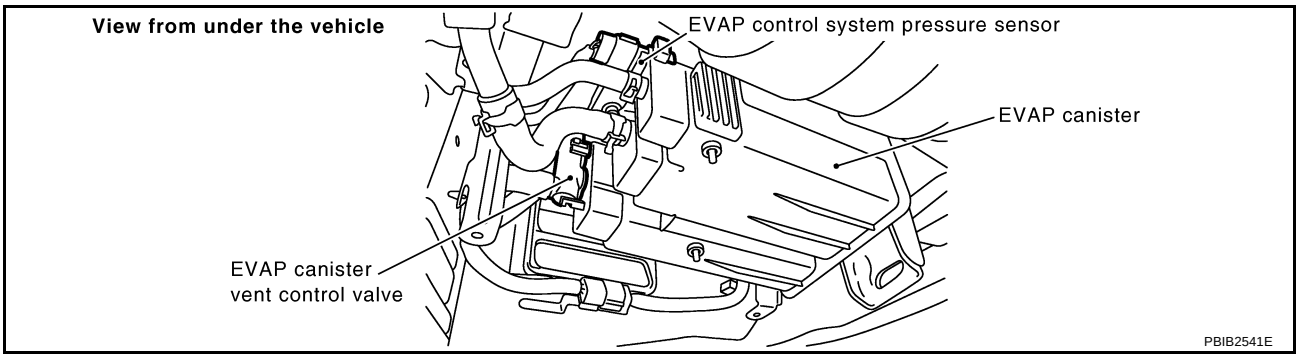
OK >> GO TO 8.
NG >> Repair or replace.



## 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.)

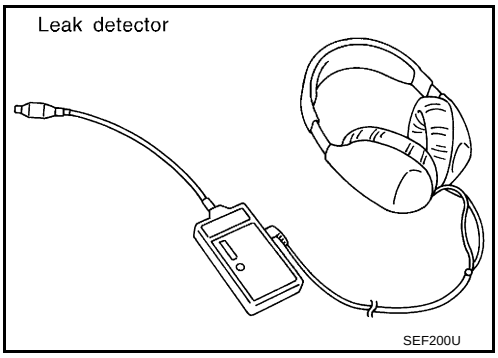



3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

**CAUTION:**

- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm$^2$ , 0.6 psi) of pressure in 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-32, "EVAPORATIVE EMISSION LINE DRAWING" .




OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

## 8. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly.
  Refer to EC-35, "Removal and Installation" .
- EVAP canister vent control valve.
  Refer to EC-339, "Component Inspection" .

OK or NG

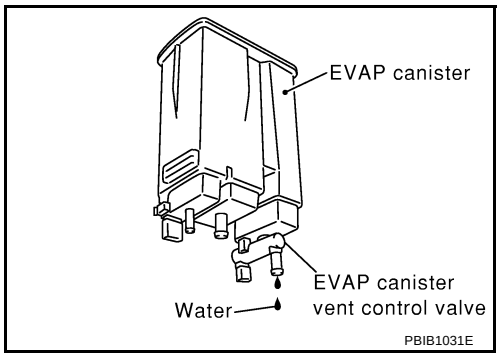
OK >> GO TO 9.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

## 9. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 10.
No (With CONSULT-II)>>GO TO 12.
No (Without CONSULT-II)>>GO TO 13.




## 10. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

**The weight should be less than 2.1 kg (4.6 lb).**

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.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

## 12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

**With CONSULT-II**

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

OK or NG

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

| ACTIVE TEST | |
|---|---|
| PURG VOL CONT/V | XXX % |
| MONITOR | |
| ENG SPEED | XXX rpm |
| A/F ALPHA-B1 | XX % |
| A/F ALPHA-B2 | XX % |
| | |
| | |
| | |
| | |

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## 13. 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.

OK or NG

OK >> GO TO 16.
NG >> GO TO 14.

## 14. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-112, "Vacuum Hose Drawing" .

OK or NG

OK >> GO TO 15.
NG >> Repair or reconnect the hose.

## 15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-332, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister purge volume control solenoid valve.

## 16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-265, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace fuel level sensor unit.

## 17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-349, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

## 18. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-32, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 19.
NG >> Repair or reconnect the hose.

## 19. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 20.

## 20. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-38, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 21.
NG >> Repair or replace hoses and tubes.

## 21. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 22.
NG >> Repair or replace hose, tube or filler neck tube.

## 22. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-41, "REFUELING EVAP VAPOR CUT VALVE" .

OK or NG

OK >> GO TO 23.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

## 23. CHECK FUEL LEVEL SENSOR

Refer to DI-16, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 24.
NG >> Replace fuel level sensor unit.

## 24. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

# DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

## Description

ABS00AT5

### SYSTEM DESCRIPTION

| Sensor | Input Signal to ECM | ECM function | Actuator |
|---|---|---|---|
| Crankshaft position sensor (POS)<br>Camshaft position sensor (PHASE) | Engine speed*1 | 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 | | |
| Battery | Battery voltage*1 | | |
| Throttle position sensor | Throttle position | | |
| Accelerator pedal position sensor | Accelerator pedal position | | |
| Air fuel ratio (A/F) sensor 1 | Density of oxygen in exhaust gas (Mixture ratio feedback signal) | | |
| Fuel tank temperature sensor | Fuel temperature in fuel tank | | |
| Wheel sensor*2 | Vehicle speed | | |

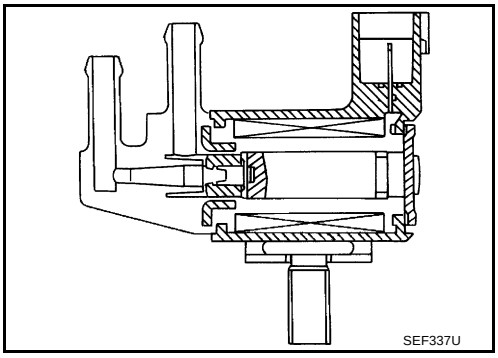
*1:ECM determines the start signal status by the signals of engine speed and battery voltage.

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

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

### COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AT6

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| PURG VOL C/V | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle<br>(Accelerator pedal is not depressed even slightly, after engine starting) | 0% |
| | | 2,000 rpm | — |

## On Board Diagnosis Logic

ABS00AT7

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0444<br>0444 | EVAP canister purge volume control solenoid valve circuit open | An excessively low voltage signal is sent to ECM through the valve | ● Harness or connectors (The solenoid valve circuit is open or shorted.)<br>● EVAP canister purge volume control solenoid valve |
| P0445<br>0445 | EVAP canister purge volume control solenoid valve circuit shorted | An excessively high voltage signal is sent to ECM through the valve | ● Harness or connectors (The solenoid valve circuit is shorted.)<br>● EVAP canister purge volume control solenoid valve |

## DTC Confirmation Procedure

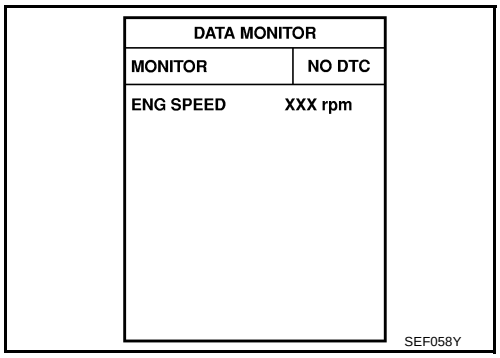
ABS00AT8

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

**TESTING CONDITION:**
**Before performing the following procedure, confirm battery voltage is more than 11V at idle.**

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 13 seconds.
4. If 1st trip DTC is detected, go to EC-331, "Diagnostic Procedure" .



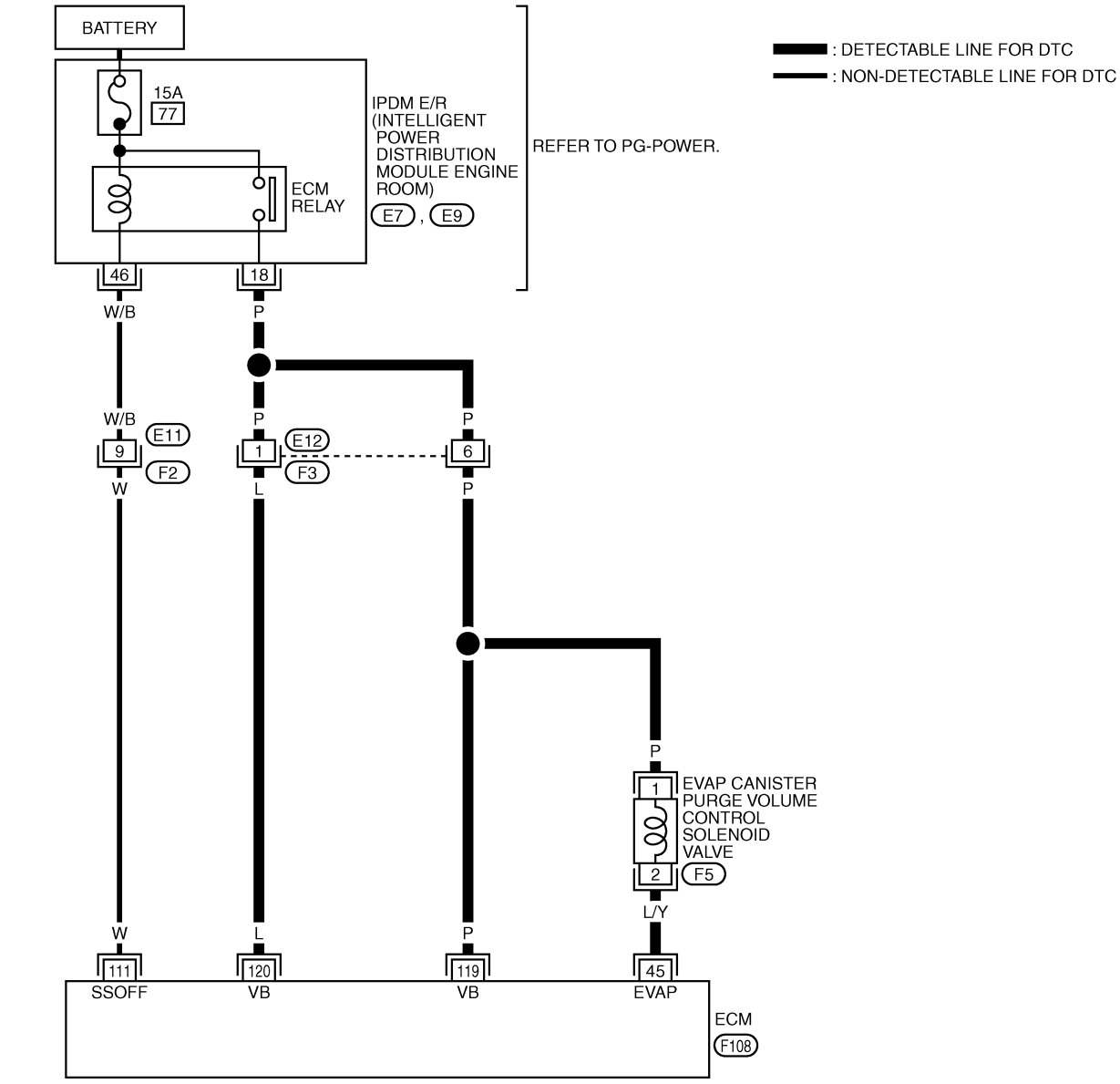

### WITH GST

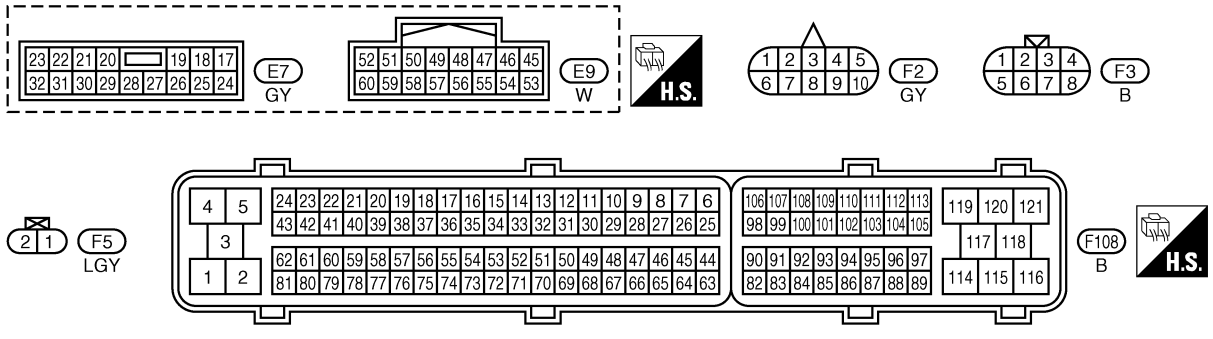
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

ABS00AT9

EC-PGC/V-01



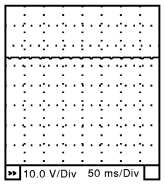
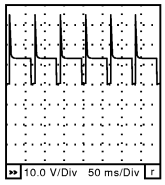




TBWM0760E

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

**CAUTION:**

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

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 45 | L/Y | EVAP canister purge volume control solenoid valve | **[Engine is running]**<br>● Idle speed<br>● Accelerator pedal is not depressed even slightly, after engine starting | BATTERY VOLTAGE<br>(11 - 14V)★<br>  <br><br>SEC990C |
| | | | **[Engine is running]**<br>● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine). | BATTERY VOLTAGE<br>(11 - 14V)★<br>  <br><br>SEC991C |
| 111 | W | ECM relay<br>(Self shut-off) | **[Engine is running]**<br>**[Ignition switch: OFF]**<br>● A few seconds after turning ignition switch OFF | 0 - 1.5V |
| | | | **[Ignition switch: OFF]**<br>● More than a few seconds after turning ignition switch OFF | BATTERY VOLTAGE<br>(11 - 14V) |
| 119<br>120 | P<br>L | Power supply for ECM | **[Ignition switch: ON]** | BATTERY VOLTAGE<br>(11 - 14V) |

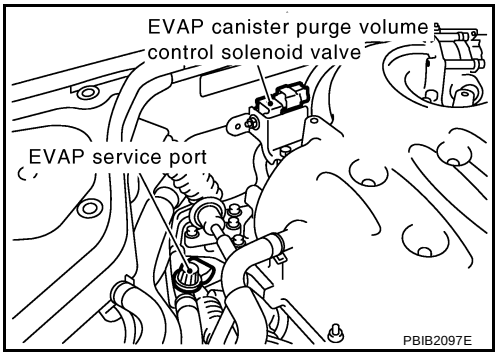
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnostic Procedure

ABS00ATA

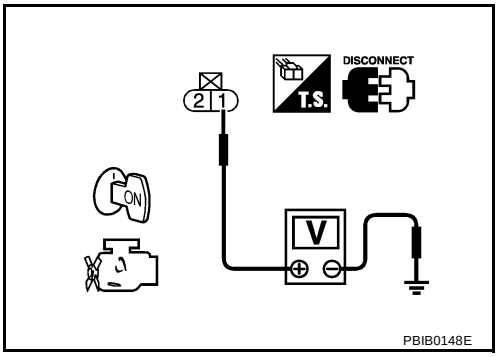
### 1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

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 E12, F3
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

### 3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

OK (With CONSULT-II)>>GO TO 4.
OK (Without CONSULT-II)>>GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

**With CONSULT-II**

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.

OK or NG

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

| ACTIVE TEST | |
|---|---|
| PURG VOL CONT/V | XXX % |
| MONITOR | |
| ENG SPEED | XXX rpm |
| A/F ALPHA-B1 | XX % |
| A/F ALPHA-B2 | XX % |
| | |
| | |
| | |
| | |

PBIB1678E

## 5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-332, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace EVAP canister purge volume control solenoid valve.

## 6. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

# Component Inspection

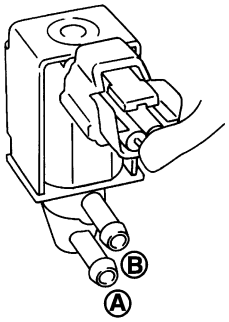
ABS00ATB

## EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

**With CONSULT-II**

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

| Condition (PURG VOL CONT/V value) | Air passage continuity between A and B |
|---|---|
| 100% | Yes |
| 0% | No |

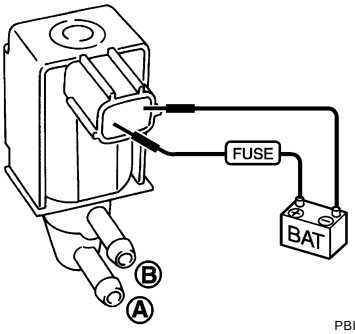



PBIB0149E

**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 |




PBIB0150E

## Removal and Installation

ABS00ATC

### EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-19, "INTAKE MANIFOLD COLLECTOR" .

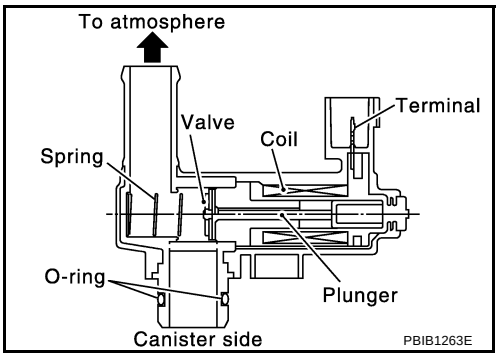
# DTC P0447 EVAP CANISTER VENT CONTROL VALVE

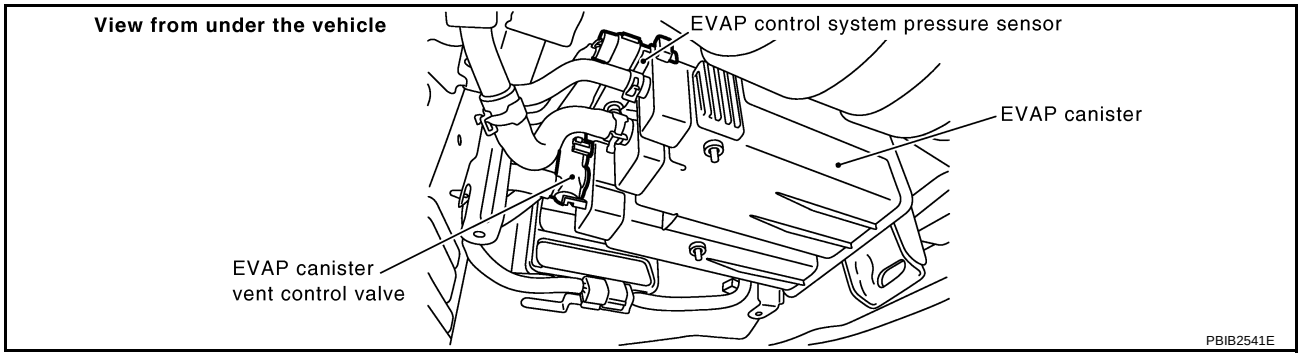
PFP:14935

## Component Description

ABS00ATD

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” diagnosis.




## CONSULT-II Reference Value in Data Monitor Mode

ABS00ATE

Specification data are reference values.

| MONITOR ITEM | CONDITION | SPECIFICATION |
|---|---|---|
| VENT CONT/V | ● Ignition switch: ON | OFF |

## On Board Diagnosis Logic

ABS00ATF

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0447<br>0447 | EVAP canister vent control valve circuit open | An improper voltage signal is sent to ECM through EVAP canister vent control valve. | ● Harness or connectors (The valve circuit is open or shorted.)<br>● EVAP canister vent control valve |

## DTC Confirmation Procedure

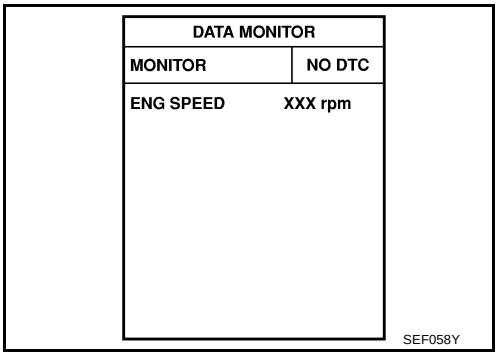
ABS00ATG

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

**TESTING CONDITION:**
**Before performing the following procedure, confirm battery voltage is more than 11V at idle.**

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 8 seconds.
4. If 1st trip DTC is detected, go to EC-337, "Diagnostic Procedure"
   .



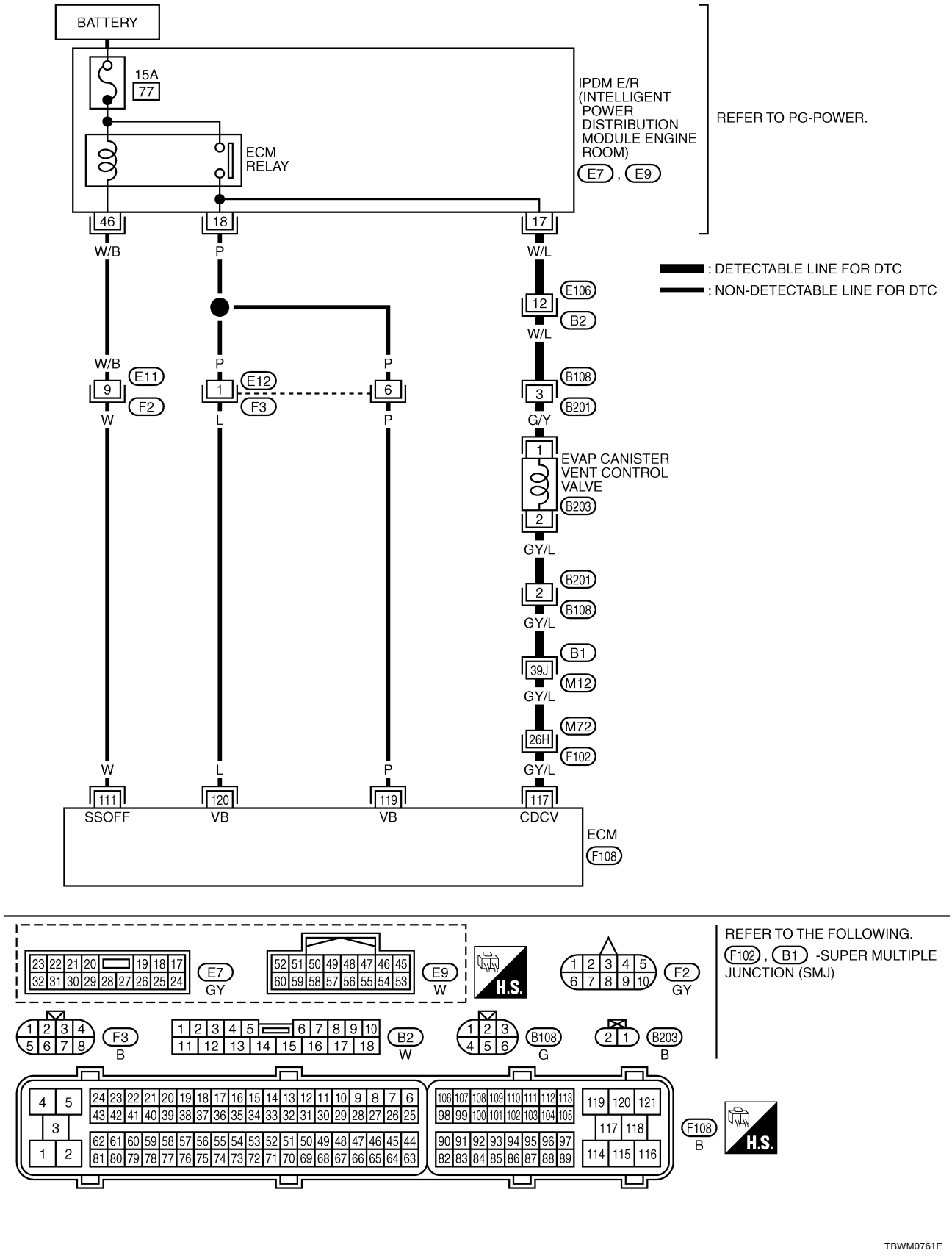

### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

ABS00ATH

EC-VENT/V-01




TBWM0761E

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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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) |
|---|---|---|---|---|
| 111 | W | ECM relay (Self shut-off) | **[Engine is running]** **[Ignition switch: OFF]** ● A few seconds after turning ignition switch OFF | 0 - 1.5V |
| | | | **[Ignition switch: OFF]** ● More than a few seconds after turning ignition switch OFF | BATTERY VOLTAGE (11 - 14V) |
| 117 | GY/L | EVAP canister vent control valve | **[Ignition switch: ON]** | BATTERY VOLTAGE (11 - 14V) |
| 119<br>120 | P<br>L | Power supply for ECM | **[Ignition switch: ON]** | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

ABS00ATI

### 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 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 % |
| | |
| | |
| | |
| | |

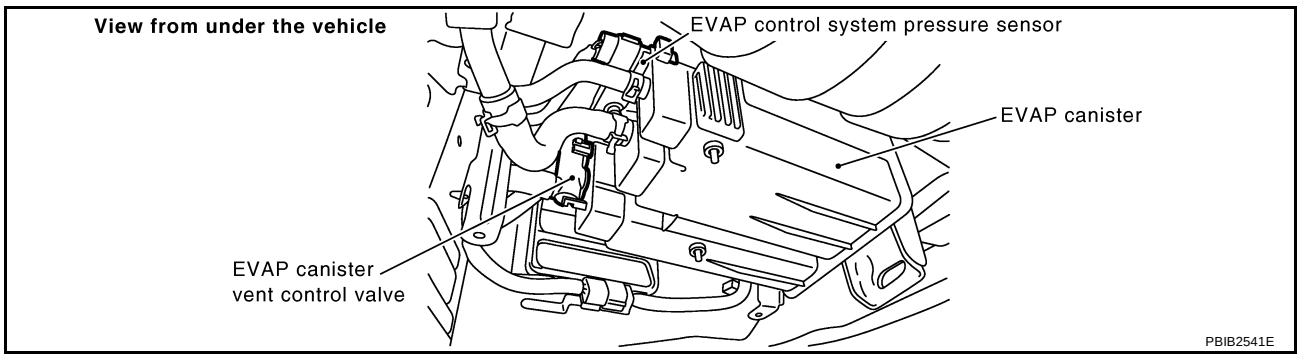
PBIB1679E

OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

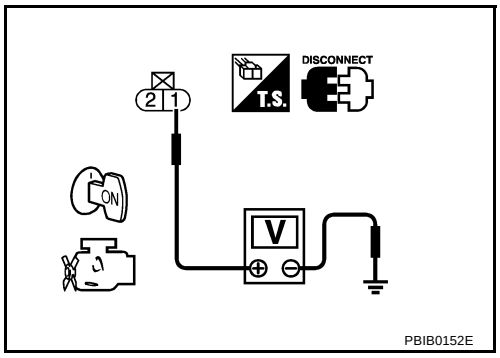
## 3. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.




3. Turn ignition switch ON.
4. Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**




OK or NG

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

## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, B2
- Harness connectors B108, B201
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

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

## 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 117 and EVAP canister vent control valve terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B201, B108
- Harness connectors B1, M12
- Harness connectors M72, F102
- Harness for open or short between EVAP canister vent control valve and ECM

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

## 7. CHECK RUBBER TUBE FOR CLOGGING

1. Turn ignition switch OFF.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 8.
NG >> Clean the rubber tube using an air blower.

## 8. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-339, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP canister vent control valve.

## 9. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

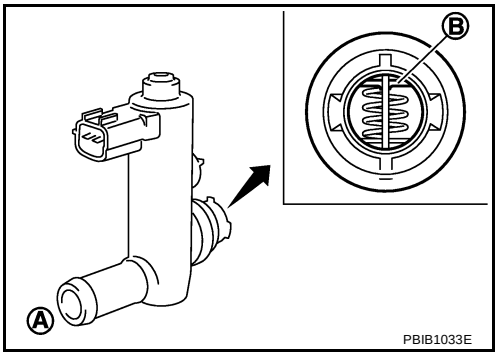
# Component Inspection

ABS00ATJ

## EVAP CANISTER VENT CONTROL VALVE

### With CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
   If NG, replace EVAP canister vent control valve.
   If OK, go to next step.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch ON.



5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
6. Check air passage continuity and operation delay time.
   **Make sure new O-ring is installed properly.**

| ACTIVE TEST | |
|---|---|
| VENT CONTROL/V | OFF |
| MONITOR | |
| ENG SPEED | XXX rpm |
| A/F ALPHA-B1 | XXX % |
| A/F ALPHA-B2 | XXX % |
| | |
| | |
| | |
| | |

PBIB1679E

| Condition VENT CONTROL/V | Air passage continuity between A and B |
|---|---|
| ON | No |
| OFF | Yes |

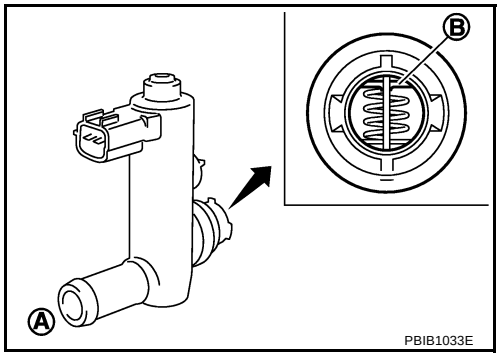
**Operation takes less than 1 second.**

If NG, replace EVAP canister vent control valve.
If OK, go to next step.

7. Clean the air passage (Portion **A** to **B** ) of EVAP canister vent control valve using an air blower.
8. Perform step 6 again.

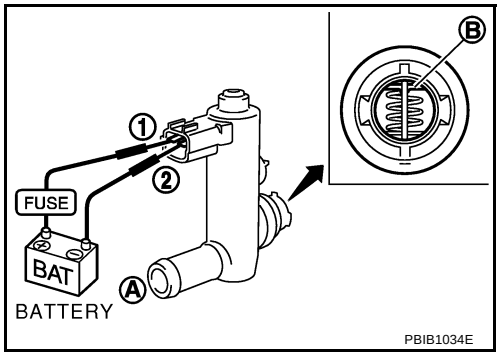
### Without CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



PBIB1033E

3. Check air passage continuity and operation delay time under the following conditions.
   **Make sure new O-ring is installed properly.**



PBIB1034E

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

**Operation takes less than 1 second.**

If NG, replace EVAP canister vent control valve.
If OK, go to next step.

4. Clean the air passage (Portion **A** to **B** ) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.

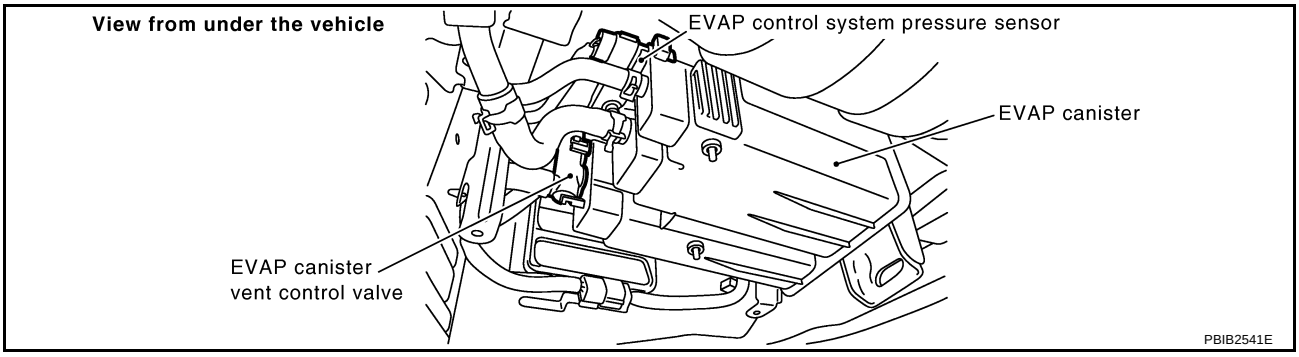
# DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

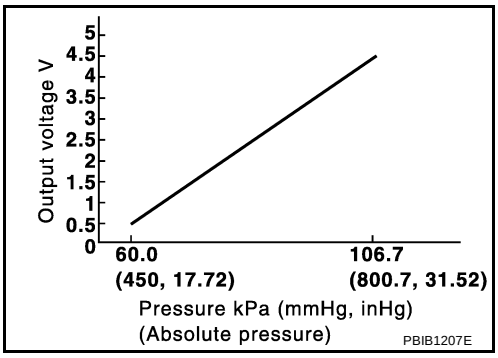
PFP:22365

## Component Description

ABS00ATK

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.




## CONSULT-II Reference Value in Data Monitor Mode

ABS00ATL

Specification data are reference values.

| MONITOR ITEM | CONDITION | SPECIFICATION |
|---|---|---|
| EVAP SYS PRES | ● Ignition switch: ON | Approx. 1.8 - 4.8V |

## On Board Diagnosis Logic

ABS00ATM

**NOTE:**
**If DTC P0451 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to** **EC-472, "DTC P1229 SENSOR POWER SUPPLY"** **.**

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0451<br>0451 | EVAP control system pressure sensor performance | ECM detects a sloshing signal from the EVAP control system pressure sensor | ● Harness or connectors<br>● EVAP control system pressure sensor |

## DTC Confirmation Procedure

ABS00ATN

**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 OFF and wait at least 10 seconds.
2. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 40 seconds.

   **NOTE:**
   **Do not depress accelerator pedal even slightly.**
   If 1st trip DTC is detected, go to EC-342, "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

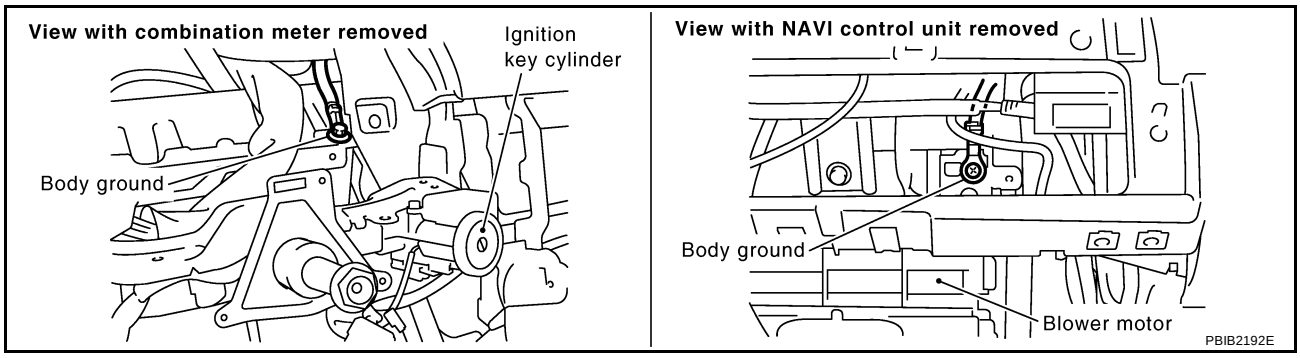
Follow the procedure “WITH CONSULT-II” above.

## Diagnostic Procedure

ABS00ATO

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

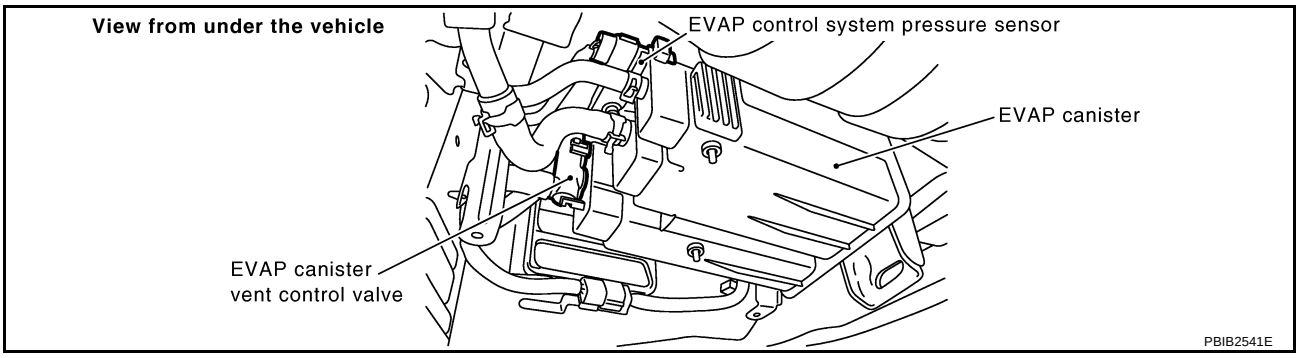



OK or NG

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

## 2. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

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 3.
NG >> Repair or replace harness connector.

## 3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-343, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace EVAP control system pressure sensor.

## 4. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
Refer to EC-346, "Wiring Diagram" .

>> **INSPECTION END**

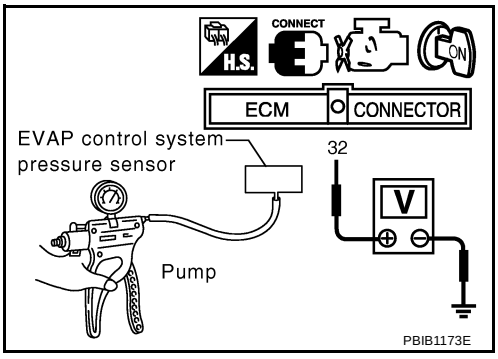
# Component Inspection

ABS00ATP

## EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

| 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:**

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

4. If NG, replace EVAP control system pressure sensor.

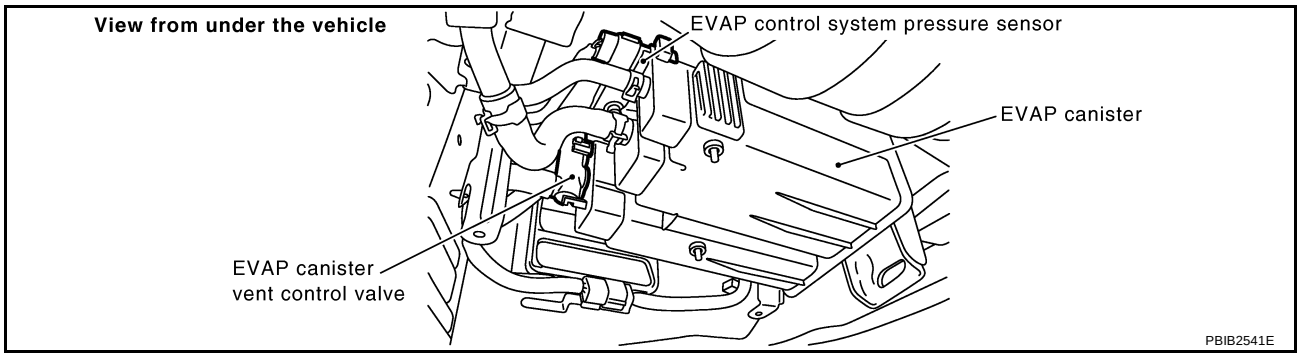
# DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

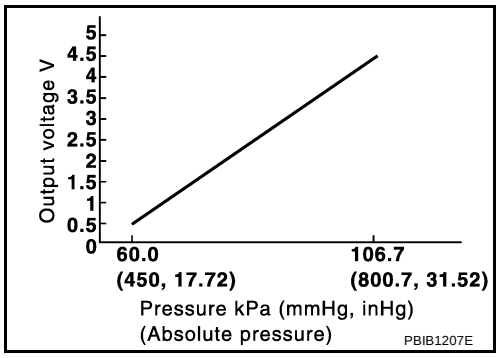
PFP:25085

## Component Description

ABS00ATQ

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.




## CONSULT-II Reference Value in Data Monitor Mode

ABS00ATR

Specification data are reference values.

| MONITOR ITEM | CONDITION | SPECIFICATION |
|---|---|---|
| EVAP SYS PRES | ● Ignition switch: ON | Approx. 1.8 - 4.8V |

## On Board Diagnosis Logic

ABS00ATS

**NOTE:**
**If DTC P0452 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to** **EC-472, "DTC P1229 SENSOR POWER SUPPLY"** **.**

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0452<br>0452 | EVAP control system pressure sensor low input | An excessively low voltage from the sensor is sent to ECM. | ● Harness or connectors<br>(The sensor circuit is open or shorted.)<br>● EVAP control system pressure sensor |

## DTC Confirmation Procedure

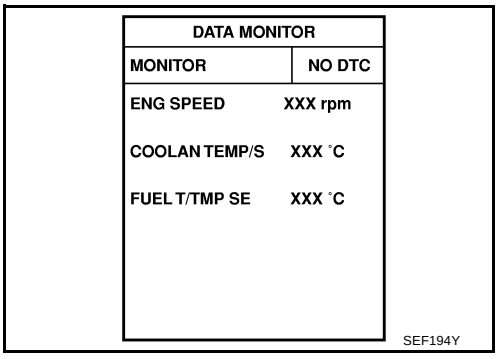
ABS00ATT

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

**TESTING CONDITION:**
**Always perform test at a temperature of 5°C (41°F) or more.**

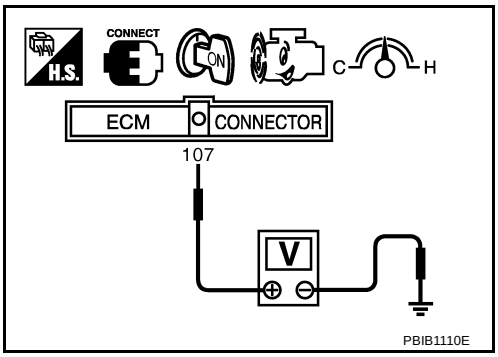
### WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “FUEL T/TEMP SE” is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
   If 1st trip DTC is detected, go to EC-347, "Diagnostic Procedure"
   .




### WITH GST

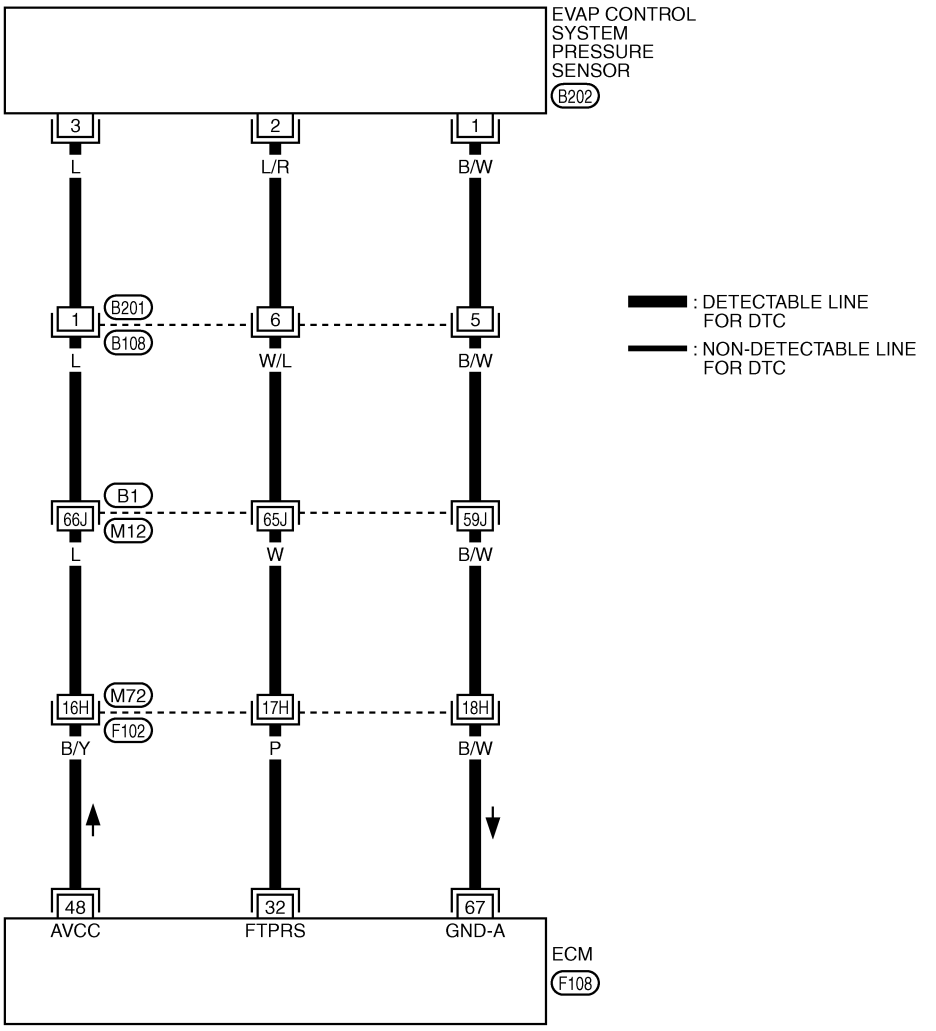
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 107 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select “Service $07” with GST.
   If 1st trip DTC is detected, go to EC-347, "Diagnostic Procedure"
   .

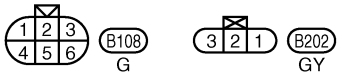


## Wiring Diagram

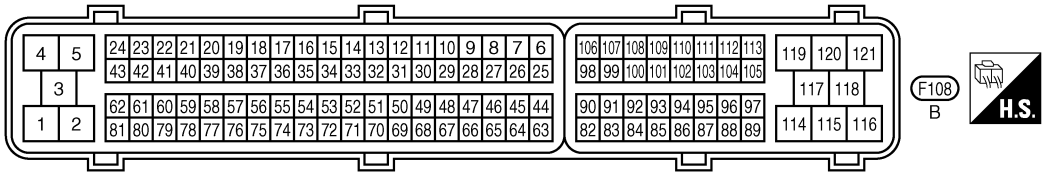
ABS00ATU

EC-PRE/SE-01




REFER TO THE FOLLOWING.
F102 , B1 -SUPER MULTIPLE JUNCTION (SMJ)




TBWM0762E

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

**CAUTION:**

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

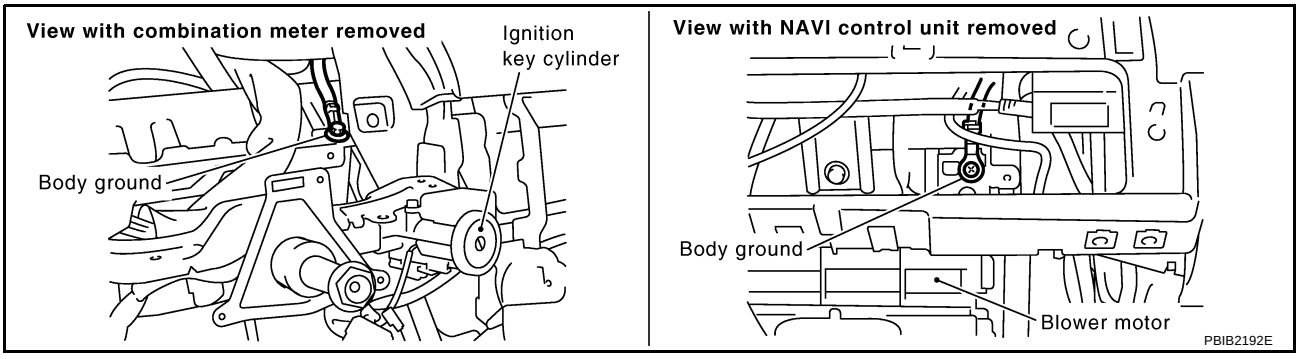
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 32 | P | EVAP control system pressure sensor | **[Ignition switch: ON]** | Approximately 1.8 - 4.8V |
| 48 | B/Y | Sensor power supply (EVAP control system pressure sensor) | **[Ignition switch: ON]** | Approximately 5V |
| 67 | B/W | Sensor ground | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |

## Diagnostic Procedure

ABS00ATV

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

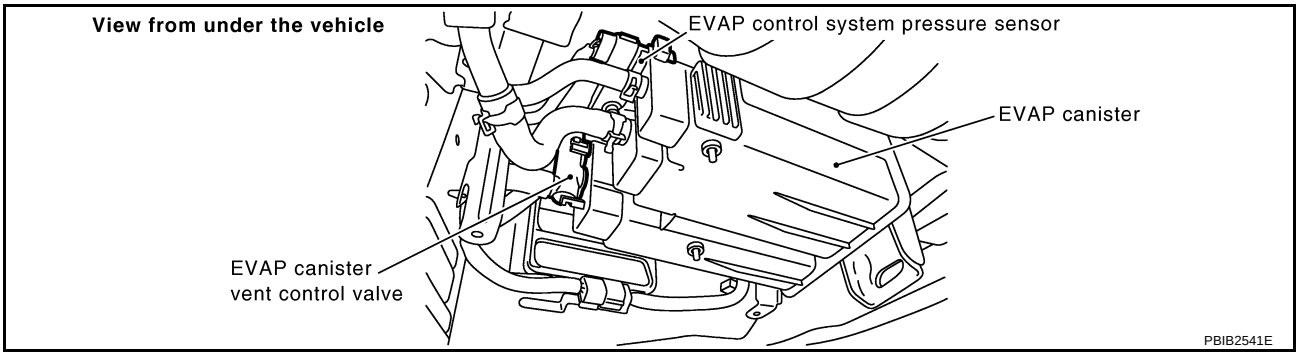



OK or NG

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

### 2. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.




2. Check sensor harness connector for water.

**Water should not exist.**

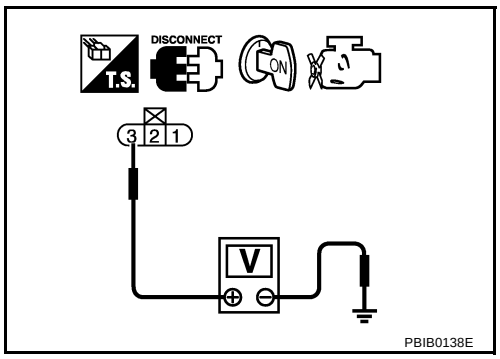
OK or NG

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

## 3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**




OK or NG

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

## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B201, B108
- Harness connectors B1, M12
- Harness connectors M72, F102
- 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.

## 5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

**Continuity should exist.**

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

OK or NG

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

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B201, B108
- Harness connectors B1, M12
- Harness connectors M72, F102
- 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.

## 7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 32 and EVAP control system pressure sensor terminal 2.
   Refer to Wiring Diagram.

   **Continuity should exist.**

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

OK or NG

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

## 8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B201, B108
- Harness connectors B1, M12
- Harness connectors M72, F102
- 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.

## 9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-349, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

## 10. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

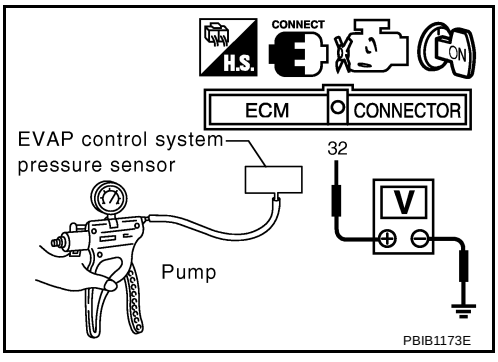
# Component Inspection

ABS00ATW

## EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.
   **Always replace O-ring with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

| 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:**

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

4. If NG, replace EVAP control system pressure sensor.

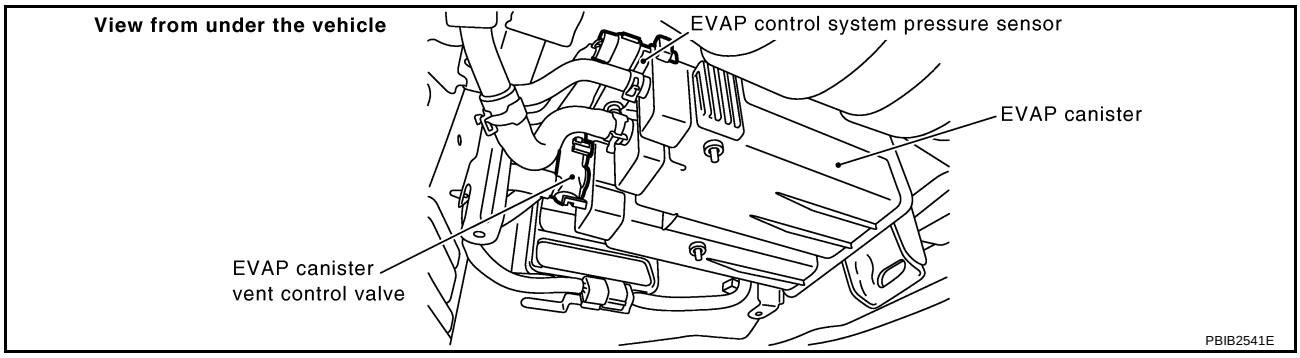
# DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

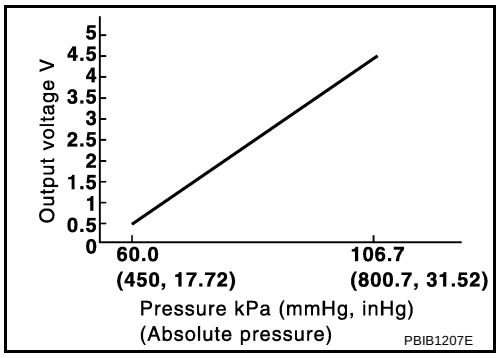
PFP:25085

## Component Description

ABS00ATX

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.




## CONSULT-II Reference Value in Data Monitor Mode

ABS00ATY

Specification data are reference values.

| MONITOR ITEM | CONDITION | SPECIFICATION |
|---|---|---|
| EVAP SYS PRES | ● Ignition switch: ON | Approx. 1.8 - 4.8V |

## On Board Diagnosis Logic

ABS00ATZ

**NOTE:**
**If DTC P0453 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-472, "DTC P1229 SENSOR POWER SUPPLY" .**

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0453<br>0453 | EVAP control system pressure sensor high input | An excessively high voltage from the sensor is sent to ECM. | ● Harness or connectors (The sensor circuit is open or shorted.)<br>● EVAP control system pressure sensor<br>● EVAP canister vent control valve<br>● EVAP canister<br>● Rubber hose from EVAP canister vent control valve to vehicle frame |

## DTC Confirmation Procedure

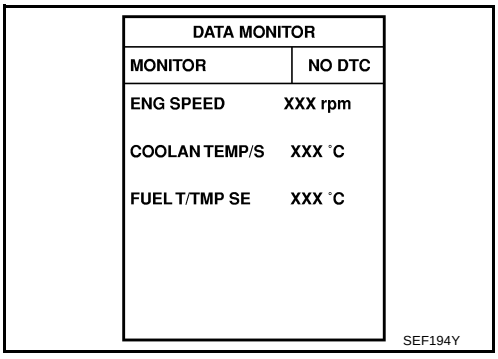
ABS00AU0

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

**TESTING CONDITION:**
**Always perform test at a temperature of 5°C (41°F) or more.**

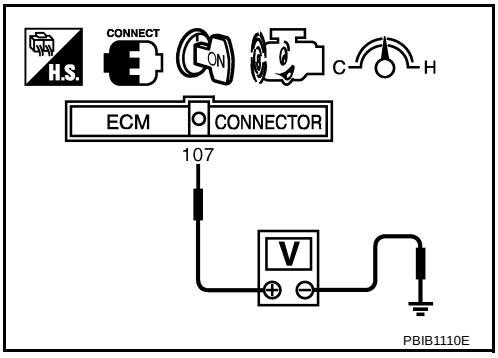
### WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “FUEL T/TEMP SE” is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. If 1st trip DTC is detected, go to EC-353, "Diagnostic Procedure"
.




### WITH GST

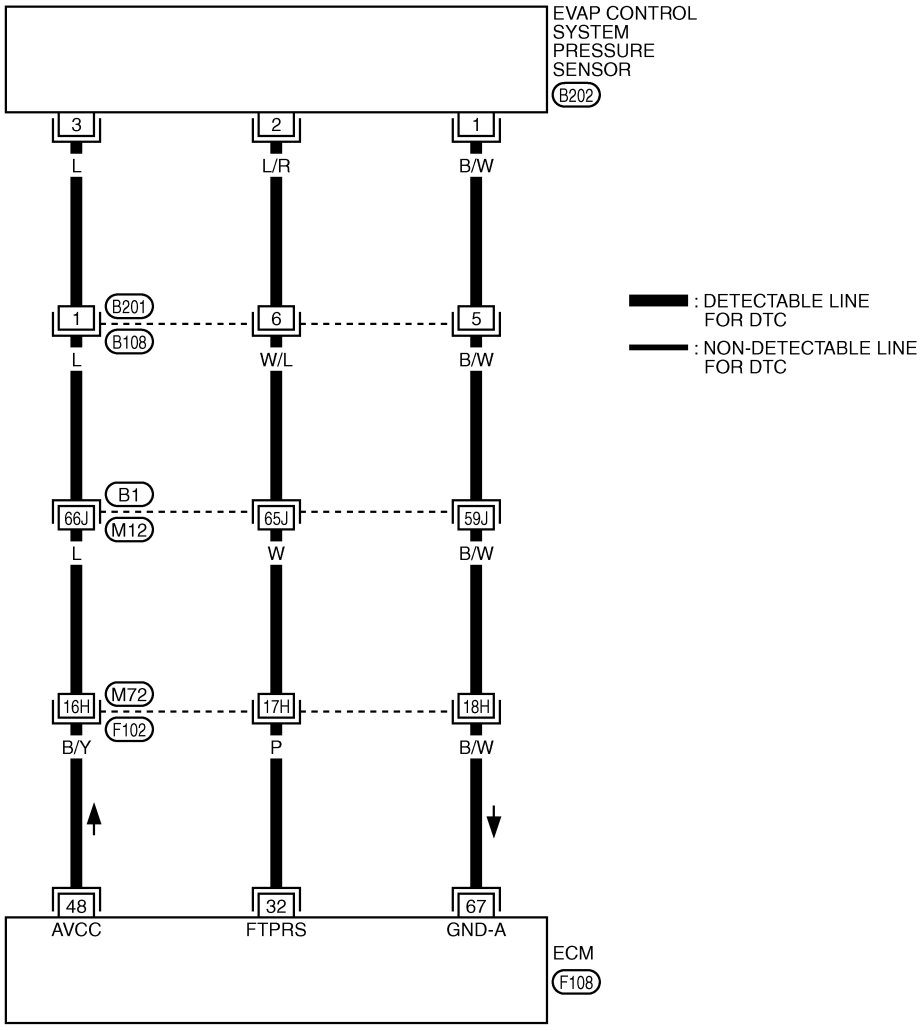
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 107 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select Service $07 with GST.
   If 1st trip DTC is detected, go to EC-353, "Diagnostic Procedure"
.



## Wiring Diagram

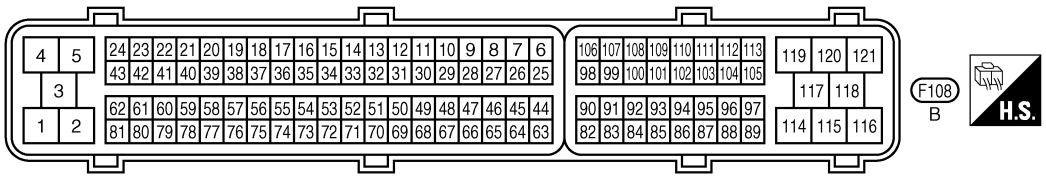
ABS00AU1

EC-PRE/SE-01





REFER TO THE FOLLOWING.
F102 , B1 -SUPER MULTIPLE JUNCTION (SMJ)




TBWM0762E

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

**CAUTION:**

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

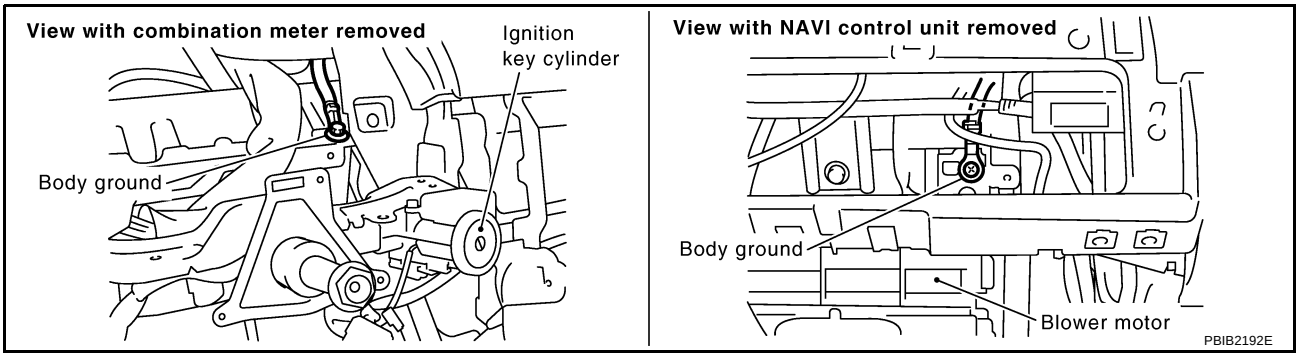
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 32 | P | EVAP control system pressure sensor | **[Ignition switch: ON]** | Approximately 1.8 - 4.8V |
| 48 | B/Y | Sensor power supply (EVAP control system pressure sensor) | **[Ignition switch: ON]** | Approximately 5V |
| 67 | B/W | Sensor ground | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |

## Diagnostic Procedure

ABS00AU2

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

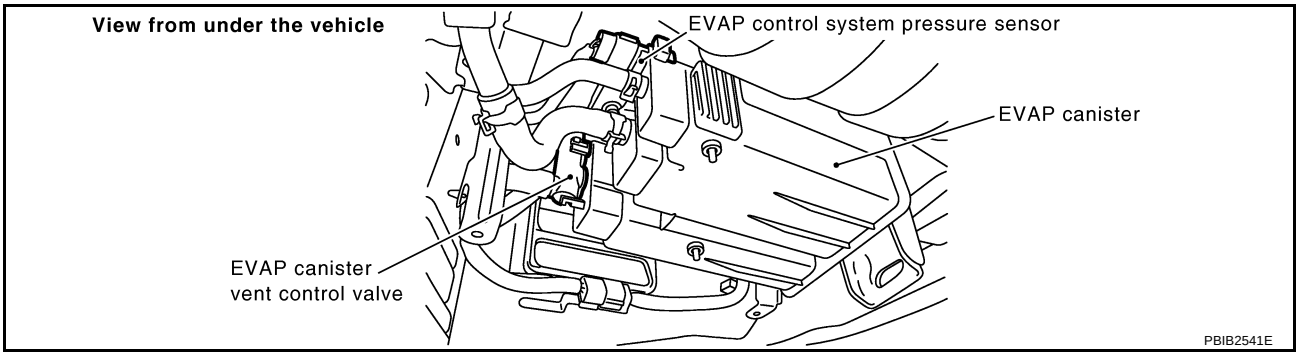



OK or NG

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

### 2. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.




2. Check sensor harness connector for water.

**Water should not exist.**

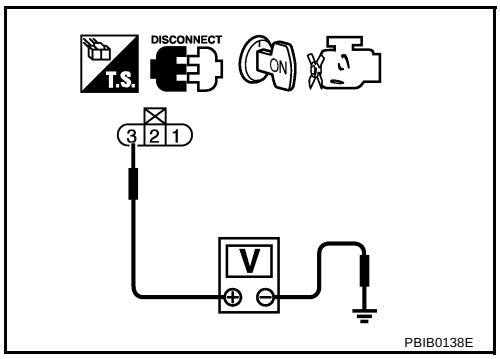
OK or NG

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

## 3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**




OK or NG

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

## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B201, B108
- Harness connectors B1, M12
- Harness connectors M72, F102
- 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.

## 5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

**Continuity should exist.**

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

OK or NG

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

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B201, B108
- Harness connectors B1, M12
- Harness connectors M72, F102
- 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.

## 7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 32 and EVAP control system pressure sensor terminal 2.
   Refer to Wiring Diagram.

   **Continuity should exist.**

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

OK or NG

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

## 8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B201, B108
- Harness connectors B1, M12
- Harness connectors M72, F102
- 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.

## 9. CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging, vent and kinked.

OK or NG

OK >> GO TO 10.
NG >> Clean the rubber tube using an air blower, repair or replace rubber tube.

## 10. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-339, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP canister vent control valve.

## 11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

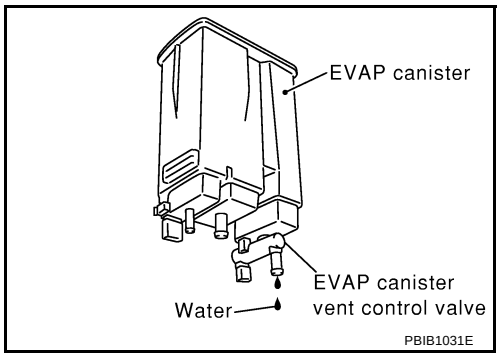
Refer to EC-357, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP control system pressure sensor.

## 12. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.




Yes or No

Yes >> GO TO 13.
No >> GO TO 15.

## 13. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

**The weight should be less than 2.1 kg (4.6 lb).**

OK or NG

OK >> GO TO 17.
NG >> GO TO 14.

## 14. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

## 15. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

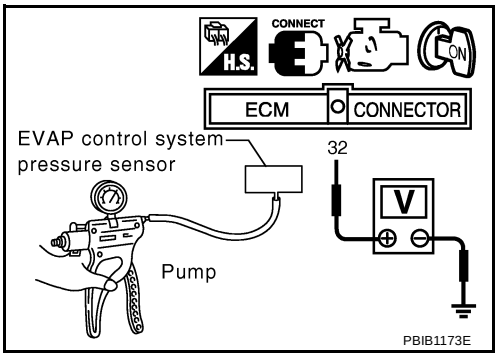
## Component Inspection

ABS00AU3

### EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

| 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:**

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

4. If NG, replace EVAP control system pressure sensor.

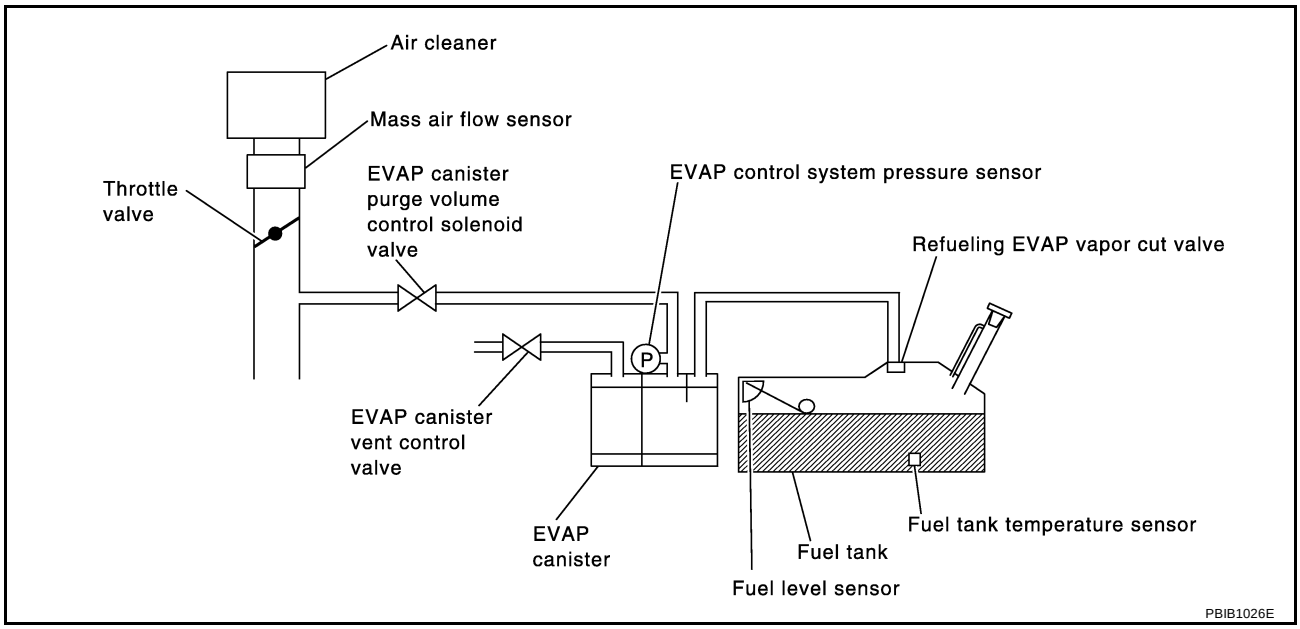
# DTC P0455 EVAP CONTROL SYSTEM

PFP:14950

## On Board Diagnosis Logic

ABS00AU4

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<br>0455 | EVAP control system gross leak detected | EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly. | ● Fuel filler cap remains open or fails to close.<br>● Incorrect fuel tank vacuum relief valve<br>● Incorrect fuel filler cap used<br>● Foreign matter caught in fuel filler cap.<br>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.<br>● Foreign matter caught in EVAP canister vent control valve.<br>● EVAP canister or fuel tank leaks<br>● EVAP purge line (pipe and rubber tube) leaks<br>● EVAP purge line rubber tube bent.<br>● Loose or disconnected rubber tube<br>● EVAP canister vent control valve and the circuit<br>● EVAP canister purge volume control solenoid valve and the circuit<br>● Fuel tank temperature sensor<br>● O-ring of EVAP canister vent control valve is missing or damaged.<br>● EVAP control system pressure sensor<br>● Refueling EVAP vapor cut valve<br>● ORVR system leaks |

**CAUTION:**

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**

- **Use only a genuine NISSAN rubber tube as a replacement.**

## DTC Confirmation Procedure

ABS00AU5

**CAUTION:**

**Never remove fuel filler cap during the DTC Confirmation Procedure.**

**NOTE:**

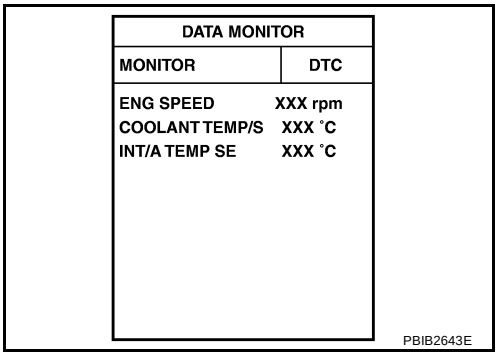
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**

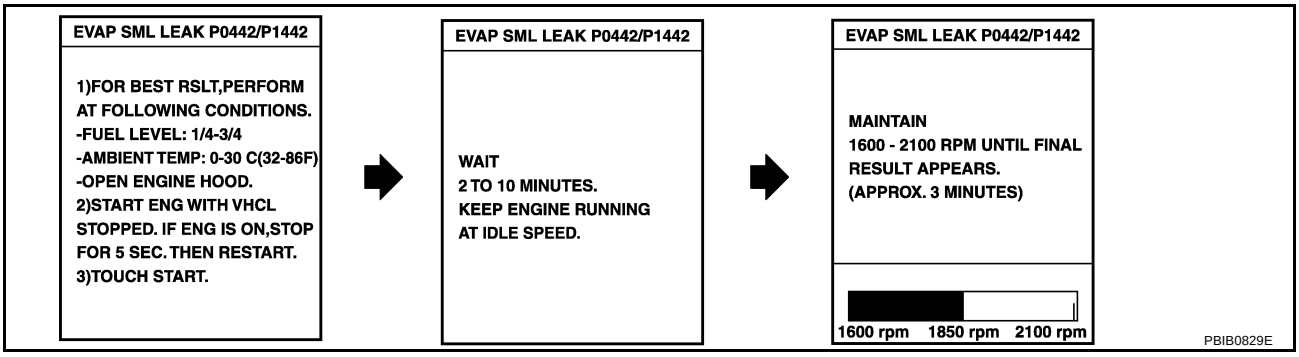
- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedures.**

### WITH CONSULT-II

1. Tighten fuel filler cap securely until ratcheting sound is heard.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
5. Make sure that the following conditions are met.
   **COOLAN TEMP/S: 0 - 70°C (32 - 158°F)**
   **INT/A TEMP SE: 0 - 60°C (32 - 140°F)**



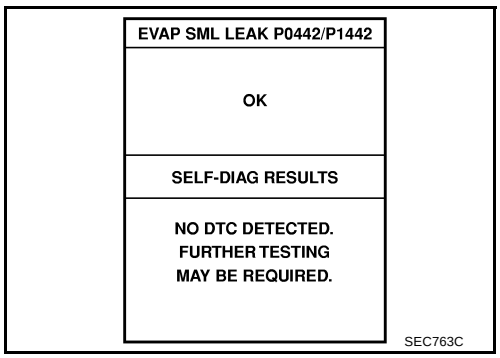

6. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.




**NOTE:**

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-71, "Basic Inspection" .

7. Make sure that “OK” is displayed.
   If “NG” is displayed, select “SELF-DIAG RESULTS” mode and make sure that “EVAP GROSS LEAK [P0455]” is displayed. If it is displayed, refer to EC-360, "Diagnostic Procedure" .
   If P0442 is displayed, perform EC-321, "Diagnostic Procedure" .




**WITH GST**

**NOTE:**

Be sure to read the explanation of EC-57, "Driving Pattern" before driving vehicle.

1. Start engine.
2. Drive vehicle according to EC-57, "Driving Pattern" .
3. Stop vehicle.
4. Turn ignition switch OFF, wait at least 10 seconds and then tarn ON.
5. Select Service $07 with GST.
   - If P0455 is displayed on the screen, go to EC-360, "Diagnostic Procedure" .
   - If P0442 is displayed on the screen, go to EC-321, "Diagnostic Procedure" .
   - If P0441 is displayed on the screen, go to EC-316, "Diagnostic Procedure" .

## Diagnostic Procedure

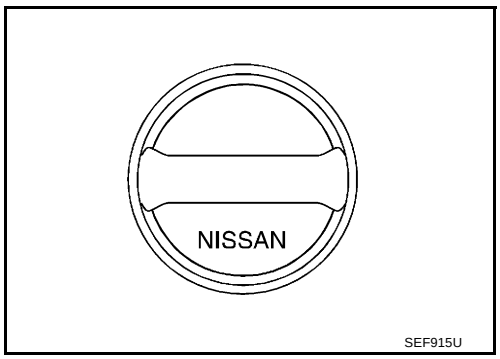
ABS00AU6

### 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-34, "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-32, "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

Check the following.

- EVAP canister vent control valve is installed properly.
  Refer to EC-35, "Removal and Installation" .
- EVAP canister vent control valve.
  Refer to EC-339, "Component Inspection" .

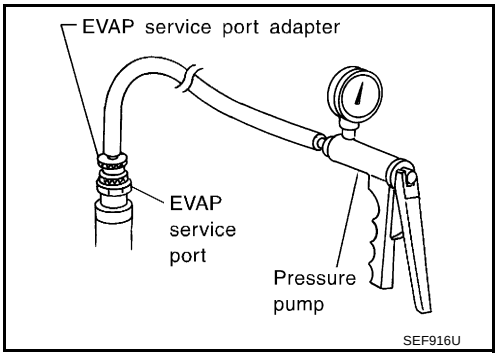
OK or NG

OK >> GO TO 8.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

## 8. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely. For the location of EVAP service port, refer to EC-32, "EVAPORATIVE EMISSION LINE DRAWING"

**NOTE:**
**Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.**

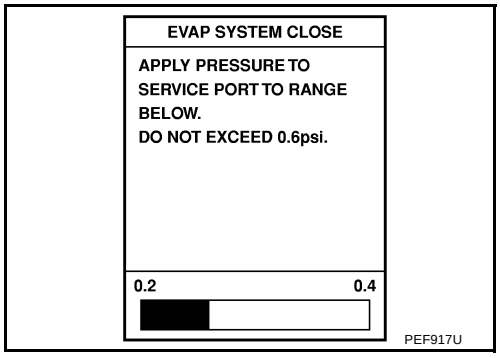



With CONSULT-II>>GO TO 9.
Without CONSULT-II>>GO TO 10.

## 9. CHECK FOR EVAP LEAK

**With CONSULT-II**

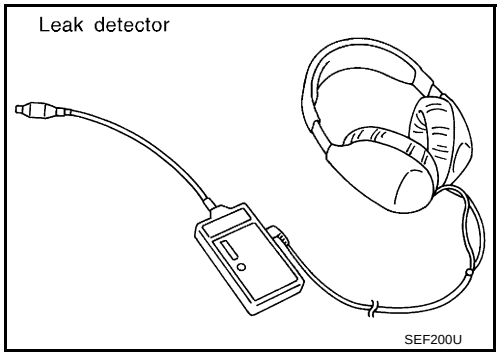
1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.




**CAUTION:**

- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm$^2$ , 0.6 psi) of pressure in 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-32, "EVAPORATIVE EMISSION LINE DRAWING" .



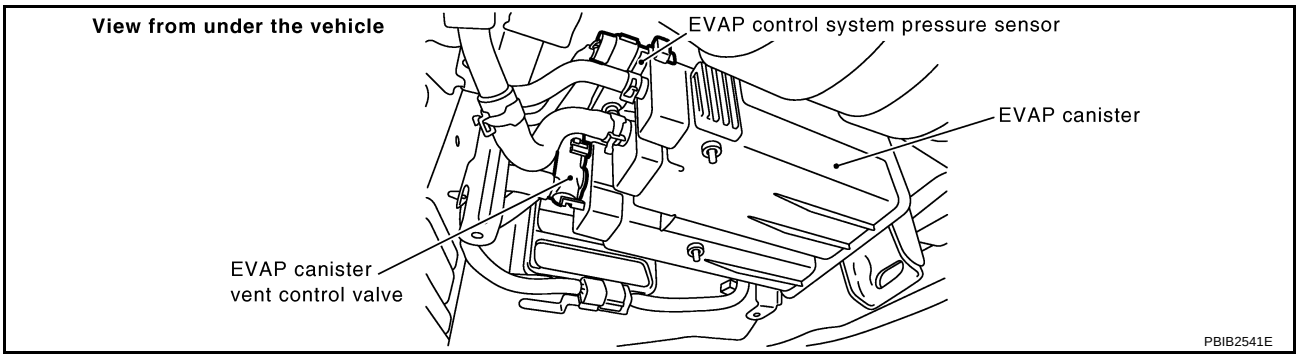

OK or NG

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.)

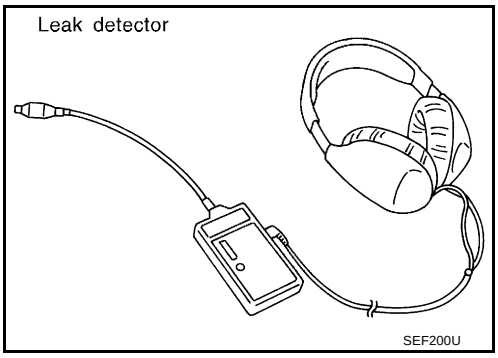



3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

**CAUTION:**

- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm$^2$ , 0.6 psi) of pressure in 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-32, "EVAPORATIVE EMISSION LINE DRAWING" .



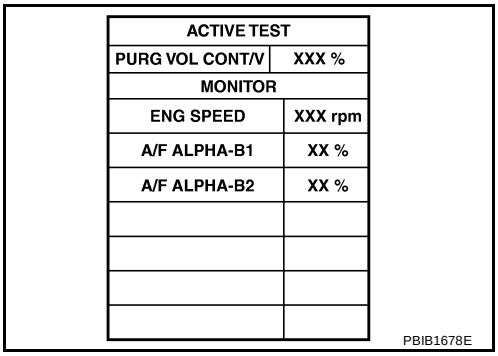

OK or NG

OK >> GO TO 12.
NG >> Repair or replace.

## 11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

**With CONSULT-II**

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.




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.

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-112, "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.

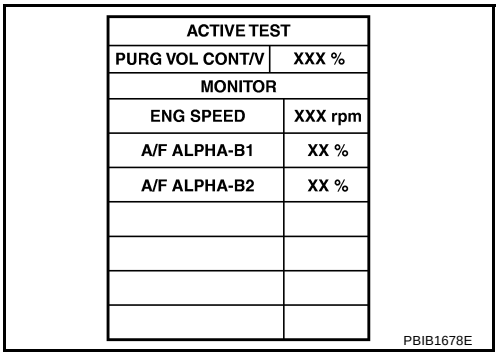
## 14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

**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.




## 15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-332, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister purge volume control solenoid valve.

## 16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-265, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace fuel level sensor unit.

## 17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-349, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

## 18. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-38, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 19.
NG >> Repair or replace hoses and tubes.

## 19. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 20.
NG >> Repair or replace hose, tube or filler neck tube.

## 20. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-41, "REFUELING EVAP VAPOR CUT VALVE" .

OK or NG

OK >> GO TO 21.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

## 21. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

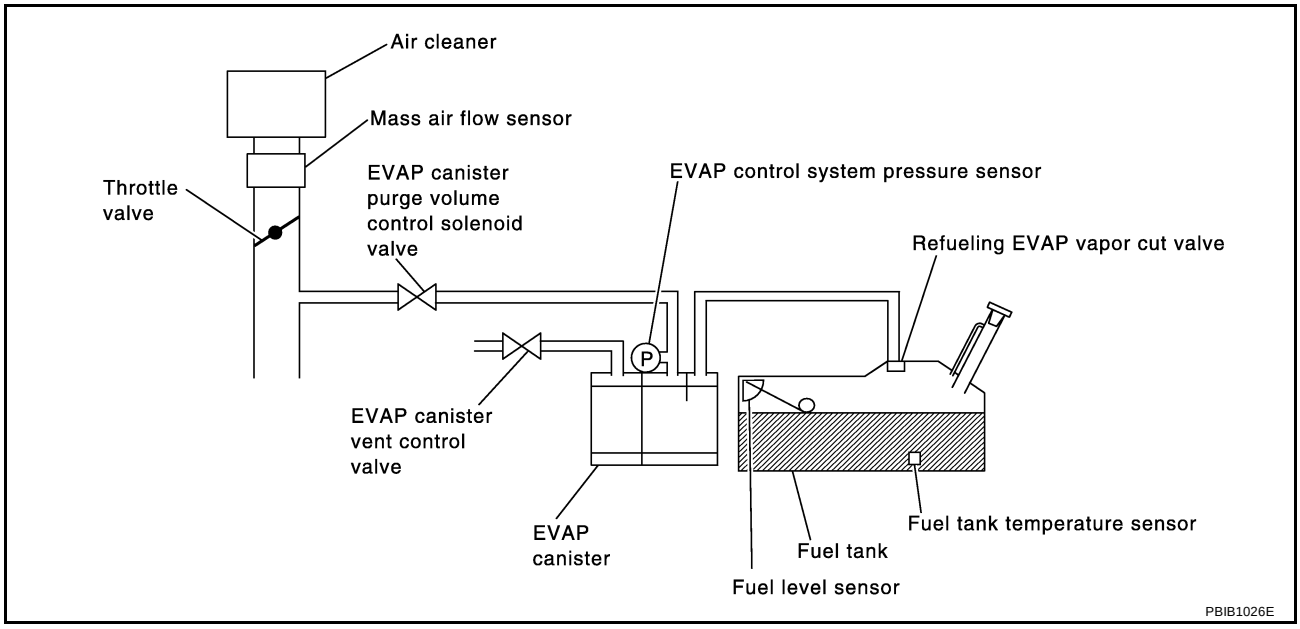
# DTC P0456 EVAP CONTROL SYSTEM

PFP:14950

## On Board Diagnosis Logic

ABS00AU7

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.
If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be detected.
If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 will be detected.
If ECM judges there are no leaks, the diagnosis will be OK.




| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0456<br>0456 | Evaporative emission control system very small leak (negative pressure check) | ● EVAP system has a very small leak.<br>● EVAP system does not operate properly. | ● Incorrect fuel tank vacuum relief valve<br>● Incorrect fuel filler cap used<br>● Fuel filler cap remains open or fails to close.<br>● Foreign matter caught in fuel filler cap.<br>● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve.<br>● Foreign matter caught in EVAP canister vent control valve.<br>● EVAP canister or fuel tank leaks<br>● EVAP purge line (pipe and rubber tube) leaks<br>● EVAP purge line rubber tube bent<br>● Loose or disconnected rubber tube<br>● EVAP canister vent control valve and the circuit<br>● EVAP canister purge volume control solenoid valve and the circuit<br>● Fuel tank temperature sensor<br>● O-ring of EVAP canister vent control valve is missing or damaged<br>● EVAP canister is saturated with water<br>● EVAP control system pressure sensor<br>● Refueling EVAP vapor cut valve<br>● ORVR system leaks<br>● Fuel level sensor and the circuit<br>● Foreign matter caught in EVAP canister purge volume control solenoid valve |

**CAUTION:**

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

## DTC Confirmation Procedure

ABS00AU8

**NOTE:**

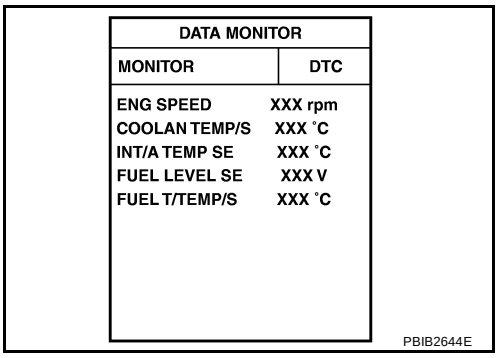
- **If DTC P0456 is displayed with P0442, first perform trouble diagnosis for DTC P0456.**
- **After repair, make sure that the hoses and clips are installed properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**

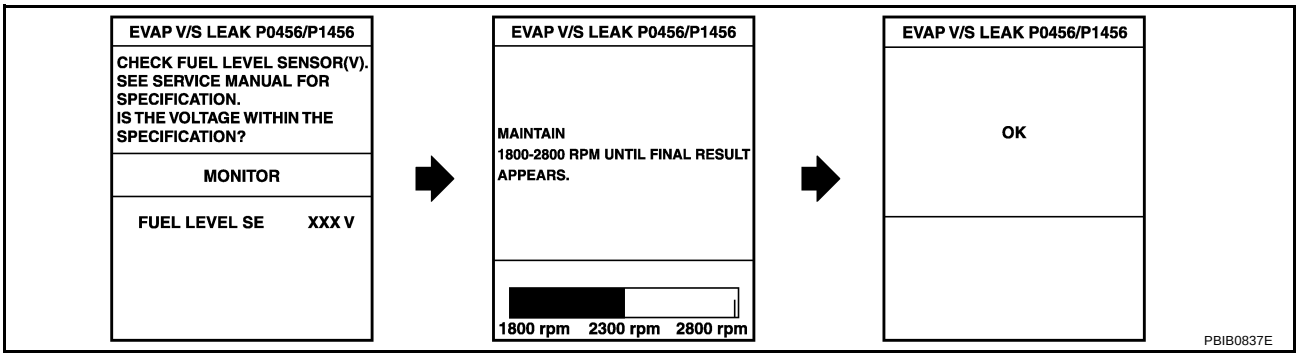
- **Open engine hood before conducting following procedure.**
- **If any of following conditions are met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**
  - **Fuel filler cap is removed.**
  - **Refilled or drained the fuel.**
  - **EVAP component parts is/are removed.**
- **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: 0.25 - 1.4V**
   **COOLAN TEMP/S: 0 - 32°C (32 - 90°F)**
   **FUEL T/TMP SE: 0 - 35°C (32 - 95°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 10 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-368, "Diagnostic Procedure" .

   **NOTE:**
   - **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to EC-71, "Basic Inspection" .**

- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

## Overall Function Check

ABS00AU9

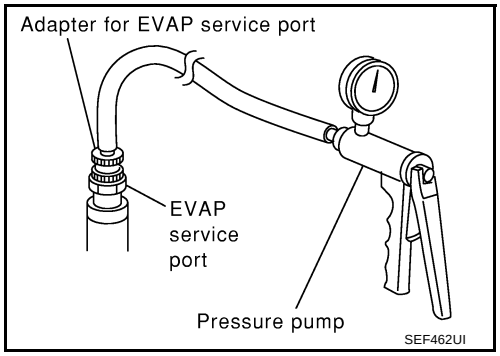
### WITH GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

**CAUTION:**

- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm$^2$ , 0.6 psi).**

1. Attach the EVAP service port adapter securely to the EVAP service port. For the location of EVAP service port, refer to EC-32, "EVAPORATIVE EMISSION LINE DRAWING"
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 Service $08.
6. Using Service $08 control the EVAP canister vent control valve (close).
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-368, "Diagnostic Procedure" .
   If OK, go to next step.




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.

**NOTE:**
**For more information, refer to GST Instruction Manual.**

## Diagnostic Procedure

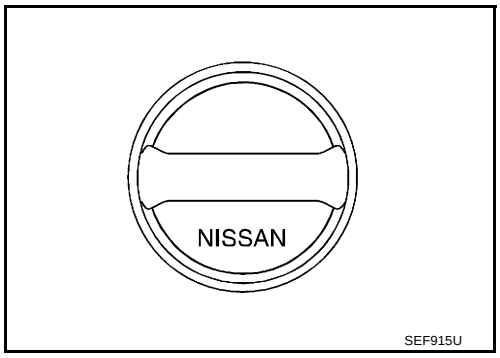
ABS00AUA

### 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-34, "FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)" .

OK or NG

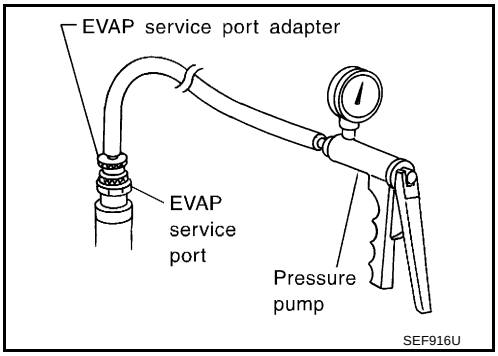
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

## 5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely. For the location of EVAP service port, refer to EC-32, "EVAPORATIVE EMISSION LINE DRAWING" .

**NOTE:**
**Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.**

With CONSULT-II>>GO TO 6.
Without CONSULT-II>>GO TO 7.

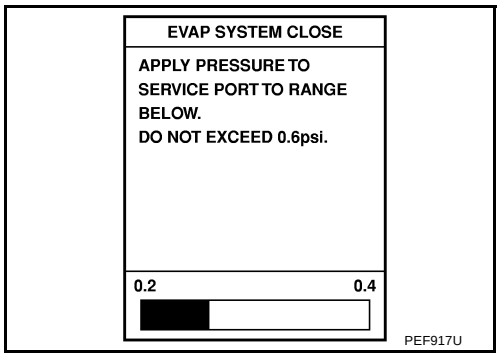


## 6. CHECK FOR EVAP LEAK

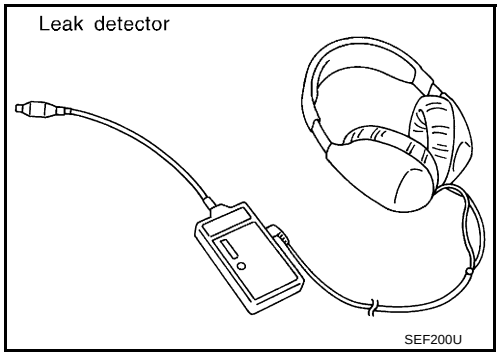
**With CONSULT-II**

1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

   **CAUTION:**
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm$^2$ , 0.6 psi) of pressure in 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-32, "EVAPORATIVE EMISSION LINE DRAWING" .



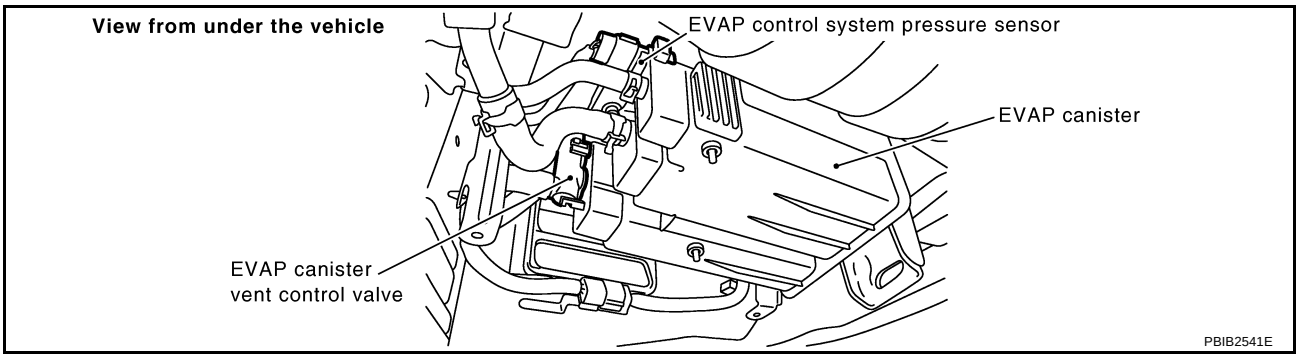

OK or NG

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.)

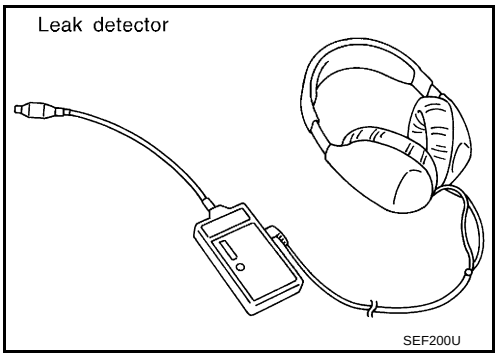



3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

**CAUTION:**

- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm$^2$ , 0.6 psi) of pressure in 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-32, "EVAPORATIVE EMISSION LINE DRAWING" .




OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

## 8. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly.
  Refer to EC-35, "Removal and Installation" .
- EVAP canister vent control valve.
  Refer to EC-339, "Component Inspection" .

OK or NG

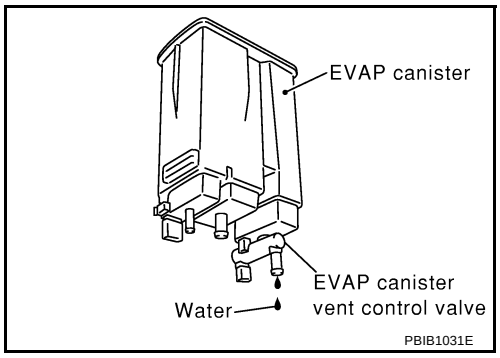
OK >> GO TO 9.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

## 9. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 10.
No (With CONSULT-II)>>GO TO 12.
No (Without CONSULT-II)>>GO TO 13.




## 10. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

**The weight should be less than 2.1 kg (4.6 lb).**

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.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

## 12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

**With CONSULT-II**

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

OK or NG

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

| ACTIVE TEST | |
|---|---|
| PURG VOL CONT/V | XXX % |
| MONITOR | |
| ENG SPEED | XXX rpm |
| A/F ALPHA-B1 | XX % |
| A/F ALPHA-B2 | XX % |
| | |
| | |
| | |
| | |

PBIB1678E

## 13. 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.

OK or NG

OK >> GO TO 16.
NG >> GO TO 14.

## 14. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-112, "Vacuum Hose Drawing" .

OK or NG

OK >> GO TO 15.
NG >> Repair or reconnect the hose.

## 15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-332, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister purge volume control solenoid valve.

## 16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-265, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace fuel level sensor unit.

## 17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-349, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

## 18. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-32, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 19.
NG >> Repair or reconnect the hose.

## 19. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 20.

## 20. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-38, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 21.
NG >> Repair or replace hoses and tubes.

## 21. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 22.
NG >> Repair or replace hose, tube or filler neck tube.

## 22. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-41, "Component Inspection" .

OK or NG

OK >> GO TO 23.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

## 23. CHECK FUEL LEVEL SENSOR

Refer to DI-16, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 24.
NG >> Replace fuel level sensor unit.

## 24. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

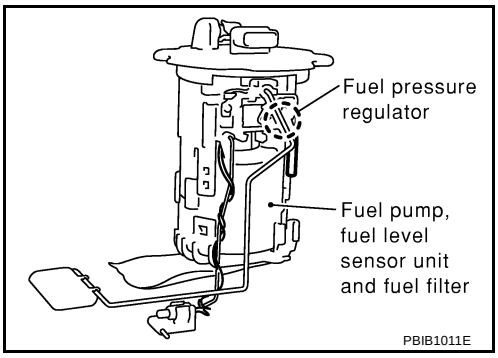
# DTC P0460 FUEL LEVEL SENSOR

PFP:25060

## Component Description

ABS00AUC

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 combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.




## On Board Diagnosis Logic

ABS00AUD

**NOTE:**
**If DTC P0460 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-166, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**
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<br>0460 | Fuel level sensor circuit noise | Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM. | ● Harness or connectors (The CAN communication line is open or shorted)<br>● Harness or connectors (The sensor circuit is open or shorted)<br>● Combination meter<br>● Fuel level sensor |

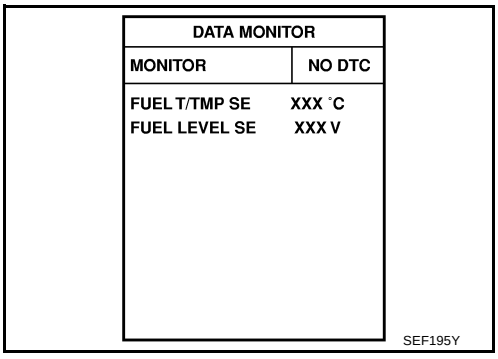
## DTC Confirmation Procedure

ABS00AUE

**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-376, "Diagnostic Procedure" .




### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Diagnostic Procedure

ABS00AUF

### 1. CHECK FUEL GAUGE OPERATION

Refer to DI-9, "Self-Diagnosis Mode of Combination Meter" .

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of DI-9, "Self-Diagnosis Mode of Combination Meter" .

### 2. CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to DI-13, "Fuel Level Sensor Signal Inspection" .

OK or NG

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

### 3. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

## Removal and Installation

ABS00AUG

### FUEL LEVEL SENSOR

Refer to FL-4, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

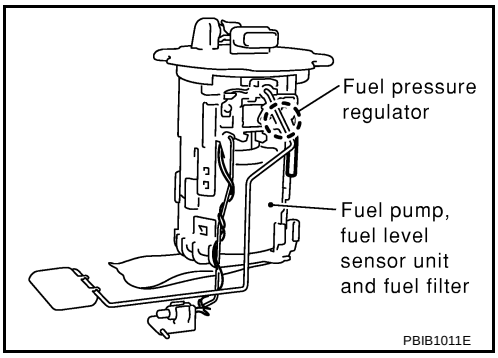
# DTC P0461 FUEL LEVEL SENSOR

PFP:25060

## Component Description

ABS00AUH

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 combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.




## On Board Diagnosis Logic

ABS00AUI

**NOTE:**
**If DTC P0461 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-166, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**
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<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. | ● Harness or connectors (The CAN communication line is open or shorted)<br>● Harness or connectors (The sensor circuit is open or shorted)<br>● Combination meter<br>● Fuel level sensor |

## Overall Function Check

ABS00AUJ

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.

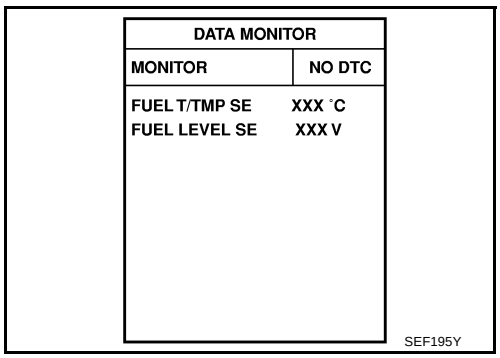
**WARNING:**
**When performing following procedure, be sure to observe the handling of the fuel. Refer to FL-11, "FUEL TANK" .**
**TESTING CONDITION:**
**Before starting overall function check, preparation of draining fuel and refilling fuel is required.**

### WITH CONSULT-II

**NOTE:**
**Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.**

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-91, "FUEL PRESSURE RELEASE" .
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
6. Select “FUEL LEVEL SE” in “DATA MONITOR” mode with CONSULT-II.

7. Check “FUEL LEVEL SE” output voltage and note it.
8. Select “FUEL PUMP” in “ACTIVE TEST” mode with CONSULT-II.
9. Touch “ON” and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Check “FUEL LEVEL SE” output voltage and note it.
11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
12. Check “FUEL LEVEL SE” output voltage and note it.
13. Confirm whether the voltage changes more than 0.03V during step 7 to 10 and 10 to 12.
    If NG, go to EC-378, "Diagnostic Procedure" .




### WITH GST

**NOTE:**
**Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.**

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line. Refer to EC-91, "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 ON.
6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
7. Confirm that the fuel gauge indication varies.
8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
9. Confirm that the fuel gauge indication varies.
10. If NG, go to EC-378, "Diagnostic Procedure" .

## Diagnostic Procedure

ABS00AUK

### 1. CHECK FUEL GAUGE OPERATION

Refer to DI-9, "Self-Diagnosis Mode of Combination Meter" .

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of DI-9, "Self-Diagnosis Mode of Combination Meter" .

### 2. CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to DI-13, "Fuel Level Sensor Signal Inspection" .

OK or NG

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

### 3. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

## Removal and Installation

ABS00AUL

### FUEL LEVEL SENSOR

Refer to FL-4, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

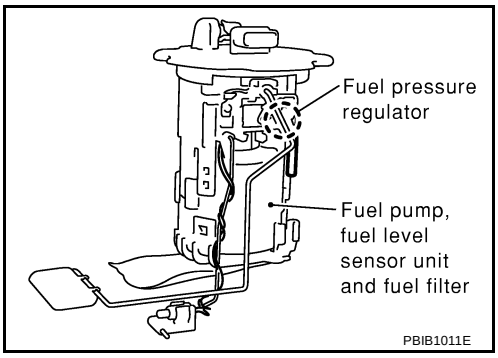
# DTC P0462, P0463 FUEL LEVEL SENSOR

PFP:25060

## Component Description

ABS00AUM

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 combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.




## On Board Diagnosis Logic

ABS00AUN

**NOTE:**
**If DTC P0462 or P0463 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-166, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**
This diagnosis indicates the former, to detect open or short circuit malfunction.

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0462<br>0462 | Fuel level sensor circuit low input | An excessively low voltage is sent from the sensor is sent to ECM. | ● Harness or connectors (The CAN communication line is open or shorted)<br>● Harness or connectors (The sensor circuit is open or shorted)<br>● Combination meter<br>● Fuel level sensor |
| P0463<br>0463 | Fuel level sensor circuit high input | An excessively high voltage is sent from the sensor is sent to ECM. | |

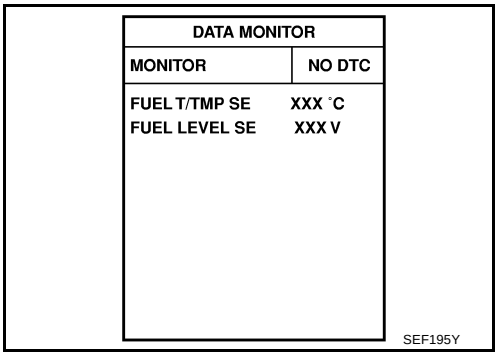
## DTC Confirmation Procedure

ABS00AUO

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
**TESTING CONDITION:**
**Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch ON.**

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-380, "Diagnostic Procedure" .




### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Diagnostic Procedure

ABS00AUP

### 1. CHECK FUEL GAUGE OPERATION

Refer to DI-9, "Self-Diagnosis Mode of Combination Meter" .

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of DI-9, "Self-Diagnosis Mode of Combination Meter" .

### 2. CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to DI-13, "Fuel Level Sensor Signal Inspection" .

OK or NG

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

### 3. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

## Removal and Installation

ABS00AUQ

### FUEL LEVEL SENSOR

Refer to FL-4, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

# DTC P0500 VSS

PFP:32702

## Description

ABS00AUR

**NOTE:**
**If DTC P0500 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-166, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**
The vehicle speed signal is sent to the combination meter from the VDC/TCS/ABS control unit by CAN communication line. The combination meter then sends the signal to the ECM by CAN communication line.

## On Board Diagnosis Logic

ABS00AUS

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0500<br>0500 | Vehicle speed sensor | The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven. | ● Harness or connectors (The CAN communication line is open or shorted)<br>● Harness or connectors (The vehicle speed signal circuit is open or shorted)<br>● Wheel sensor<br>● Combination meter<br>● VDC/TCS/ABS control unit |

## DTC Confirmation Procedure

ABS00AUT

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

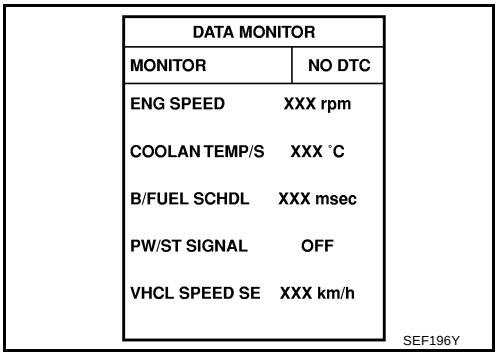
**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**
**Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.**

### WITH CONSULT-II

1. Start engine (VDC switch OFF).
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
   If NG, go to EC-382, "Diagnostic Procedure" .
   If OK, go to following step.
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Warm engine up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

| | |
|---|---|
| ENG SPEED | 1,700 - 6,000 rpm |
| COOLAN TEMP/S | More than 70°C (158°F) |
| B/FUEL SCHDL | 5.5 - 31.8 (A/T) msec<br>5.0 - 31.8 (M/T) msec |
| Shift lever | Except P or N position (A/T)<br>Except Neutral position (M/T) |
| PW/ST SIGNAL | OFF |




6. If 1st trip DTC is detected, go to EC-382, "Diagnostic Procedure" .

## Overall Function Check

ABS00AUU

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

**WITH GST**

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed sensor signal in Service $01 with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to EC-382, "Diagnostic Procedure" .

## Diagnostic Procedure

ABS00AUV

### 1. CHECK DTC WITH VDC/TCS ABS CONTROL UNIT

Refer to BRC-10, "TROUBLE DIAGNOSIS" .

OK or NG

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

### 2. COMBINATION METER

Check combination meter function.
Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

# DTC P0506 ISC SYSTEM

PFP:23781

## Description

ABS00AUW

**NOTE:**
**If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.**
The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

## On Board Diagnosis Logic

ABS00AUX

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0506<br>0506 | Idle speed control system RPM lower than expected | The idle speed is less than the target idle speed by 100 rpm or more. | ● Electric throttle control actuator<br>● Intake air leak |

## DTC Confirmation Procedure

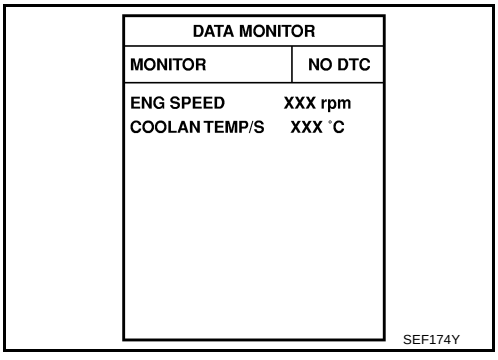
ABS00AUY

**NOTE:**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- **If the target idle speed is out of the specified value, perform Idle Air Volume Learning, EC-89, "Idle Air Volume Learning" , before conducting DTC Confirmation Procedure. For the target idle speed, refer to the Service Data and Specifications (SDS), EC-685, "SERVICE DATA AND SPECIFICATIONS (SDS)" .**

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

### WITH CONSULT-II

1. Open engine hood.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
5. Start engine and run it for at least 1 minute at idle speed.
6. If 1st trip DTC is detected, go to EC-384, "Diagnostic Procedure" .




### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Diagnostic Procedure

ABS00AUZ

### 1. CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 2.
NG >> Discover air leak location and repair.

### 2. REPLACE ECM

1. Stop engine.
2. Replace ECM.
3. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-228, "ECM Re-communicating Function" .
4. Perform EC-88, "VIN Registration" .
5. Perform EC-88, "Accelerator Pedal Released Position Learning" .
6. Perform EC-88, "Throttle Valve Closed Position Learning" .
7. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

# DTC P0507 ISC SYSTEM

PFP:23781

## Description

ABS00AV0

**NOTE:**
**If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.**
The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

## On Board Diagnosis Logic

ABS00AV1

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0507<br>0507 | Idle speed control system RPM higher than expected | The idle speed is more than the target idle speed by 200 rpm or more. | ● Electric throttle control actuator<br>● Intake air leak<br>● PCV system |

## DTC Confirmation Procedure

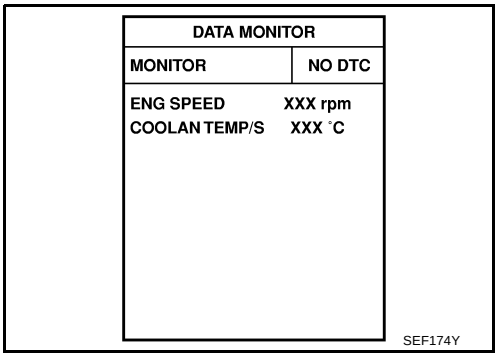
ABS00AV2

**NOTE:**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- **If the target idle speed is out of the specified value, perform Idle Air Volume Learning, EC-89, "Idle Air Volume Learning" , before conducting DTC Confirmation Procedure. For the target idle speed, refer to the Service Data and Specifications (SDS), EC-685, "SERVICE DATA AND SPECIFICATIONS (SDS)" .**

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

### WITH CONSULT-II

1. Open engine hood.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
5. Start engine and run it for at least 1 minute at idle speed.
6. If 1st trip DTC is detected, go to EC-386, "Diagnostic Procedure" .




### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Diagnostic Procedure

ABS00AV3

### 1. CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

OK or NG

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

### 2. CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 3.
NG >> Discover air leak location and repair.

### 3. REPLACE ECM

1. Stop engine.
2. Replace ECM.
3. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-228, "ECM Re-communicating Function" .
4. Perform EC-88, "VIN Registration" .
5. Perform EC-88, "Accelerator Pedal Released Position Learning" .
6. Perform EC-88, "Throttle Valve Closed Position Learning" .
7. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

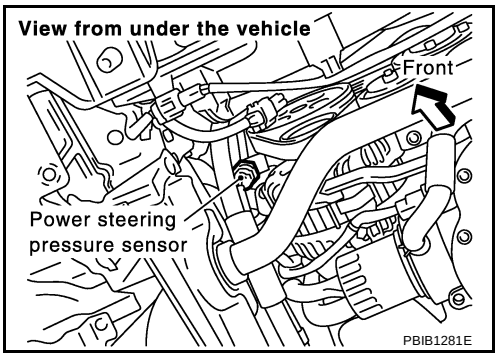
# DTC P0550 PSP SENSOR

PFP:49763

## Component Description

ABS00AV4

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AV5

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| PW/ST SIGNAL | ● Engine: After warming up, idle the engine | Steering wheel: Not being turned. (Forward direction) | OFF |
| | | Steering wheel: Being turned. | ON |

## On Board Diagnosis Logic

ABS00AV6

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

**NOTE:**
**If DTC P0550 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-472, "DTC P1229 SENSOR POWER SUPPLY" .**

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P0550<br>0550 | Power steering pressure sensor circuit | An excessively low or high voltage from the sensor is sent to ECM. | ● Harness or connectors (The sensor circuit is open or shorted)<br>● Power steering pressure sensor |

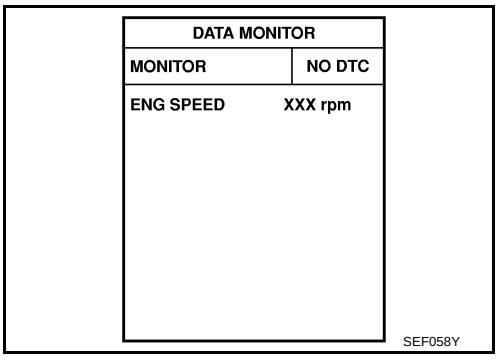
## DTC Confirmation Procedure

ABS00AV7

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

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-389, "Diagnostic Procedure" .



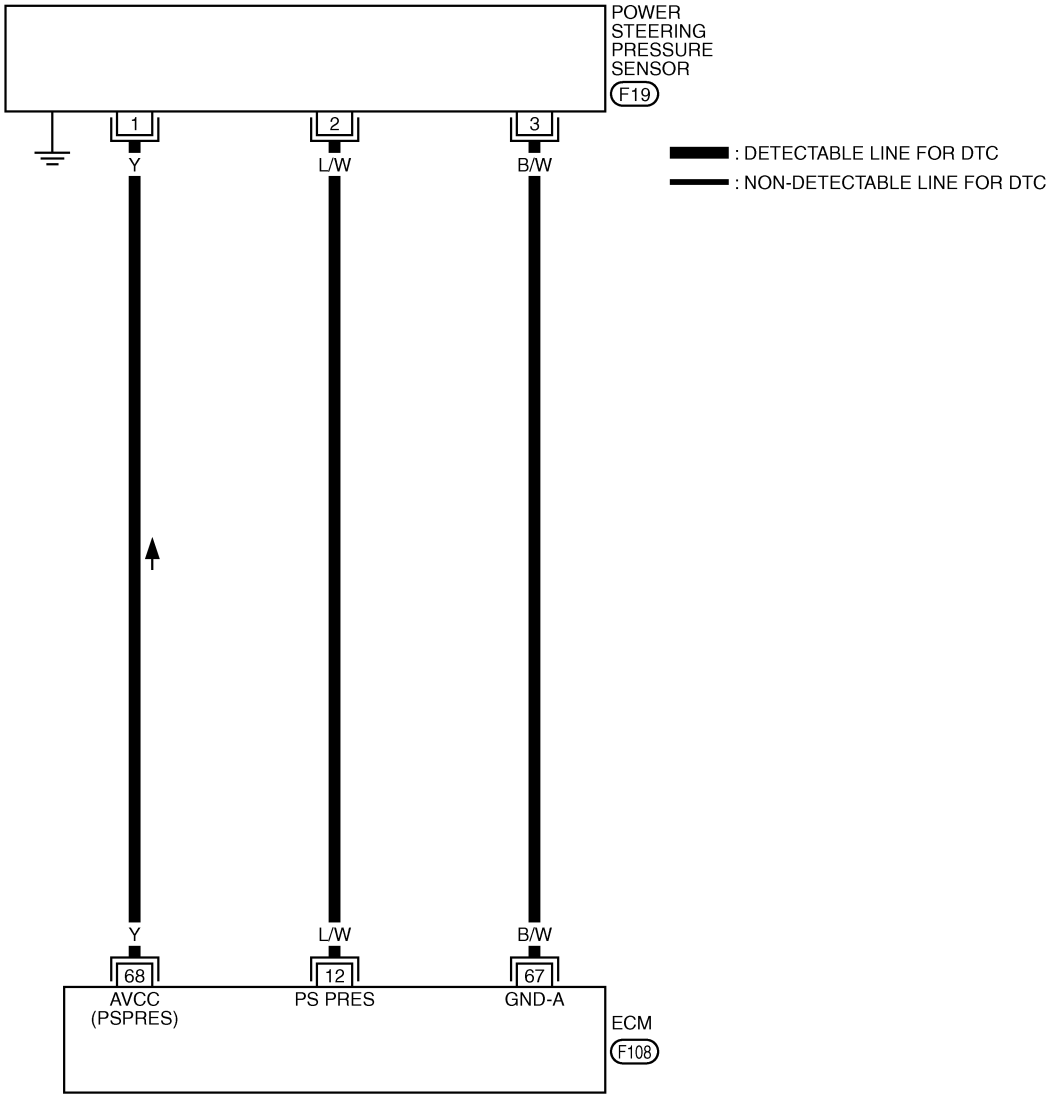

### WITH GST

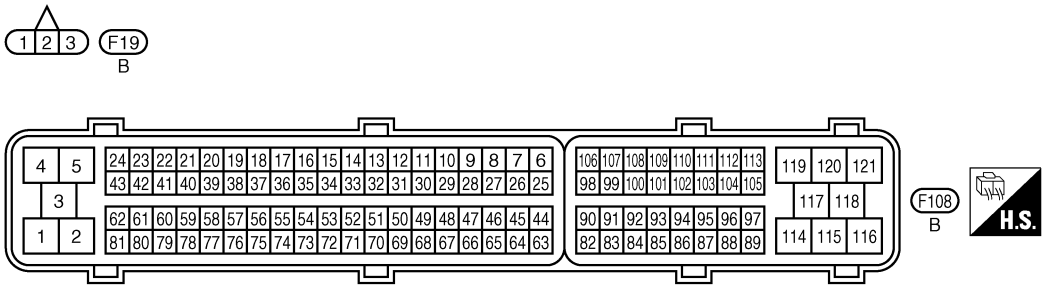
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

ABS00AV8

EC-PS/SEN-01




TBWT0663E

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

**CAUTION:**

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

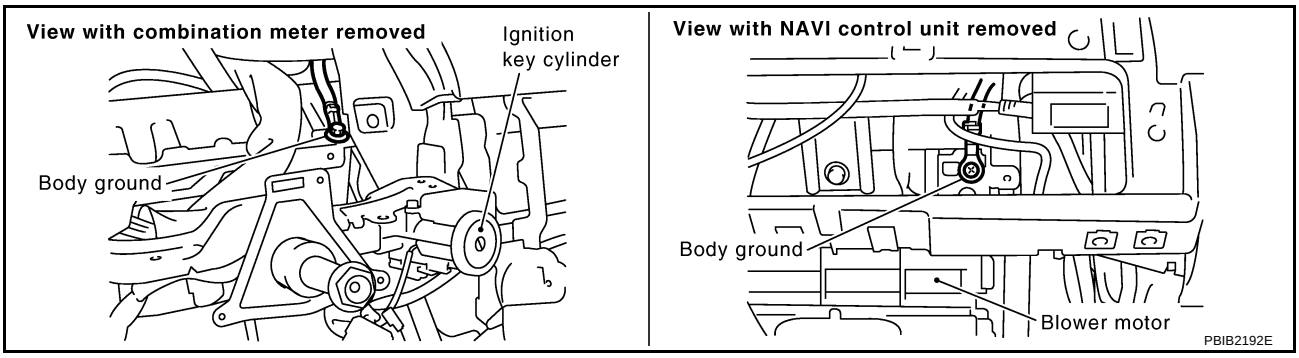
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 12 | L/W | Power steering pressure sensor | **[Engine is running]**<br>● Steering wheel: Being turned. | 0.5 - 4.5V |
| | | | **[Engine is running]**<br>● Steering wheel: Not being turned. | 0.4 - 0.8V |
| 67 | B/W | Sensor ground | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 68 | Y | Sensor power supply (Power steering pressure sensor / EVAP control system pressure sensor) | **[Ignition switch: ON]** | Approximately 5V |

## Diagnostic Procedure

ABS00AV9

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

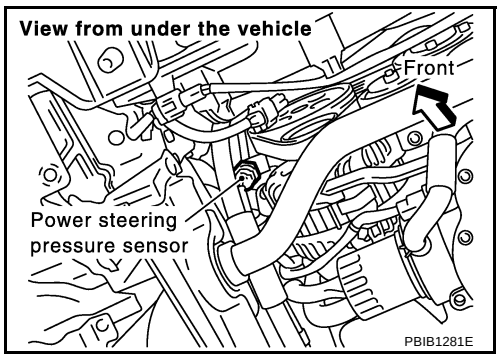



OK or NG

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

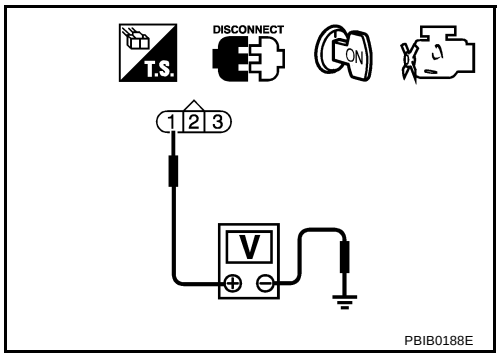
## 2. CHECK PSP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect power steering pressure (PSP) sensor harness connector.
2. Turn ignition switch ON.




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

**Voltage: Approximately 5V**




OK or NG

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

## 3. CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

**Continuity should exist.**

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

OK or NG

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

## 4. CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 12 and PSP sensor terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 5. CHECK PSP SENSOR

Refer to EC-391, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace PSP sensor.

## 6. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

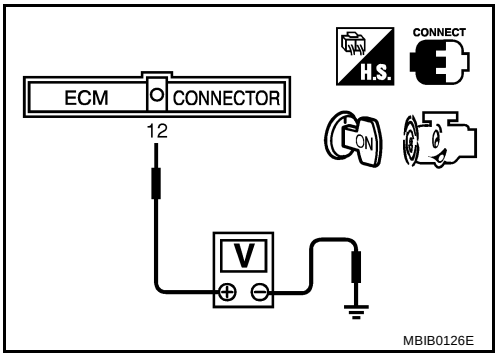
# Component Inspection

ABS00AVA

## POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.
3. Check voltage between ECM terminal 12 and ground under the following conditions.

| Condition | Voltage |
|---|---|
| Steering wheel: Being turned. | 0.5 - 4.5V |
| Steering wheel: Not being turned. | 0.4 - 0.8V |




# Removal and Installation

ABS00DFA

## POWER STEERING PRESSURE SENSOR

Refer to PS-32, "HYDRAULIC LINE" .

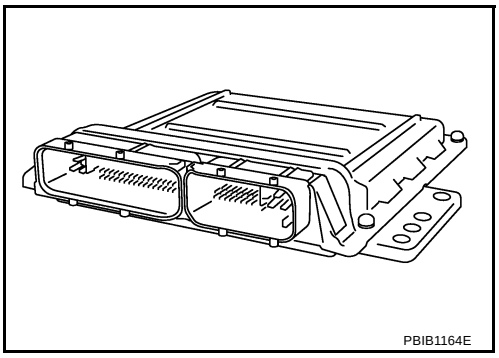
# DTC P0605 ECM

PFP:23710

## Component Description

ABS00AVB

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


PBIB1164E

## On Board Diagnosis Logic

ABS00AVC

**This self-diagnosis has one or two trip detection logic.**

| DTC No. | Trouble diagnosis name | DTC detecting condition | | Possible cause |
|---|---|---|---|---|
| P0605<br>0605 | Engine control module | A) | ECM calculation function is malfunctioning. | ● ECM |
| | | B) | ECM EEP-ROM system is malfunctioning. | |
| | | C) | ECM self shut-off function is malfunctioning. | |

### FAIL-SAFE MODE

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

| Detected items | Engine operation condition in fail-safe mode |
|---|---|
| Malfunction A | ● ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.<br>● ECM deactivates ASCD operation. |

## DTC Confirmation Procedure

ABS00AVD

**Perform PROCEDURE FOR MALFUNCTION A first. If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. If there is no malfunction on PROCEDURE FOR MALFUNCTION B, perform PROCEDURE FOR MALFUNCTION C.**

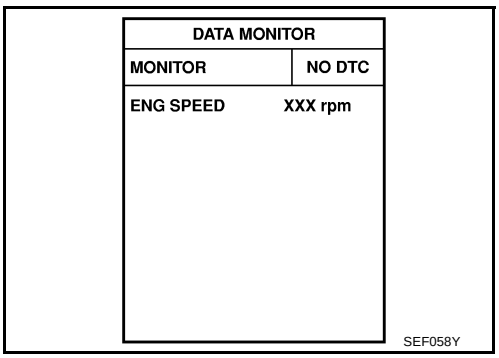
**NOTE:**

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

### PROCEDURE FOR MALFUNCTION A

#### With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-393, "Diagnostic Procedure" .



SEF058Y

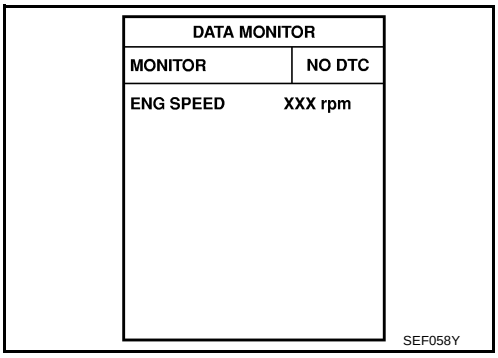
#### With GST

Follow the procedure “With CONSULT-II” above.

## PROCEDURE FOR MALFUNCTION B

### With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4. If 1st trip DTC is detected, go to EC-393, "Diagnostic Procedure" .



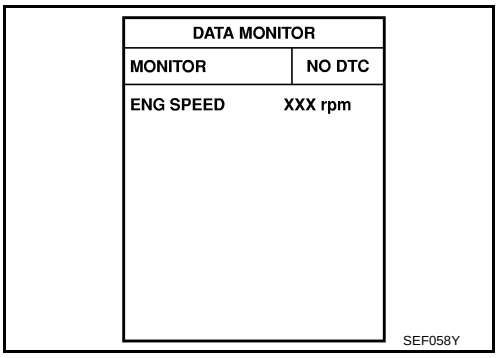

### With GST

Follow the procedure “With CONSULT-II” above.

## PROCEDURE FOR MALFUNCTION C

### With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4. Repeat step 3 for 32 times.
5. If 1st trip DTC is detected, go to EC-393, "Diagnostic Procedure" .




### With GST

Follow the procedure “With CONSULT-II” above.

## Diagnostic Procedure

ABS00AVE

### 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-392, "DTC Confirmation Procedure" .
5. Is the 1st trip DTC P0605 displayed again?

#### With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-392, "DTC Confirmation Procedure" .
5. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

## 2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-228, "ECM Re-communicating Function" .
3. Perform EC-88, "VIN Registration" .
4. Perform EC-88, "Accelerator Pedal Released Position Learning" .
5. Perform EC-88, "Throttle Valve Closed Position Learning" .
6. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

# DTC P1031, P1032, P1051, P1052 A/F SENSOR 1 HEATER

PFP:22693

## Description

ABS00AVF

### SYSTEM DESCRIPTION

| Sensor | Input Signal to ECM | ECM function | Actuator |
|---|---|---|---|
| Camshaft position sensor (PHASE)<br>Crankshaft position sensor (POS) | Engine speed | Air fuel ratio (A/F) sensor 1 heater control | Air fuel ratio (A/F) sensor 1 heater |
| Mass air flow sensor | Amount of intake air | | |

The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor 1 element at the specified range.

## CONSULT-II Reference Value in Data Monitor Mode

ABS00AVG

Specification data are reference values.

| MONITOR ITEM | CONDITION | SPECIFICATION |
|---|---|---|
| A/F S1 HTR (B1)<br>A/F S1 HTR (B2) | ● Engine: After warming up, idle the engine | 0 - 100% |

## On Board Diagnosis Logic

ABS00AVH

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P1031<br>1031<br>(Bank 1)<br>P1051<br>1051<br>(Bank 2) | Air fuel ratio (A/F) sensor 1 heater control circuit low | The current amperage in the heated air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range.<br>(An excessively low voltage signal is sent to ECM through the heated air fuel ratio (A/F) sensor 1 heater.) | ● Harness or connectors<br>(The A/F sensor 1 heater circuit is open or shorted.)<br>● Air fuel ratio (A/F) sensor 1 heater |
| P1032<br>1032<br>(Bank 1)<br>P1052<br>1052<br>(Bank 2) | Air fuel ratio (A/F) sensor 1 heater control circuit high | The current amperage in the heated air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range.<br>(An excessively high voltage signal is sent to ECM through the heated air fuel ratio (A/F) sensor 1 heater.) | ● Harness or connectors<br>(The A/F sensor 1 heater circuit is shorted.)<br>● Air fuel ratio (A/F) sensor 1 heater |

## DTC Confirmation Procedure

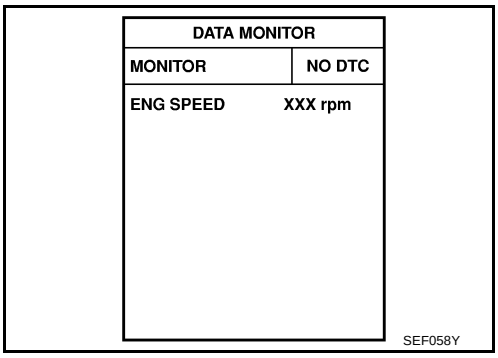
ABS00AVI

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

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

### WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and let it idle for at least 10 seconds.
3. If 1st trip DTC is detected, go to EC-399, "Diagnostic Procedure"
.



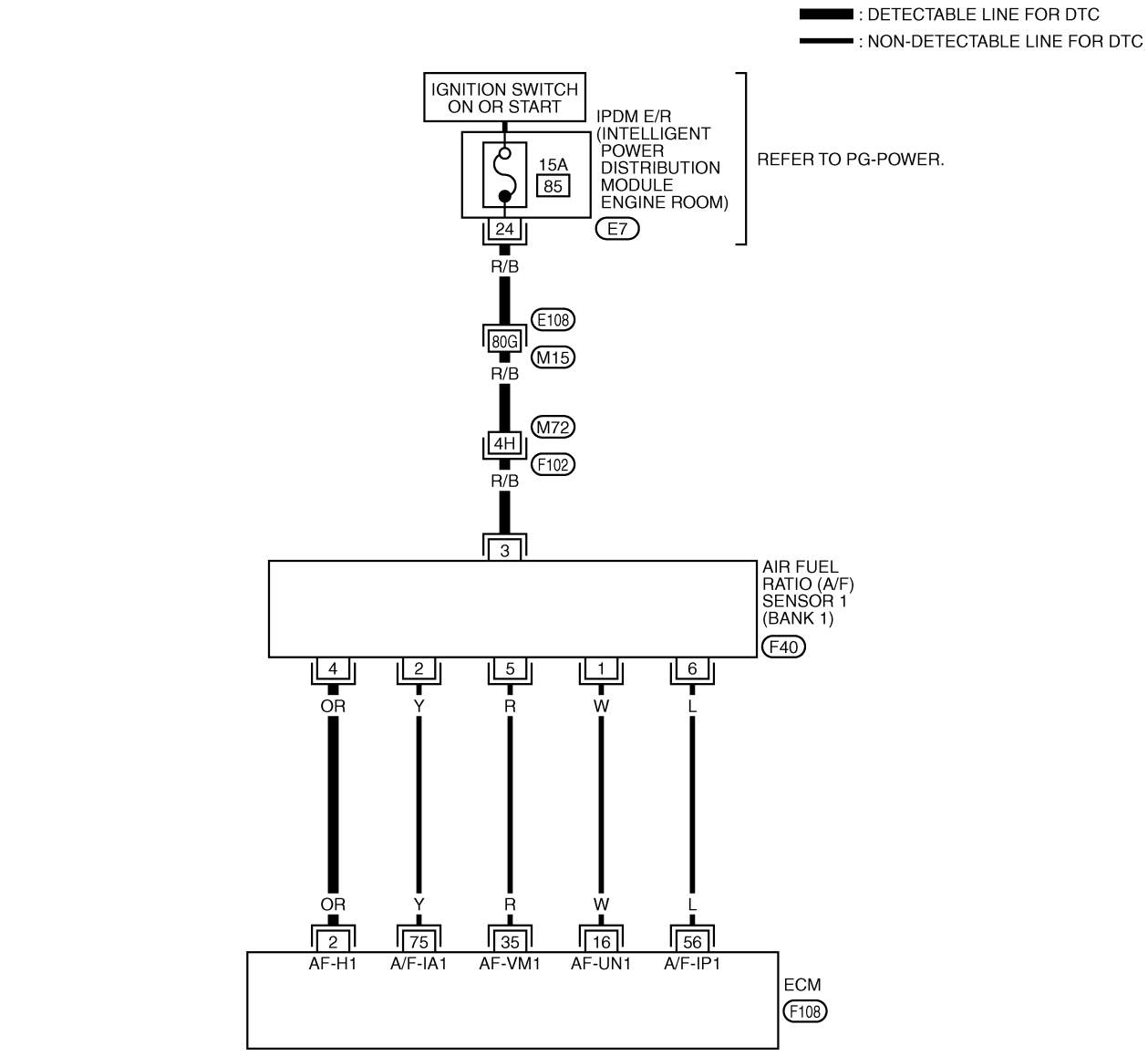

### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram
### BANK 1

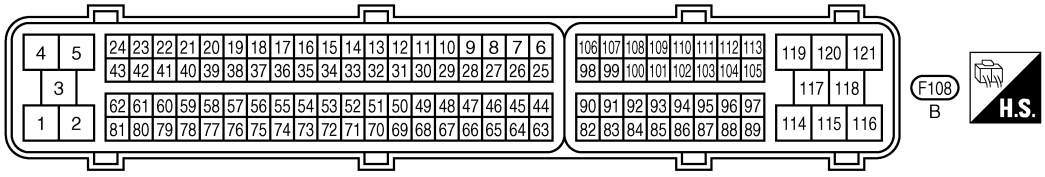
ABS00AVJ

EC-AF1HB1-01





REFER TO THE FOLLOWING.
E108 , F102 -SUPER MULTIPLE JUNCTION (SMJ)

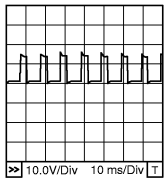



TBWM0763E

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

**CAUTION:**

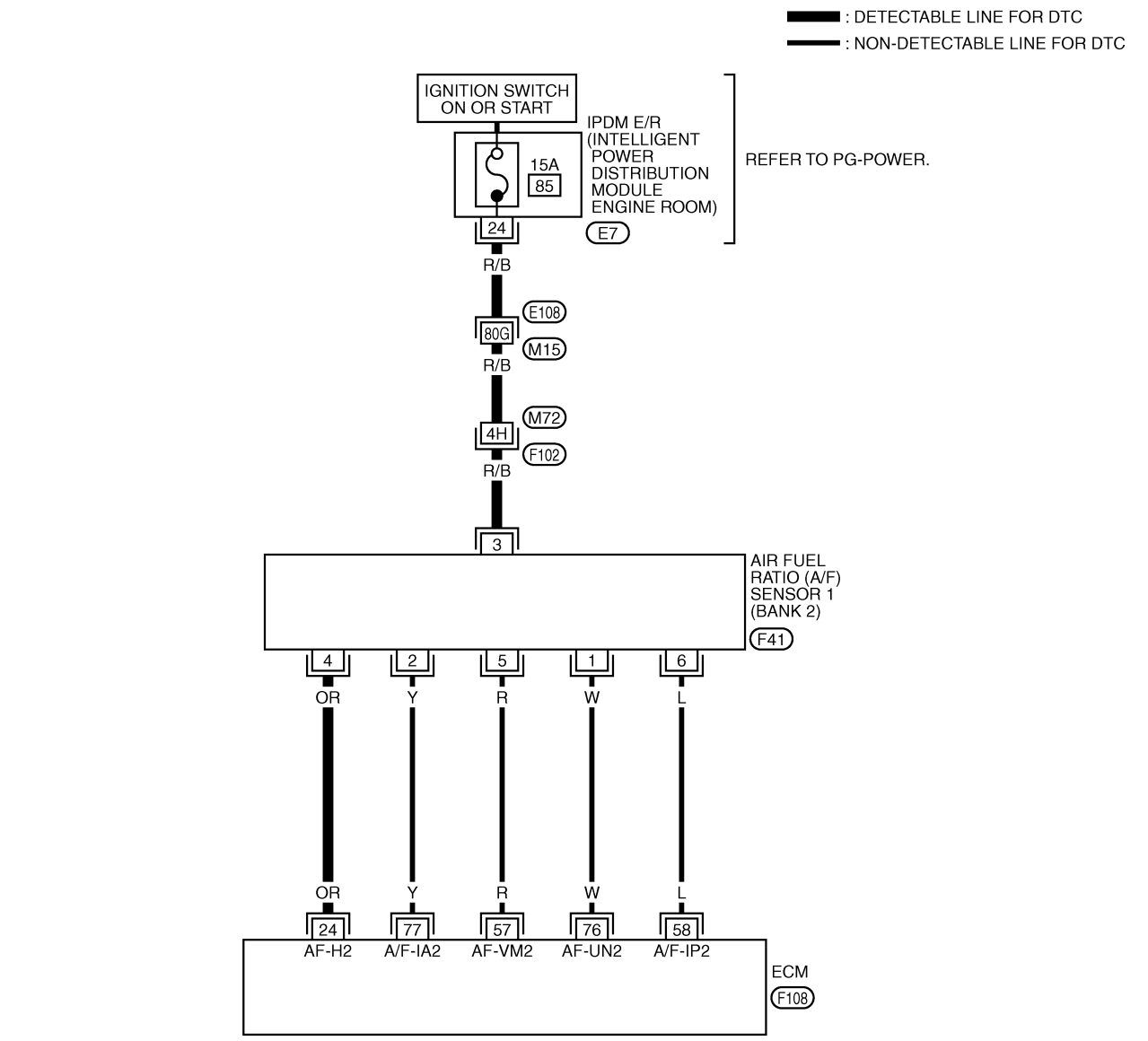
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

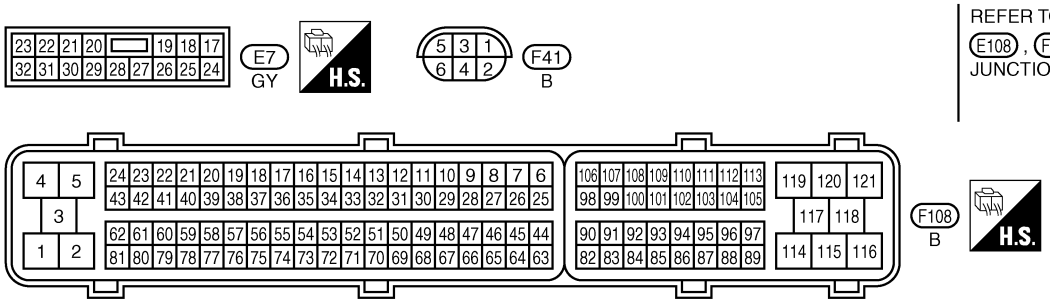
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 2 | OR | A/F sensor 1 heater (Bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 5V★<br>  <br><br>PBIB1584E |

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

## BANK 2

EC-AF1HB2-01

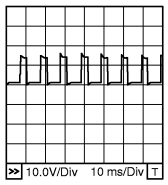



TBWM0764E

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

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

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 24 | OR | A/F sensor 1 heater (Bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 5V★<br>  <br><br>PBIB1584E |

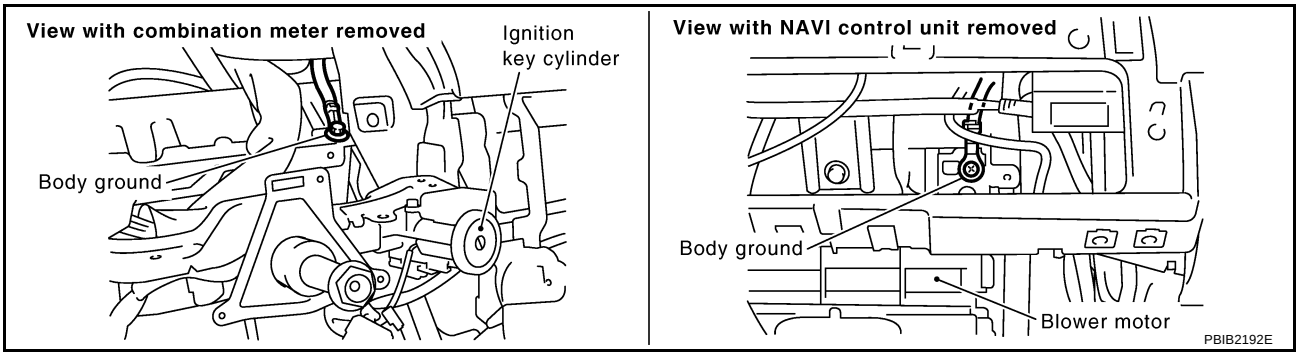
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnostic Procedure

ABS00AVK

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

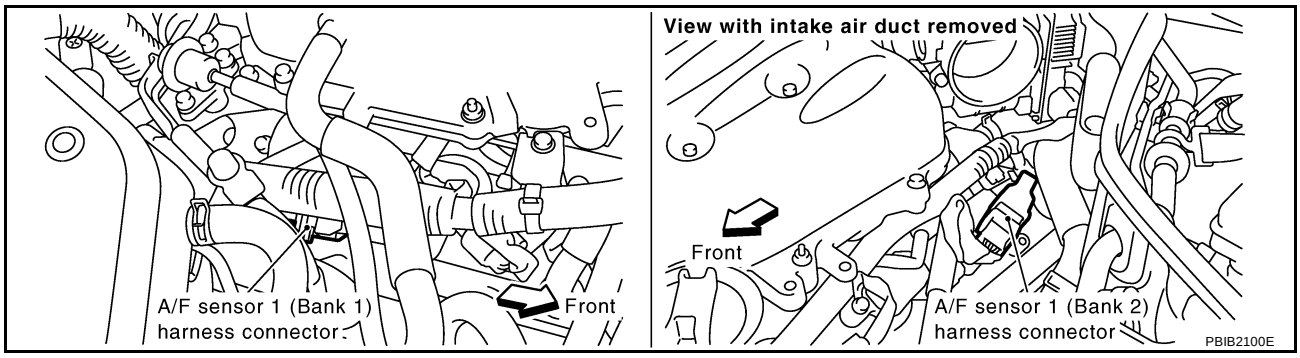



OK or NG

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

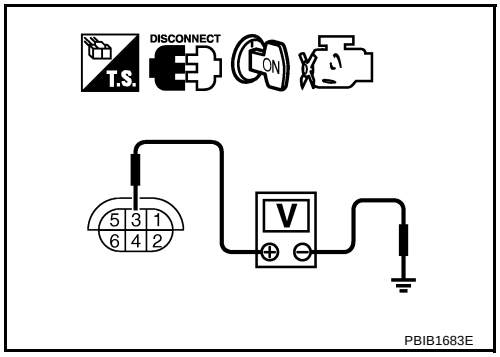
## 2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.




2. Turn ignition switch ON.
3. Check voltage between A/F sensor 1 terminal 3 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 M72, F102
- Harness connectors E108, M15
- IPDM E/R harness connector E7
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

## 4. CHECK A/F SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 2 (bank 1) or 24 (bank 2) and A/F sensor 1 terminal 4. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 5. CHECK A/F SENSOR 1 HEATER

Refer to EC-401, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace A/F sensor 1.

## 6. CHECK INTERMITTENT INCIDENT

Perform EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

# Component Inspection

ABS00AVL

## AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Check resistance between terminals 3 and 4.

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

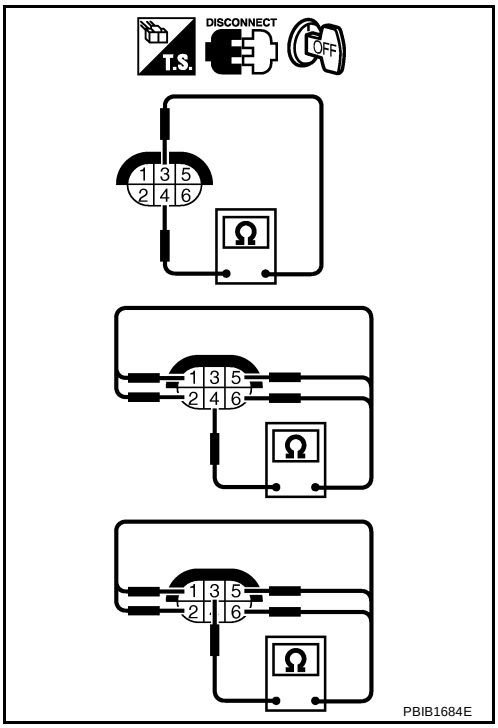
Check continuity between terminals 3 and 1, 2, 5, 6, terminals 4 and 1, 2, 5, 6.

**Continuity should not exist.**

If NG, replace the A/F sensor 1.

**CAUTION:**

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




# Removal and Installation

ABS00AVM

## AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-26, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

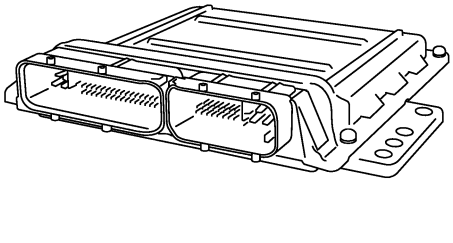
# DTC P1065 ECM POWER SUPPLY

PFP:23710

## Component Description

ABS00AVN

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the Idle Air Volume Learning value memory, etc.



PBIB1164E

## On Board Diagnosis Logic

ABS00AVO

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P1065<br>1065 | ECM power supply circuit | ECM back-up RAM system does not function properly. | ● Harness or connectors<br>[The ECM power supply (back-up) circuit is open or shorted.]<br>● ECM |

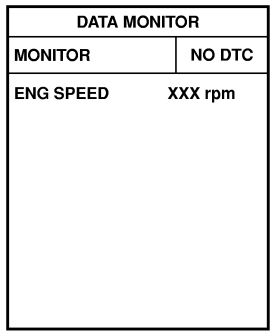
## DTC Confirmation Procedure

ABS00AVP

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

### WITH CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
5. Repeat steps 3 and 4 for four times.
6. If 1st trip DTC is detected, go to EC-404, "Diagnostic Procedure".




SEF058Y

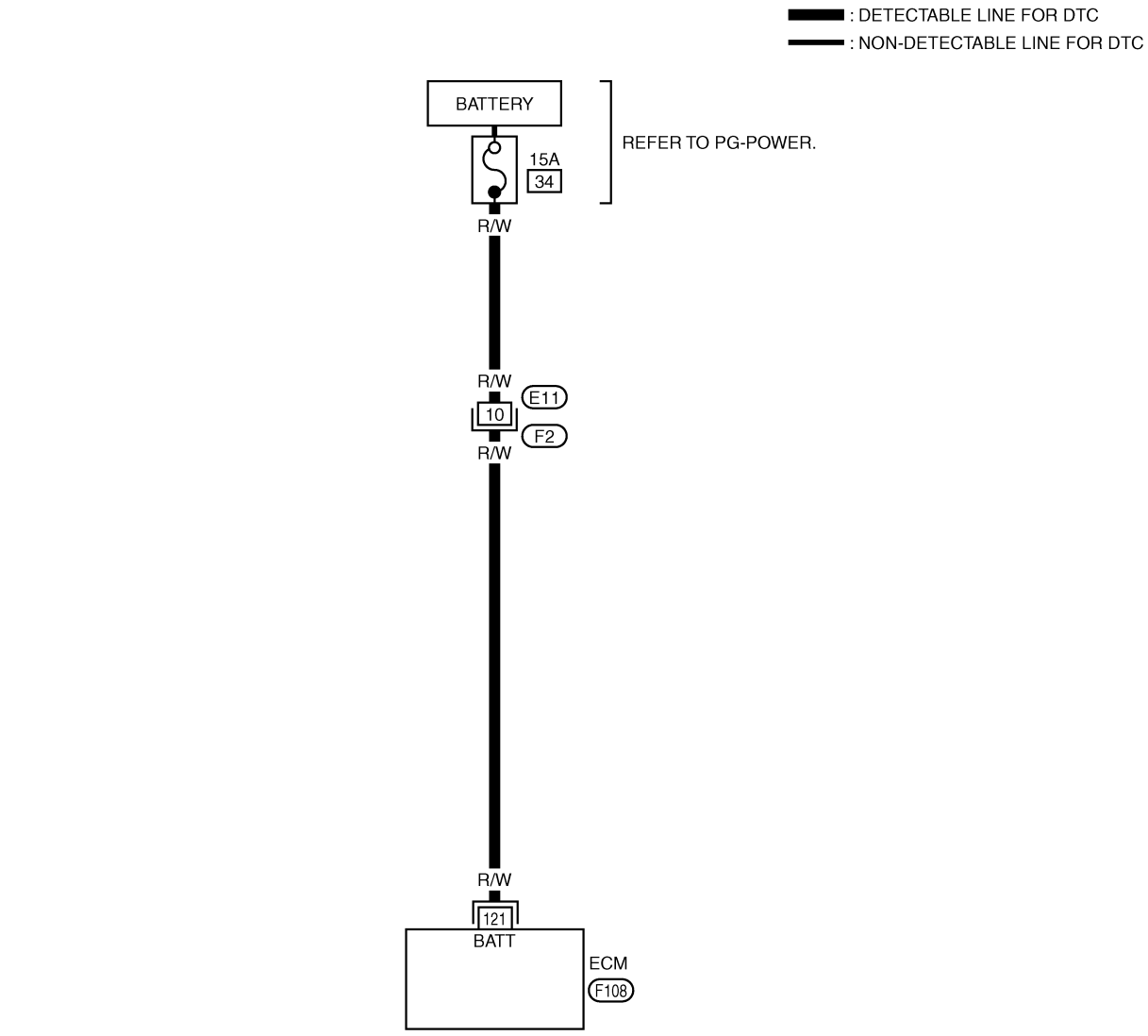
### WITH GST

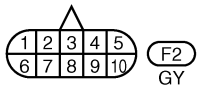
Follow the procedure “WITH CONSULT-II” above.

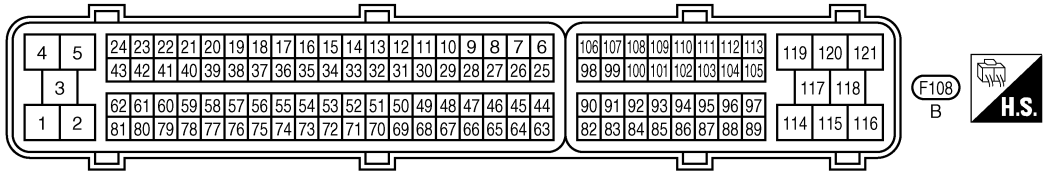
## Wiring Diagram

ABS00AVQ

EC-ECM/PW-01




TBWT0664E

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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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) |
|---|---|---|---|---|
| 121 | R/W | Power supply for ECM (Back-up) | **[Ignition switch: OFF]** | BATTERY VOLTAGE (11 - 14V) |

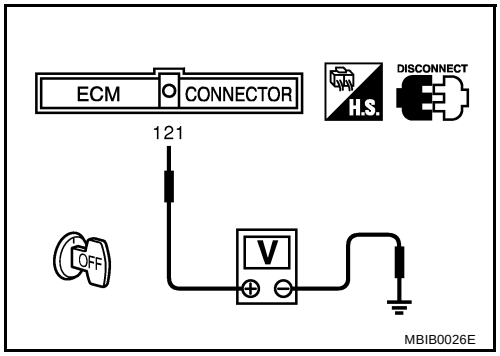
## Diagnostic Procedure

ABS00AVR

### 1. CHECK ECM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**




OK or NG

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

### 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E11, F2
- 15A fuse
- Harness for open or short between ECM and battery

>> Repair or replace harness or connectors.

### 3. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

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

## 4. PERFORM DTC CONFIRMATION PROCEDURE

**With CONSULT-II**

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-402, "DTC Confirmation Procedure" .
5. Is the 1st trip DTC P1065 displayed again?

**With GST**

1. Turn ignition switch ON.
2. Select “Service $04” with GST.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-402, "DTC Confirmation Procedure" .
5. Is the 1st trip DTC P1065 displayed again?

Yes or No

Yes >> GO TO 5.
No >> **INSPECTION END**

## 5. REPLACE ECM

1. Replace ECM.
2. Perform initialization of IVIS (NATS) system and registration of all IVIS (NATS) ignition key IDs. Refer to BL-228, "ECM Re-communicating Function" .
3. Perform EC-88, "VIN Registration" .
4. Perform EC-88, "Accelerator Pedal Released Position Learning" .
5. Perform EC-88, "Throttle Valve Closed Position Learning" .
6. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

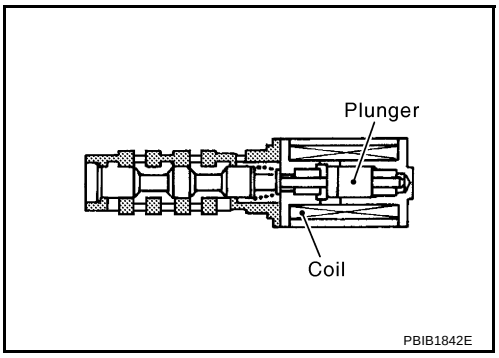
# DTC P1111, P1136 IVT CONTROL SOLENOID VALVE

PFP:23796

## Component Description

ABS00AVS

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
The shorter pulse width retards valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AVT

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| INT/V SOL (B1)<br>INT/V SOL (B2) | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle | 0% - 2% |
| | | When revving engine up to 2,000 rpm quickly | Approx. 0% - 50% |

## On Board Diagnosis Logic

ABS00AVU

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P1111<br>1111<br>(Bank 1)<br>P1136<br>1136<br>(Bank 2) | Intake valve timing control solenoid valve circuit | An improper voltage is sent to the ECM through intake valve timing control solenoid valve. | ● Harness or connectors (The intake valve timing control solenoid valve circuit is open or shorted.)<br>● Intake valve timing control solenoid valve |

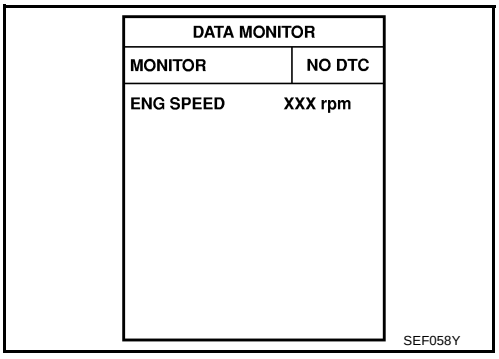
## DTC Confirmation Procedure

ABS00AVV

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

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If 1st trip DTC is detected, go to EC-410, "Diagnostic Procedure" .



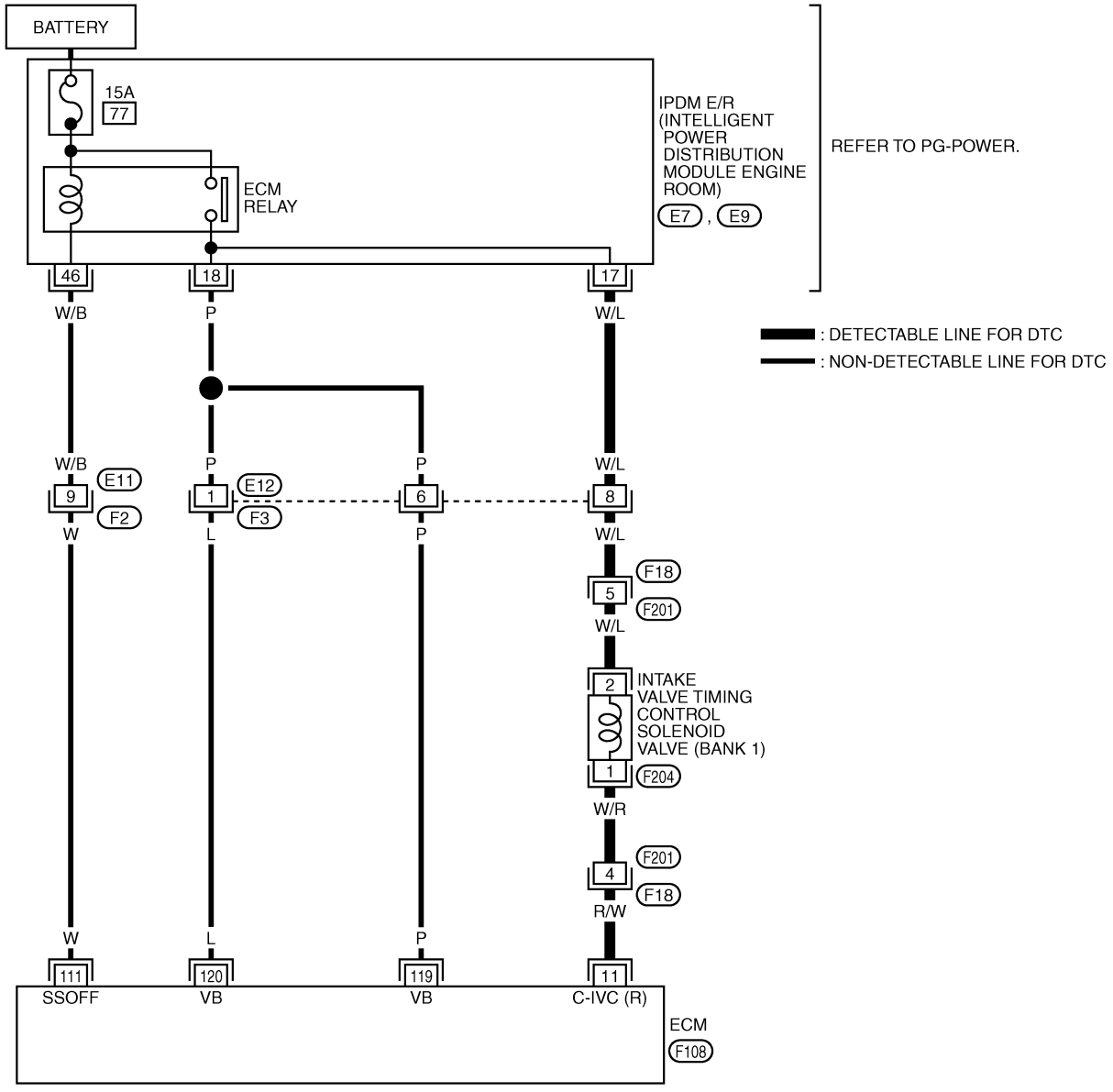

### WITH GST

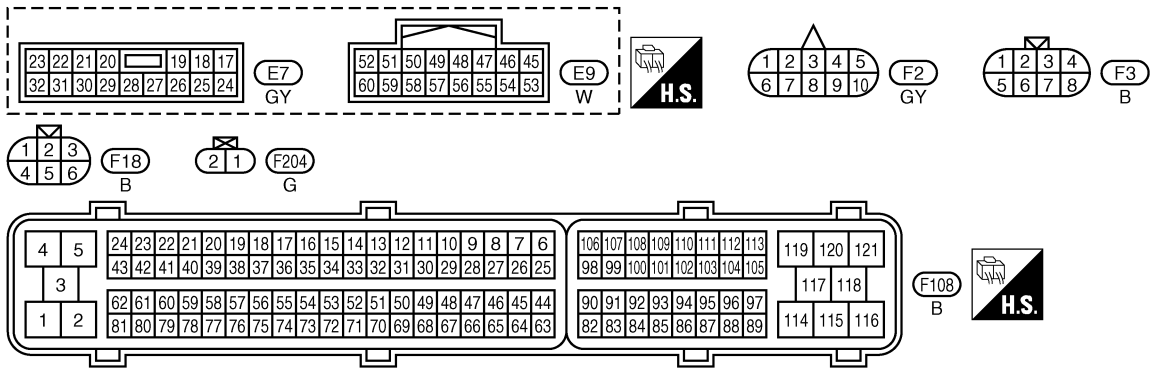
Following the procedure “WITH CONSULT-II” above.

## Wiring Diagram
### BANK 1

ABS00AVW

EC-IVCB1-01



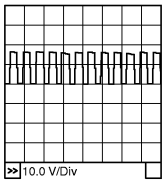




TBWM0765E

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

**CAUTION:**

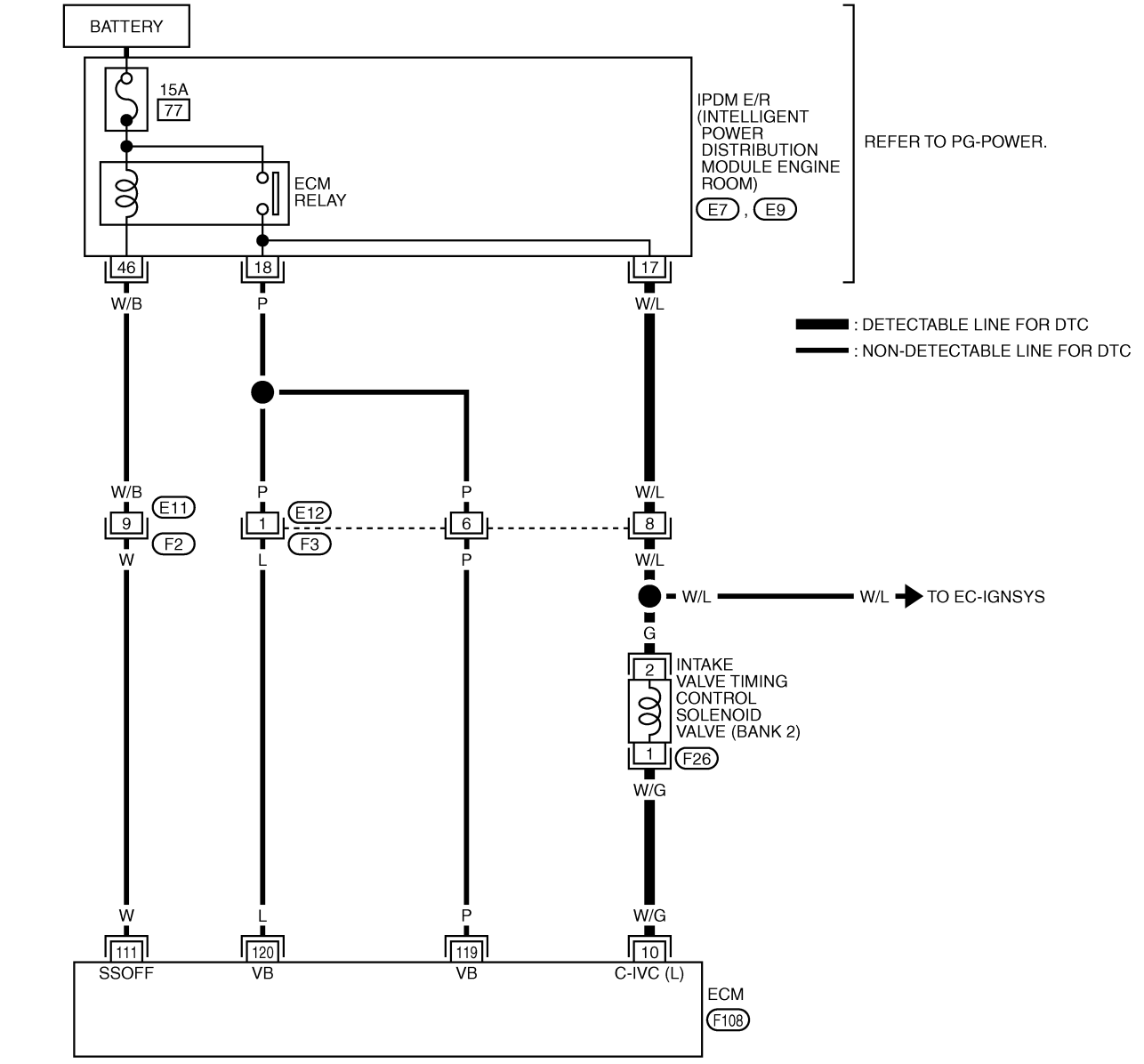
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

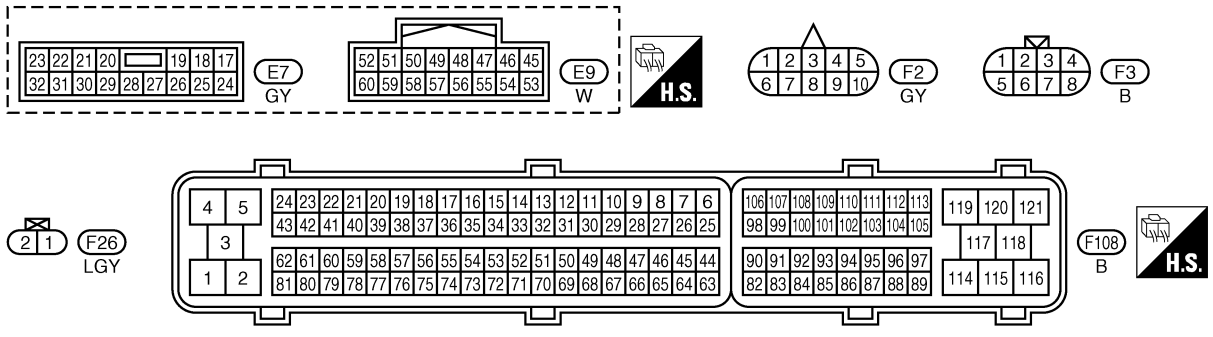
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 11 | R/W | Intake valve timing control solenoid valve (bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | BATTERY VOLTAGE<br>(11 - 14V) |
| | | | **[Engine is running]**<br>● **Warm-up condition**<br>● When revving engine up to 2,500 rpm quickly | 7 - 12V★<br>  <br><br>PBIB1790E |

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

## BANK 2

EC-IVCB2-01



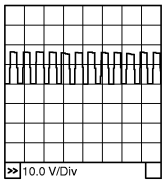




TBWM0766E

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

**CAUTION:**

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

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 10 | W/G | Intake valve timing control solenoid valve (bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | BATTERY VOLTAGE (11 - 14V) |
| | | | **[Engine is running]**<br>● **Warm-up condition**<br>● When revving engine up to 2,500 rpm quickly | 7 - 12V★<br>  <br><br>PBIB1790E |

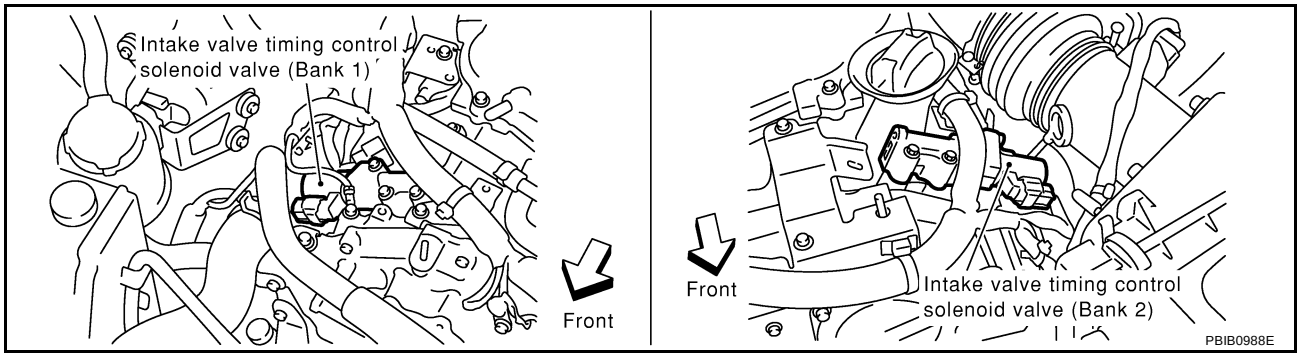
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnostic Procedure

ABS00AVX

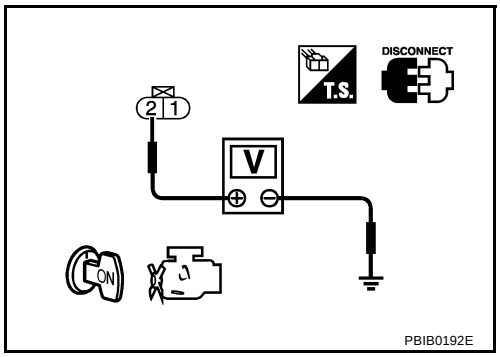
### 1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.




3. Turn ignition switch ON.
4. Check voltage between intake valve timing control solenoid valve terminal 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 E12, F3
- Harness connectors F18, F201 (Bank 1)
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

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

## 3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 11 (bank 1) or 10 (bank 2) and intake valve timing control solenoid valve terminal 1. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F18, F201 (Bank 1)
- Harness for open and short between ECM and intake valve timing control solenoid valve

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

## 5. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-412, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace intake valve timing control solenoid valve.

## 6. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

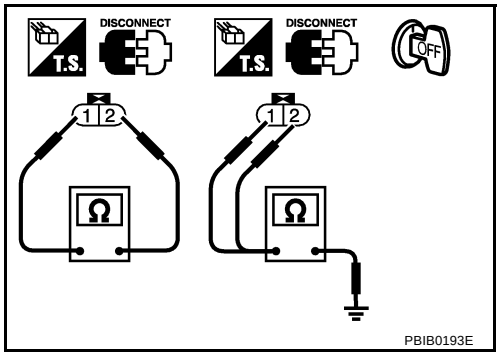
## Component Inspection

ABS00DFB

### INTAKE VALVE TIMING CONTROL SOLENOID VALVE

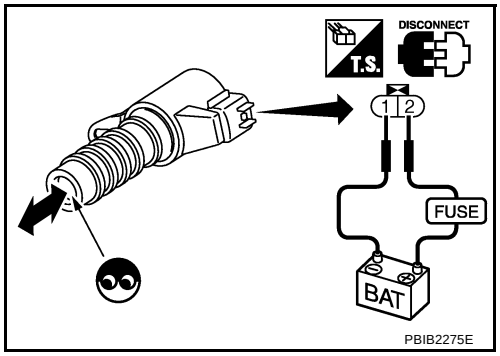
1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve as follows.

| Terminal | Resistance |
|---|---|
| 1 and 2 | 7.0 - 7.5Ω [at 20°C (68°F)] |
| 1 or 2 and ground | ∞Ω (Continuity should not exist.) |




If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.

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




**CAUTION:**
**Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.**
If NG, replace intake valve timing control solenoid valve.

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

## Removal and Installation

ABS00AVZ

### INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-64, "TIMING CHAIN" .

# DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

PFP:16119

## Component Description

ABS00AW0

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

## On Board Diagnosis Logic

ABS00AW1

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

| DTC No. | Trouble diagnosis name | DTC detecting condition | | Possible cause |
|---|---|---|---|---|
| P1121<br>1121 | Electric throttle control actuator | A) | Electric throttle control actuator does not function properly due to the return spring malfunction. | ● Electric throttle control actuator |
| | | B) | Throttle valve opening angle in fail-safe mode is not in specified range. | |
| | | C) | ECM detects the throttle valve is stuck open. | |

### FAIL-SAFE MODE

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

| Detected items | Engine operating condition in fail-safe mode |
|---|---|
| Malfunction A | ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm. |
| Malfunction B | ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less. |
| Malfunction C | While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P (A/T), Neutral (M/T) position, and engine speed will not exceed 1,000 rpm or more. |

## DTC Confirmation Procedure

ABS00AW2

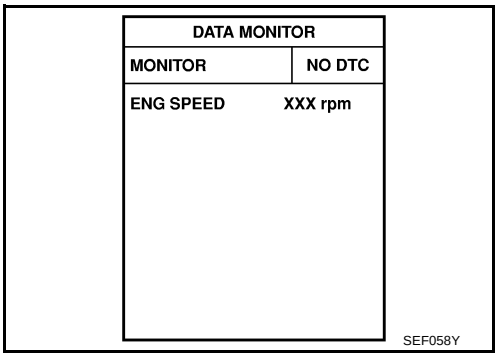
**NOTE:**

- **Perform PROCEDURE FOR MALFUNCTION A AND B first. If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION C.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

### PROCEDURE FOR MALFUNCTION A AND B

**With CONSULT-II**

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Set shift lever to D position (A/T) or 1st position (M/T), and wait at least 3 seconds.
4. Set shift lever to P position (A/T) or Neutral position (M/T).
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Turn ignition switch ON and wait at least 1 second.
7. Set shift lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
8. Set shift lever to P position (A/T) or Neutral position (M/T).
9. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
10. If DTC is detected, go to EC-414, "Diagnostic Procedure" .



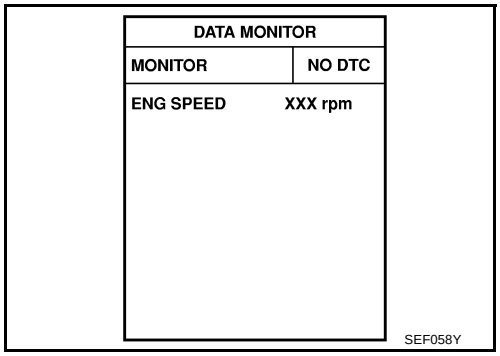
### With GST

Follow the procedure “With CONSULT-II” above.

### PROCEDURE FOR MALFUNCTION C

### With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Set shift lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
4. Set shift lever to N, P position (A/T) or Neutral (M/T).
5. Start engine and let it idle for 3 seconds.
6. If DTC is detected, go to EC-414, "Diagnostic Procedure" .




### With GST

Follow the procedure “With CONSULT-II” above.

## Diagnostic Procedure

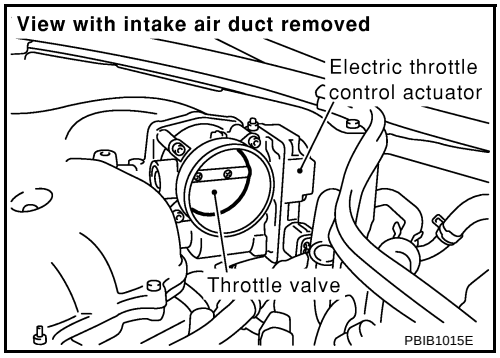
ABS00AW3

### 1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.




### 2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-88, "Throttle Valve Closed Position Learning" .
3. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

# DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

PFP:16119

## Description

ABS00AW4

**NOTE:**
**If DTC P1122 is displayed with DTC P1121 or 1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-413, "DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR" or EC-421, "DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY" .**

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

## On Board Diagnosis Logic

ABS00AW5

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

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P1122<br>1122 | Electric throttle control performance problem | Electric throttle control function does not operate properly. | ● Harness or connectors (The throttle control motor circuit is open or shorted)<br>● Electric throttle control actuator |

### FAIL-SAFE MODE

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

| Engine operating condition in fail-safe mode |
|---|
| ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. |

## DTC Confirmation Procedure

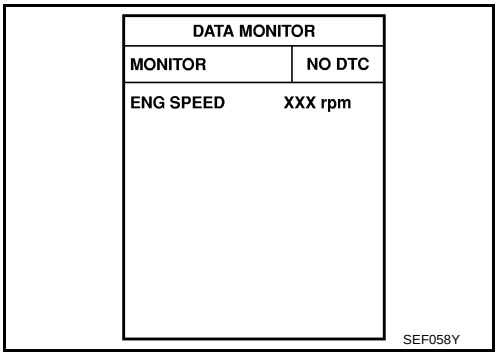
ABS00AW6

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

**TESTING CONDITION:**
**Before performing the following procedure, confirm that battery voltage is more than 11V when engine is running.**

### WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-417, "Diagnostic Procedure" .

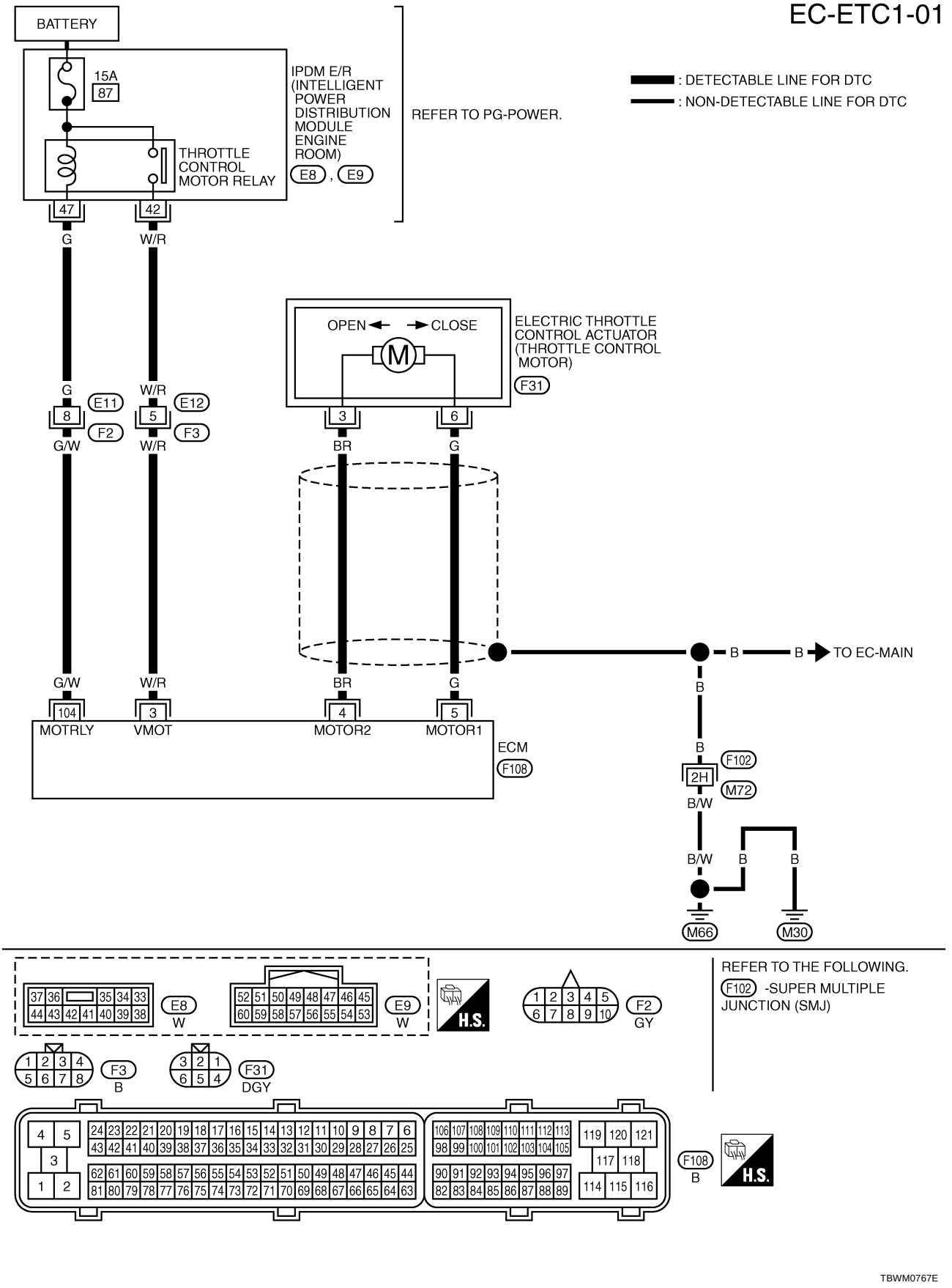



### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

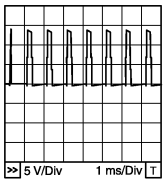
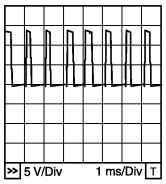
ABS00AW7




TBWM0767E

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

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

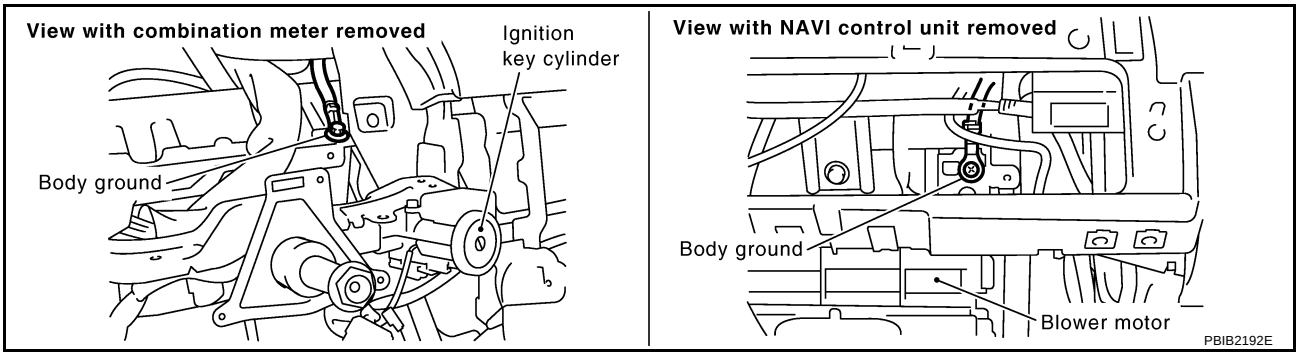
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 3 | W/R | Throttle control motor relay power supply | **[Ignition switch: ON]** | BATTERY VOLTAGE (11 - 14V) |
| 4 | BR | Throttle control motor (Close) | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully released | 0 - 14V★<br>  <br><br>PBIB1104E |
| 5 | G | Throttle control motor (Open) | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully depressed | 0 - 14V★<br>  <br><br>PBIB1105E |
| 104 | G/W | Throttle control motor relay | **[Ignition switch: OFF]** | BATTERY VOLTAGE (11 - 14V) |
| | | | **[Ignition switch: ON]** | 0 - 1.0V |

## Diagnostic Procedure

ABS00AW8

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .



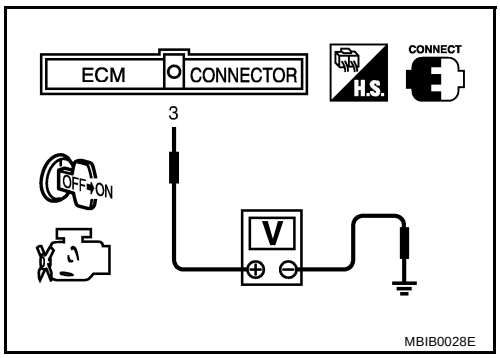

OK or NG

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

## 2. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

| Ignition switch | Voltage |
|---|---|
| OFF | Approximately 0V |
| ON | Battery voltage (11 - 14V) |




OK or NG

OK >> GO TO 10.
NG >> GO TO 3.

## 3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector E8.
4. Check continuity between ECM terminal 3 and IPDM E/R terminal 42. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- Harness for open or short between ECM and IPDM E/R

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

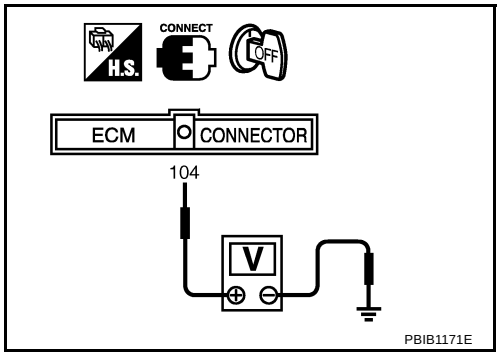
## 5. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Reconnect all harness connectors disconnected.
2. Check voltage between ECM terminal 104 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

OK >> GO TO 9.
NG >> GO TO 6.



## 6. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E9.
3. Check continuity between ECM terminal 104 and IPDM E/R terminal 47. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E11, F2
- Harness for open or short between ECM and IPDM E/R

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

## 8. CHECK FUSE

1. Disconnect 15A fuse.
2. Check 15A fuse for blown.

OK or NG

OK >> GO TO 9.
NG >> Replace 15A fuse.

## 9. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

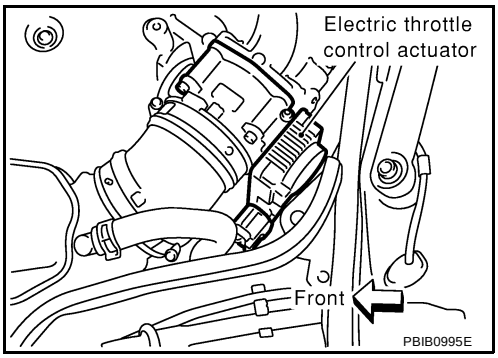
OK or NG

OK >> Replace IPDM E/R. Refer to PG-16, "IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)" .
NG >> Repair or replace harness or connectors.

## 10. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

| Electric throttle control actuator terminal | ECM terminal | Continuity |
|---|---|---|
| 3 | 5 | Should not exist |
| | 4 | Should exist |
| 6 | 5 | Should exist |
| | 4 | Should not exist |



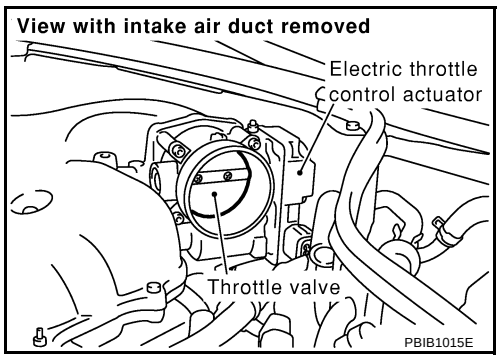

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

## 11. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve and the housing.




OK or NG

OK >> GO TO 12.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

## 12. CHECK THROTTLE CONTROL MOTOR

Refer to EC-420, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> GO TO 14.

## 13. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 14.
NG >> Repair or replace harness or connectors.

## 14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-88, "Throttle Valve Closed Position Learning" .
3. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

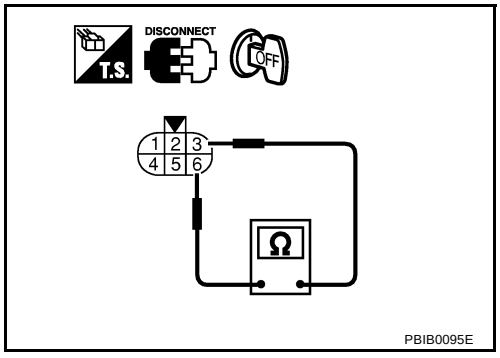
# Component Inspection

ABS00AW9

### THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 3 and 6.

**Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]**




3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-88, "Throttle Valve Closed Position Learning" .
5. Perform EC-89, "Idle Air Volume Learning" .

# Remove and Installation

ABS00AWA

### ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-19, "INTAKE MANIFOLD COLLECTOR" .

# DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

PFP:16119

## Component Description

ABS00AWB

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

## CONSULT-II Reference Value in Data Monitor Mode

ABS00AWC

Specification data are reference values.

| MONITOR ITEM | CONDITION | SPECIFICATION |
|---|---|---|
| THRTL RELAY | ● Ignition switch: ON | ON |

## On Board Diagnosis Logic

ABS00AWD

**These self-diagnoses have the one trip detection logic.**

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P1124<br>1124 | Throttle control motor relay circuit short | ECM detects the throttle control motor relay is stuck ON. | ● Harness or connectors (The throttle control motor relay circuit is shorted)<br>● Throttle control motor relay |
| P1126<br>1126 | Throttle control motor relay circuit open | ECM detects a voltage of power source for throttle control motor is excessively low. | ● Harness or connectors (The throttle control motor relay circuit is open)<br>● Throttle control motor relay |

### FAIL-SAFE MODE

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

| Engine operating condition in fail-safe mode |
|---|
| ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. |

## DTC Confirmation Procedure

ABS00AWE

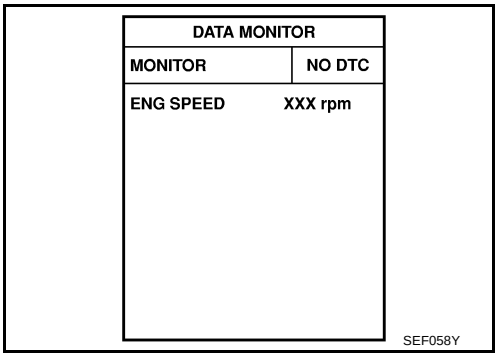
**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

### PROCEDURE FOR DTC P1124

**TESTING CONDITION:**
**Before performing the following procedure, confirm that battery voltage is more than 8V.**

**With CONSULT-II**

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-424, "Diagnostic Procedure" .



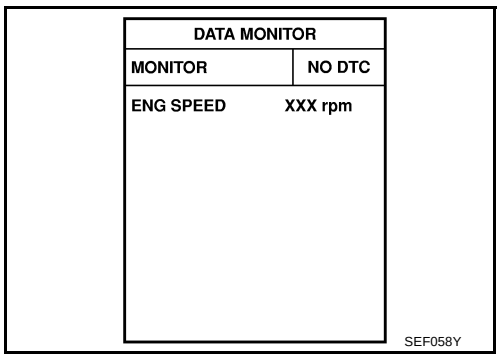
### With GST

Follow the procedure “With CONSULT-II” above.

## PROCEDURE FOR DTC P1126

### With CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR””mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-424, "Diagnostic Procedure" .

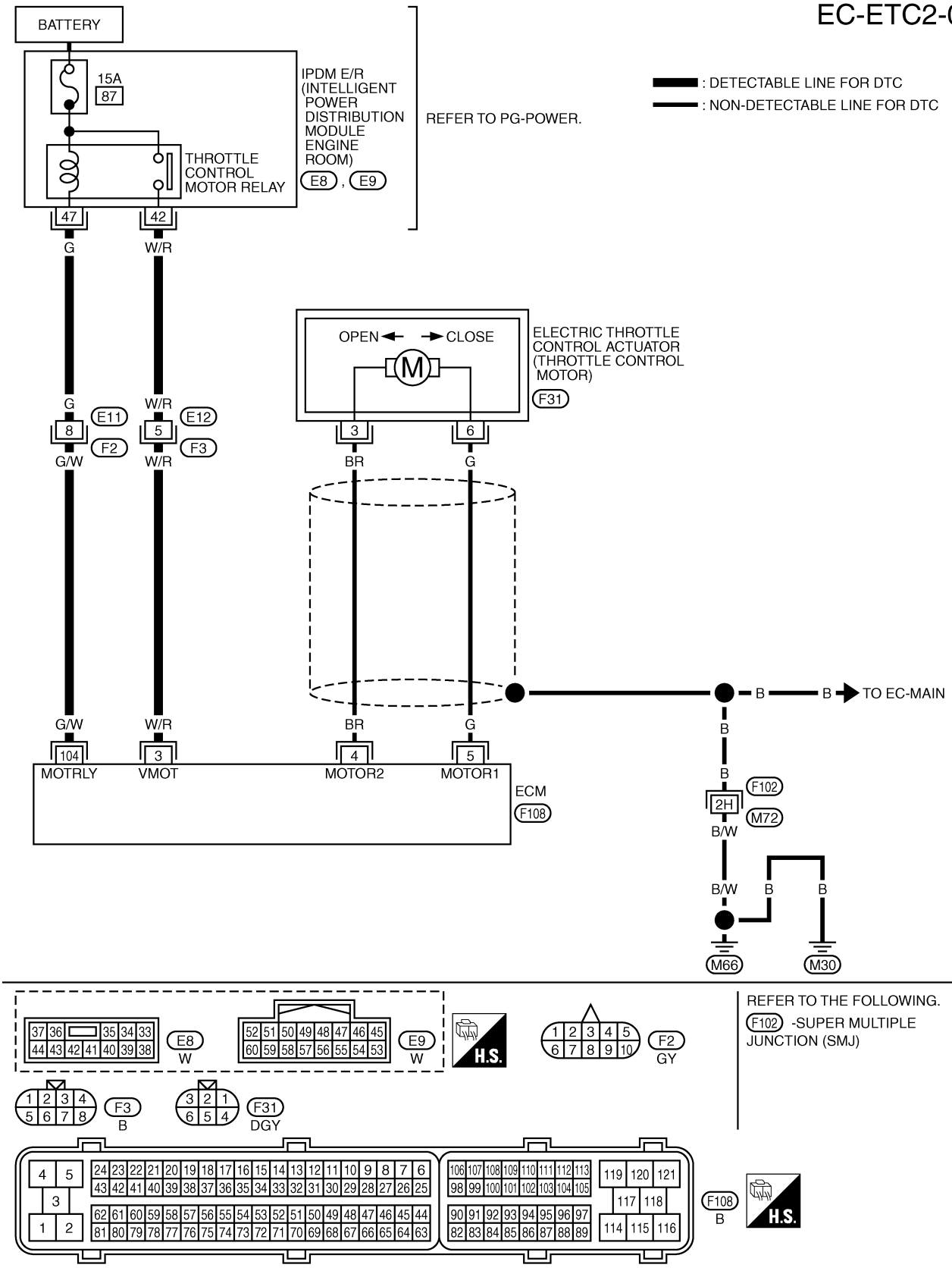



### With GST

Follow the procedure “With CONSULT-II” above.

## Wiring Diagram

ABS00AWF




TBWM0768E

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

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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) |
|---|---|---|---|---|
| 3 | W/R | Throttle control motor relay power supply | **[Ignition switch: ON]** | BATTERY VOLTAGE (11 - 14V) |
| 104 | G/W | Throttle control motor relay | **[Ignition switch: OFF]** | BATTERY VOLTAGE (11 - 14V) |
| | | | **[Ignition switch: ON]** | 0 - 1.0V |

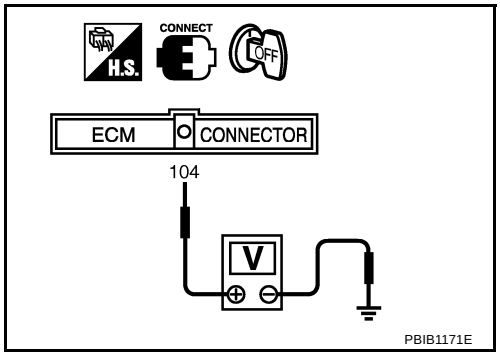
## Diagnostic Procedure

ABS00AWG

### 1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM terminal 104 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**




OK or NG

OK >> GO TO 5.
NG >> GO TO 2.

### 2. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E9.
3. Check continuity between ECM terminal 104 and IPDM E/R terminal 47. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

### 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E11, F2
- Harness for open or short between ECM and IPDM E/R

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

## 4. CHECK FUSE

1. Disconnect 15A fuse.
2. Check 15A fuse for blown.

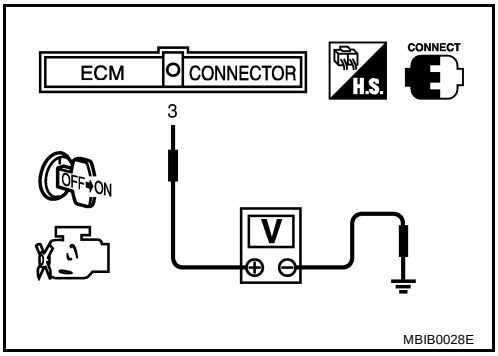
OK or NG

OK >> GO TO 8.
NG >> Replace 15A fuse.

## 5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

1. Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

| Ignition switch | Voltage |
|---|---|
| OFF | Approximately 0V |
| ON | Battery voltage (11 - 14V) |




OK or NG

OK >> GO TO 8.
NG >> GO TO 6.

## 6. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector E8.
4. Check continuity between ECM terminal 3 and IPDM E/R terminal 42. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- Harness for open or short between ECM and IPDM E/R

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

## 8. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R. Refer to PG-16, "IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)" .
NG >> Repair or replace harness or connectors.

# DTC P1128 THROTTLE CONTROL MOTOR

PFP:16119

## Component Description

ABS00AWH

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

## On Board Diagnosis Logic

ABS00AWI

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

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P1128<br>1128 | Throttle control motor circuit short | ECM detects short in both circuits between ECM and throttle control motor. | ● Harness or connectors (The throttle control motor circuit is shorted.)<br>● Electric throttle control actuator (Throttle control motor) |

### FAIL-SAFE MODE

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

| Engine operating condition in fail-safe mode |
|---|
| ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. |

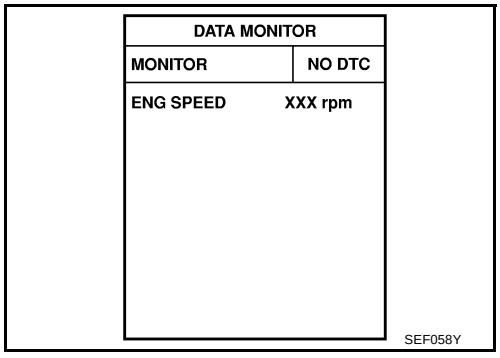
## DTC Confirmation Procedure

ABS00AWJ

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

### WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-428, "Diagnostic Procedure" .

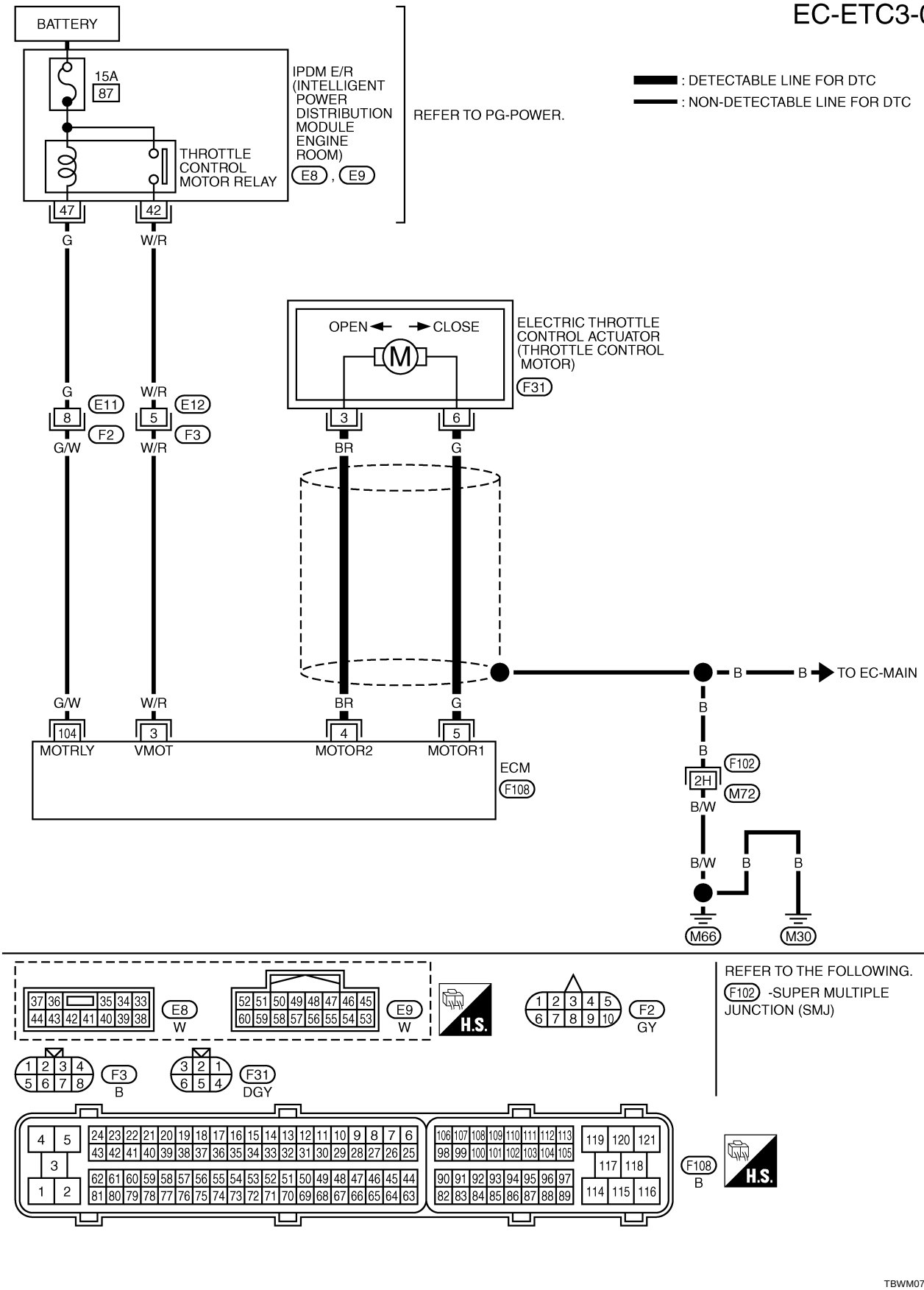



### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

ABS00AWK

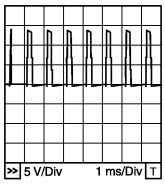
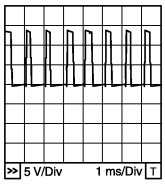



TBWM0769E

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

**CAUTION:**

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

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 4 | BR | Throttle control motor (Close) | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully released | 0 - 14V★<br>  <br><br>PBIB1104E |
| 5 | G | Throttle control motor (Open) | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully depressed | 0 - 14V★<br>  <br><br>PBIB1105E |

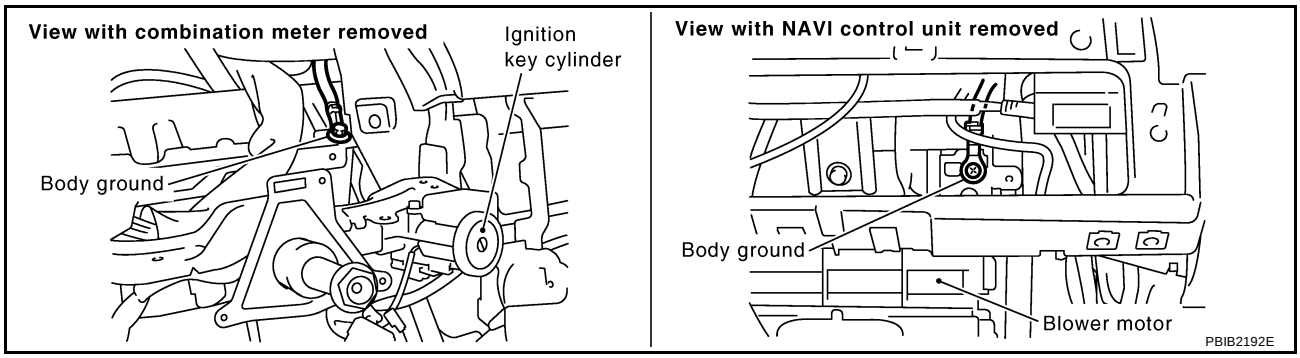
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnostic Procedure

ABS00AWL

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

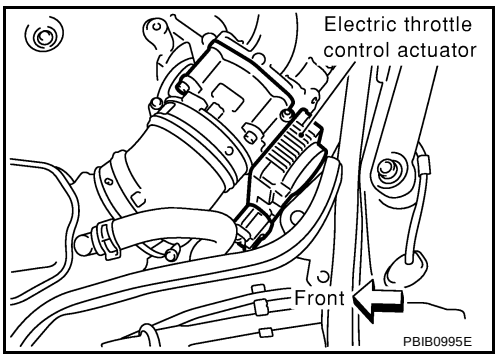



OK or NG

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

## 2. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.




| Electric throttle control actuator terminal | ECM terminal | Continuity |
|---|---|---|
| 3 | 5 | Should not exist |
| | 4 | Should exist |
| 6 | 5 | Should exist |
| | 4 | Should not exist |

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

OK or NG

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

## 3. CHECK THROTTLE CONTROL MOTOR

Refer to EC-429, "Component Inspection" .

OK or NG

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

## 4. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

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

## 5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-88, "Throttle Valve Closed Position Learning" .
3. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

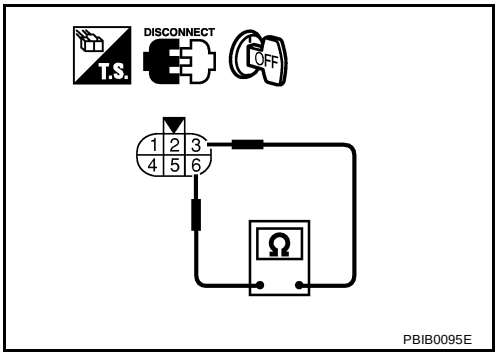
# Component Inspection

ABS00AWM

## THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 3 and 6.

**Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]**




3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-88, "Throttle Valve Closed Position Learning" .
5. Perform EC-89, "Idle Air Volume Learning" .

## Removal and Installation

ABS00AWN

### ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-19, "INTAKE MANIFOLD COLLECTOR" .

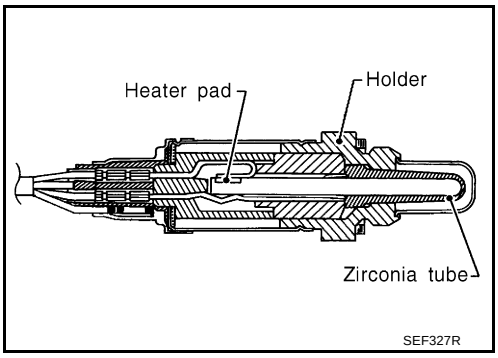
# DTC P1146, P1166 HO2S2

PFP:226A0

## Component Description

ABS00AWO

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




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AWP

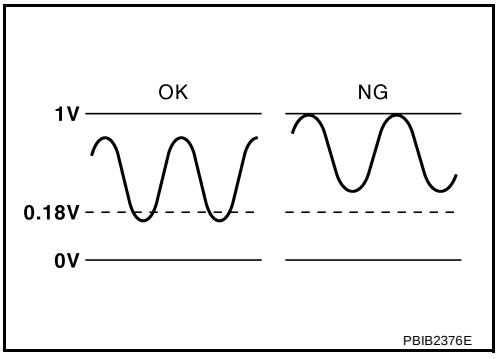
Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| HO2S2 (B1)<br>HO2S2 (B2) | ● Warm-up condition<br>● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | Revving engine from idle 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

ABS00AWQ

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst 1 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<br>1146<br>(Bank 1) | Heated oxygen sensor 2 minimum voltage monitoring | The minimum voltage from the sensor is not reached to the specified voltage. | ● Harness or connectors (The sensor circuit is open or shorted)<br>● Heated oxygen sensor 2<br>● Fuel pressure<br>● Fuel injector |
| P1166<br>1166<br>(Bank 2) | | | |

## DTC Confirmation Procedure

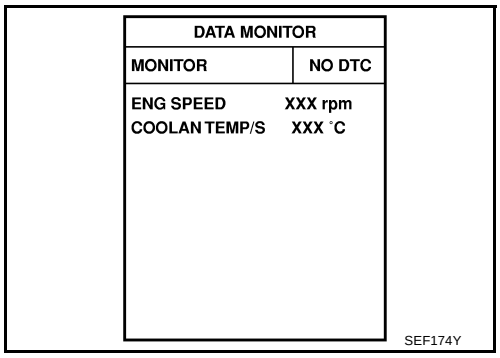
ABS00AWR

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

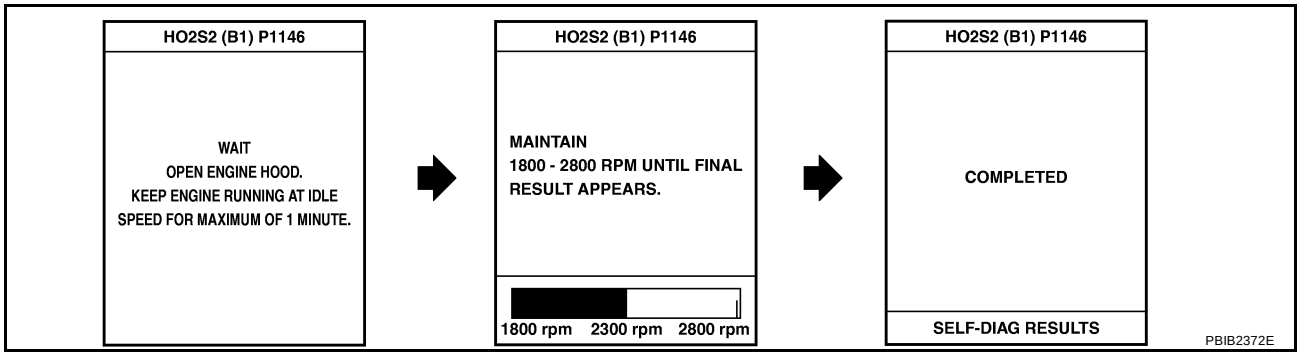
### WITH CONSULT-II

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

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




7. Open engine hood.
8. Select “HO2S2 (B1) P1146” or “HO2S2 (B2) P1166” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
9. Start engine and following the instruction of CONSULT-II.




**NOTE:**
It will take at most 10 minutes until “COMPLETED” is displayed.

10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
    If “NG” is displayed, refer to EC-437, "Diagnostic Procedure" .
    If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

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

## Overall Function Check

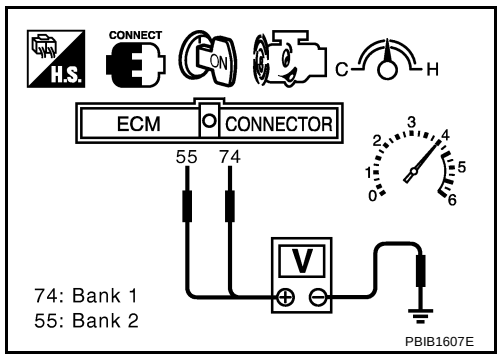
ABS00AWS

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st tip DTC might not be confirmed.

### WITH GST

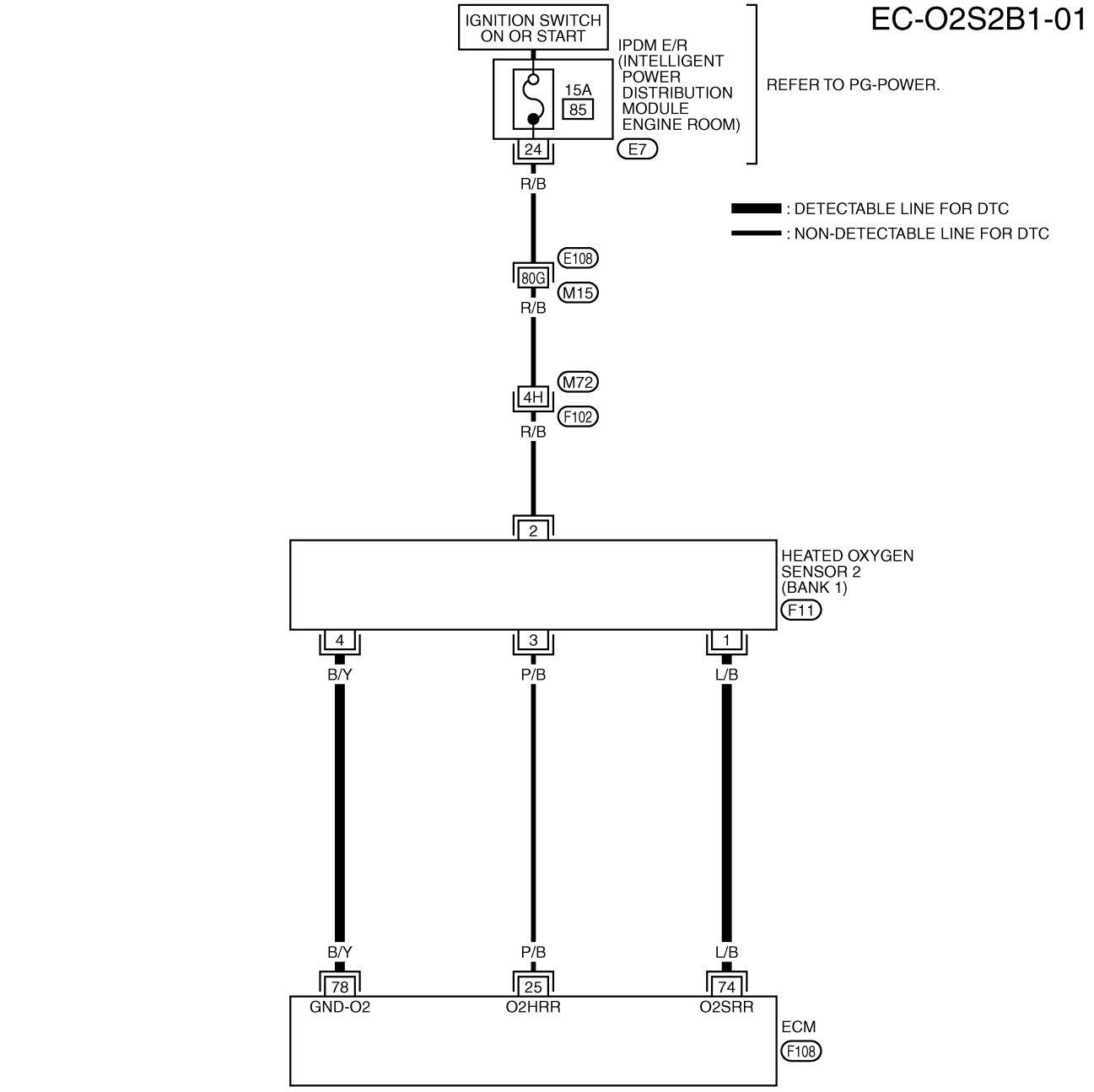
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.

6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
(Depress and release accelerator pedal as soon as possible.)
**The voltage should be below 0.18V at least once during this procedure.**
**If the voltage can be confirmed in step 6, step 7 is not necessary.**
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T).
**The voltage should be below 0.18V at least once during this procedure.**
8. If NG, go to EC-437, "Diagnostic Procedure" .



## Wiring Diagram
### BANK 1

ABS00AWT




TBWM0750E

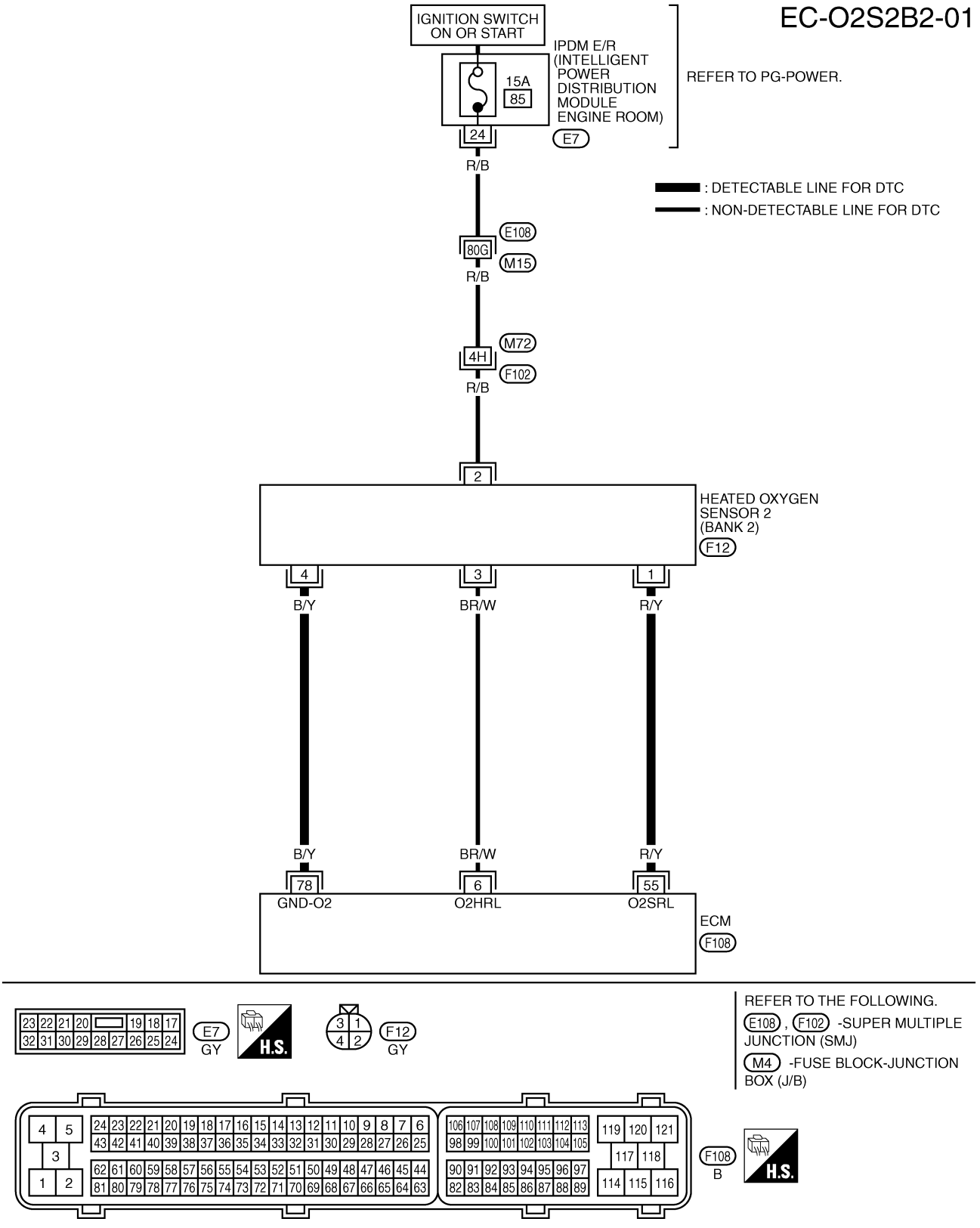
Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

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

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 74 | L/B | Heated oxygen sensor 2 (bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Revving engine from idle to 3,000 rpm quickly after the following conditions are met.<br>– After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | 0 - Approximately 1.0V |
| 78 | B/Y | Sensor ground (Heated oxygen sensor) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |

## BANK 2




TBWM0751E

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

**CAUTION:**

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

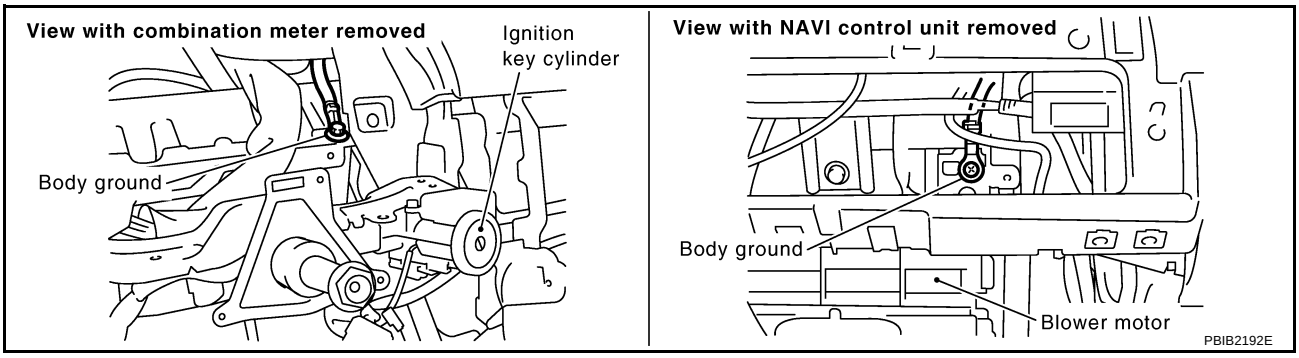
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 55 | R/Y | Heated oxygen sensor 2 (bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Revving engine from idle to 3,000 rpm quickly after the following conditions are met.<br>– After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | 0 - Approximately 1.0V |
| 78 | B/Y | Sensor ground (Heated oxygen sensor) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |

## Diagnostic Procedure

ABS00AWU

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .



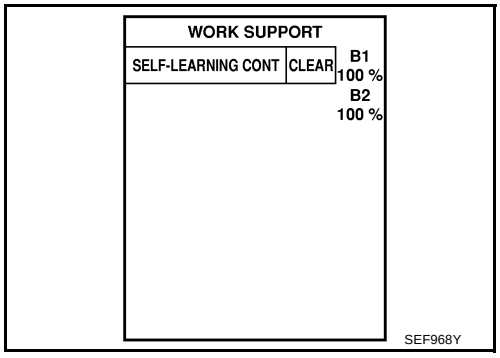

OK or NG

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

## 2. CLEAR THE SELF-LEARNING DATA

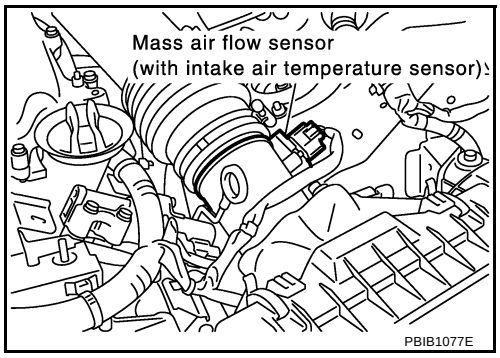
**With CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   **Is the 1st trip DTC P0172 or P0175 detected?**
   **Is it difficult to start engine?**




**Without CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-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 or P0175 detected?**
   **Is it difficult to start engine?**



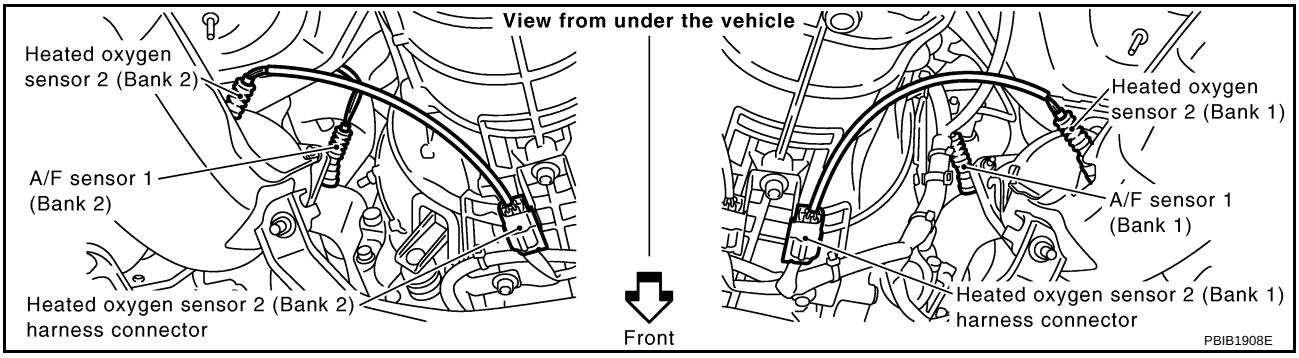

Yes or No

Yes >> Perform trouble diagnosis for DTC P0172, P0175. Refer to EC-252, "DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 3.

## 3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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




4. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

| DTC | Terminals | | Bank |
|---|---|---|---|
| | ECM | Sensor | |
| P1146 | 74 | 1 | 1 |
| P1166 | 55 | 1 | 2 |

**Continuity should exist.**

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

| DTC | Terminals | | Bank |
|---|---|---|---|
| | ECM | Sensor | |
| P1146 | 74 | 1 | 1 |
| P1166 | 55 | 1 | 2 |

**Continuity should not exist.**

3. Also check harness for short to power.

OK or NG

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

## 5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-440, "Component Inspection" .

OK or NG

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

## 6. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

# Component Inspection

ABS00AWV

## 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 1 minute under no load.
5. Let engine idle for 1 minute.

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

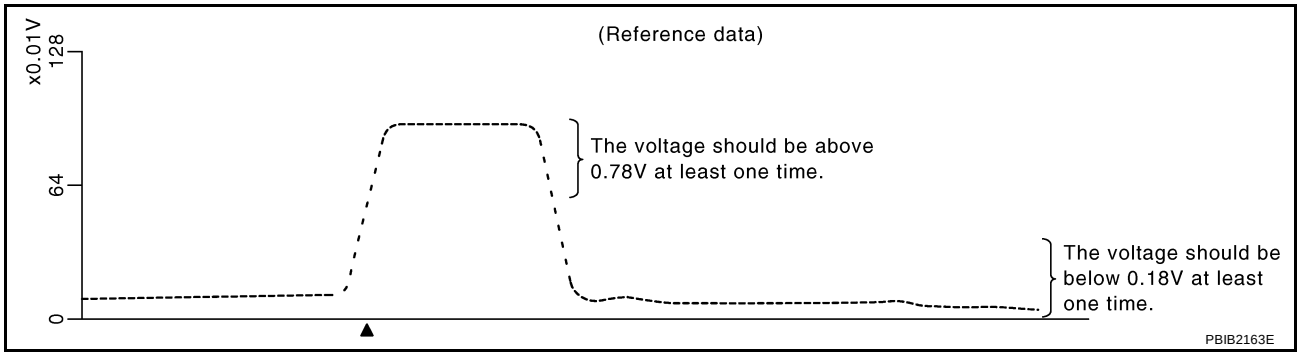
SEF174Y

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 |
| HO2S2 (B1) | XXX V |
| HO2S2 (B2) | XXX V |
| | |
| | |
| | |
| | |

PBIB1672E

7. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.




**“HO2S2 (B1)/(B2)” should be above 0.78V at least once when the “FUEL INJECTION” is +25%.**
**“HO2S2 (B1)/(B2)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.**

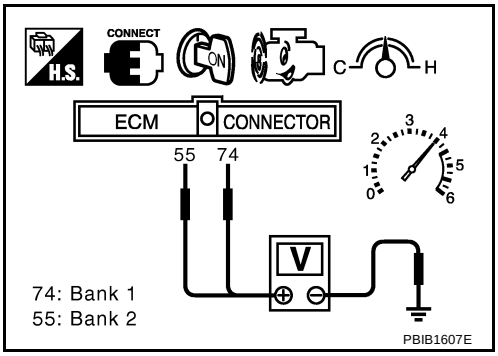
**CAUTION:**

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

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

### Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   **The voltage should be above 0.78V at least once during this procedure.**
   **If the voltage is above 0.78V at step 6, step 7 is not necessary.**
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T).
   **The voltage should be below 0.18V at least once during this procedure.**
8. If NG, replace heated oxygen sensor 2.




**CAUTION:**

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

## Removal and Installation

ABS00AWW

### HEATED OXYGEN SENSOR 2

Refer to EM-26, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

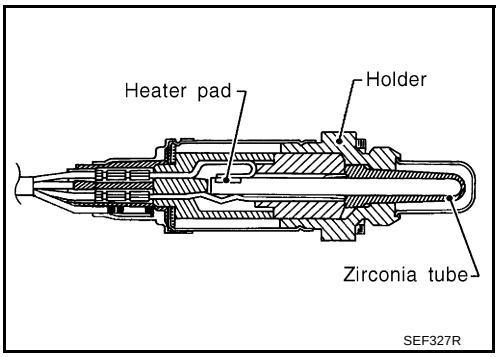
# DTC P1147, P1167 HO2S2

PFP:226A0

## Component Description

ABS00AWX

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




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AWY

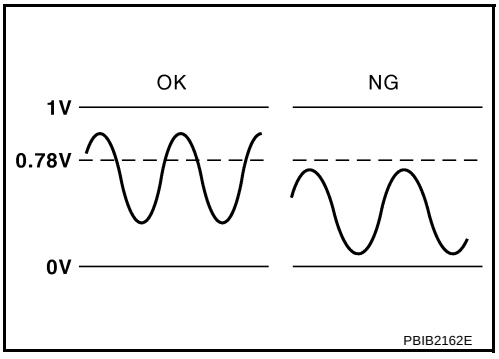
Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| HO2S2 (B1)<br>HO2S2 (B2) | ● Warm-up condition<br>● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | Revving engine from idle 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

ABS00AWZ

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the three way catalyst 1 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<br>1147<br>(Bank 1) | Heated oxygen sensor 2 maximum voltage monitoring | The maximum voltage from the sensor is not reached to the specified voltage. | ● Harness or connectors (The sensor circuit is open or shorted)<br>● Heated oxygen sensor 2<br>● Fuel pressure<br>● Fuel injector<br>● Intake air leaks |
| P1167<br>1167<br>(Bank 2) | | | |

## DTC Confirmation Procedure

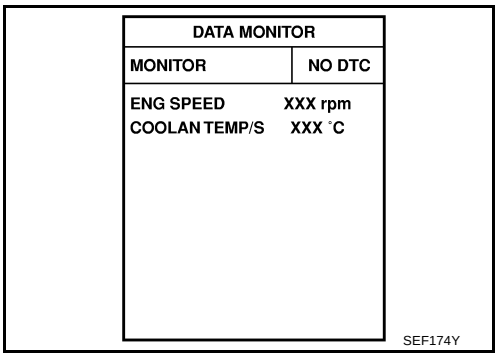
ABS00AX0

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

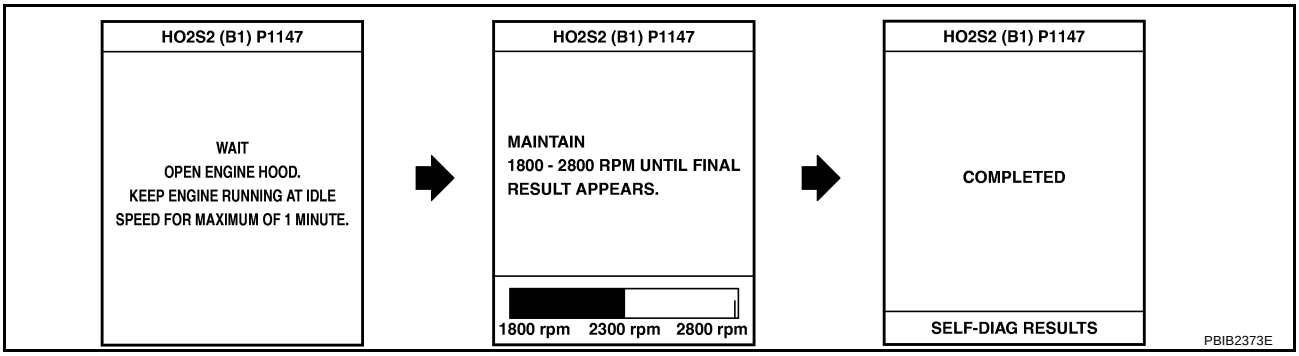
### WITH CONSULT-II

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

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




7. Open engine hood.
8. Select "HO2S2 (B1) P1147" or "HO2S2 (B2) P1167" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
9. Start engine and following the instruction of CONSULT-II.




**NOTE:**
It will take at most 10 minutes until "COMPLETED" is displayed.

10. Make sure that "OK" is displayed after touching "SELF-DIAG RESULTS".
    If "NG" is displayed, refer to EC-448, "Diagnostic Procedure" .
    If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

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

## Overall Function Check

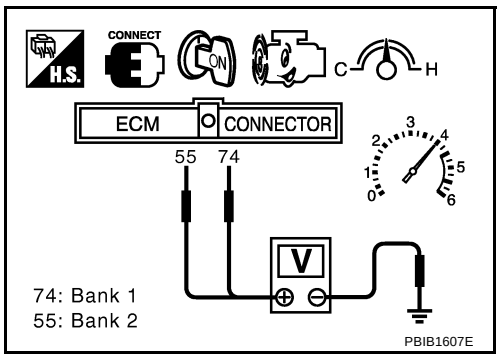
ABS00AX1

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

### WITH GST

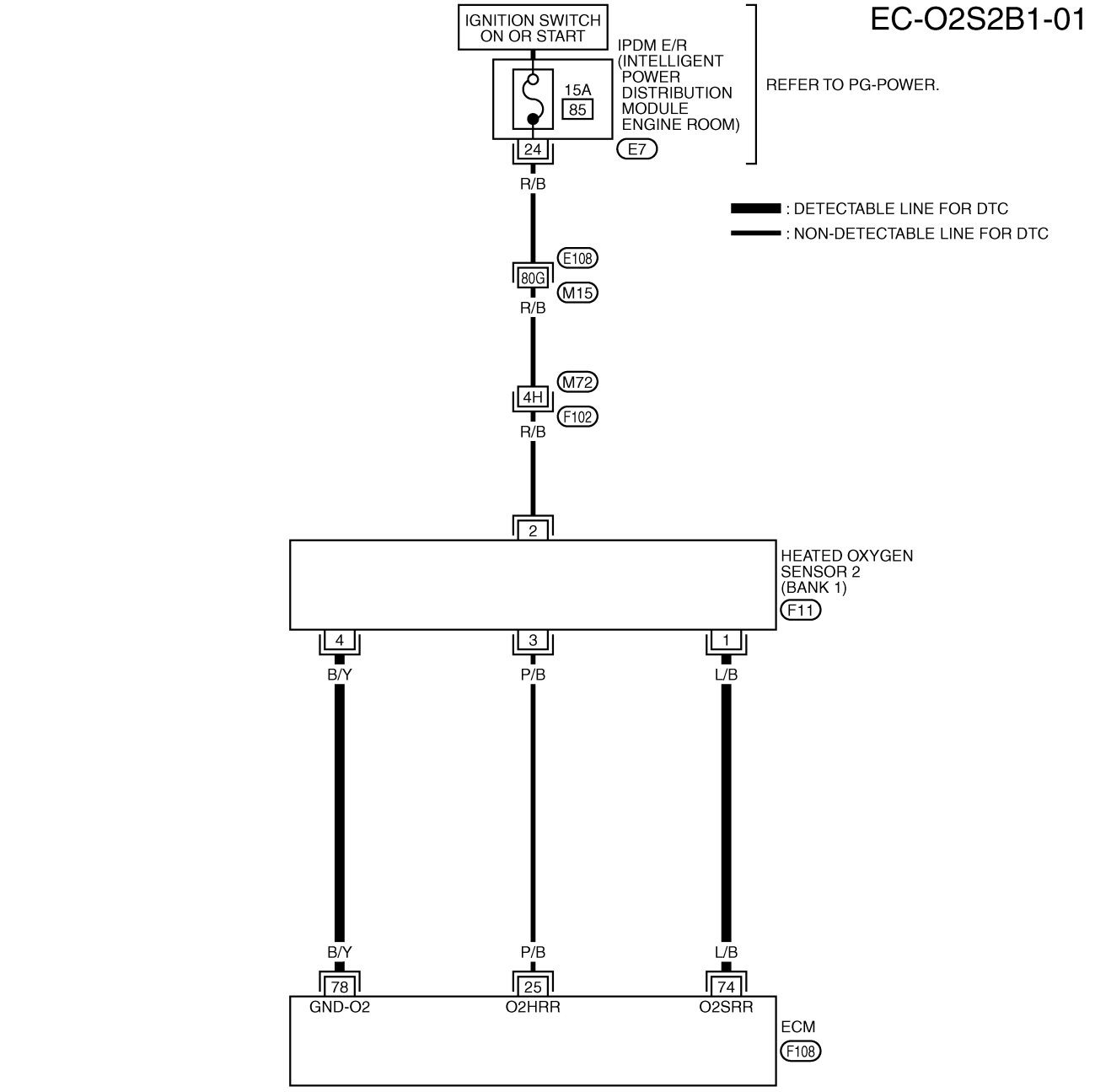
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.

6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   **The voltage should be above 0.78V at least once during this procedure.**
   **If the voltage can be confirmed in step 6, step 7 is not necessary.**
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T).
   **The voltage should be above 0.78V at least once during this procedure.**
8. If NG, go to EC-448, "Diagnostic Procedure" .



## Wiring Diagram
### BANK 1

ABS00AX2




TBWM0750E

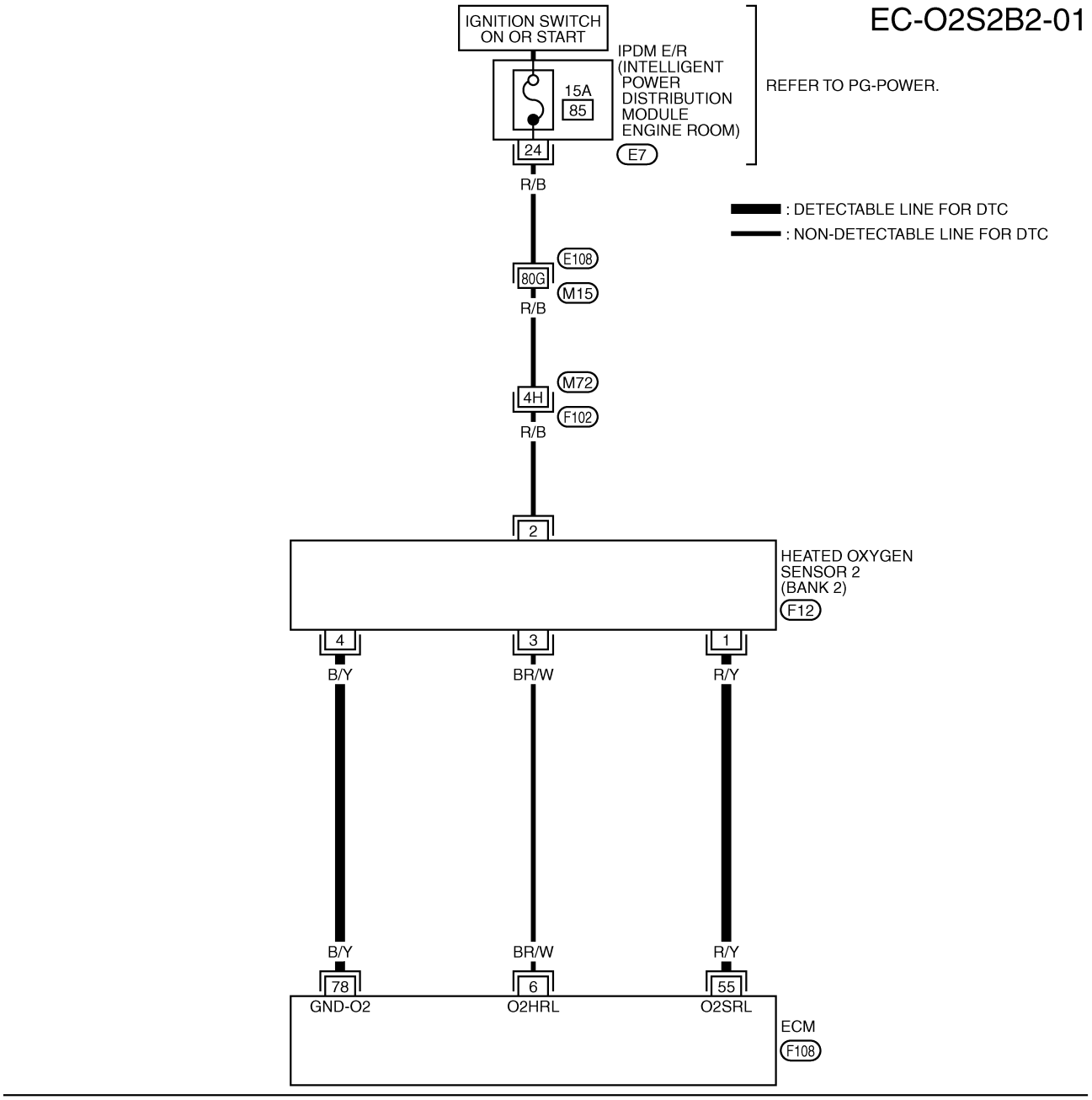
Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

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

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 74 | L/B | Heated oxygen sensor 2 (bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Revving engine from idle to 3,000 rpm quickly after the following conditions are met.<br>– After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | 0 - Approximately 1.0V |
| 78 | B/Y | Sensor ground (Heated oxygen sensor) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |

## BANK 2




TBWM0751E

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

**CAUTION:**

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

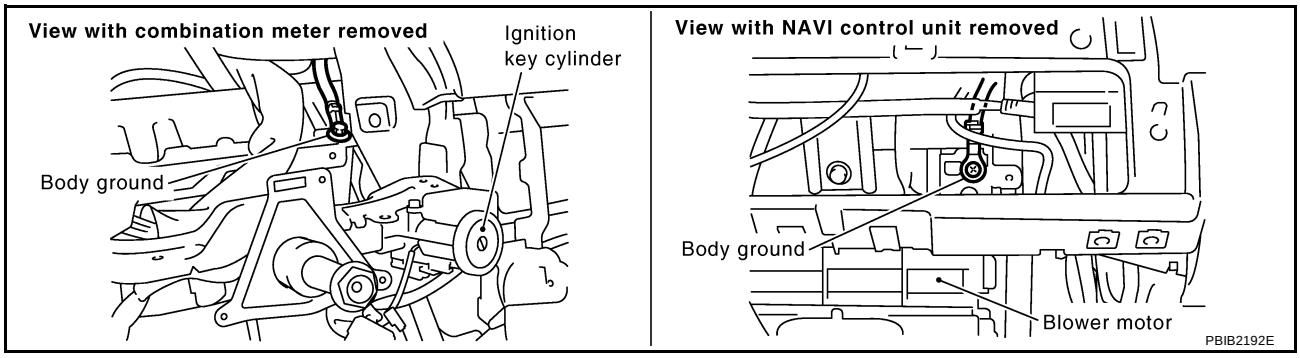
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 55 | R/Y | Heated oxygen sensor 2 (bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Revving engine from idle to 3,000 rpm quickly after the following conditions are met.<br>– After keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load. | 0 - Approximately 1.0V |
| 78 | B/Y | Sensor ground (Heated oxygen sensor) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |

## Diagnostic Procedure

ABS00AX3

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .



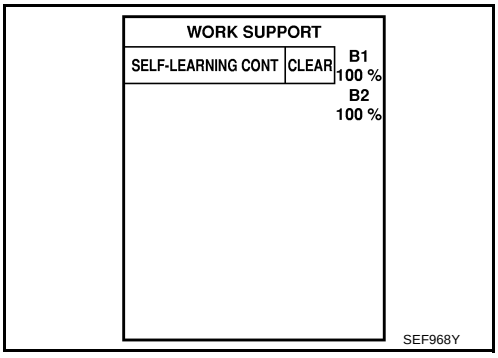

OK or NG

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

## 2. CLEAR THE SELF-LEARNING DATA

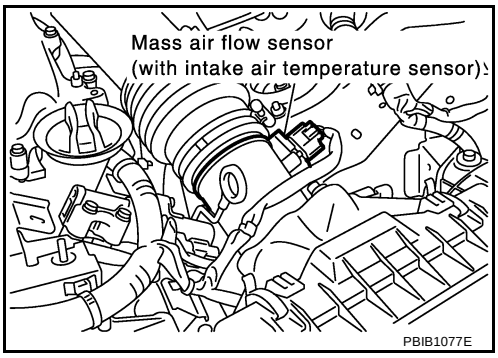
**With CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   **Is the 1st trip DTC P0171 or P0174 detected?**
   **Is it difficult to start engine?**




**Without CONSULT-II**

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-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 P0174 detected?**
   **Is it difficult to start engine?**



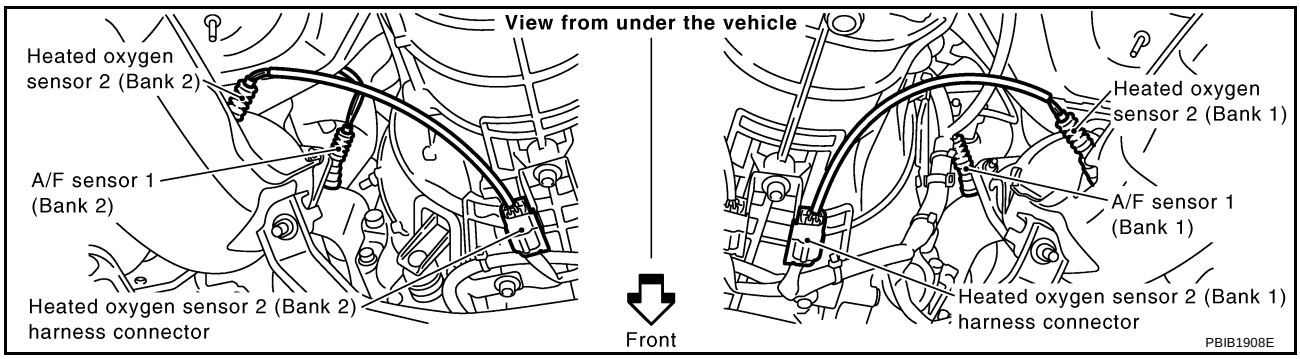

Yes or No

Yes >> Perform trouble diagnosis for DTC P0171or P0174. Refer to EC-242, "DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 3.

## 3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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




4. Check harness continuity between HO2S2 terminal 4 and ECM terminal 78. Refer to Wiring Diagram.

**Continuity should exist.**

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

OK or NG

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

## 4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows. Refer to Wiring Diagram.

| DTC | Terminals | | Bank |
|---|---|---|---|
| | ECM | Sensor | |
| P1147 | 74 | 1 | 1 |
| P1167 | 55 | 1 | 2 |

**Continuity should exist.**

2. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

| DTC | Terminals | | Bank |
|---|---|---|---|
| | ECM | Sensor | |
| P1147 | 74 | 1 | 1 |
| P1167 | 55 | 1 | 2 |

**Continuity should not exist.**

3. Also check harness for short to power.

OK or NG

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

## 5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-451, "Component Inspection" .

OK or NG

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

## 6. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

# Component Inspection

ABS00AX4

## 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 1 minute under no load.
5. Let engine idle for 1 minute.

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

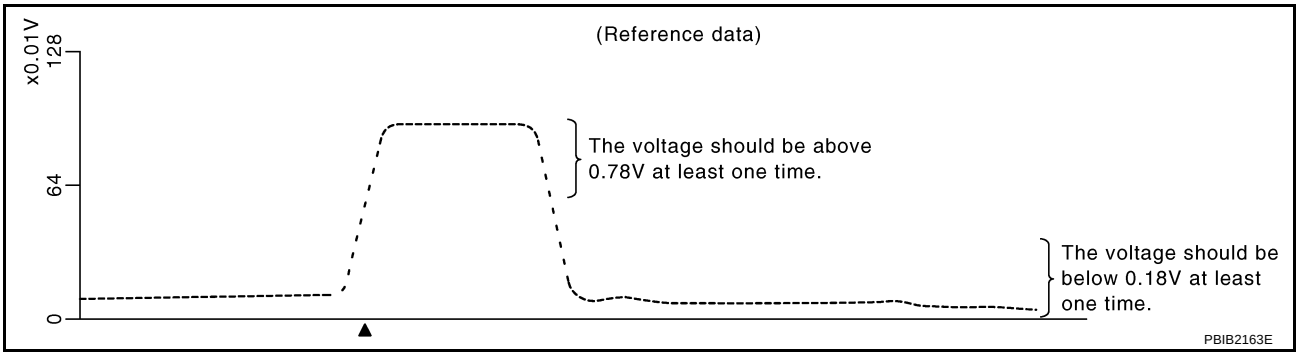
SEF174Y

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 |
| HO2S2 (B1) | XXX V |
| HO2S2 (B2) | XXX V |
| | |
| | |
| | |
| | |

PBIB1672E

7. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.




**“HO2S2 (B1)/(B2)” should be above 0.78V at least once when the “FUEL INJECTION” is +25%.**
**“HO2S2 (B1)/(B2)” should be below 0.18V at least once when the “FUEL INJECTION” is –25%.**

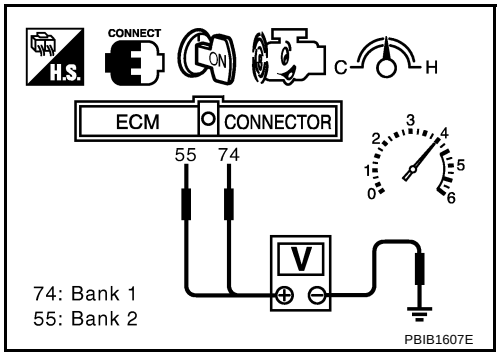
**CAUTION:**

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

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

### Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) signal] and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   **The voltage should be above 0.78V at least once during this procedure.**
   **If the voltage is above 0.78V at step 6, step 7 is not necessary.**
7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T).
   **The voltage should be below 0.18V at least once during this procedure.**
8. If NG, replace heated oxygen sensor 2.




**CAUTION:**

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

## Removal and Installation

ABS00AX5

### HEATED OXYGEN SENSOR 2

Refer to EM-26, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

# DTC P1148, P1168 CLOSED LOOP CONTROL

PFP:22690

## On Board Diagnosis Logic

ABS00AX6

**These self-diagnoses have the one trip detection logic.**

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P1148<br>1148<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. | ● Harness or connectors<br>[The air fuel ratio (A/F) sensor 1 circuit is open or shorted.]<br>● Air fuel ratio (A/F) sensor 1<br>● Air fuel ratio (A/F) sensor 1 heater |
| P1168<br>1168<br>(Bank 2) | | The closed loop control function for bank 2 does not operate even when vehicle is driving in the specified condition. | |

DTC P1148 or P1168 is displayed with another DTC for air fuel ratio (A/F) sensor 1.
Perform the trouble diagnosis for the corresponding DTC.

# DTC P1211 TCS CONTROL UNIT

PFP:47850

## Description

ABS00AX7

The malfunction information related to TCS is transferred through the CAN communication line from VDC/TCS/ABS control unit to ECM.

**Be sure to erase the malfunction information such as DTC not only for VDC/TCS/ABS control unit but also for ECM after TCS related repair.**

## On Board Diagnosis Logic

ABS00AX8

**Freeze frame data is not stored in the ECM for this self-diagnosis.**
**The MIL will not light up for this self-diagnosis.**

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P1211<br>1211 | TCS control unit | ECM receives a malfunction information from VDC/TCS/ABS control unit. | ● VDC/TCS/ABS control unit<br>● TCS related parts |

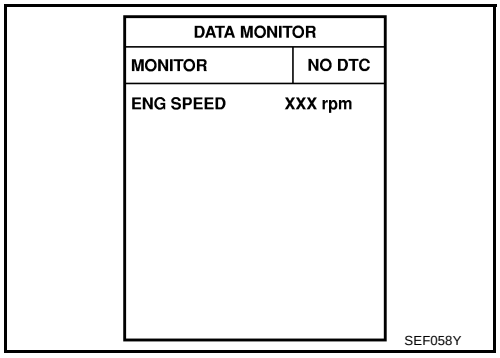
## DTC Confirmation Procedure

ABS00AX9

**TESTING CONDITION:**
**Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.**

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 60 seconds.
4. If 1st trip DTC is detected, go to EC-454, "Diagnostic Procedure" .




### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Diagnostic Procedure

ABS00AXA

Go to BRC-10, "TROUBLE DIAGNOSIS" .

# DTC P1212 TCS COMMUNICATION LINE

PFP:47850

## Description

ABS00AXB

**NOTE:**
**If DTC P1212 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-166, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**
This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and VDC/TCS/ABS control unit.
**Be sure to erase the malfunction information such as DTC not only for VDC/TCS/ABS control unit but also for ECM after TCS related repair.**

## On Board Diagnosis Logic

ABS00AXC

**Freeze frame data is not stored in the ECM for this self-diagnosis.**
**The MIL will not light up for this self-diagnosis.**

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P1212<br>1212 | TCS communication line | ECM can not receive the information from VDC/TCS/ABS control unit continuously. | ● Harness or connectors (The CAN communication line is open or shorted.)<br>● VDC/TCS/ABS control unit<br>● Dead (Weak) battery |

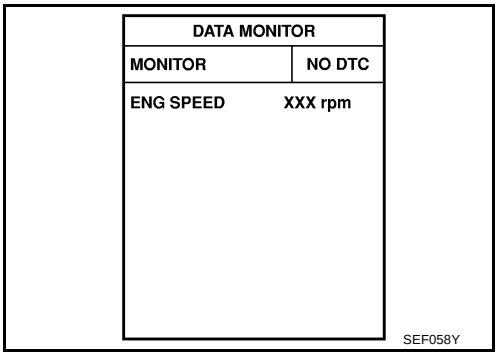
## DTC Confirmation Procedure

ABS00AXD

**TESTING CONDITION:**
**Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.**

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 10 seconds.
4. If 1st trip DTC is detected, go to EC-455, "Diagnostic Procedure" .




### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Diagnostic Procedure

ABS00AXE

Go to BRC-10, "TROUBLE DIAGNOSIS" .

# DTC P1217 ENGINE OVER TEMPERATURE

PFP:00000

## Description

ABS00AXF

### SYSTEM DESCRIPTION

**NOTE:**
**If DTC P1217 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-166, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**

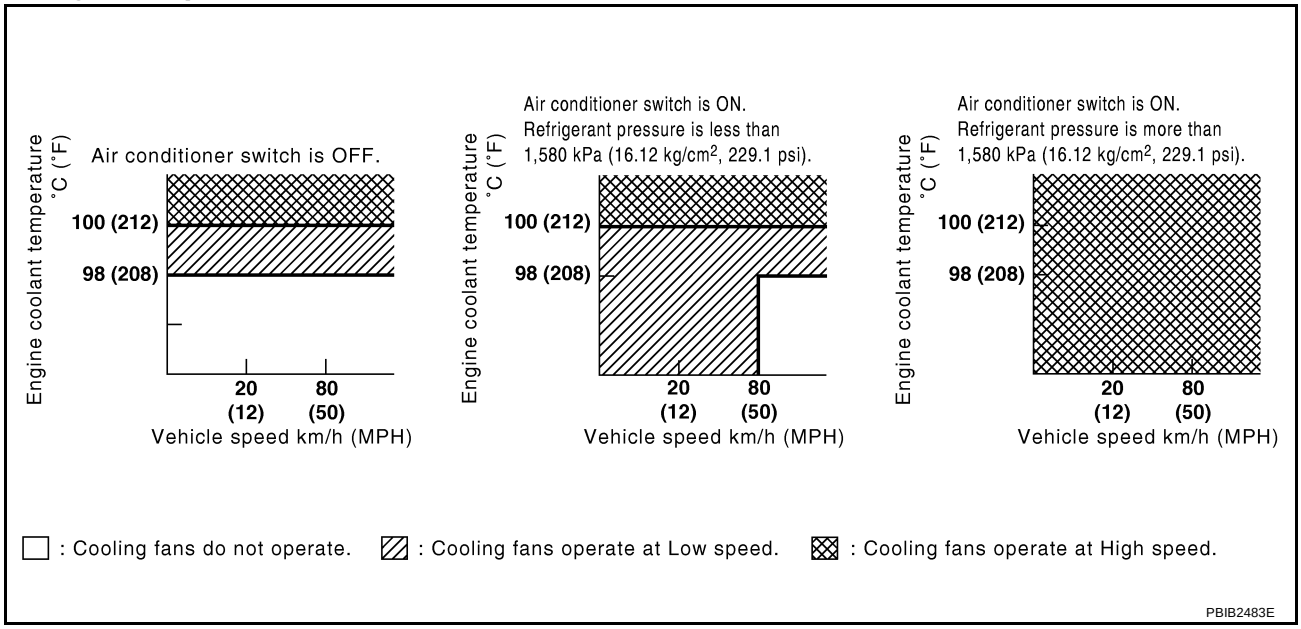
### Cooling Fan Control

| Sensor | Input Signal to ECM | ECM function | Actuator |
|---|---|---|---|
| Crankshaft position sensor (POS)<br>Camshaft position sensor (PHASE) | Engine speed*1 | Cooling fan control | IPDM E/R (Cooling fan relay) |
| Battery | Battery voltage*1 | | |
| Wheel sensor | Vehicle speed*2 | | |
| Engine coolant temperature sensor | Engine coolant temperature | | |
| Air conditioner switch | Air conditioner ON signal*2 | | |
| Refrigerant pressure sensor | Refrigerant pressure | | |

*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to ECM through CAN communication line.

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

### Cooling Fan Operation



### Cooling Fan Relay Operation

The ECM controls cooling fan relays in the IPDM E/R through CAN communication line.

| Cooling fan speed | Cooling fan relay | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| Stop | OFF | OFF | OFF |
| Low | ON | OFF | OFF |
| High | ON | ON | ON |

## COMPONENT DESCRIPTION

### Cooling Fan Motor

The cooling fan operates at each speed when the current flows in the cooling fan motor as follows.

| Cooling fan speed | Cooling fan motor terminals | |
|---|---|---|
| | (+) | (−) |
| Low | 1 | 4 |
| | 2 | 3 |
| High | 1 and 2 | 3 and 4 |

## CONSULT-II Reference Value in Data Monitor Mode

ABS00AXG

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| AIR COND SIG | ● Engine: After warming up, idle the engine | Air conditioner switch: OFF | OFF |
| | | Air conditioner switch: ON (Compressor operates.) | ON |
| COOLING FAN | ● Engine: After warming up, idle the engine<br>● Air conditioner switch: OFF | Engine coolant temperature is 97°C (206°F) or less | OFF |
| | | Engine coolant temperature is between 98°C (208°F) and 99°C (210°F) | LOW |
| | | Engine coolant temperature is 100°C (212°F) or more | HI |

## On Board Diagnosis Logic

ABS00AXH

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<br>1217 | Engine over temperature (Overheat) | ● Cooling fan does not operate properly (Overheat).<br>● Cooling fan system does not operate properly (Overheat).<br>● Engine coolant was not added to the system using the proper filling method.<br>● Engine coolant is not within the specified range. | ● Harness or connectors (The cooling fan circuit is open or shorted.)<br>● Cooling fan<br>● IPDM E/R (Cooling fan relays)<br>● Radiator hose<br>● Radiator<br>● Radiator cap<br>● Water pump<br>● Thermostat<br>For more information, refer to EC-467, "Main 12 Causes of Overheating" . |

**CAUTION:**

**When a malfunction is indicated, be sure to replace the coolant. Refer to CO-10, "Changing Engine Coolant" . Also, replace the engine oil. Refer to LU-9, "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-12, "Anti-Freeze Coolant Mixture Ratio" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

## Overall Function Check

ABS00AXI

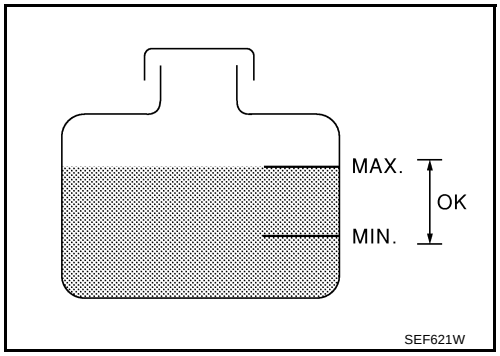
Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

**WARNING:**

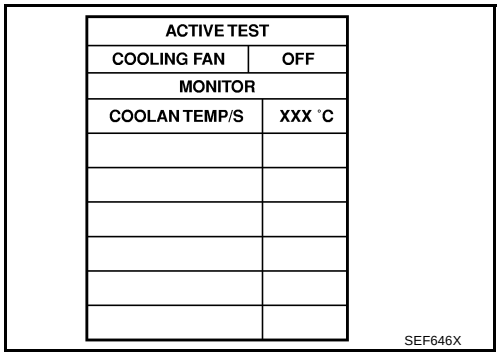
**Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.**
**Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.**

### 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-462, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-462, "Diagnostic Procedure" .
3. Turn ignition switch ON.

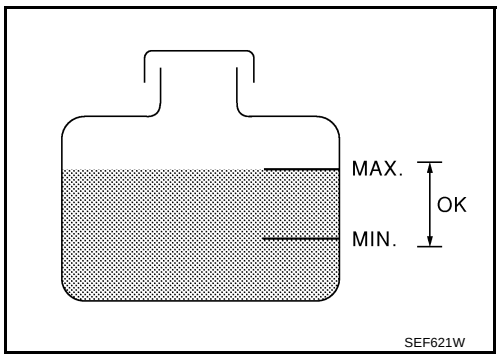



4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-462, "Diagnostic Procedure" .

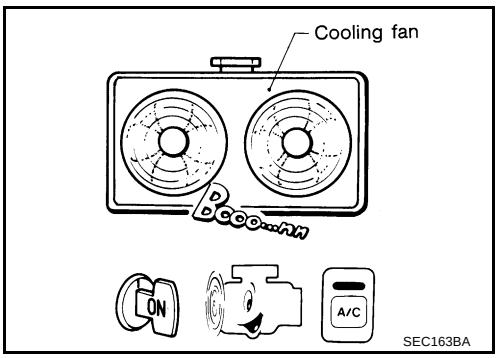



### WITH GST

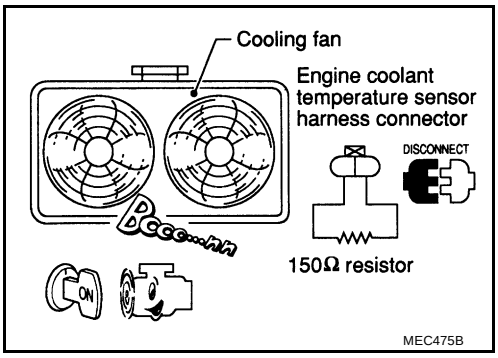
1. Check the coolant level in the reservoir tank and radiator.
   **Allow engine to cool before checking coolant level.**
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-462, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-462, "Diagnostic Procedure" .
3. Start engine.
   **CAUTION:**
   **Be careful not to overheat engine.**
4. Turn air conditioner switch ON.
5. Turn blower fan switch ON.



6. Make sure that cooling fan operates at low speed.
   If NG, go to EC-462, "Diagnostic Procedure" .
   If OK, go to the following step.
7. Turn ignition switch OFF.
8. Turn air conditioner switch and blower fan switch OFF.
9. Disconnect engine coolant temperature sensor harness connector.
10. Connect 150Ω resistor to engine coolant temperature sensor harness connector.



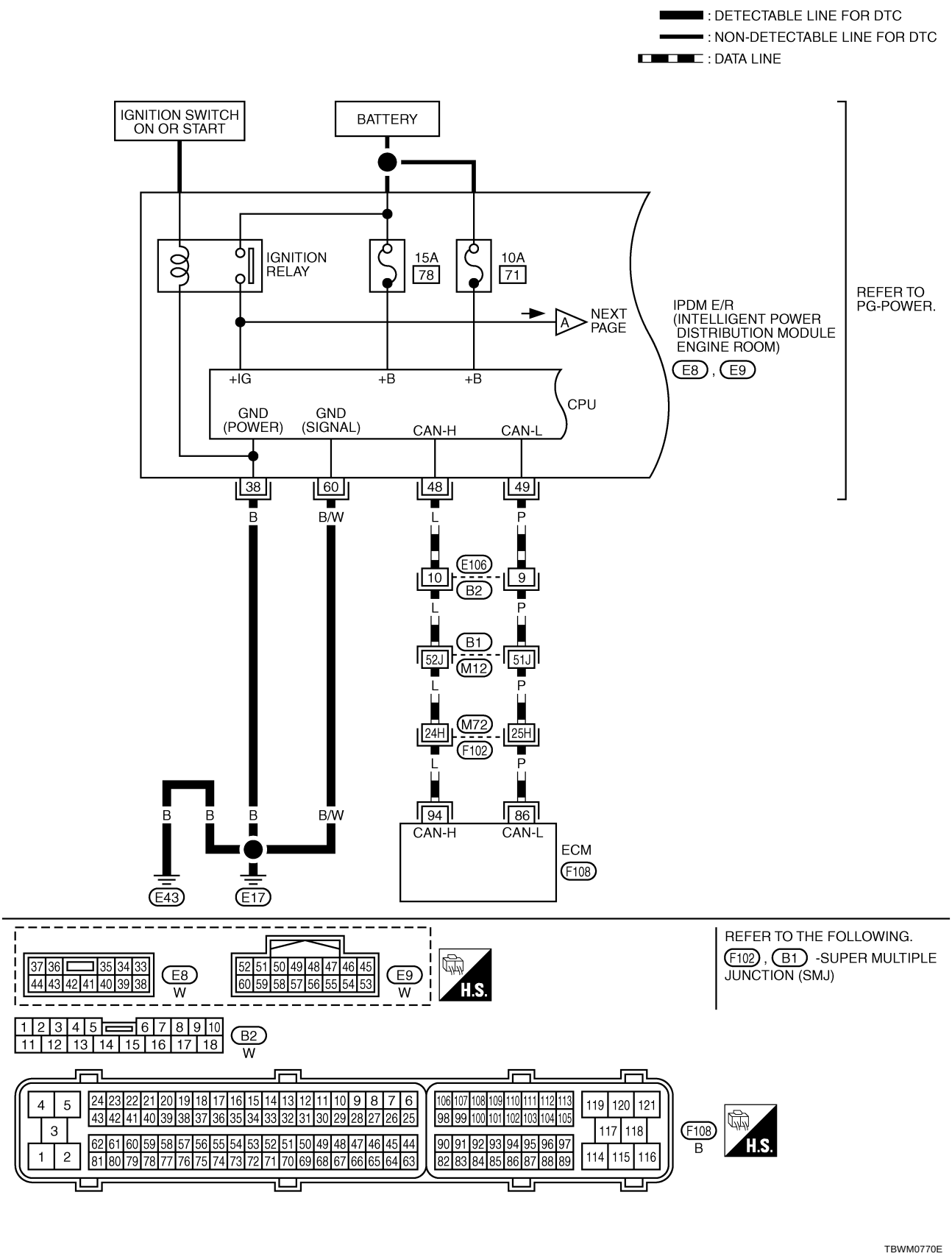

11. Restart engine and make sure that cooling fan operates at higher speed than low speed.
    **CAUTION:**
    **Be careful not to overheat engine.**
12. If NG, go to EC-462, "Diagnostic Procedure" .



## Wiring Diagram

ABS00AXJ

EC-COOL/F-01

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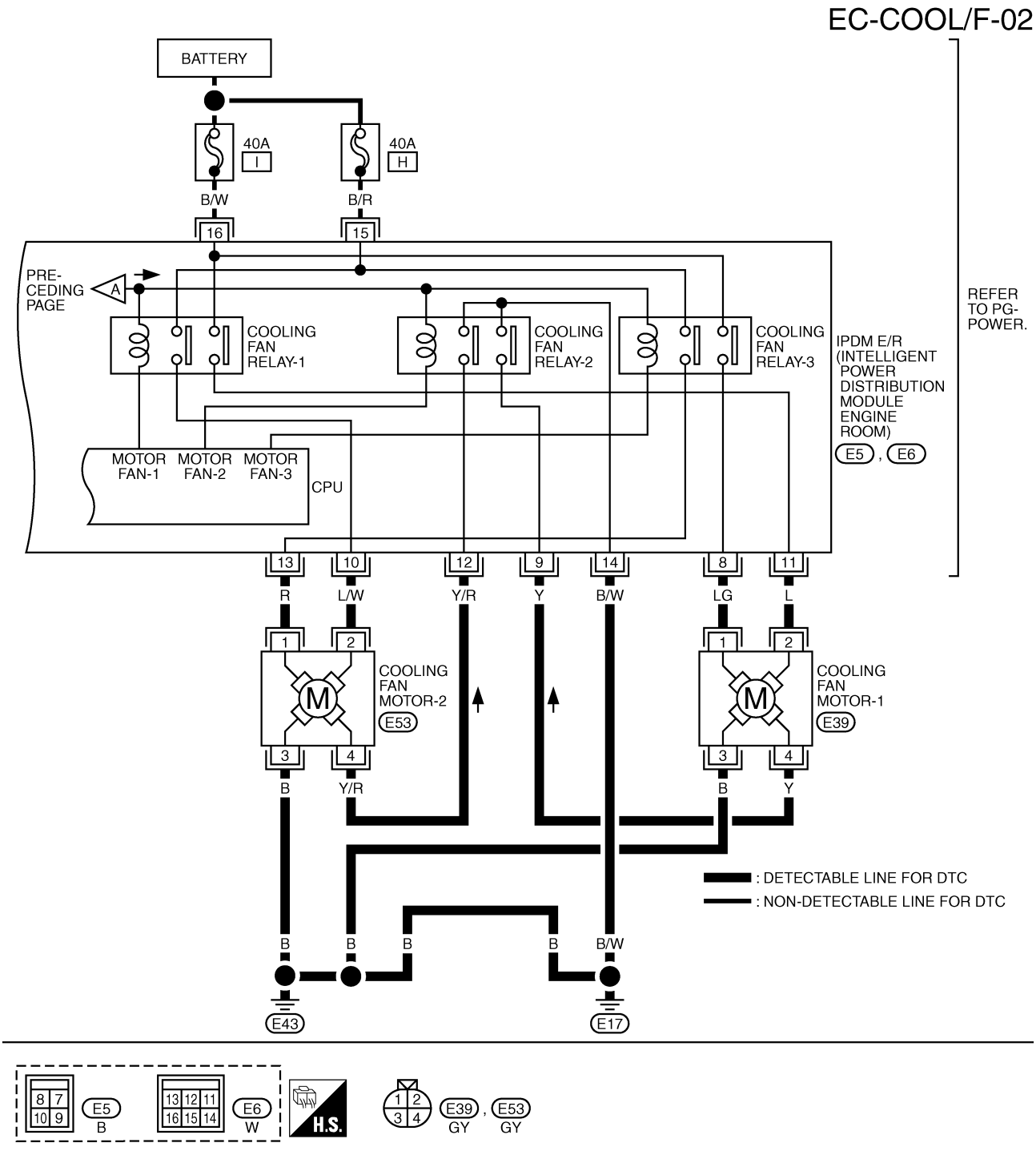
EC-COOL/F-02
BATTERY
40A
I
40A
H
B/W
B/R
16
15
PRE-
CEDING
PAGE
A
COOLING
FAN
RELAY-1
COOLING
FAN
RELAY-2
COOLING
FAN
RELAY-3
IPDM E/R
(INTELLIGENT
POWER
DISTRIBUTION
MODULE
ENGINE
ROOM)
E5 , E6
REFER
TO PG-
POWER.
MOTOR
FAN-1
MOTOR
FAN-2
MOTOR
FAN-3
CPU
13
10
12
9
14
8
11
R
L/W
Y/R
Y
B/W
LG
L
1
2
3
4
M
COOLING
FAN
MOTOR-2
E53
COOLING
FAN
MOTOR-1
E39
B
Y/R
B
Y
: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
B
B
B
B
B/W
E43
E17
8 7
10 9
E5
B
13 12 11
16 15 14
E6
W
H.S.
1 2
3 4
E39 , E53
GY GY

TBWM0771E

## Diagnostic Procedure

ABS00AXK

### 1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 4.

### 2. CHECK COOLING FAN LOW SPEED OPERATION

**With CONSULT-II**

1. Start engine and let it idle.
2. Select “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II and touch “LOW” on the CONSULT-II screen.
3. Make sure that cooling fans-1 and -2 operate at low speed.

OK or NG

OK >> GO TO 3.
NG >> Check cooling fan low speed control circuit. (Go to EC-464, "PROCEDURE A" .)

| ACTIVE TEST | |
|---|---|
| COOLING FAN | LOW |
| MONITOR | |
| COOLAN TEMP/S | XXX °C |
| | |
| | |
| | |
| | |
| | |
| | |

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### 3. CHECK COOLING FAN HIGH SPEED OPERATION

**With CONSULT-II**

1. Touch “HIGH” on the CONSULT-II screen.
2. Make sure that cooling fans-1 and -2 operate at higher speed than low speed.

OK or NG

OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to EC-466, "PROCEDURE B" .)

| ACTIVE TEST | |
|---|---|
| COOLING FAN | HIGH |
| MONITOR | |
| COOLAN TEMP/S | XXX °C |
| | |
| | |
| | |
| | |
| | |
| | |

SEF785Z

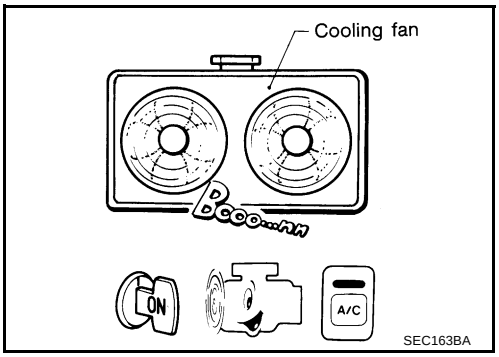
### 4. CHECK COOLING FAN LOW SPEED OPERATION

**Without CONSULT-II**

1. Start engine and let it idle.
2. Turn air conditioner switch ON.
3. Turn blower fan switch ON.
4. Make sure that cooling fans-1 and -2 operate at low speed.

OK or NG

OK >> GO TO 5.
NG >> Check cooling fan low speed control circuit. (Go to EC-464, "PROCEDURE A" .)

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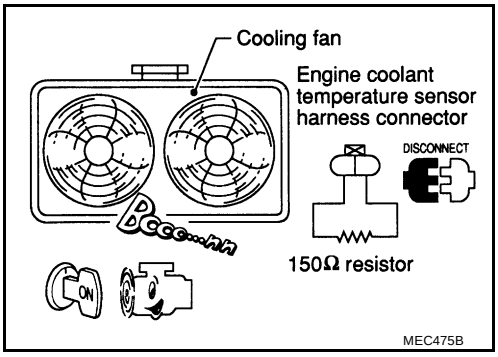
## 5. CHECK COOLING FAN HIGH SPEED OPERATION

**Without CONSULT-II**

1. Turn ignition switch OFF.
2. Turn air conditioner switch and blower fan switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
5. Restart engine and make sure that cooling fans-1 and -2 operate at higher speed than low speed.



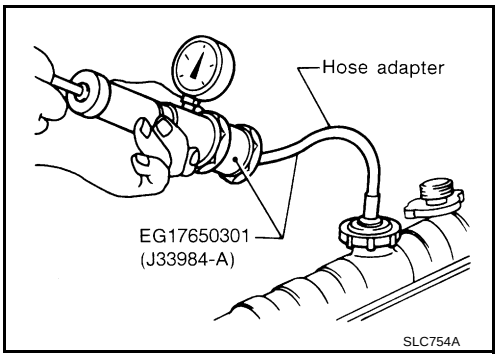

OK or NG

OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to EC-466, "PROCEDURE B" .)

## 6. CHECK COOLING SYSTEM FOR LEAK

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

**Testing pressure: 157 kPa (1.6 kg/cm$^2$ , 23 psi)**




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

OK or NG

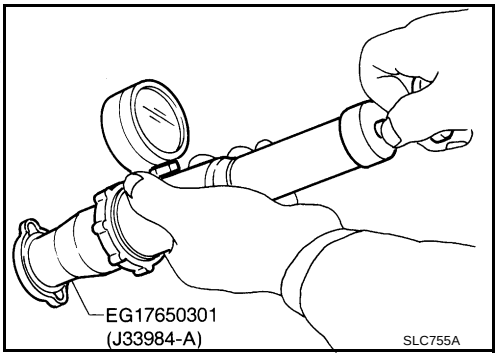
OK >> GO TO 7.
NG >> Check the following for leak. Refer to CO-10, "LEAK CHECK" .

- Hose
- Radiator
- Water pump

## 7. CHECK RADIATOR CAP

Apply pressure to cap with a tester.

**Radiator cap relief pressure: 59 - 98 kPa (0.6 - 1.0 kg/cm$^2$ , 9 - 14 psi)**



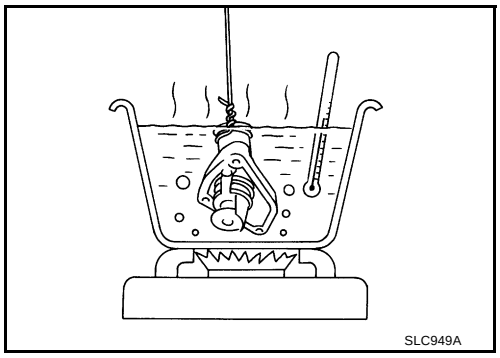

OK or NG

OK >> GO TO 8.
NG >> Replace radiator cap.

## 8. CHECK THERMOSTAT

1. Check valve seating condition at normal room temperatures.
   **It should seat tightly.**
2. Check valve opening temperature and valve lift.

   **Valve opening temperature: 82°C (180°F) [standard]**
   **Valve lift: More than 8.6 mm/95°C (0.339 in/203°F)**




3. Check if valve is closed at 5°C (9°F) below valve opening temperature.
   For details, refer to CO-28, "WATER INLET AND THERMOSTAT ASSEMBLY" .

OK or NG

OK >> GO TO 9.
NG >> Replace thermostat

## 9. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-206, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace engine coolant temperature sensor.

## 10. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to EC-467, "Main 12 Causes of Overheating" .

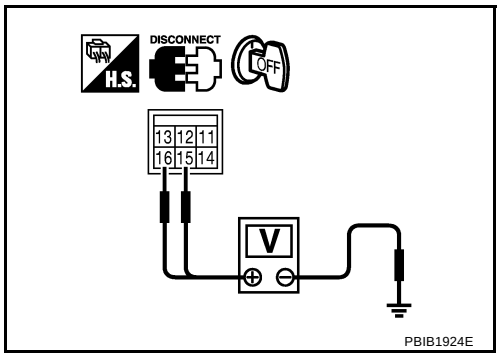
>> **INSPECTION END**

### PROCEDURE A

## 1. CHECK POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E6.
3. Check voltage between IPDM E/R terminals 15, 16 and ground with CONSULT-II or tester.

   **Voltage: Battery voltage**




OK or NG

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

## 2. DETECT MALFUNCTIONING PART

Check the following.

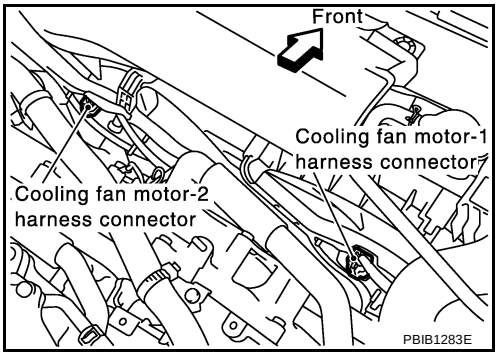
- 40A fusible links
- Harness for open or short between IPDM E/R and battery

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

## 3. CHECK COOLING FAN MOTORS CIRCUIT

1. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
2. Disconnect all IPDM E/R harness connector.
3. Check harness continuity between the following;
   cooling fan motor-1 terminal 2 and IPDM E/R terminal 11,
   cooling fan motor-1 terminal 3 and ground.
   IPDM E/R terminal 38, 60 and ground.
   Refer to wiring diagram.

   **Continuity should exist.**




4. Also check harness for short to ground and short to power.
5. Check harness continuity between the following;
   cooling fan motor-2 terminal 2 and IPDM E/R terminal 10,
   cooling fan motor-2 terminal 3 and ground.
   Refer to wiring diagram.

   **Continuity should exist.**

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

OK or NG

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

## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between cooling fan motors-1, 2 and IPDM E/R
- Harness for open or short between cooling fan motors-1, 2 and ground
- Harness for open or short between IPDM E/R and ground

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

## 5. CHECK COOLING FAN MOTORS

Refer to EC-467, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace cooling fan motors.

## 6. CHECK INTERMITTENT INCIDENT

Perform EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R. Refer to PG-16, "IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)" .
NG >> Repair or replace harness or connector.

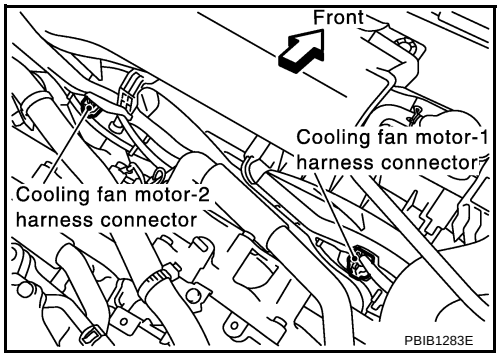
## PROCEDURE B

### 1. CHECK COOLING FAN MOTORS CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Disconnect all IPDM E/R harness connectors.
4. Check harness continuity between the following;
   cooling fan motor-1 terminal 1 and IPDM E/R terminal 8,
   cooling fan motor-1 terminal 4 and IPDM E/R terminal 9,
   IPDM E/R terminal 14, 38, 60 and ground.
   Refer to wiring diagram.

   **Continuity should exist.**
5. Also check harness for short to ground and short to power.
6. Check harness continuity between the following;
   cooling fan motor-2 terminal 1 and IPDM E/R terminal 13,
   cooling fan motor-2 terminal 4 and IPDM E/R terminal 12.
   Refer to wiring diagram.

   **Continuity should exist.**
7. 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 for open or short between cooling fan motors-1, 2 and IPDM E/R
- Harness for open or short between cooling fan motors-1, 2 and ground
- Harness for open or short between IPDM E/R and ground

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

### 3. CHECK COOLING FAN MOTORS

Refer to EC-467, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace cooling fan motors.

### 4. CHECK INTERMITTENT INCIDENT

Perform EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R. Refer to PG-16, "IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)" .
NG >> Repair or replace harness connectors.

## Main 12 Causes of Overheating

ABS00AXL

| Engine | Step | Inspection item | Equipment | Standard | Reference page |
|---|---|---|---|---|---|
| OFF | 1 | ● Blocked radiator<br>● Blocked condenser<br>● Blocked radiator grille<br>● Blocked bumper | ● Visual | No blocking | — |
| | 2 | ● Coolant mixture | ● Coolant tester | 50 - 50% coolant mixture | MA-12 |
| | 3 | ● Coolant level | ● Visual | Coolant up to MAX level in reservoir tank and radiator filler neck | CO-10 |
| | 4 | ● Radiator cap | ● Pressure tester | 59 - 98 kPa (0.6 - 1.0 kg/cm$^2$ , 9 - 14 psi) (Limit) | CO-15 |
| ON*2 | 5 | ● Coolant leaks | ● Visual | No leaks | CO-10 |
| ON*2 | 6 | ● Thermostat | ● Touch the upper and lower radiator hoses | Both hoses should be hot | CO-28 |
| ON*1 | 7 | ● Cooling fan | ● CONSULT-II | Operating | See trouble diagnosis for DTC P1217 (EC-456 ). |
| OFF | 8 | ● Combustion gas leak | ● Color checker chemical tester 4 Gas analyzer | Negative | — |
| ON*3 | 9 | ● Coolant temperature gauge | ● Visual | Gauge less than 3/4 when driving | — |
| | | ● Coolant overflow to reservoir tank | ● Visual | No overflow during driving and idling | CO-10 |
| OFF*4 | 10 | ● Coolant return from reservoir tank to radiator | ● Visual | Should be initial level in reservoir tank | CO-10 |
| OFF | 11 | ● Cylinder head | ● Straight gauge feeler gauge | 0.1 mm (0.004 in) Maximum distortion (warping) | EM-101 |
| | 12 | ● Cylinder block and pistons | ● Visual | No scuffing on cylinder walls or piston | EM-123 |

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to CO-6, "OVERHEATING CAUSE ANALYSIS" .

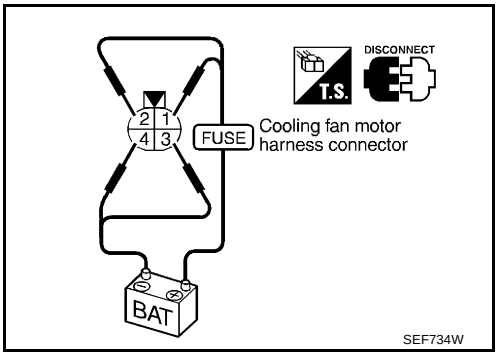
## Component Inspection

ABS00AXM

### COOLING FAN MOTORS-1 AND -2

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

| | Speed | terminals | |
|---|---|---|---|
| | | (+) | (–) |
| Cooling fan motor | Low | 1 | 4 |
| | | 2 | 3 |
| | High | 1 and 2 | 3 and 4 |




**Cooling fan motor should operate.**

If NG, replace cooling fan motor.

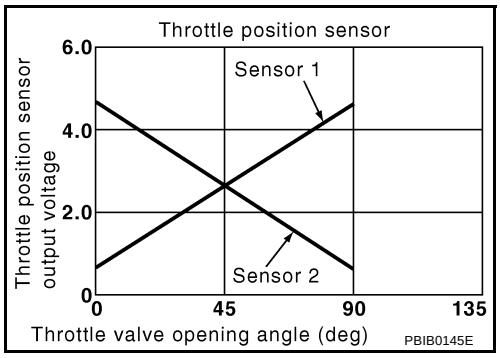
# DTC P1225 TP SENSOR

PFP:16119

## Component Description

ABS00AXN

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




## On Board Diagnosis Logic

ABS00AXO

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

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P1225<br>1225 | Closed throttle position learning performance problem | Closed throttle position learning value is excessively low. | ● Electric throttle control actuator (TP sensor 1 and 2) |

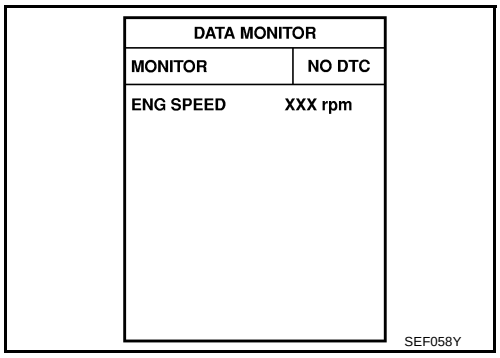
## DTC Confirmation Procedure

ABS00AXP

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
**TESTING CONDITION:**
**Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. If 1st trip DTC is detected, go to EC-469, "Diagnostic Procedure"
.




### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Diagnostic Procedure

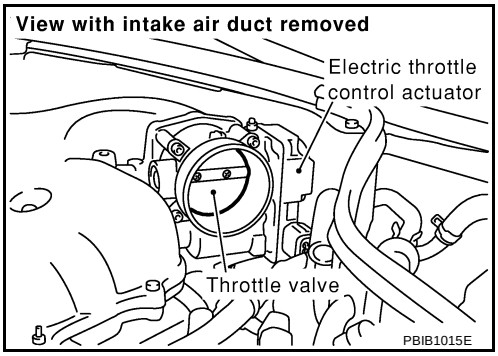
ABS00AXQ

### 1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.




### 2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-88, "Throttle Valve Closed Position Learning" .
3. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

## Removal and Installation

ABS00AXR

### ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-19, "INTAKE MANIFOLD COLLECTOR" .

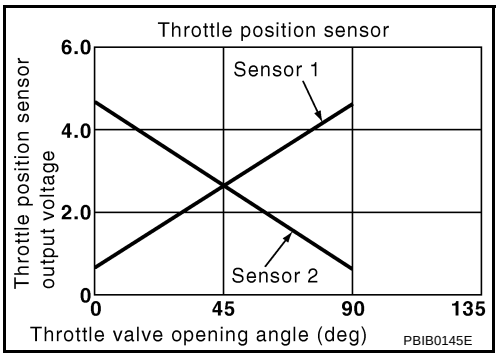
# DTC P1226 TP SENSOR

PFP:16119

## Component Description

ABS00AXS

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




## On Board Diagnosis Logic

ABS00AXT

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

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P1226<br>1226 | Closed throttle position learning performance problem | Closed throttle position learning is not performed successfully, repeatedly. | ● Electric throttle control actuator (TP sensor 1 and 2) |

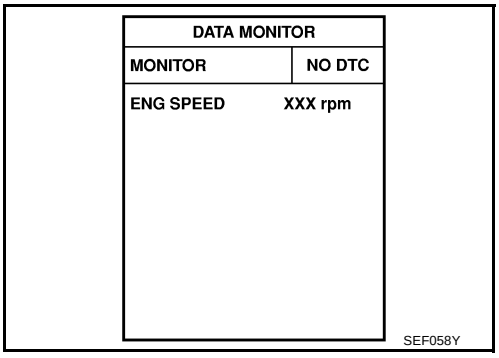
## DTC Confirmation Procedure

ABS00AXU

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
**TESTING CONDITION:**
**Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Repeat steps 3 and 4 for 32 times.
6. If 1st trip DTC is detected, go to EC-471, "Diagnostic Procedure" .




### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Diagnostic Procedure

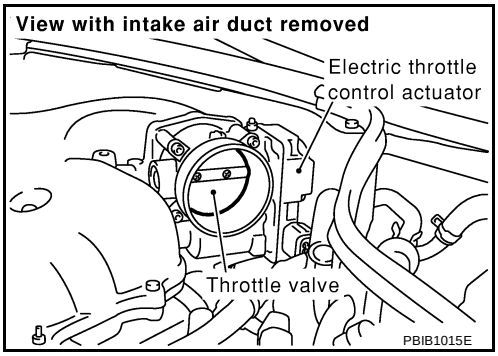
ABS00AXV

### 1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.




### 2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-88, "Throttle Valve Closed Position Learning" .
3. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

## Removal and Installation

ABS00AXW

### ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-19, "INTAKE MANIFOLD COLLECTOR" .

# DTC P1229 SENSOR POWER SUPPLY

PFP:16119

## On Board Diagnosis Logic

ABS00AXX

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

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P1229<br>1229 | Sensor power supply circuit short | ECM detects a voltage of power source for sensor is excessively low or high. | ● Harness or connectors<br>(The APP sensor 1 circuit is shorted.)<br>(The EVAP control system pressure sensor circuit is shorted.)<br>(The PSP sensor circuit is shorted.)<br>(The refrigerant pressure sensor circuit is shorted.)<br>● Accelerator pedal position sensor (APP sensor 1)<br>● EVAP control system pressure sensor<br>● Power steering pressure sensor<br>● Refrigerant pressure sensor |

### FAIL-SAFE MODE

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

| Engine operation condition in fail-safe mode |
|---|
| ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. |

## DTC Confirmation Procedure

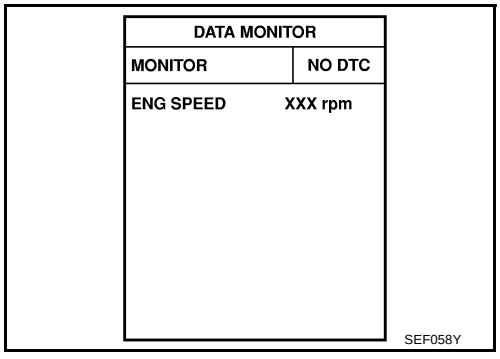
ABS00AXY

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

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

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-474, "Diagnostic Procedure" .



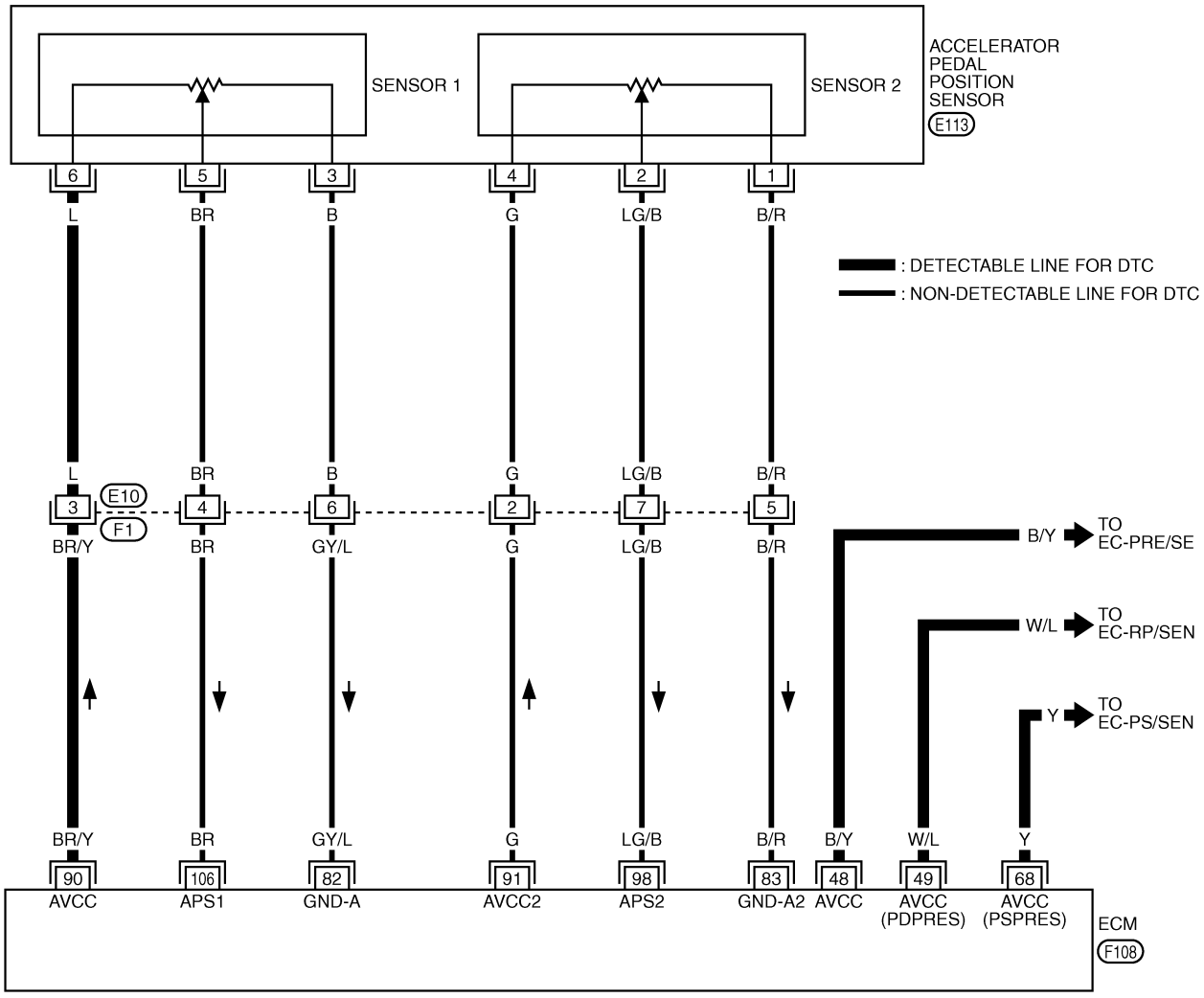

### WITH GST

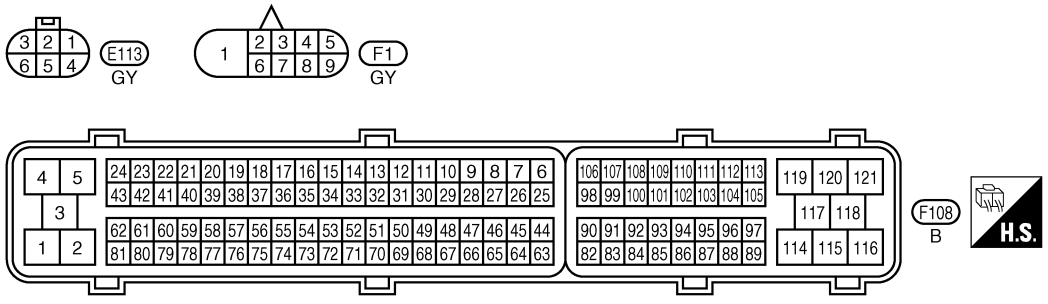
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

ABS00AXZ

EC-SEN/PW-01




TBWM0772E

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

**CAUTION:**

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

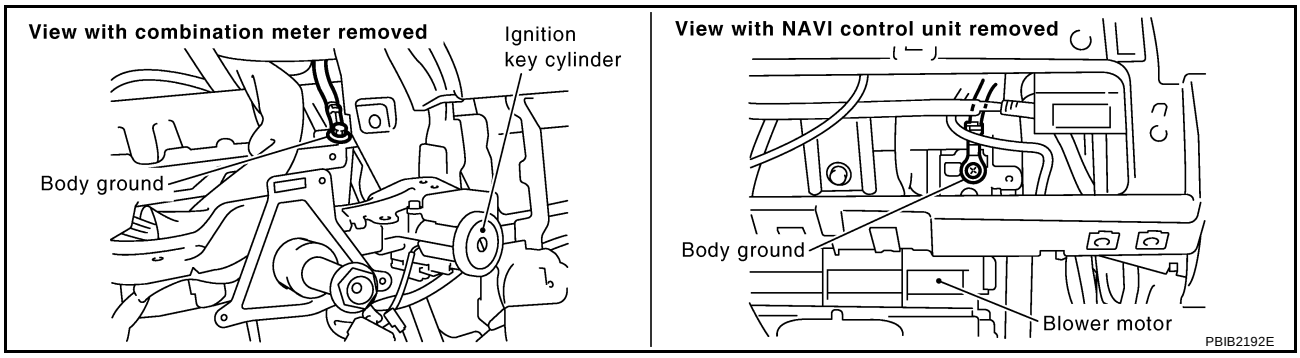
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 48 | B/Y | Sensor power supply (EVAP control system pressure sensor) | **[Ignition switch: ON]** | Approximately 5V |
| 49 | W/L | Sensor power supply (Refrigerant pressure sensor) | **[Ignition switch: ON]** | Approximately 5V |
| 68 | Y | Sensor power supply (Power steering pressure sensor) | **[Ignition switch: ON]** | Approximately 5V |
| 90 | BR/Y | Sensor power supply (Accelerator pedal position sensor 1) | **[Ignition switch: ON]** | Approximately 5V |

## Diagnostic Procedure

ABS00AY0

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .



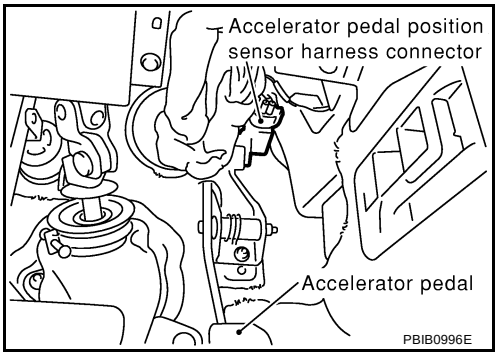

OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

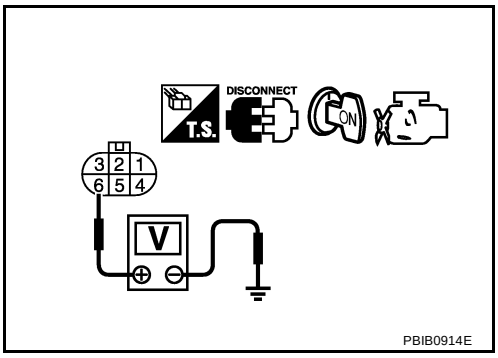
## 2. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

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




3. Check voltage between APP sensor terminal 6 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**




OK or NG

OK >> GO TO 5.
NG >> GO TO 3.

## 3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

| ECM terminal | Sensor terminal | Reference Wiring Diagram |
|---|---|---|
| 48 | EVAP control system pressure sensor terminal 3 | EC-346 |
| 49 | Refrigerant pressure sensor terminal 1 | EC-654 |
| 68 | PSP sensor terminal 1 | EC-388 |
| 90 | APP sensor terminal 6 | EC-473 |

OK or NG

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

## 4. CHECK COMPONENTS

Check the following.

- EVAP control system pressure sensor (Refer to EC-349, "Component Inspection" .)
- Refrigerant pressure sensor (Refer to ATC-92, "COMPONENT INSPECTION" .)
- Power steering pressure sensor (Refer to EC-391, "Component Inspection" .)

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning component.

## 5. CHECK APP SENSOR

Refer to EC-603, "Component Inspection" .

OK or NG

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

## 6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-88, "Accelerator Pedal Released Position Learning" .
3. Perform EC-88, "Throttle Valve Closed Position Learning" .
4. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

## 7. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

# DTC P1271, P1281 A/F SENSOR 1

PFP:22693

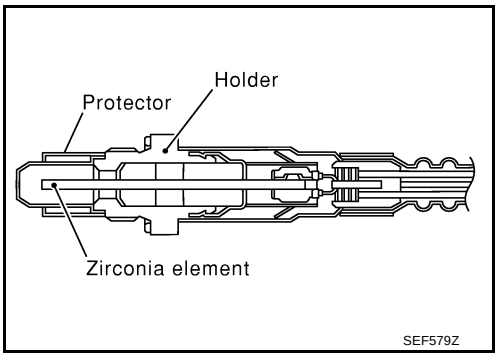
## Component Description

ABS00AY1

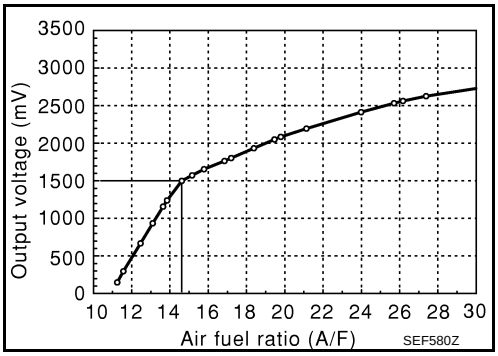
The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide $\lambda$ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.




An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AY2

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| A/F SEN1 (B1)<br>A/F SEN1 (B2) | ● Engine: After warming up | Maintaining engine speed at 2,000 rpm | Fluctuates around 1.5V |

## On Board Diagnosis Logic

ABS00AY3

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately low.

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible Cause |
|---|---|---|---|
| P1271<br>1271<br>(Bank 1) | Air fuel ratio (A/F) sensor 1 circuit no activity detected | ● The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0V. | ● Harness or connectors (The A/F sensor 1 circuit is open or shorted.)<br>● Air fuel ratio (A/F) sensor 1 |
| P1281<br>1281<br>(Bank 2) | | | |

## DTC Confirmation Procedure

ABS00AY4

**CAUTION:**

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

**NOTE:**

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

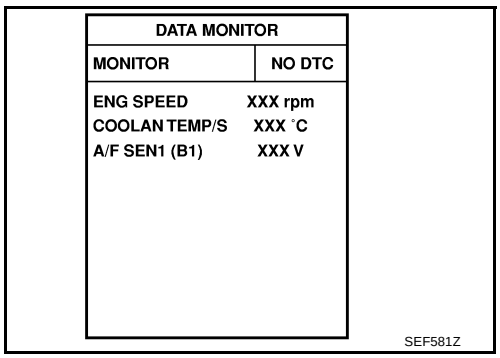
**TESTING CONDITION:**

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

### WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-II.

3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.
   If the indication is constantly approx. 0V, go to EC-482, "Diagnostic Procedure" .
   If the indication is not constantly approx. 0V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.




| | |
|---|---|
| ENG SPEED | 1,000 - 3,200 rpm |
| VHCL SPEED SE | More than 40 km/h (25 MPH) |
| B/FUEL SCHDL | 1.5 - 9.0 msec |
| Shift lever | Suitable position |

**NOTE:**
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.**

7. If 1st trip DTC is displayed, go to EC-482, "Diagnostic Procedure" .

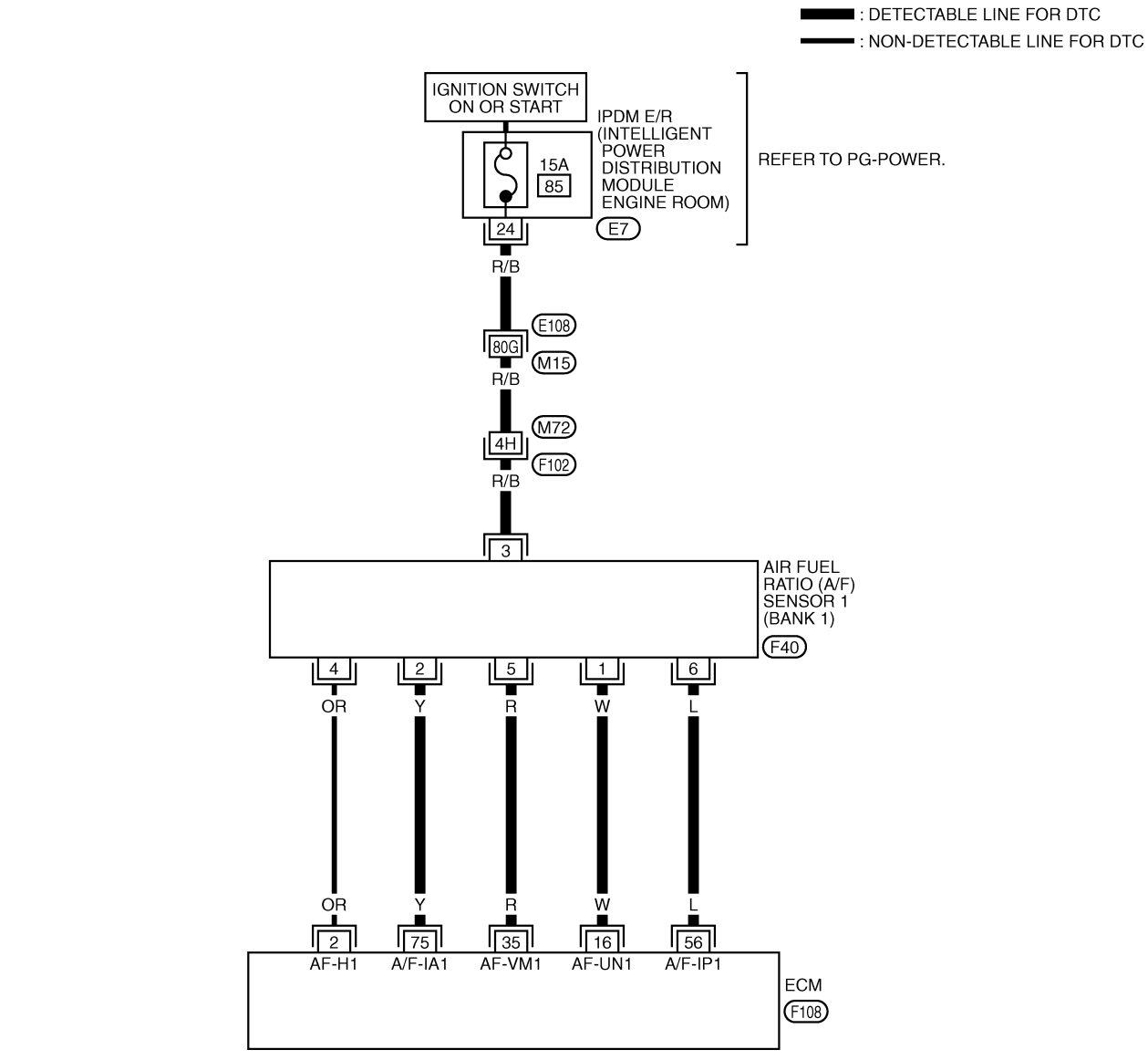
### WITH GST

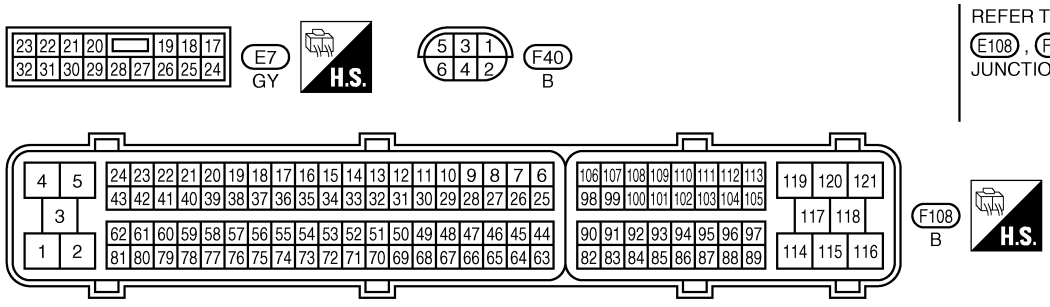
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram
### BANK 1

ABS00AY5

EC-AF1B1-01




TBWM0773E

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

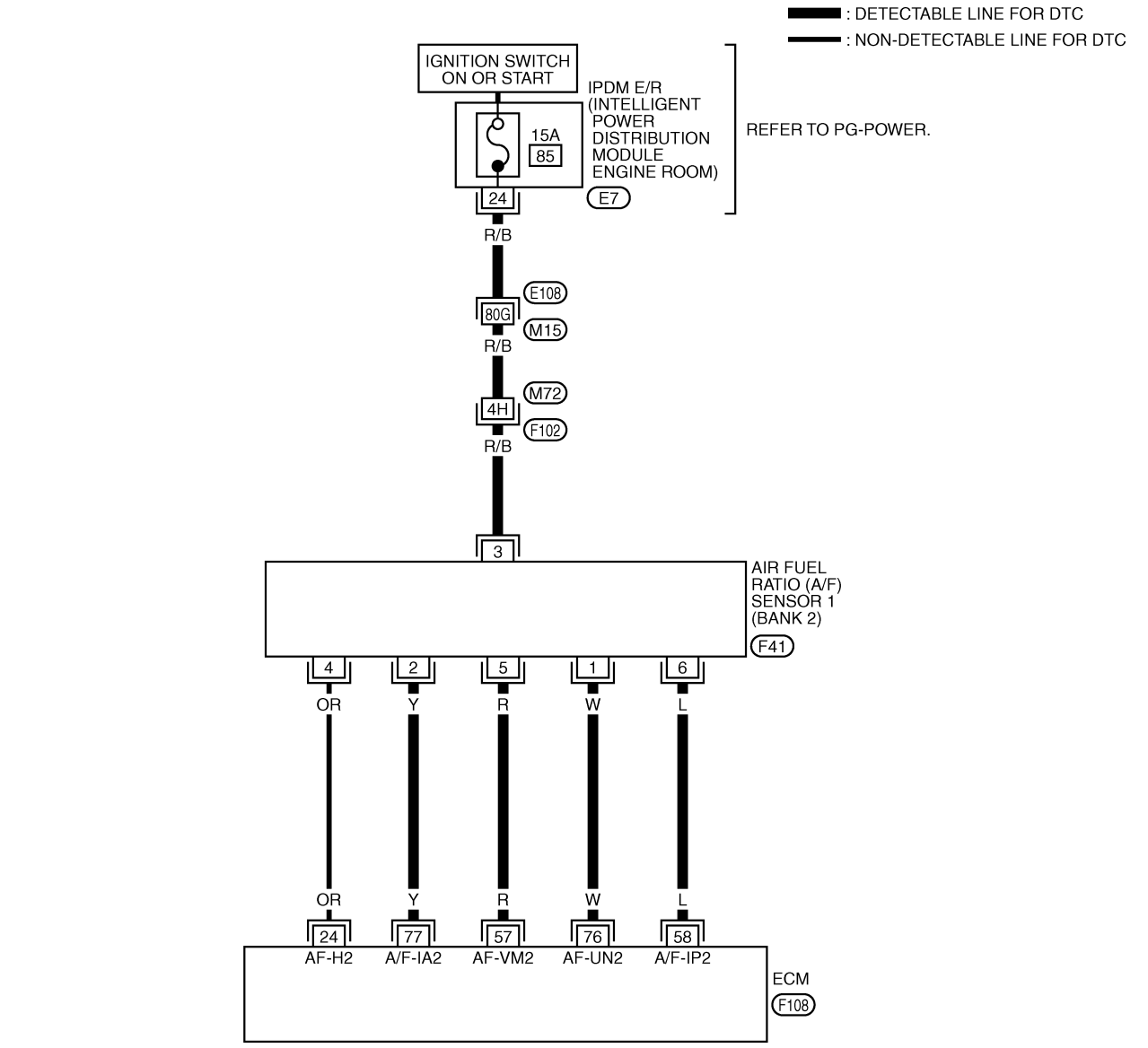
**CAUTION:**

**Do not use ECM ground terminals when measuring input/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) |
|---|---|---|---|---|
| 16 | W | A/F sensor 1 (Bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 3.1V |
| 35 | R | | | Approximately 2.6V |
| 56 | L | | | Approximately 2.3V |
| 75 | Y | | | Approximately 2.3V |

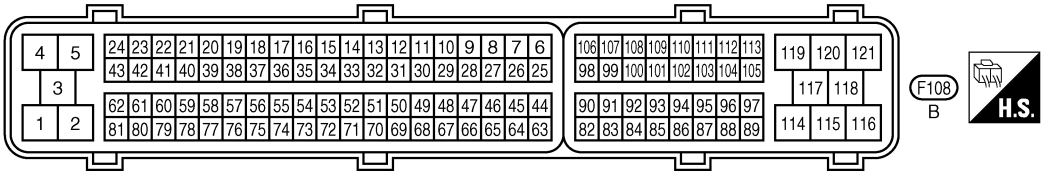
## BANK 2

EC-AF1B2-01





REFER TO THE FOLLOWING.
E108 , F102 -SUPER MULTIPLE JUNCTION (SMJ)




TBWM0774E

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

**CAUTION:**

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

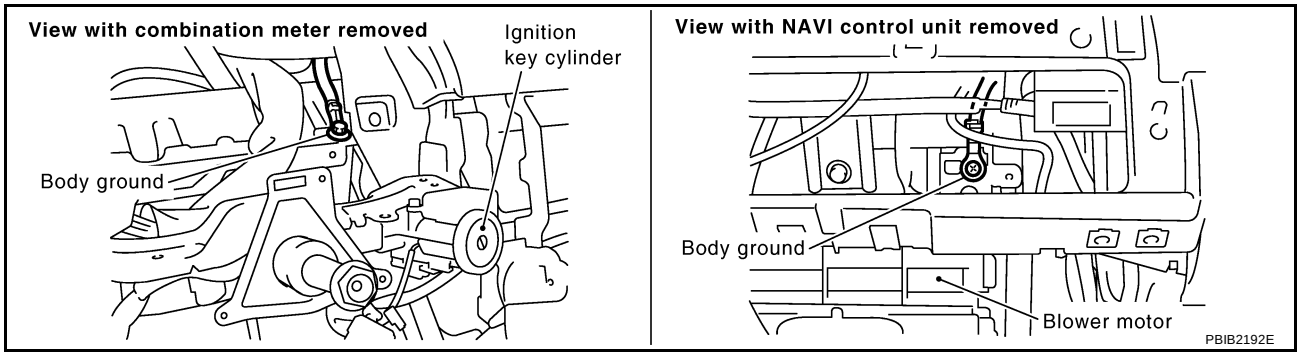
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 57 | R | A/F sensor 1 (Bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 2.6V |
| 58 | L | | | Approximately 2.3V |
| 76 | W | | | Approximately 3.1V |
| 77 | Y | | | Approximately 2.3V |

## Diagnostic Procedure

ABS00AY6

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

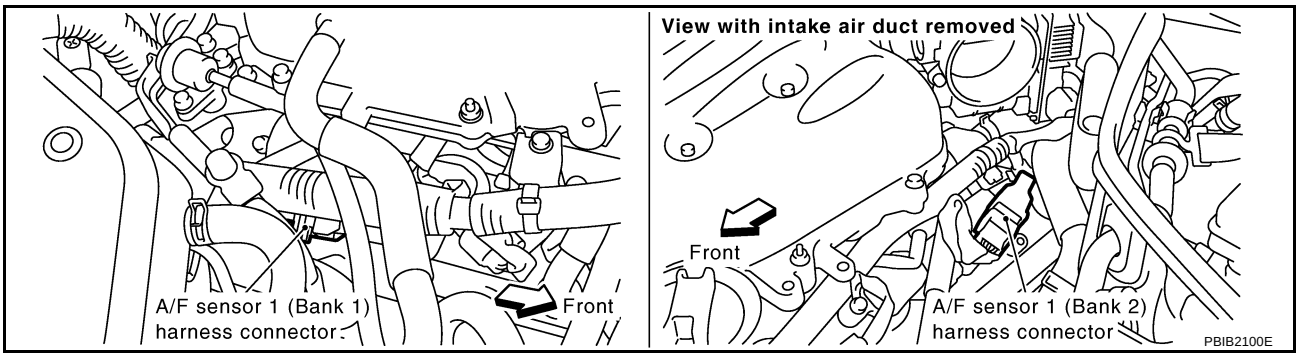



OK or NG

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

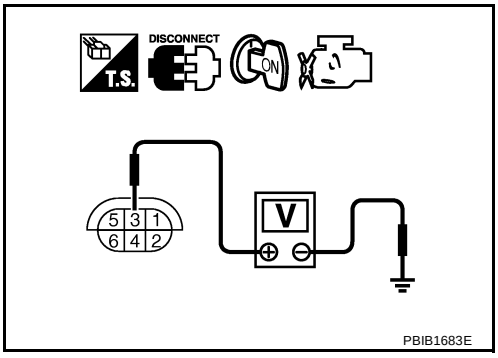
## 2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.




2. Turn ignition switch ON.
3. Check voltage between A/F sensor 1 terminal 3 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 M72, F102
- Harness connectors E108, M15
- IPDM E/R harness connector E7
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

## 4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.

| | A/F sensor 1 terminal | ECM terminal |
|---|---|---|
| Bank 1 | 1 | 16 |
| | 2 | 75 |
| | 5 | 35 |
| | 6 | 56 |
| Bank 2 | 1 | 76 |
| | 2 | 77 |
| | 5 | 57 |
| | 6 | 58 |

**Continuity should exist.**

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

| Bank 1 | | Bank 2 | |
|---|---|---|---|
| A/F sensor 1 terminal | ECM terminal | A/F sensor 1 terminal | ECM terminal |
| 1 | 16 | 1 | 76 |
| 2 | 75 | 2 | 77 |
| 5 | 35 | 5 | 57 |
| 6 | 56 | 6 | 58 |

**Continuity should not exist.**

5. Also check harness for short to 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 INTERMITTENT INCIDENT

Perform EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

# Removal and Installation

ABS00AY7

### AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-26, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

# DTC P1272, P1282 A/F SENSOR 1

PFP:22693

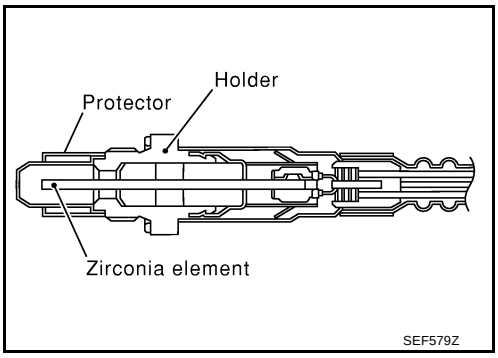
## Component Description

ABS00AY8

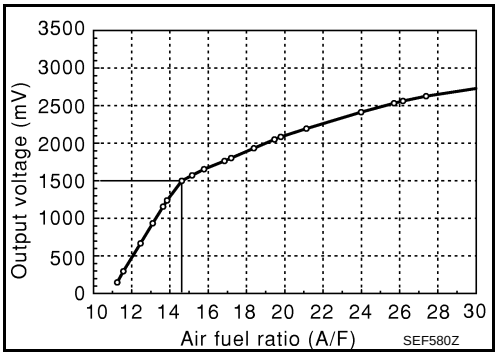
The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide $\lambda$ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.




An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AY9

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| A/F SEN1 (B1)<br>A/F SEN1 (B2) | ● Engine: After warming up | Maintaining engine speed at 2,000 rpm | Fluctuates around 1.5V |

## On Board Diagnosis Logic

ABS00AYA

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately high.

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible Cause |
|---|---|---|---|
| P1272<br>1272<br>(Bank 1) | Air fuel ratio (A/F) sensor 1 circuit no activity detected | ● The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5V. | ● Harness or connectors (The A/F sensor 1 circuit is open or shorted.)<br>● Air fuel ratio (A/F) sensor 1 |
| P1282<br>1282<br>(Bank 2) | | | |

## DTC Confirmation Procedure

ABS00AYB

**CAUTION:**

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

**NOTE:**

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

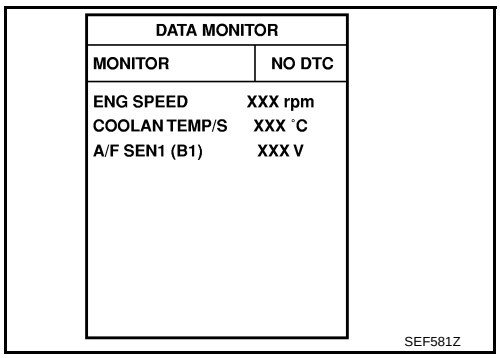
**TESTING CONDITION:**

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

### WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-II.

3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.
   If the indication is constantly approx. 5V, go to EC-490, "Diagnostic Procedure" .
   If the indication is not constantly approx. 5V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.




| | |
|---|---|
| ENG SPEED | 1,000 - 3,200 rpm |
| VHCL SPEED SE | More than 40 km/h (25 MPH) |
| B/FUEL SCHDL | 1.5 - 9.0 msec |
| Shift lever | Suitable position |

**NOTE:**
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.**

7. If 1st trip DTC is displayed, go to EC-490, "Diagnostic Procedure" .

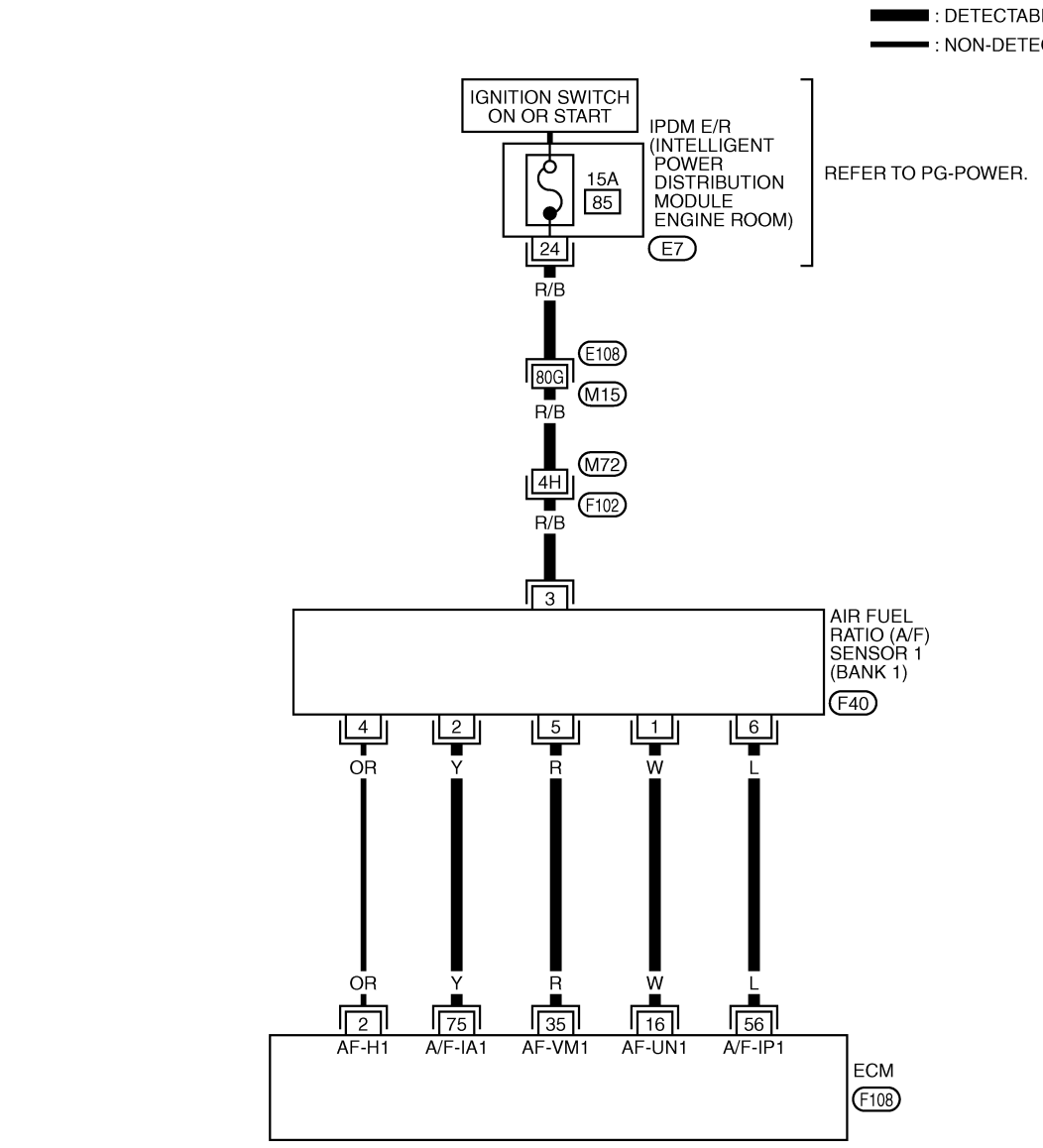
### WITH GST

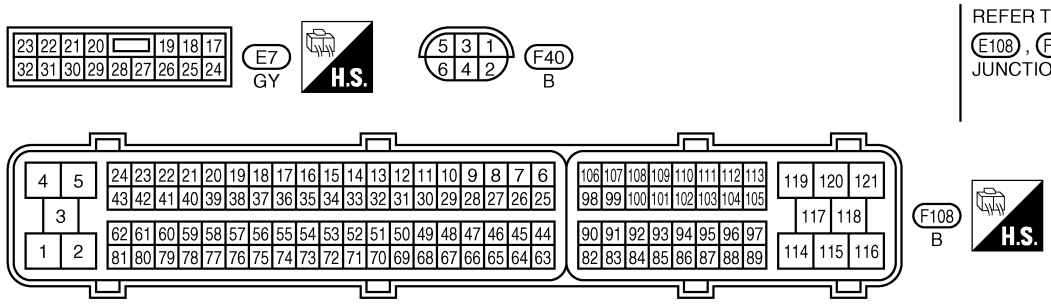
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram
### BANK 1

ABS00AYC

EC-AF1B1-01




TBWM0773E

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

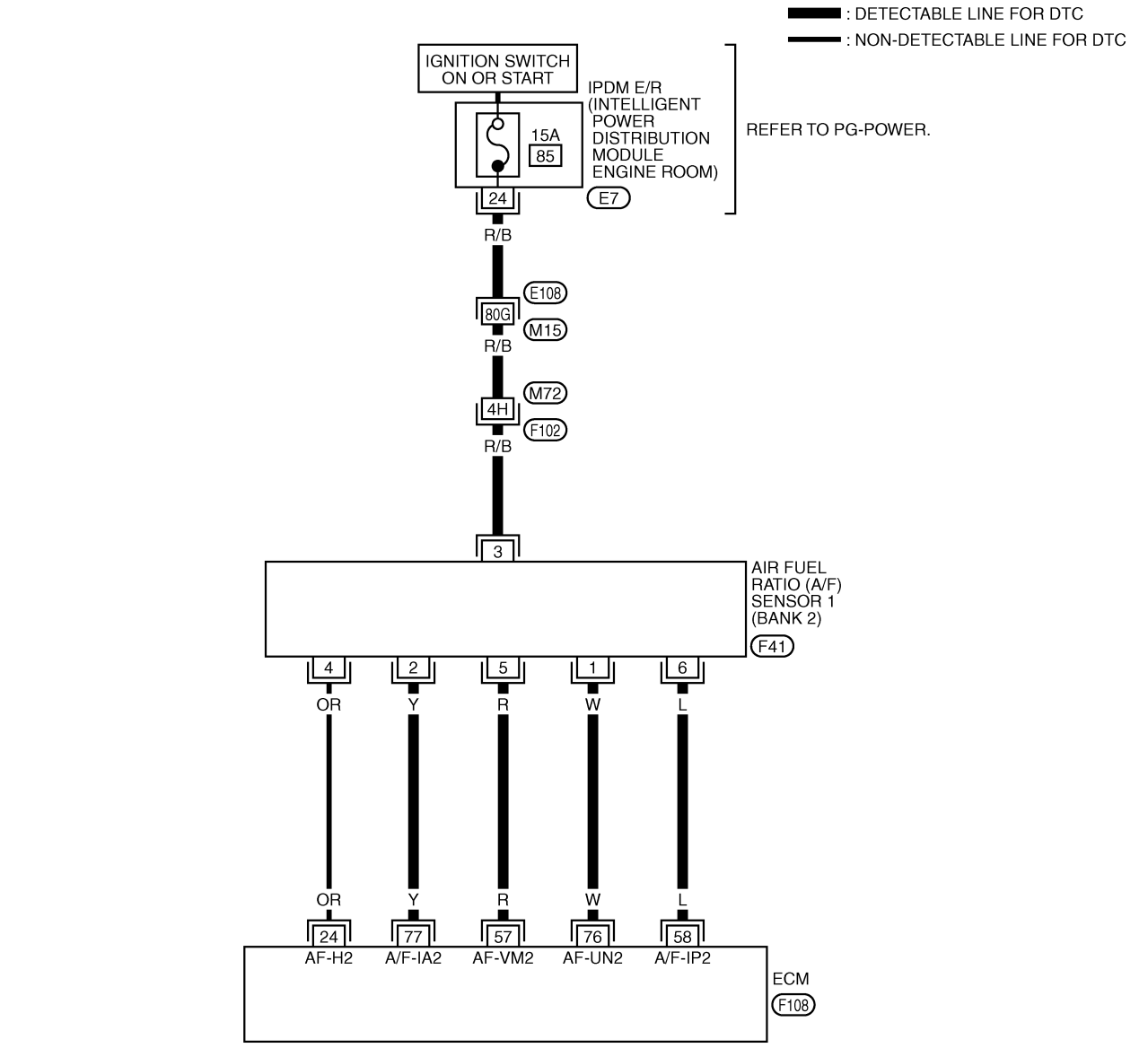
**CAUTION:**

**Do not use ECM ground terminals when measuring input/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) |
|---|---|---|---|---|
| 16 | W | A/F sensor 1 (Bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 3.1V |
| 35 | R | | | Approximately 2.6V |
| 56 | L | | | Approximately 2.3V |
| 75 | Y | | | Approximately 2.3V |

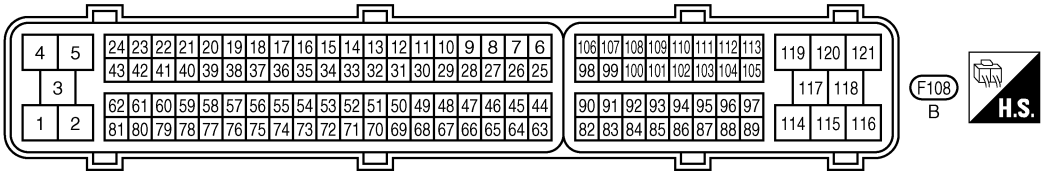
## BANK 2

EC-AF1B2-01





REFER TO THE FOLLOWING.
E108 , F102 -SUPER MULTIPLE JUNCTION (SMJ)




TBWM0774E

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

**CAUTION:**

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

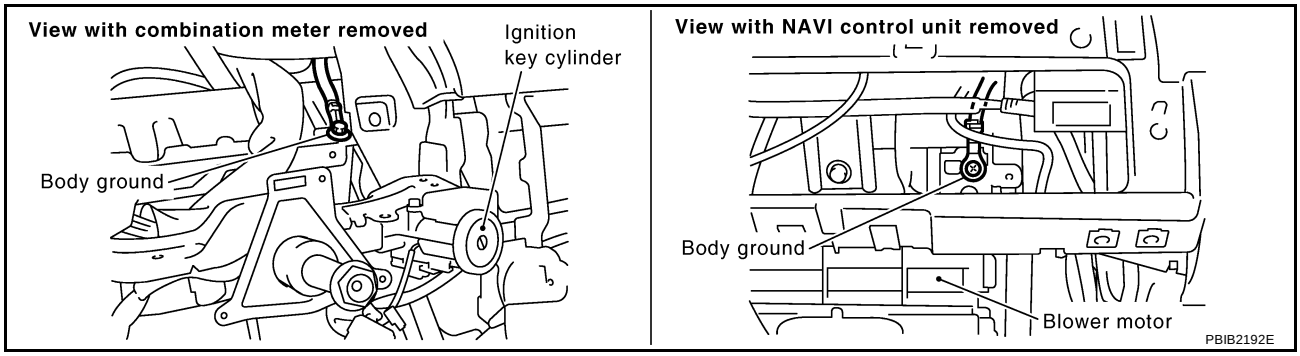
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 57 | R | A/F sensor 1 (Bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 2.6V |
| 58 | L | | | Approximately 2.3V |
| 76 | W | | | Approximately 3.1V |
| 77 | Y | | | Approximately 2.3V |

## Diagnostic Procedure

ABS00AYD

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

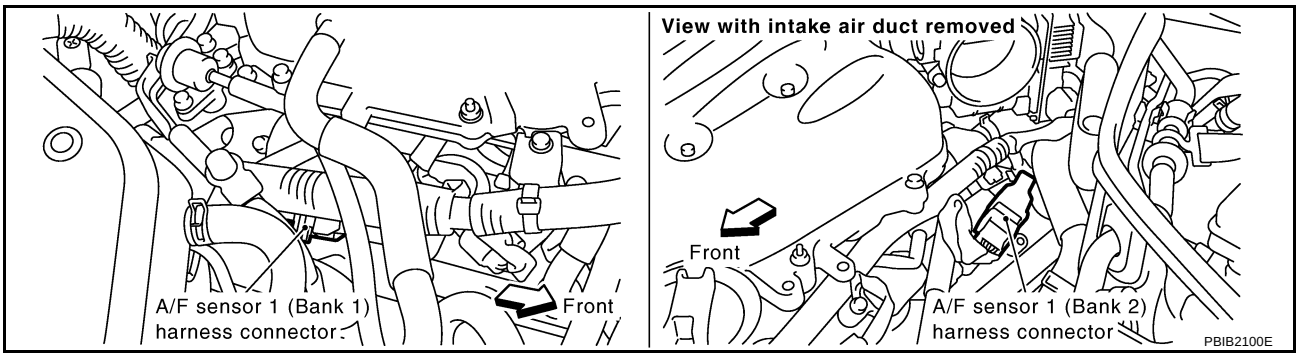



OK or NG

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

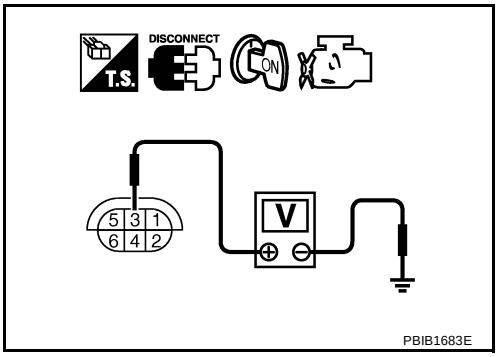
## 2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.




2. Turn ignition switch ON.
3. Check voltage between A/F sensor 1 terminal 3 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 M72, F102
- Harness connectors E108, M15
- IPDM E/R harness connector E7
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

## 4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.

| | A/F sensor 1 terminal | ECM terminal |
|---|---|---|
| Bank 1 | 1 | 16 |
| | 2 | 75 |
| | 5 | 35 |
| | 6 | 56 |
| Bank 2 | 1 | 76 |
| | 2 | 77 |
| | 5 | 57 |
| | 6 | 58 |

**Continuity should exist.**

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

| Bank 1 | | Bank 2 | |
|---|---|---|---|
| A/F sensor 1 terminal | ECM terminal | A/F sensor 1 terminal | ECM terminal |
| 1 | 16 | 1 | 76 |
| 2 | 75 | 2 | 77 |
| 5 | 35 | 5 | 57 |
| 6 | 56 | 6 | 58 |

**Continuity should not exist.**

5. Also check harness for short to 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 INTERMITTENT INCIDENT

Perform EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

# Removal and Installation

ABS00AYE

## AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-26, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

# DTC P1273, P1283 A/F SENSOR 1

PFP:22693

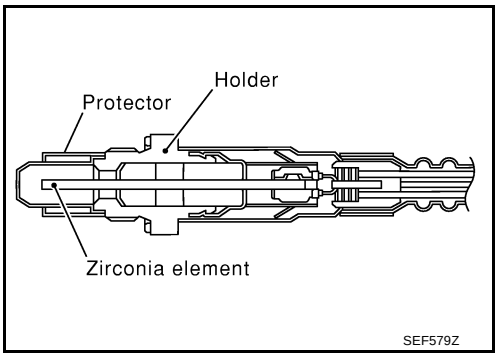
## Component Description

ABS00AYF

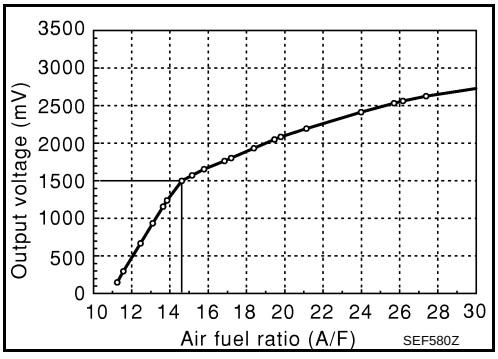
The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide $\lambda$ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.




An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AYG

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| A/F SEN1 (B1)<br>A/F SEN1 (B2) | ● Engine: After warming up | Maintaining engine speed at 2,000 rpm | Fluctuates around 1.5V |

## On Board Diagnosis Logic

ABS00AYH

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible Cause |
|---|---|---|---|
| P1273<br>1273<br>(Bank 1) | Air fuel ratio (A/F) sensor 1 lean shift monitoring | ● The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period. | ● Air fuel ratio (A/F) sensor 1<br>● Air fuel ratio (A/F) sensor 1 heater<br>● Fuel pressure<br>● Fuel injector<br>● Intake air leaks |
| P1283<br>1283<br>(Bank 2) | | | |

## DTC Confirmation Procedure

ABS00AYI

**NOTE:**

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

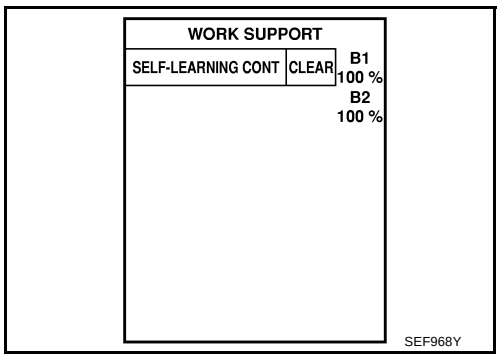
**TESTING CONDITION:**

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

### WITH CONSULT-II

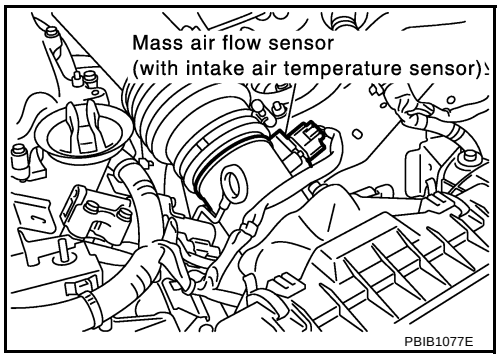
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.

4. Clear the self-learning coefficient by touching “CLEAR”.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
7. Let engine idle for 1 minute.
8. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
9. If 1st trip DTC is detected, go to EC-498, "Diagnostic Procedure" .




## WITH GST

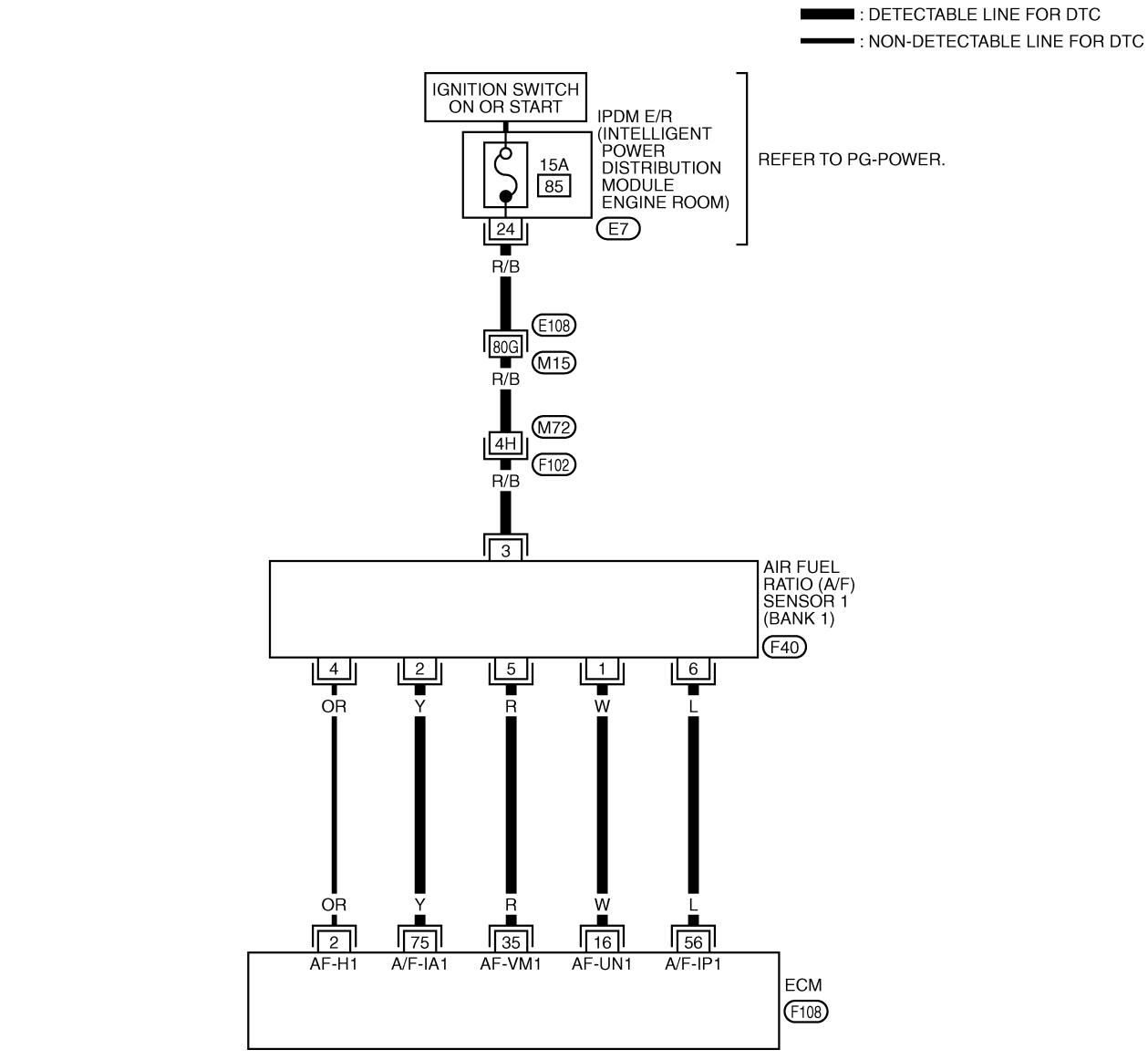
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Start engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service $03 with GST and make sure that DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
9. Let engine idle for 1 minute.
10. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
11. Select Service $07 with GST.
    If 1st trip DTC is detected, go to EC-498, "Diagnostic Procedure" .

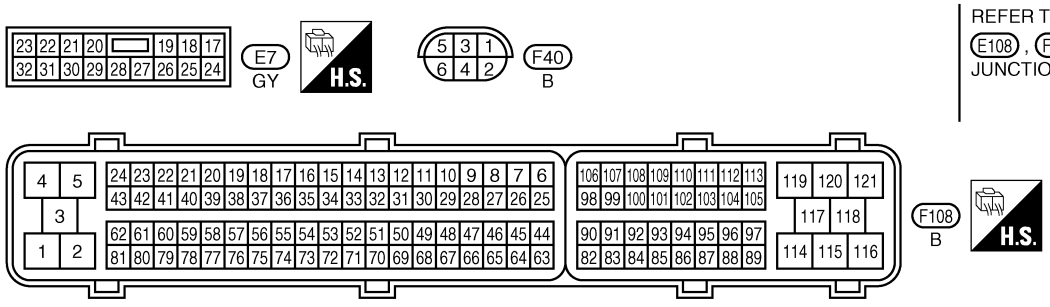


## Wiring Diagram
### BANK 1

ABS00AYJ

EC-AF1B1-01




TBWM0773E

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

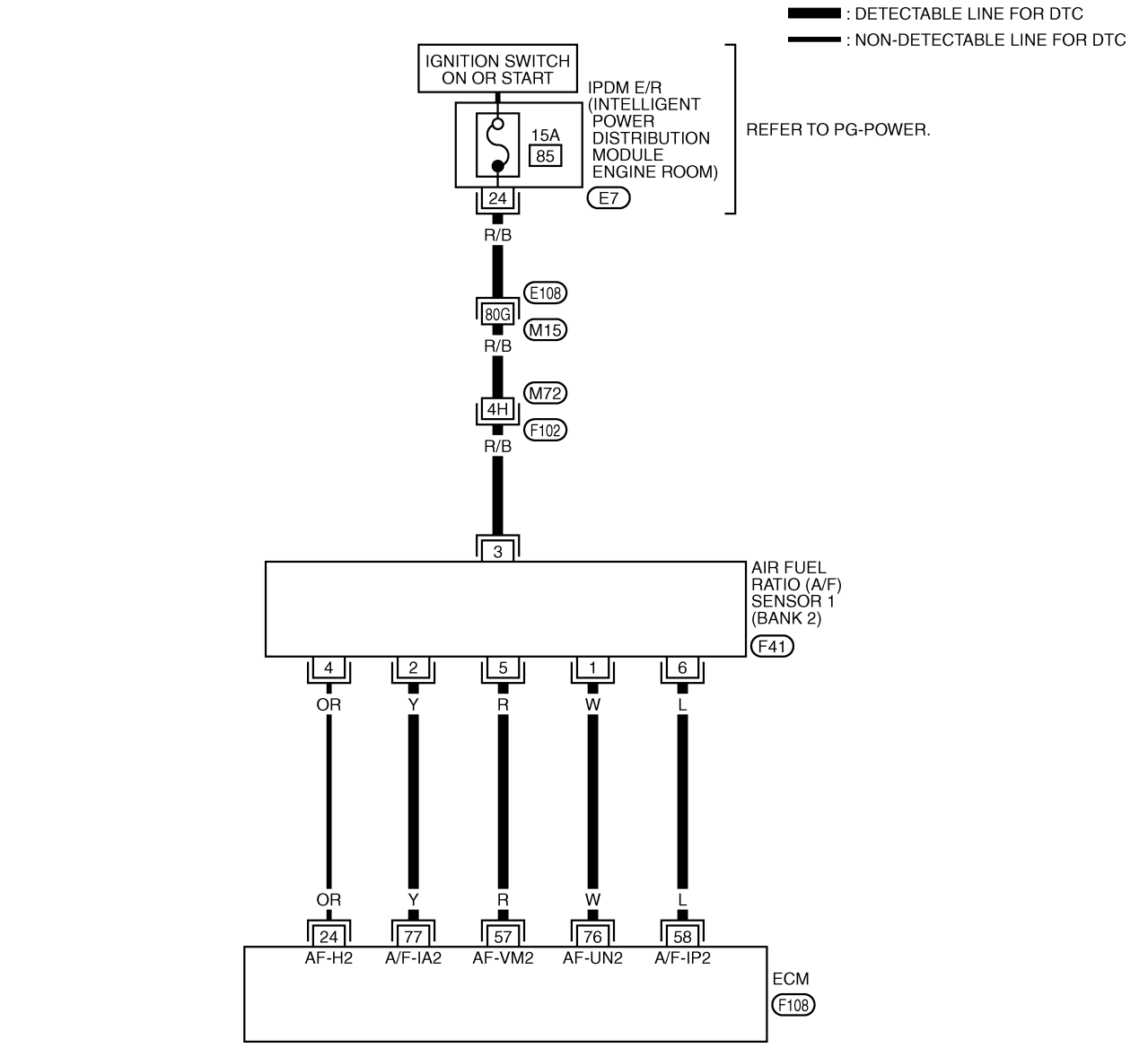
**CAUTION:**

**Do not use ECM ground terminals when measuring input/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) |
|---|---|---|---|---|
| 16 | W | A/F sensor 1 (Bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 3.1V |
| 35 | R | | | Approximately 2.6V |
| 56 | L | | | Approximately 2.3V |
| 75 | Y | | | Approximately 2.3V |

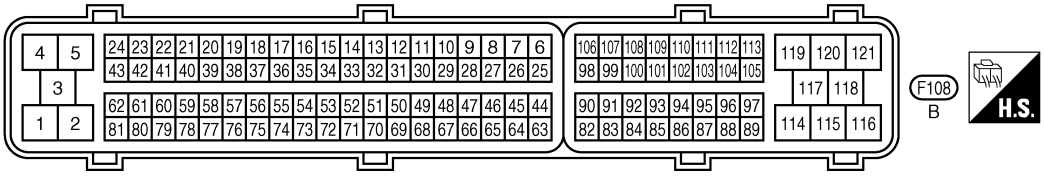
## BANK 2

EC-AF1B2-01





REFER TO THE FOLLOWING.
E108 , F102 -SUPER MULTIPLE JUNCTION (SMJ)




TBWM0774E

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

**CAUTION:**

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

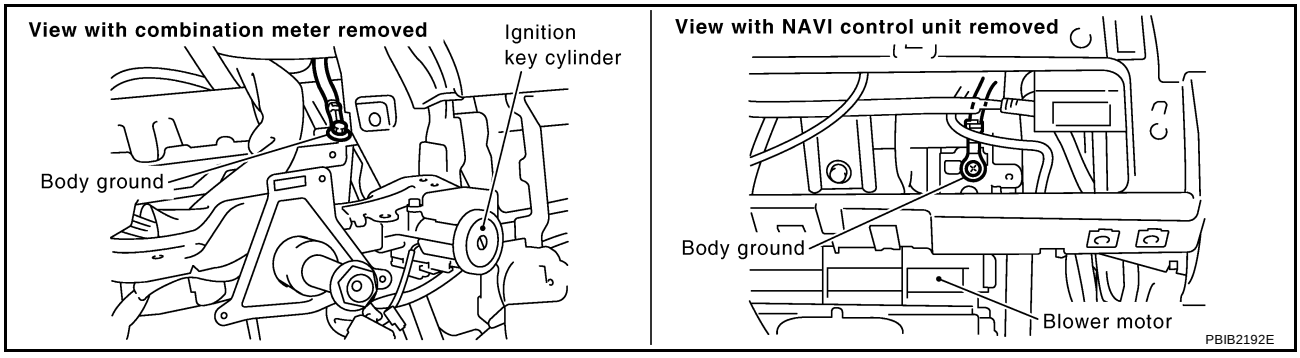
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 57 | R | A/F sensor 1 (Bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 2.6V |
| 58 | L | | | Approximately 2.3V |
| 76 | W | | | Approximately 3.1V |
| 77 | Y | | | Approximately 2.3V |

## Diagnostic Procedure

ABS00AYK

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

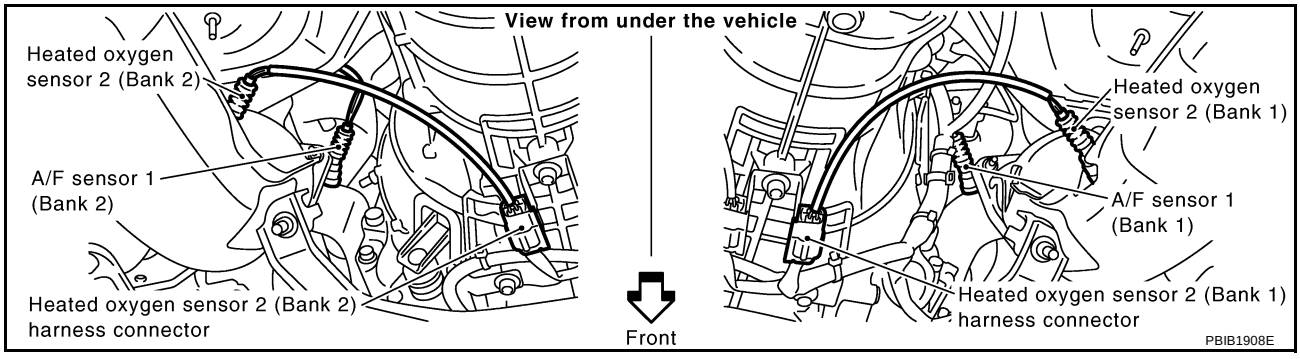



OK or NG

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

### 2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.



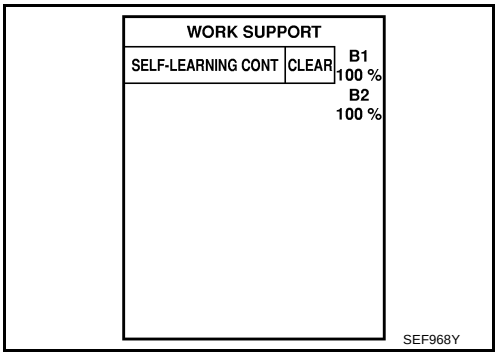

**Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)**

>> GO TO 3.

## 3. CLEAR THE SELF-LEARNING DATA

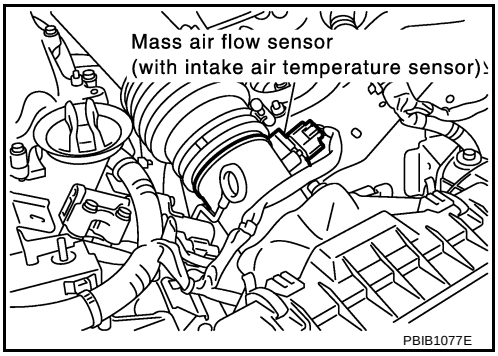
**With CONSULT-II**

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.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to EC-60, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.
   **Is the 1st trip DTC P0171 or P0174 detected?**
   **Is it difficult to start engine?**



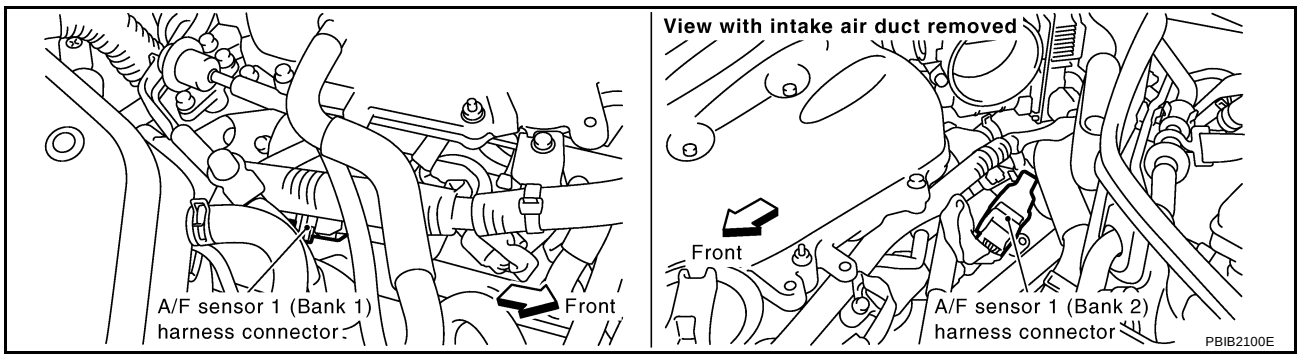

Yes or No

Yes >> Perform trouble diagnosis for DTC P0171 or P0174. Refer to EC-242, "DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 4.

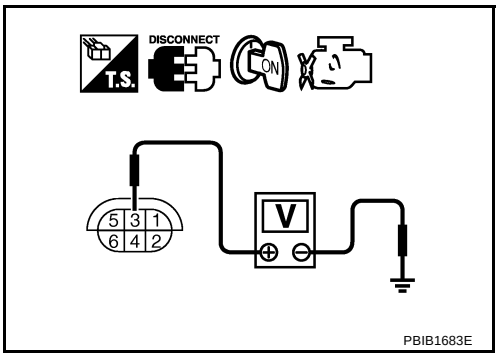
## 4. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.




3. Turn ignition switch ON.
4. Check voltage between A/F sensor 1 terminal 3 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 M72, F102
- Harness connectors E108, M15
- IPDM E/R harness connector E7
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

## 6. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.

| | A/F sensor 1 terminal | ECM terminal |
|---|---|---|
| Bank 1 | 1 | 16 |
| | 2 | 75 |
| | 5 | 35 |
| | 6 | 56 |
| Bank 2 | 1 | 76 |
| | 2 | 77 |
| | 5 | 57 |
| | 6 | 58 |

**Continuity should exist.**

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

| Bank 1 | | Bank 2 | |
|---|---|---|---|
| A/F sensor 1 terminal | ECM terminal | A/F sensor 1 terminal | ECM terminal |
| 1 | 16 | 1 | 76 |
| 2 | 75 | 2 | 77 |
| 5 | 35 | 5 | 57 |
| 6 | 56 | 6 | 58 |

**Continuity should not exist.**

5. Also check harness for short to 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 A/F SENSOR 1 HEATER

Refer to EC-401, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace A/F sensor 1.

## 8. CHECK INTERMITTENT INCIDENT

Perform EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

# Removal and Installation

ABS00AYL

## AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-26, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

# DTC P1274, P1284 A/F SENSOR 1

PFP:22693

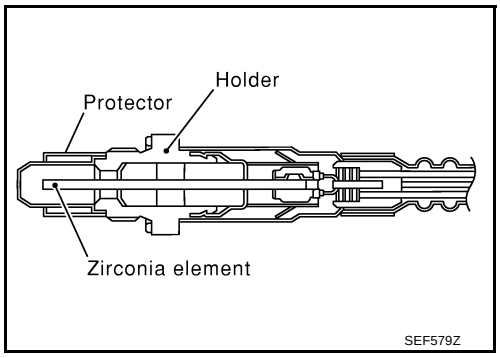
## Component Description

ABS00AYM

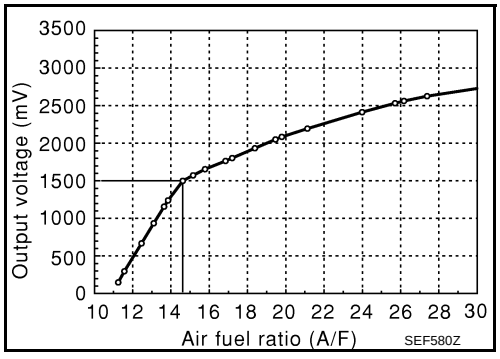
The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide $\lambda$ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.




An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AYN

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| A/F SEN1 (B1)<br>A/F SEN1 (B2) | ● Engine: After warming up | Maintaining engine speed at 2,000 rpm | Fluctuates around 1.5V |

## On Board Diagnosis Logic

ABS00AYO

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible Cause |
|---|---|---|---|
| P1274<br>1274<br>(Bank 1)<br>P1284<br>1284<br>(Bank 2) | Air fuel ratio (A/F) sensor 1 rich shift monitoring | ● The A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period. | ● Air fuel ratio (A/F) sensor 1<br>● Air fuel ratio (A/F) sensor 1 heater<br>● Fuel pressure<br>● Fuel injector |

## DTC Confirmation Procedure

ABS00AYP

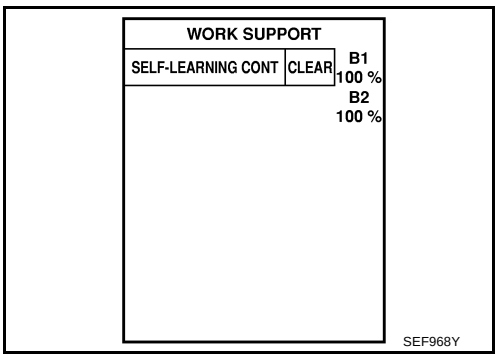
**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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

### WITH CONSULT-II

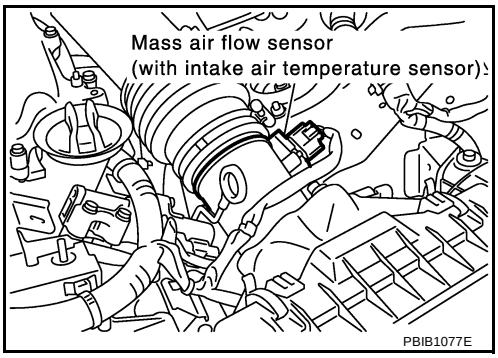
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.

4. Clear the self-learning coefficient by touching “CLEAR”.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
7. Let engine idle for 1 minute.
8. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
9. If 1st trip DTC is detected, go to EC-507, "Diagnostic Procedure" .




## WITH GST

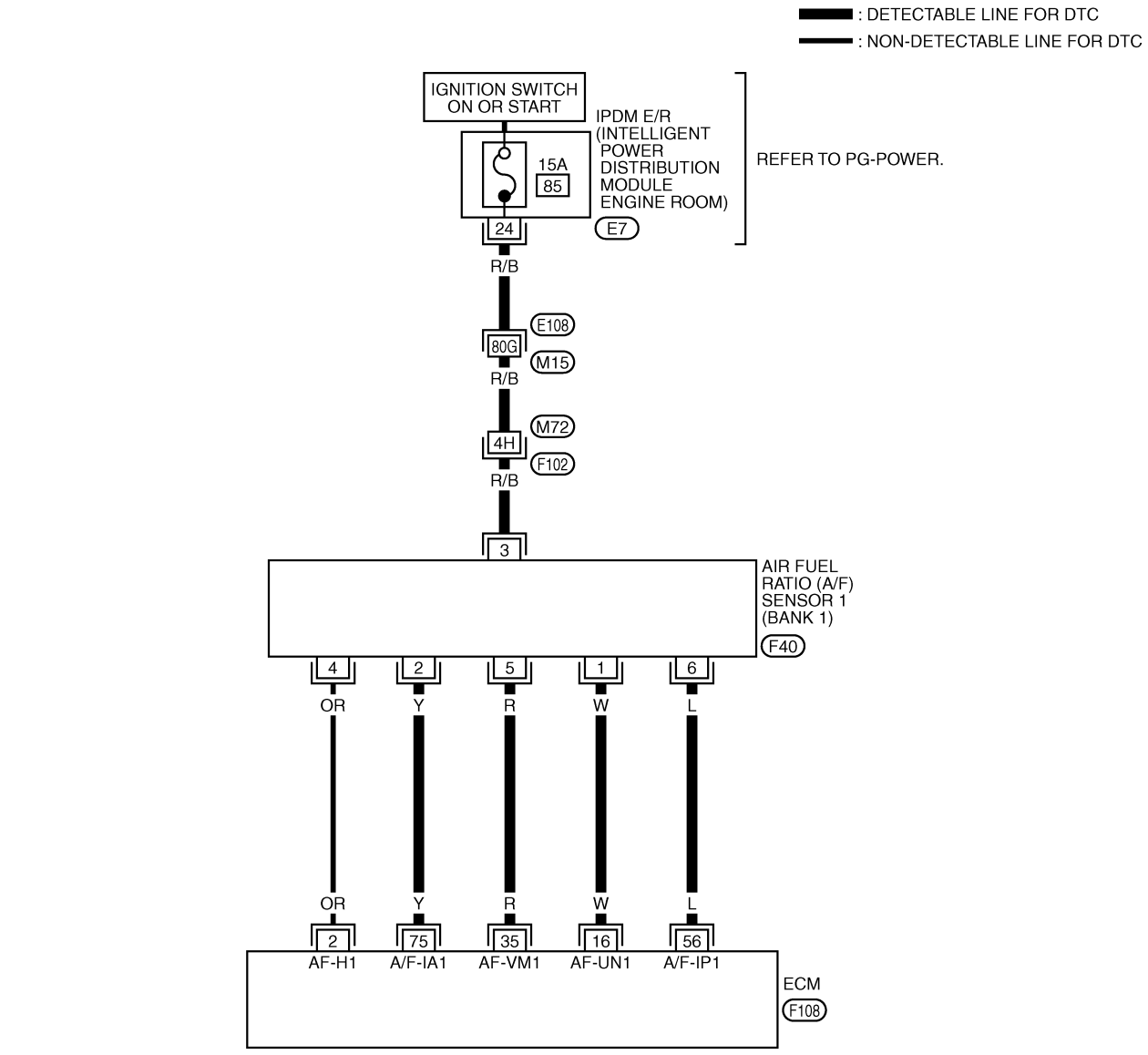
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Start engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service $03 with GST and make sure that DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
9. Let engine idle for 1 minute.
10. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
11. Select Service $07 with GST.
    If 1st trip DTC is detected, go to EC-507, "Diagnostic Procedure" .

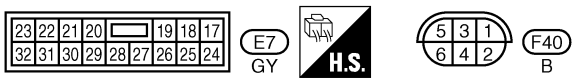


## Wiring Diagram
### BANK 1

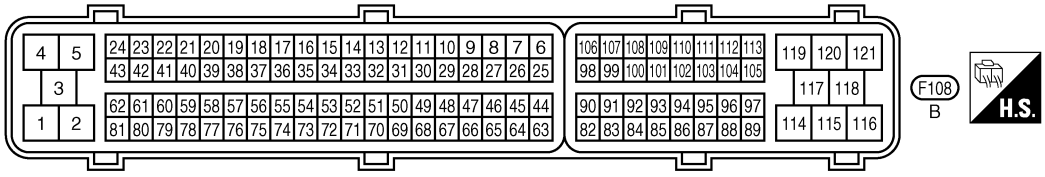
ABS00AYQ

EC-AF1B1-01




REFER TO THE FOLLOWING.
E108 , F102 -SUPER MULTIPLE JUNCTION (SMJ)




TBWM0773E

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

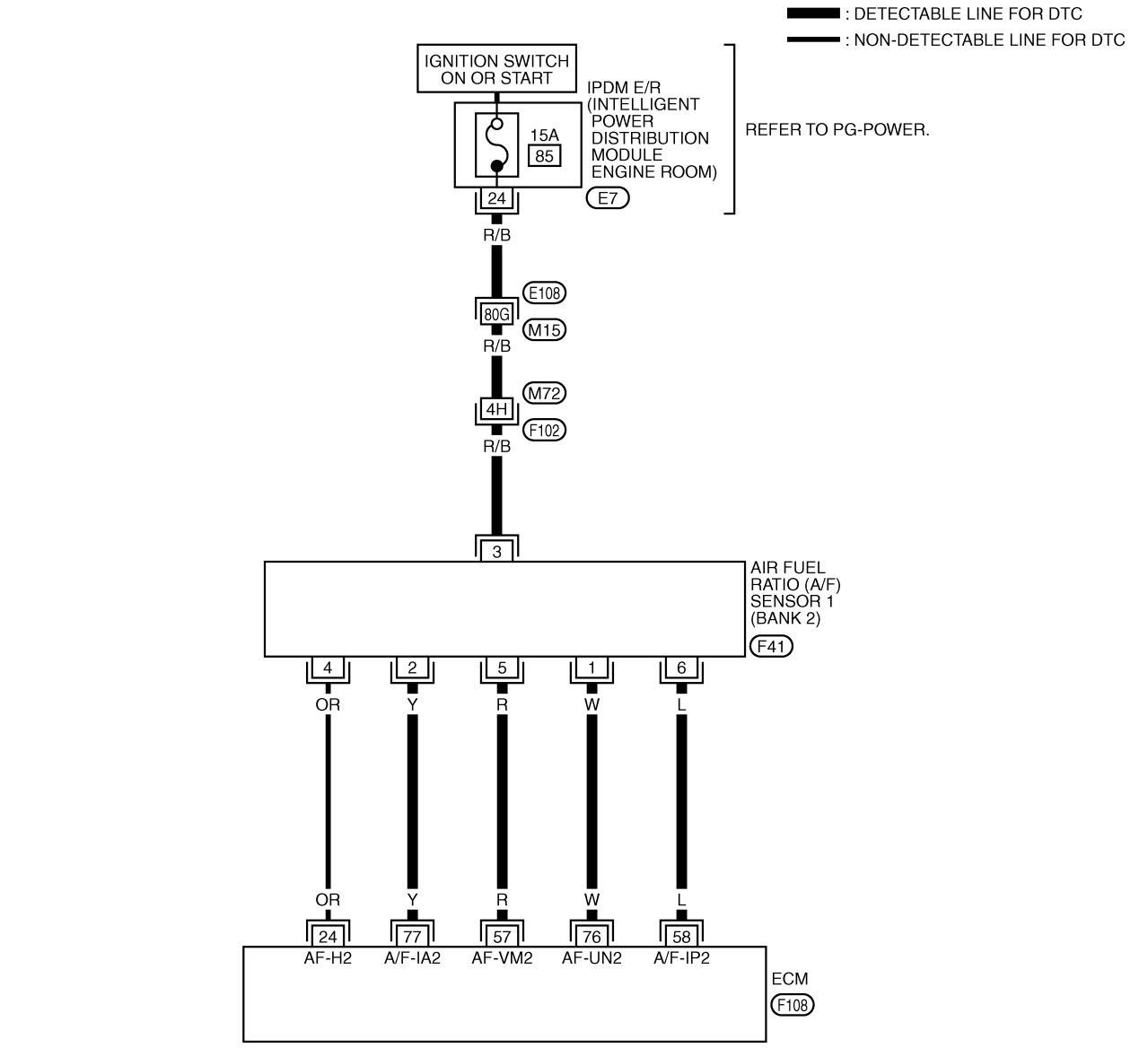
**CAUTION:**

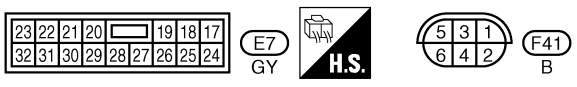
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 16 | W | A/F sensor 1 (Bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 3.1V |
| 35 | R | | | Approximately 2.6V |
| 56 | L | | | Approximately 2.3V |
| 75 | Y | | | Approximately 2.3V |

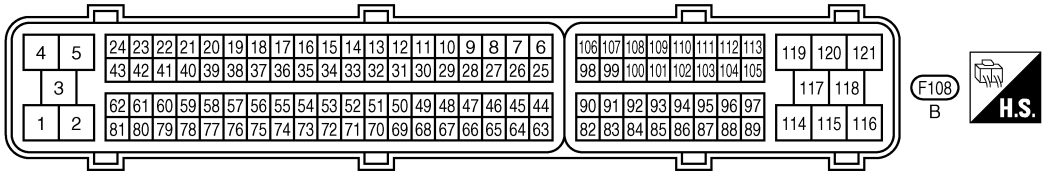
## BANK 2

EC-AF1B2-01




REFER TO THE FOLLOWING.
E108 , F102 -SUPER MULTIPLE JUNCTION (SMJ)




TBWM0774E

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

**CAUTION:**

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

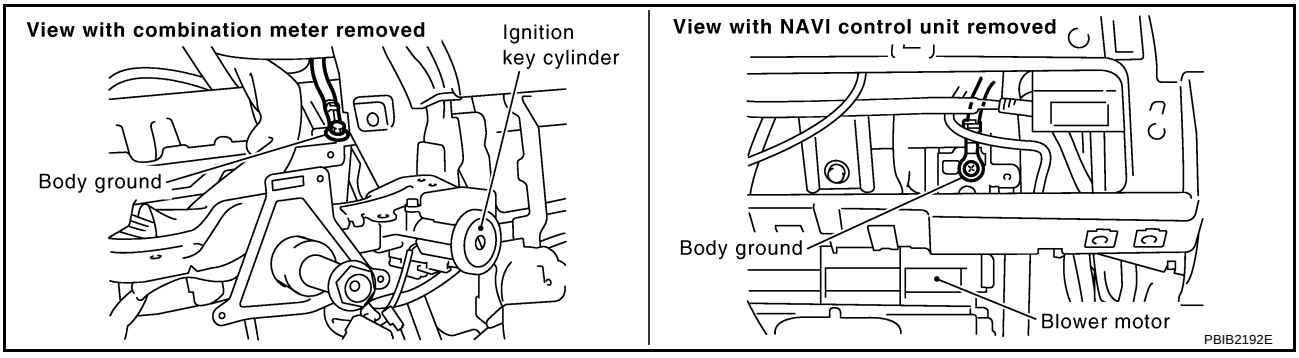
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 57 | R | A/F sensor 1 (Bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 2.6V |
| 58 | L | | | Approximately 2.3V |
| 76 | W | | | Approximately 3.1V |
| 77 | Y | | | Approximately 2.3V |

## Diagnostic Procedure

ABS00AYR

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

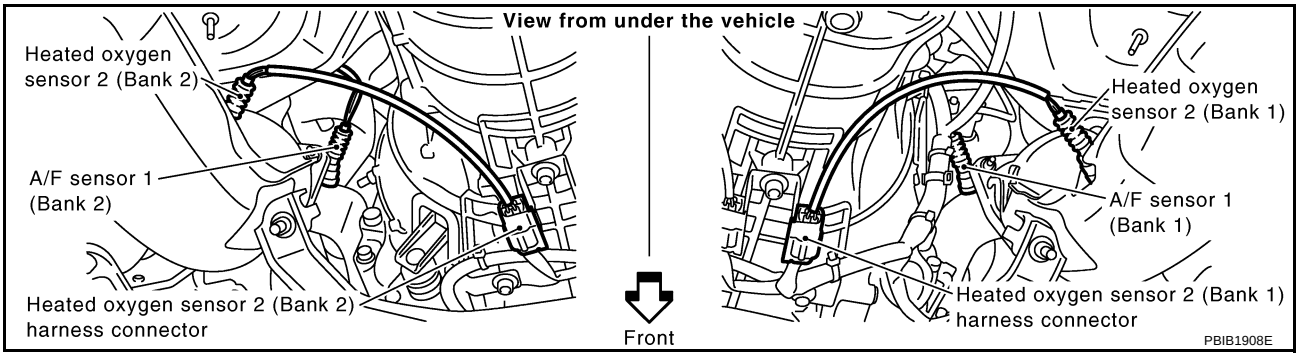



OK or NG

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

### 2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.



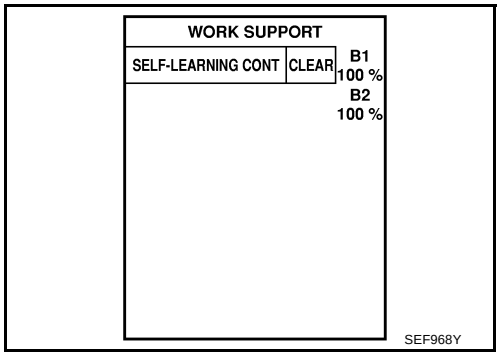

**Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)**

>> GO TO 3.

## 3. CLEAR THE SELF-LEARNING DATA.

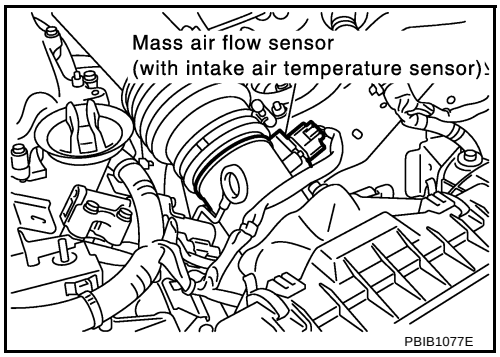
**With CONSULT-II**

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.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to EC-60, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.
   **Is the 1st trip DTC P0172 or P0175 detected?**
   **Is it difficult to start engine?**



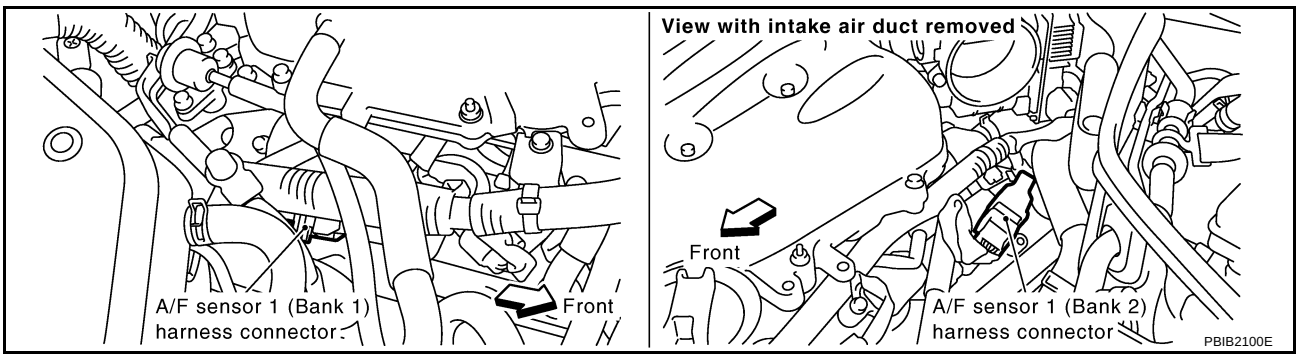

Yes or No

Yes >> Perform trouble diagnosis for DTC P0172 or P0175. Refer to EC-252, "DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 4.

## 4. CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.




3. Check harness connector for water.
   **Water should not exit.**

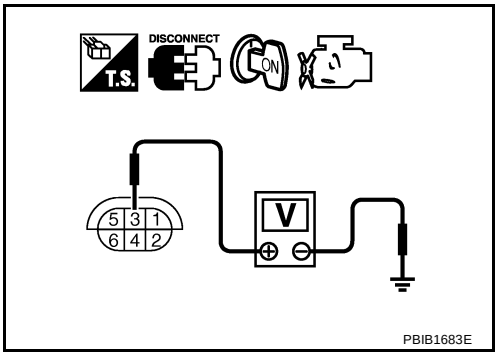
OK or NG

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

## 5. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**




OK or NG

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

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M72, F102
- Harness connectors E108, M15
- IPDM E/R harness connector E7
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

## 7. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.

| | A/F sensor 1 terminal | ECM terminal |
|---|---|---|
| Bank 1 | 1 | 16 |
| | 2 | 75 |
| | 5 | 35 |
| | 6 | 56 |
| Bank 2 | 1 | 76 |
| | 2 | 77 |
| | 5 | 57 |
| | 6 | 58 |

**Continuity should exist.**

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

| Bank 1 | | Bank 2 | |
|---|---|---|---|
| A/F sensor 1 terminal | ECM terminal | A/F sensor 1 terminal | ECM terminal |
| 1 | 16 | 1 | 76 |
| 2 | 75 | 2 | 77 |
| 5 | 35 | 5 | 57 |
| 6 | 56 | 6 | 58 |

**Continuity should not exist.**

5. Also check harness for short to 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 A/F SENSOR 1 HEATER

Refer to EC-401, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace A/F sensor 1.

## 9. CHECK INTERMITTENT INCIDENT

Perform EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

# Removal and Installation

ABS00AYS

## AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-26, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

# DTC P1276, P1286 A/F SENSOR 1

PFP:22693

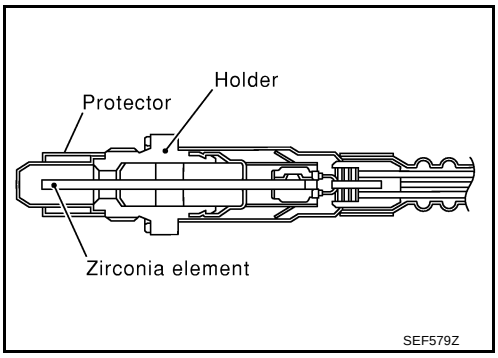
## Component Description

ABS00AYT

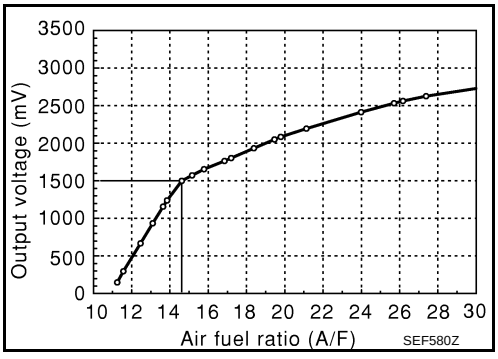
The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide $\lambda$ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.




An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AYU

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| A/F SEN1 (B1)<br>A/F SEN1 (B2) | ● Engine: After warming up | Maintaining engine speed at 2,000 rpm | Fluctuates around 1.5V |

## On Board Diagnosis Logic

ABS00AYV

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal fluctuates according to fuel feedback control.

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible Cause |
|---|---|---|---|
| P1276<br>1276<br>(Bank 1) | Air fuel ratio (A/F) sensor 1 circuit high voltage | ● The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 1.5V. | ● Harness or connectors (The A/F sensor 1 circuit is open or shorted.)<br>● Air fuel ratio (A/F) sensor 1 |
| P1286<br>1286<br>(Bank 2) | | | |

## DTC Confirmation Procedure

ABS00AYW

**CAUTION:**

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

**NOTE:**

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

**TESTING CONDITION:**

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

### WITH CONSULT-II

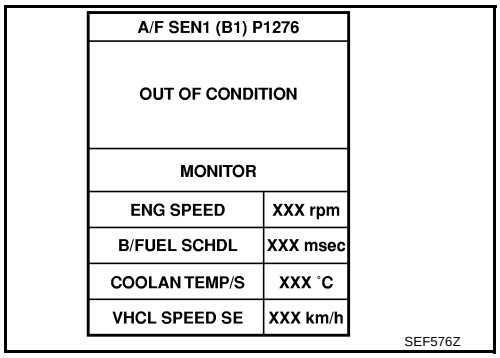
1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-II.
3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.

If the indication is constantly approx. 1.5V and does not fluctuates, go to EC-517, "Diagnostic Procedure" .
If the indication fluctuates around 1.5V, go to next step.

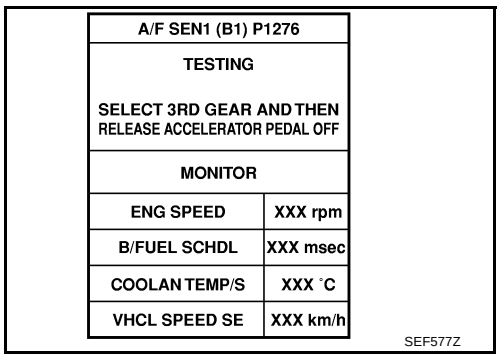
4. Select “A/F SEN1 (B1) P1276” or “A/F SEN1 (B2) P1286” of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-II.
5. Touch “START”.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

| | |
|---|---|
| ENG SPEED | 1,100 - 3,200 rpm |
| VHCL SPEED SE | More than 64 km/h (40 MPH) |
| B/FUEL SCHDL | 1.0 - 8.0 msec |
| Shift lever | D position (A/T)<br>5th position (M/T) |

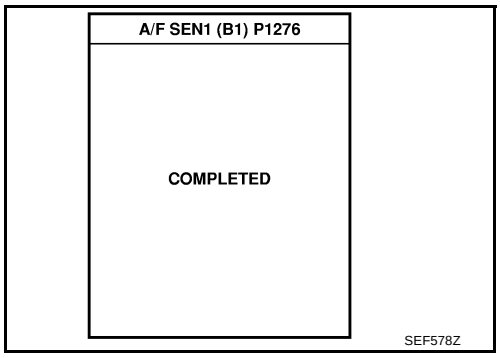
**If “TESTING” is not displayed after 20 seconds, retry from step 2.**




7. Release accelerator pedal fully.
   **NOTE:**
   Never apply brake during releasing the accelerator pedal.




8. Make sure that “TESTING” changes to “COMPLETED”.
   **If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.**
9. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
   If “NG” is displayed, go to EC-517, "Diagnostic Procedure" .




## Overall Function Check

ABS00AYX

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

### WITH GST

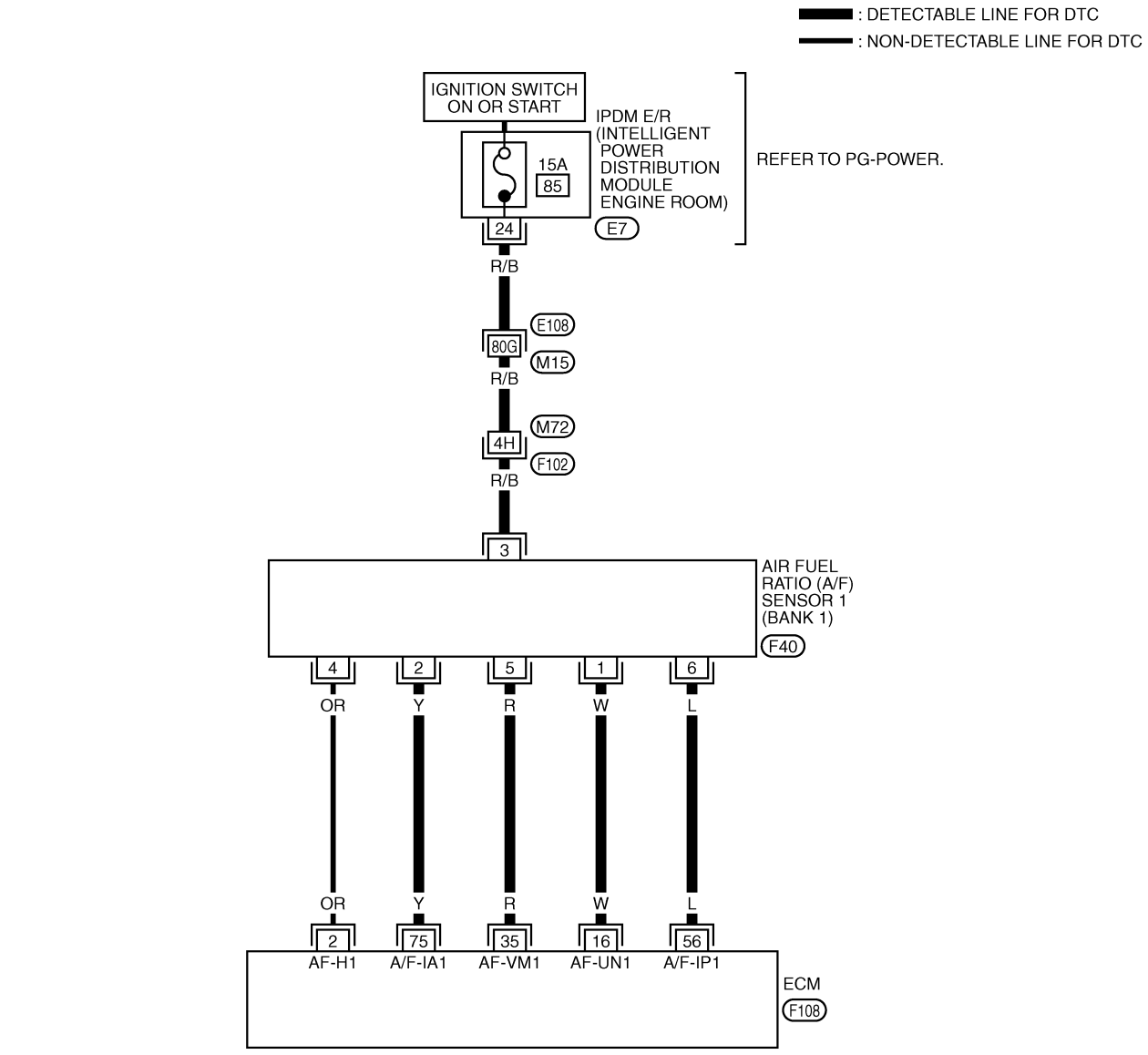
1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Set shift lever to D position (A/T) or 5th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
   **NOTE:**
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 for five times.

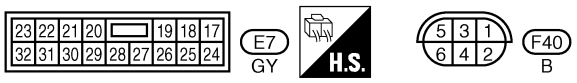
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no 1st trip DTC is displayed.
   If the 1st trip DTC is displayed, go to EC-517, "Diagnostic Procedure" .

## Wiring Diagram
### BANK 1

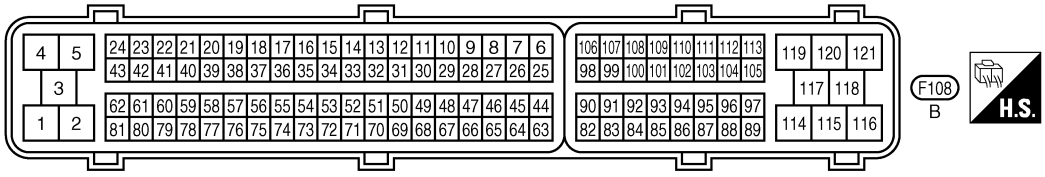
ABS00AYY

EC-AF1B1-01




REFER TO THE FOLLOWING.
E108 , F102 -SUPER MULTIPLE JUNCTION (SMJ)




TBWM0773E

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

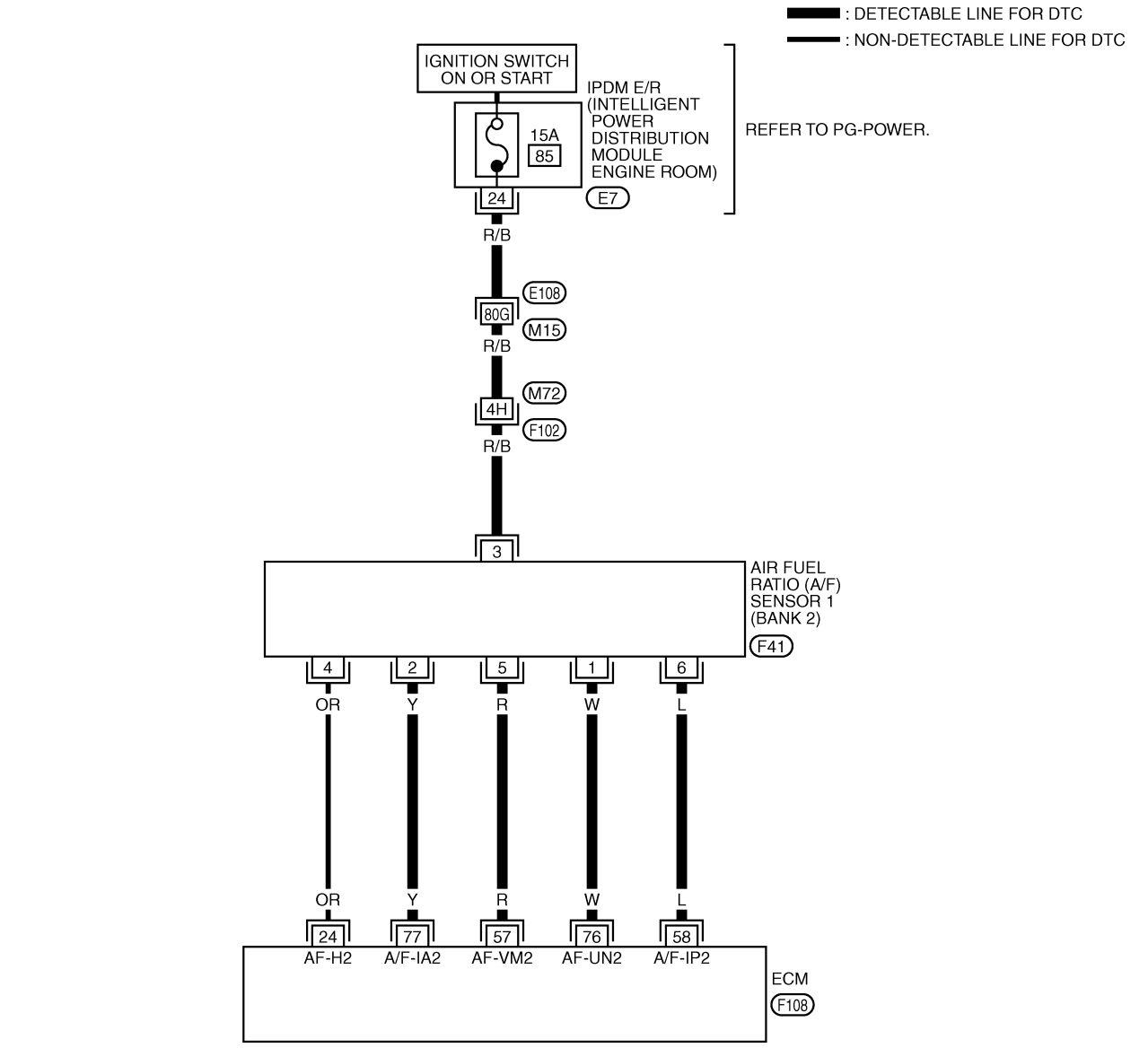
**CAUTION:**

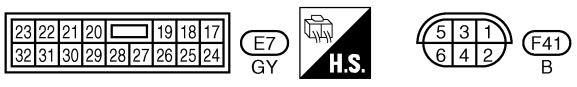
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 16 | W | A/F sensor 1 (Bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 3.1V |
| 35 | R | | | Approximately 2.6V |
| 56 | L | | | Approximately 2.3V |
| 75 | Y | | | Approximately 2.3V |

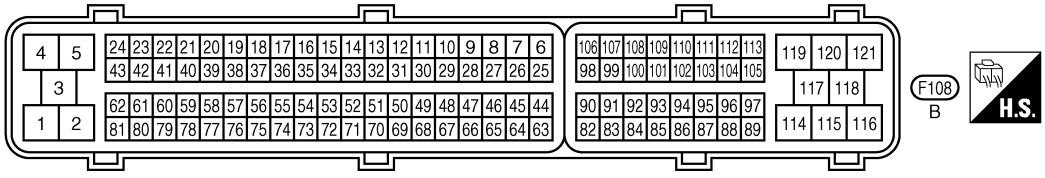
## BANK 2

EC-AF1B2-01




REFER TO THE FOLLOWING.
E108 , F102 -SUPER MULTIPLE JUNCTION (SMJ)




TBWM0774E

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

**CAUTION:**

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

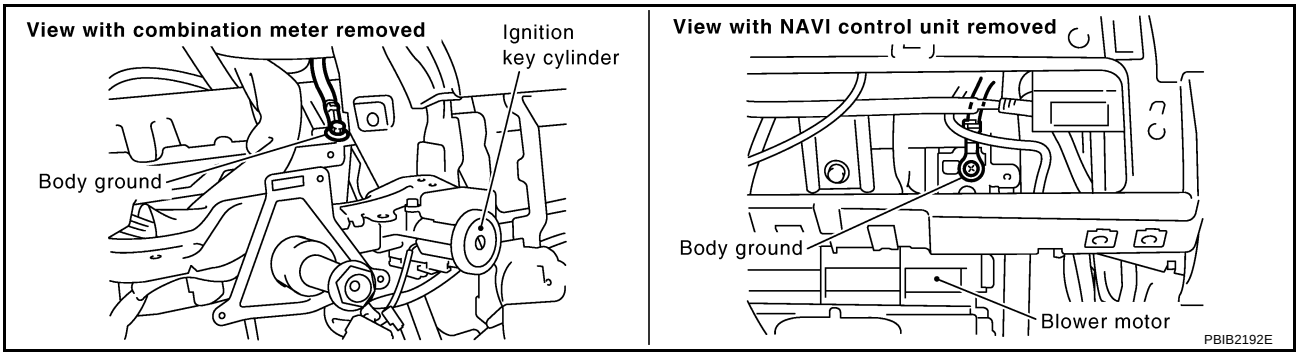
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 57 | R | A/F sensor 1 (Bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 2.6V |
| 58 | L | | | Approximately 2.3V |
| 76 | W | | | Approximately 3.1V |
| 77 | Y | | | Approximately 2.3V |

## Diagnostic Procedure

ABS00AYZ

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

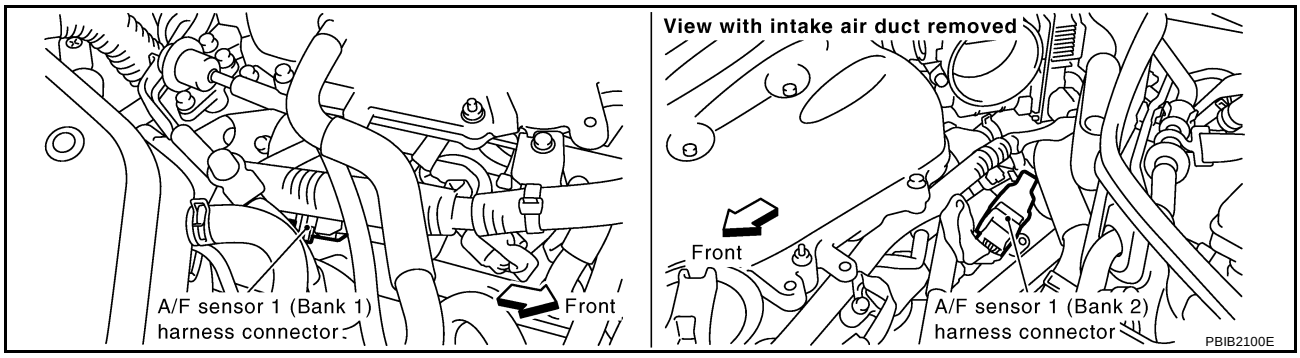



OK or NG

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

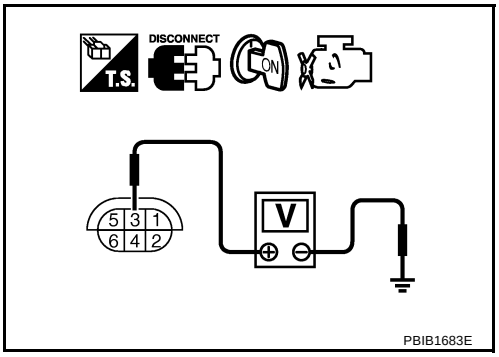
## 2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.




2. Turn ignition switch ON.
3. Check voltage between A/F sensor 1 terminal 3 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 M72, F102
- Harness connectors E108, M15
- IPDM E/R harness connector E7
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

## 4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.

| | A/F sensor 1 terminal | ECM terminal |
|---|---|---|
| Bank 1 | 1 | 16 |
| | 2 | 75 |
| | 5 | 35 |
| | 6 | 56 |
| Bank 2 | 1 | 76 |
| | 2 | 77 |
| | 5 | 57 |
| | 6 | 58 |

**Continuity should exist.**

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

| Bank 1 | | Bank 2 | |
|---|---|---|---|
| A/F sensor 1 terminal | ECM terminal | A/F sensor 1 terminal | ECM terminal |
| 1 | 16 | 1 | 76 |
| 2 | 75 | 2 | 77 |
| 5 | 35 | 5 | 57 |
| 6 | 56 | 6 | 58 |

**Continuity should not exist.**

5. Also check harness for short to 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 INTERMITTENT INCIDENT

Perform EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

# Removal and Installation

ABS00AZ0

### AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-26, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

# DTC P1278, P1288 A/F SENSOR 1

PFP:22693

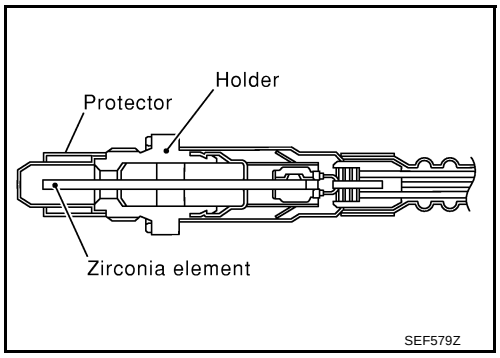
## Component Description

ABS00AZ1

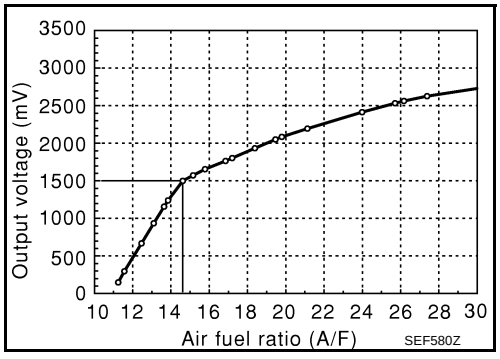
The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide $\lambda$ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.




An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AZ2

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| A/F SEN1 (B1)<br>A/F SEN1 (B2) | ● Engine: After warming up | Maintaining engine speed at 2,000 rpm | Fluctuates around 1.5V |

## On Board Diagnosis Logic

ABS00AZ3

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

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible Cause |
|---|---|---|---|
| P1278<br>1278<br>(Bank 1) | Air fuel ratio (A/F) sensor 1 circuit slow response | ● The response (from RICH to LEAN) of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time. | ● Harness or connectors (The A/F sensor 1 circuit is open or shorted.)<br>● Air fuel ratio (A/F) sensor 1<br>● Air fuel ratio (A/F) sensor 1 heater<br>● Fuel pressure<br>● Fuel injector<br>● Intake air leaks<br>● Exhaust gas leaks<br>● PCV<br>● Mass air flow sensor |
| P1288<br>1288<br>(Bank 2) | | | |

## DTC Confirmation Procedure

ABS00AZ4

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

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

### WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. 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 1minute under no load.
4. Let engine idle for 1 minute.
5. Select “A/F SEN1(B1) P1278/P1279” or “A/F SEN1(B1) P1288/P1289” of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-II.
6. Touch “START”.
   If “COMPLETED” appears on CONSULT-II screen, go to step 10.
   If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.

| A/F SEN1 (B1) P1278/P1279 | |
|---|---|
| OUT OF CONDITION | |
| MONITOR | |
| ENG SPEED | XXX rpm |
| B/FUEL SCHDL | XXX msec |
| COOLAN TEMP/S | XXX °C |
| VHCL SPEED SE | XXX km/h |

PBIB0756E

7. After perform the following procedure, “TESTING” will be displayed on the CONSULT-II screen.

a. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.

b. Fully release accelerator pedal and then let engine idle for about 10 seconds.
   **If “TESTING” is not displayed after 10 seconds, refer to EC-146, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .**

8. Wait for about 20 seconds at idle at under the condition that “TESTING” is displayed on the CONSULT-II screen.

| A/F SEN1 (B1) P1278/P1279 | |
|---|---|
| TESTING | |
| MONITOR | |
| ENG SPEED | XXX rpm |
| B/FUEL SCHDL | XXX msec |
| COOLAN TEMP/S | XXX °C |
| VHCL SPEED SE | XXX km/h |

PBIB1925E

9. Make sure that “TESTING” changes to “COMPLETED”.
   **If “TESTING” changed to “OUT OF CONDITION”, refer to EC-146, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .**
10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
    If “NG” is displayed, go to EC-526, "Diagnostic Procedure" .

| A/F SEN1 (B1) P1278/P1279 |
|---|
| COMPLETED |

PBIB0758E

### WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Select Service $01 with GST.
3. Calculate the total value of “Short term fuel trim” and “Long term fuel trim” indications.
   Make sure that the total percentage should be within ±15%.
   If OK, go to the following step.
   If NG, check the following.

- Intake air leaks
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Fuel injectors
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

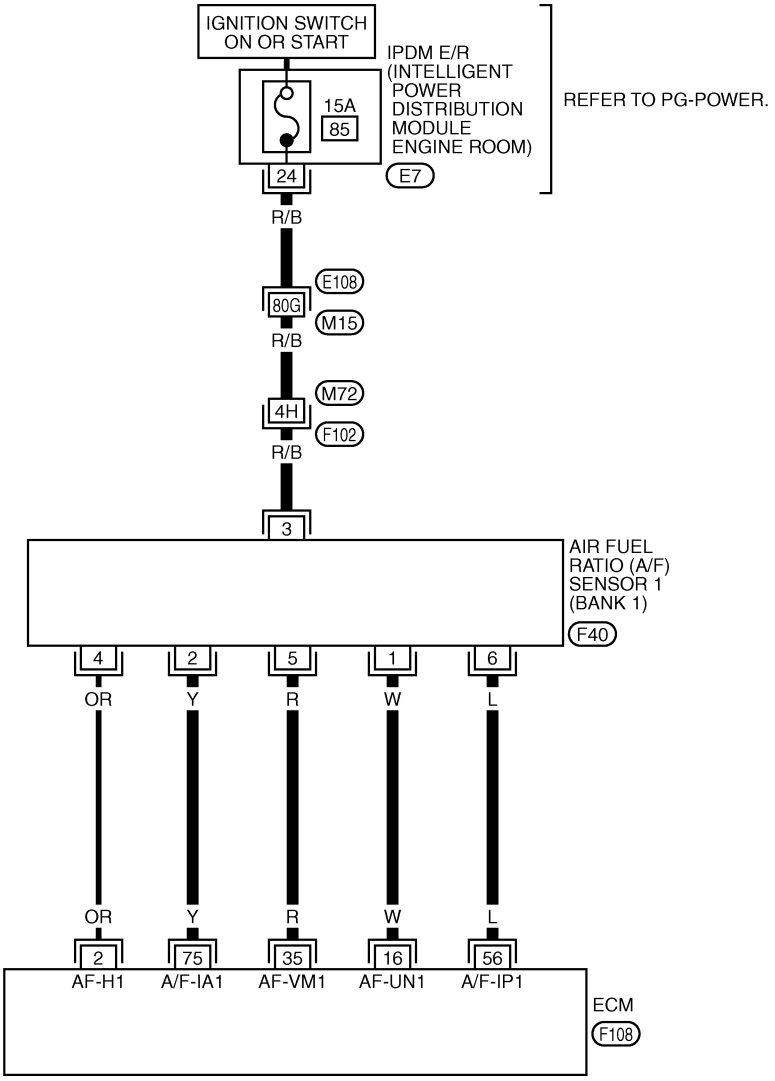
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Select Service $07 with GST.
   If 1st trip DTC is detected, go to EC-526, "Diagnostic Procedure" .

## Wiring Diagram
### BANK 1

ABS00AZ5

EC-AF1B1-01

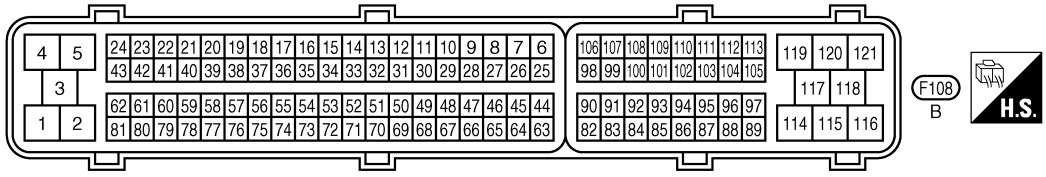
: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC








REFER TO THE FOLLOWING.
E108 , F102 -SUPER MULTIPLE JUNCTION (SMJ)




TBWM0773E

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

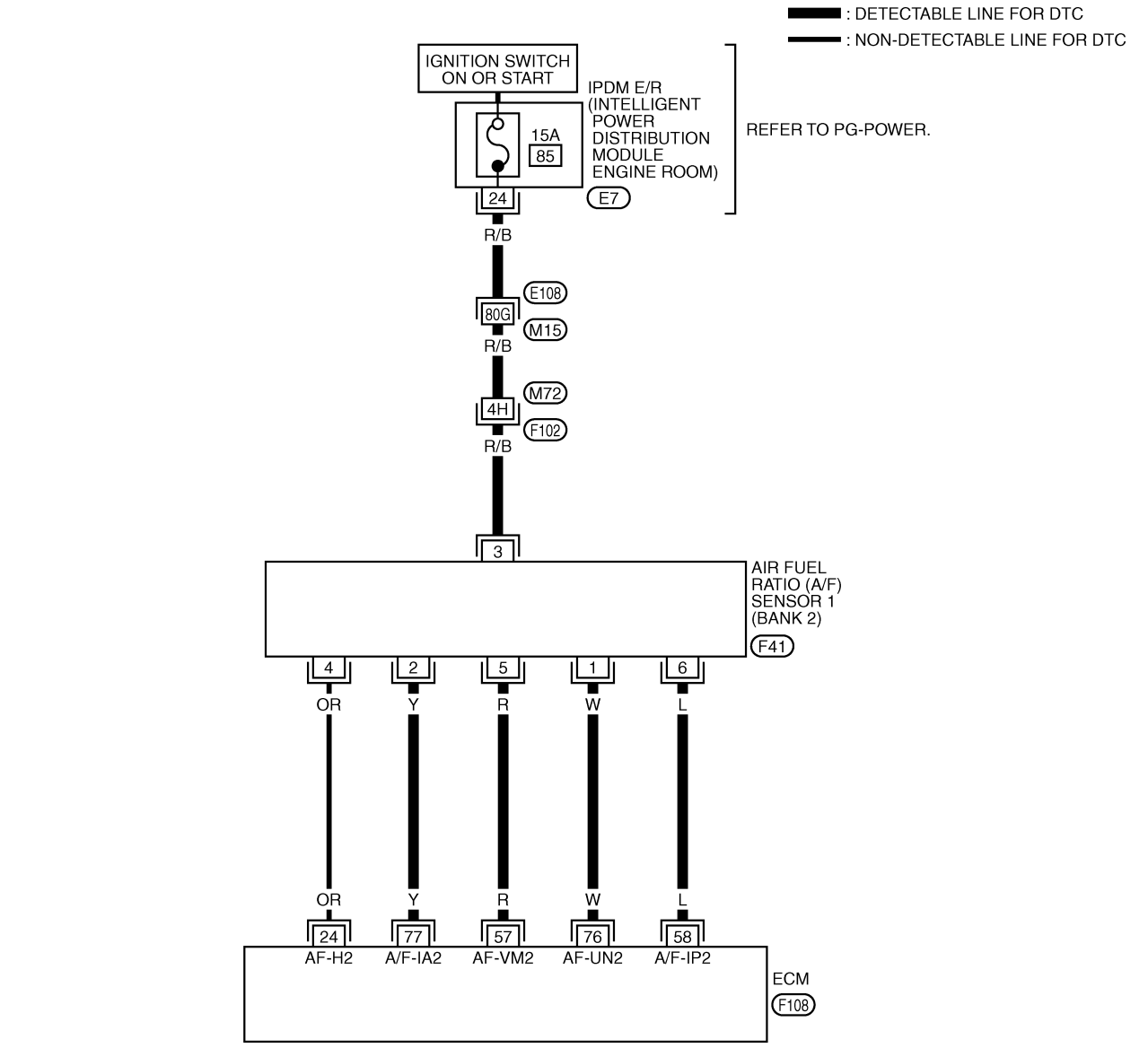
**CAUTION:**

**Do not use ECM ground terminals when measuring input/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) |
|---|---|---|---|---|
| 16 | W | A/F sensor 1 (Bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 3.1V |
| 35 | R | | | Approximately 2.6V |
| 56 | L | | | Approximately 2.3V |
| 75 | Y | | | Approximately 2.3V |

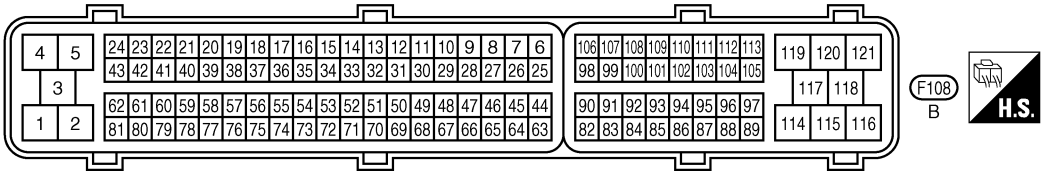
## BANK 2

EC-AF1B2-01





REFER TO THE FOLLOWING.
E108 , F102 -SUPER MULTIPLE JUNCTION (SMJ)




TBWM0774E

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

**CAUTION:**

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

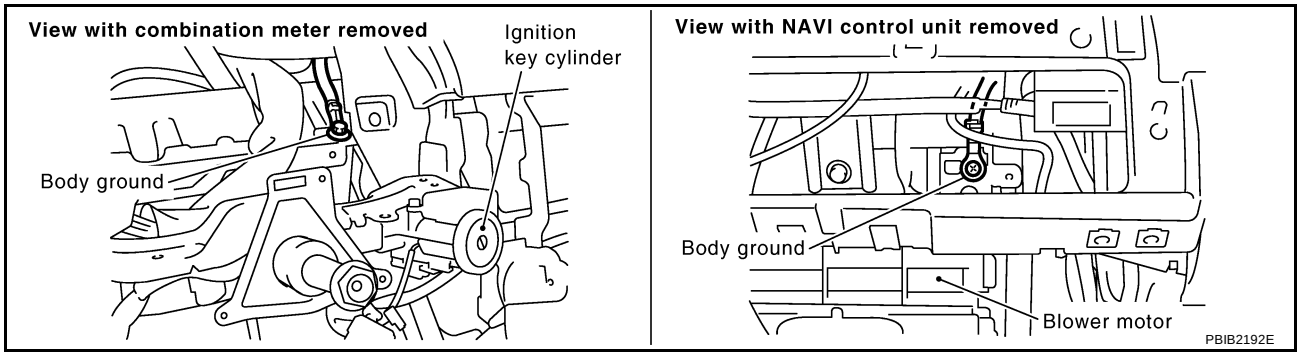
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 57 | R | A/F sensor 1 (Bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 2.6V |
| 58 | L | | | Approximately 2.3V |
| 76 | W | | | Approximately 3.1V |
| 77 | Y | | | Approximately 2.3V |

## Diagnostic Procedure

ABS00AZ6

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

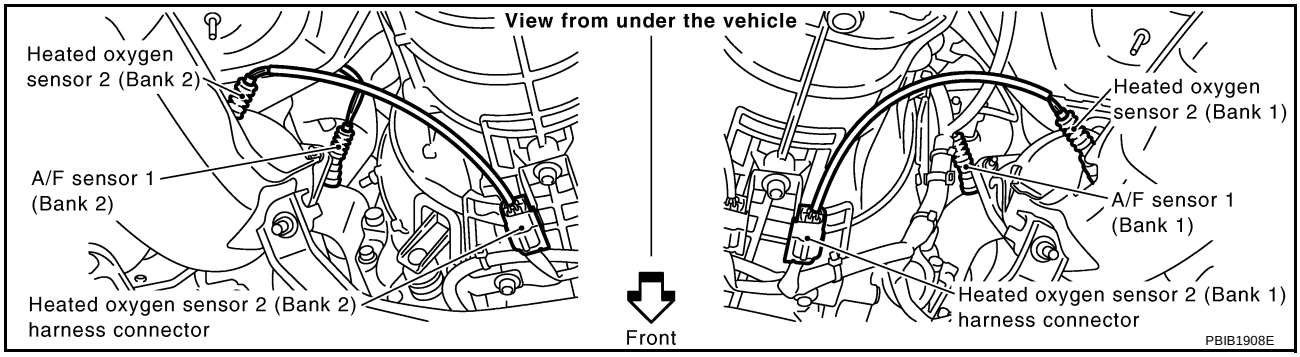



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

### 2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.

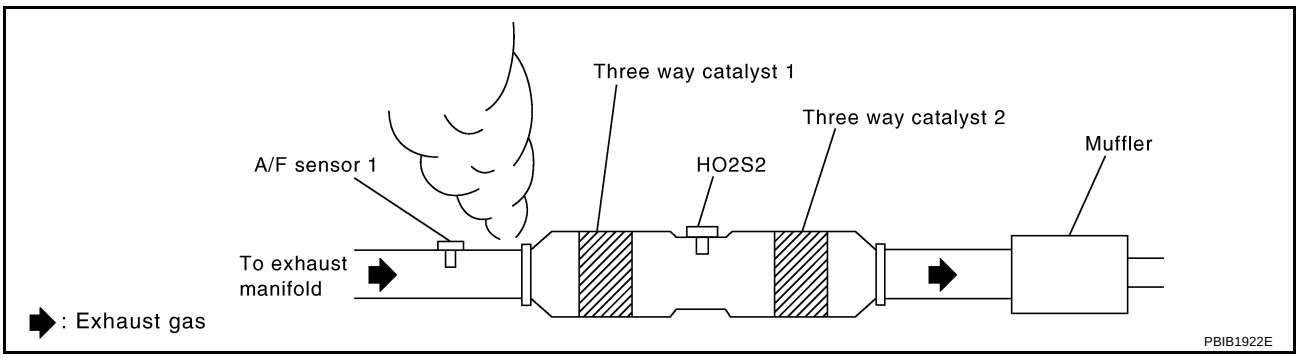



**Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)**

>> GO TO 3.

## 3. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst 1.




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.

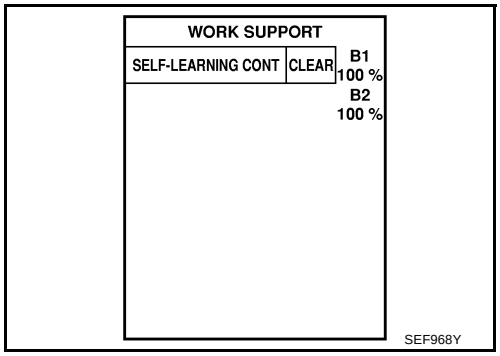
OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

## 5. CLEAR THE SELF-LEARNING DATA

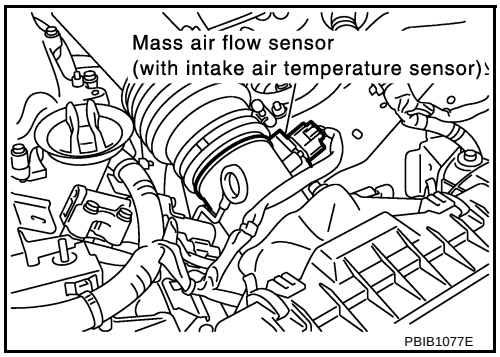
**With CONSULT-II**

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” or “START”.
4. Run engine for at least 10 minutes at idle speed.
   **Is the 1st trip DTC P0171, P172, P0174 or P0175 detected?**
   **Is it difficult to start engine?**




**Without CONSULT-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.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to EC-60, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.
   **Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?**
   **Is it difficult to start engine?**



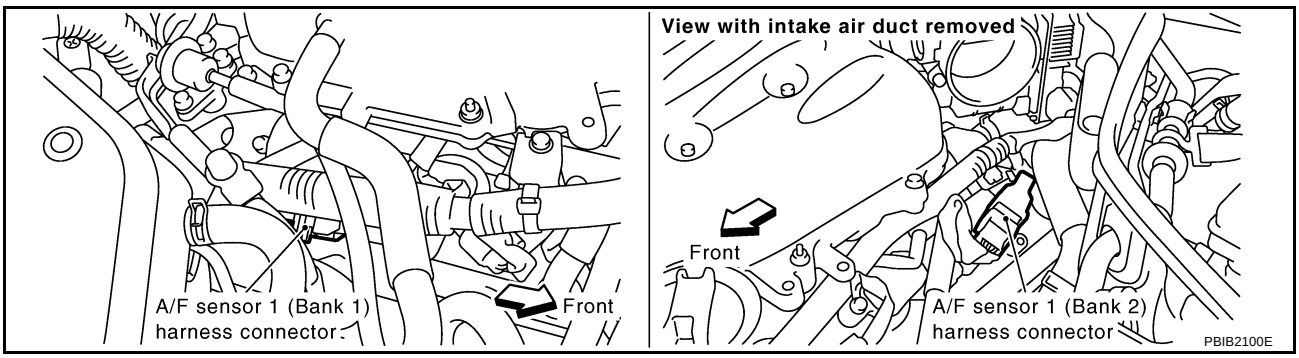

Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-242, "DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION" or EC-252, "DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 6.

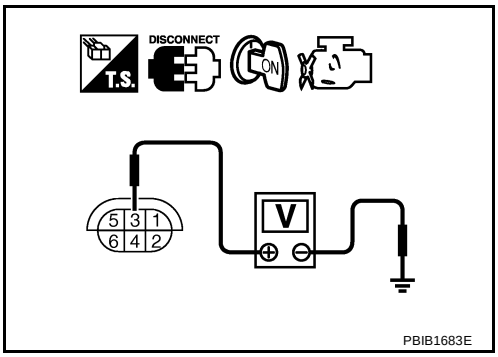
## 6. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.




3. Turn ignition switch ON.
4. Check voltage between A/F sensor 1 terminal 3 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 M72, F102
- Harness connectors E108, M15
- IPDM E/R harness connector E7
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

## 8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.

| | A/F sensor 1 terminal | ECM terminal |
|---|---|---|
| Bank 1 | 1 | 16 |
| | 2 | 75 |
| | 5 | 35 |
| | 6 | 56 |
| Bank 2 | 1 | 76 |
| | 2 | 77 |
| | 5 | 57 |
| | 6 | 58 |

**Continuity should exist.**

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

| Bank 1 | | Bank 2 | |
|---|---|---|---|
| A/F sensor 1 terminal | ECM terminal | A/F sensor 1 terminal | ECM terminal |
| 1 | 16 | 1 | 76 |
| 2 | 75 | 2 | 77 |
| 5 | 35 | 5 | 57 |
| 6 | 56 | 6 | 58 |

**Continuity should not exist.**

5. Also check harness for short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 9. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-401, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace A/F sensor 1.

## 10. CHECK MASS AIR FLOW SENSOR

Refer to EC-188, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace mass air flow sensor.

## 11. CHECK PCV VALVE

Refer to EC-43, "POSITIVE CRANKCASE VENTILATION" .

OK or NG

OK >> GO TO 12.
NG >> Repair or replace PCV valve.

## 12. CHECK INTERMITTENT INCIDENT

Perform EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

# Removal and Installation

ABS00AZ7

## AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-26, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

# DTC P1279, P1289 A/F SENSOR 1

PFP:22693

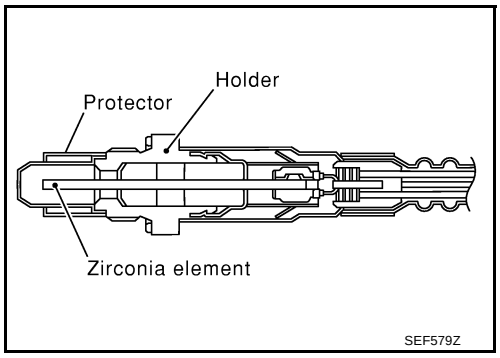
## Component Description

ABS00AZ8

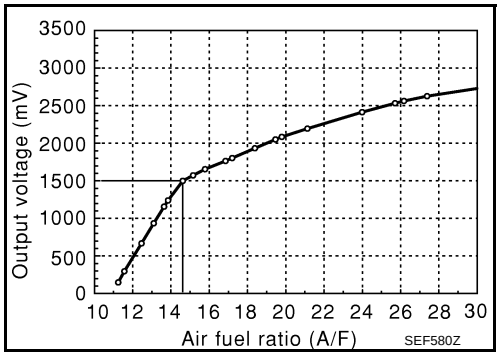
The air fuel ratio (A/F) sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide $\lambda$ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.




An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AZ9

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| A/F SEN1 (B1)<br>A/F SEN1 (B2) | ● Engine: After warming up | Maintaining engine speed at 2,000 rpm | Fluctuates around 1.5V |

## On Board Diagnosis Logic

ABS00AZA

To judge the malfunction of A/F sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the air fuel ration A/F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible Cause |
|---|---|---|---|
| P1279<br>1279<br>(Bank 1) | Air fuel ratio (A/F) sensor 1 circuit slow response | ● The response (from LEAN to RICH) of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time. | ● Harness or connectors (The A/F sensor 1 circuit is open or shorted.)<br>● Air fuel ratio (A/F) sensor 1<br>● Air fuel ratio (A/F) sensor 1 heater<br>● Fuel pressure<br>● Fuel injector<br>● Intake air leaks<br>● Exhaust gas leaks<br>● PCV<br>● Mass air flow sensor |
| P1289<br>1289<br>(Bank 2) | | | |

## DTC Confirmation Procedure

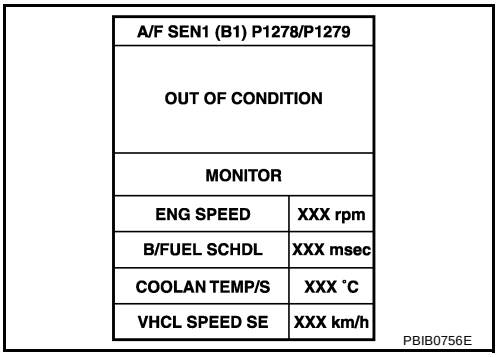
ABS00AZB

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**
**Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

### WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. 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 1minute under no load.
4. Let engine idle for 1 minute.
5. Select “A/F SEN1(B1) P1278/P1279” or “A/F SEN1(B1) P1288/P1289” of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-II.
6. Touch “START”.
   If “COMPLETED” appears on CONSULT-II screen, go to step 10.
   If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.

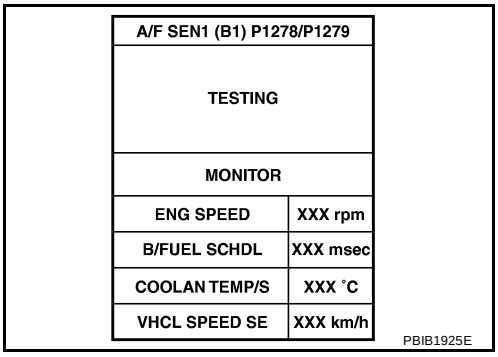



7. After perform the following procedure, “TESTING” will be displayed on the CONSULT-II screen.

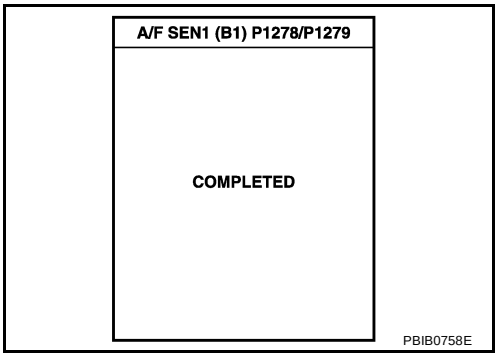
a. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.

b. Fully release accelerator pedal and then let engine idle for about 10 seconds.
   **If “TESTING” is not displayed after 10 seconds, refer to EC-146, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .**

8. Wait for about 20 seconds at idle at under the condition that “TESTING” is displayed on the CONSULT-II screen.




9. Make sure that “TESTING” changes to “COMPLETED”.
   **If “TESTING” changed to “OUT OF CONDITION”, refer to EC-146, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .**
10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
    If “NG” is displayed, go to EC-538, "Diagnostic Procedure" .




### WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Select Service $01 with GST.
3. Calculate the total value of “Short term fuel trim” and “Long term fuel trim” indications.
   Make sure that the total percentage should be within ±15%.
   If OK, go to the following step.
   If NG, check the following.

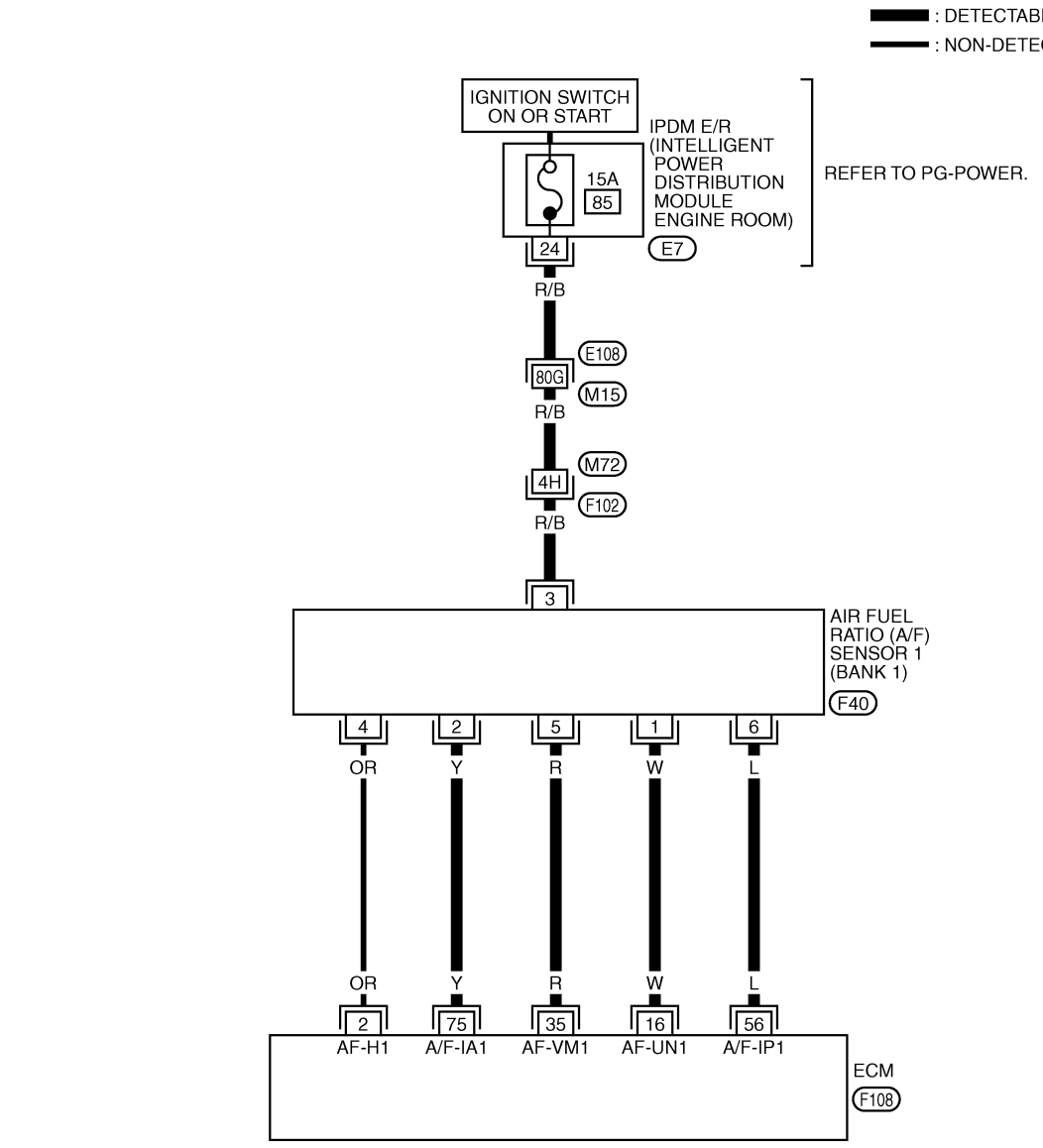
- Intake air leaks
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Fuel injectors
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

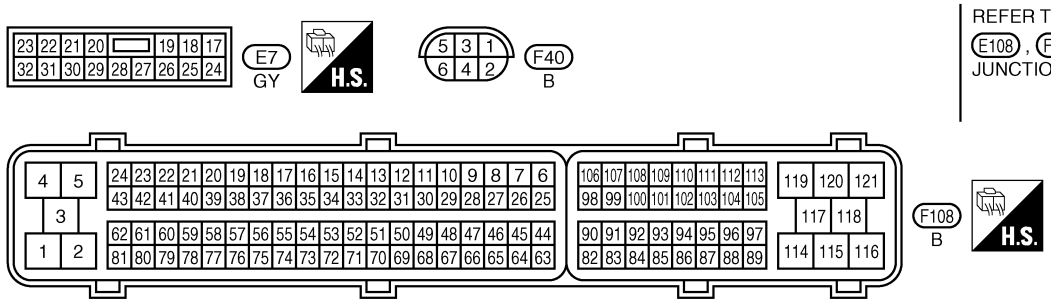
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Select Service $07 with GST.
   If 1st trip DTC is detected, go to EC-538, "Diagnostic Procedure" .

## Wiring Diagram
### BANK 1

ABS00AZC

EC-AF1B1-01




REFER TO THE FOLLOWING.
E108 , F102 -SUPER MULTIPLE JUNCTION (SMJ)

TBWM0773E

Specification data are reference values and are measured between each terminal and ground.

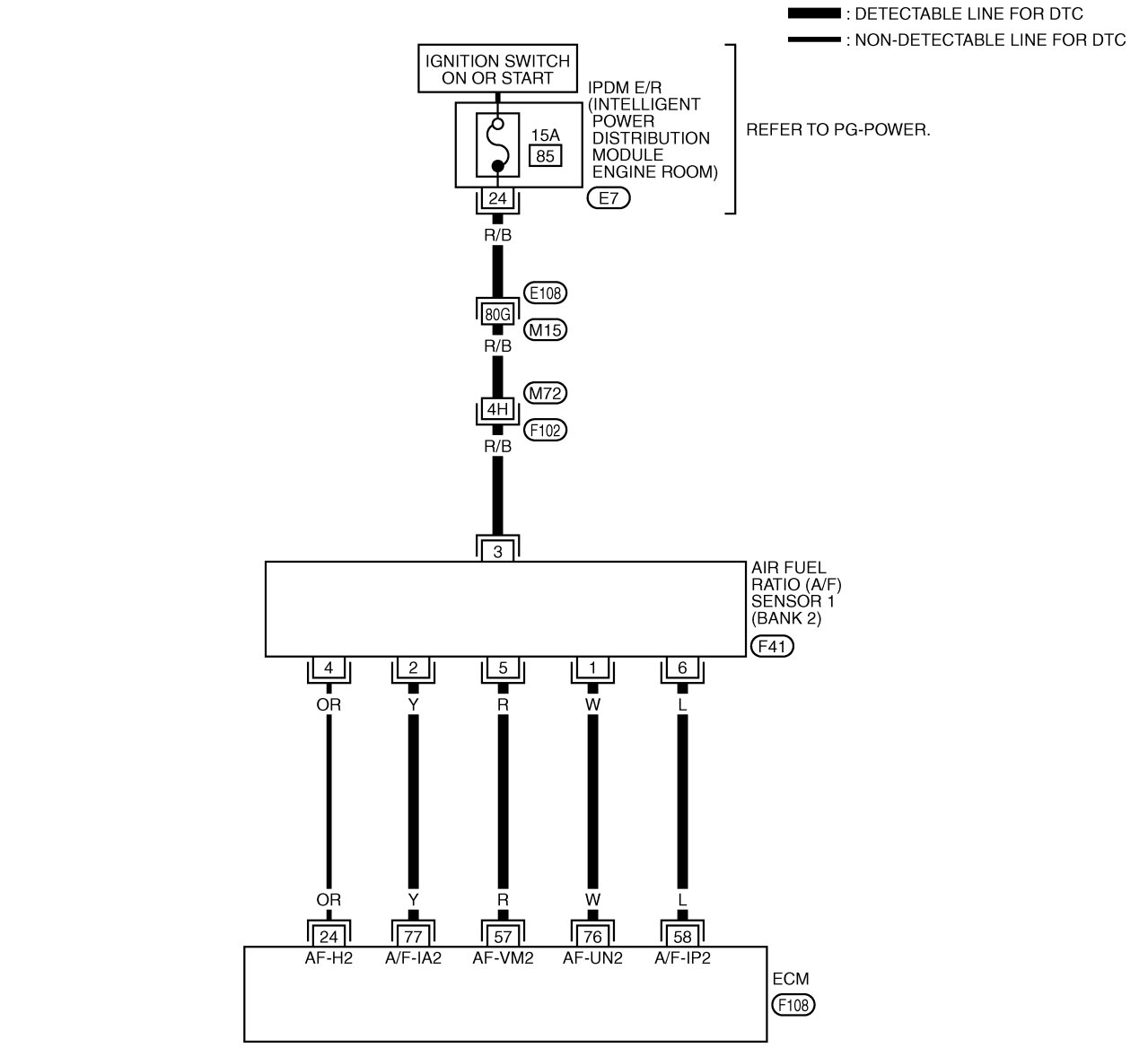
**CAUTION:**

**Do not use ECM ground terminals when measuring input/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) |
|---|---|---|---|---|
| 16 | W | A/F sensor 1 (Bank 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 3.1V |
| 35 | R | | | Approximately 2.6V |
| 56 | L | | | Approximately 2.3V |
| 75 | Y | | | Approximately 2.3V |

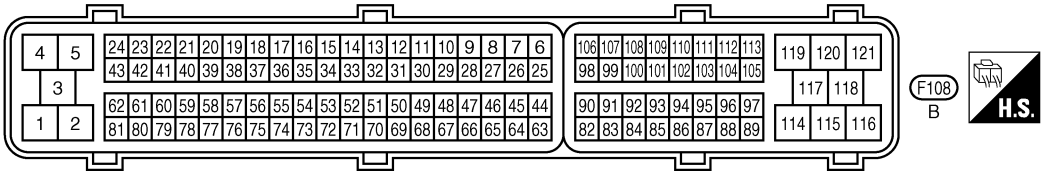
## BANK 2

EC-AF1B2-01





REFER TO THE FOLLOWING.
E108 , F102 -SUPER MULTIPLE JUNCTION (SMJ)




TBWM0774E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

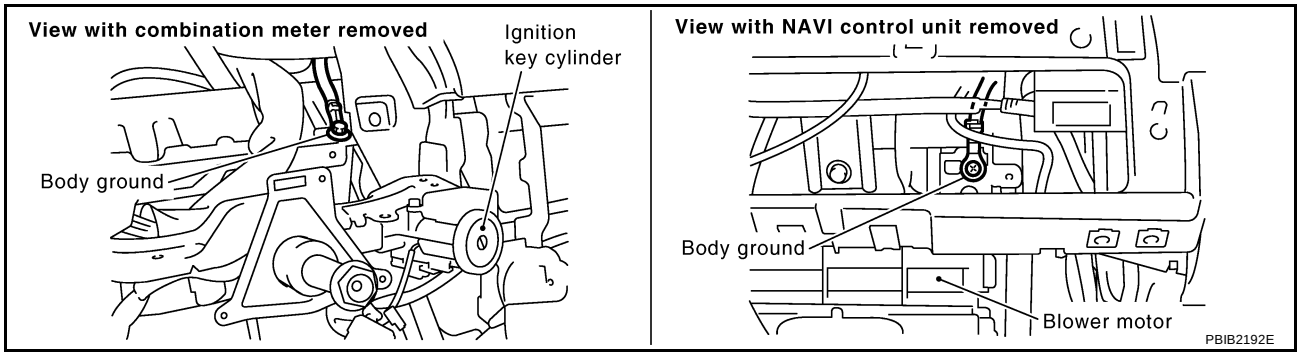
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 57 | R | A/F sensor 1 (Bank 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 2.6V |
| 58 | L | | | Approximately 2.3V |
| 76 | W | | | Approximately 3.1V |
| 77 | Y | | | Approximately 2.3V |

## Diagnostic Procedure

ABS00AZD

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

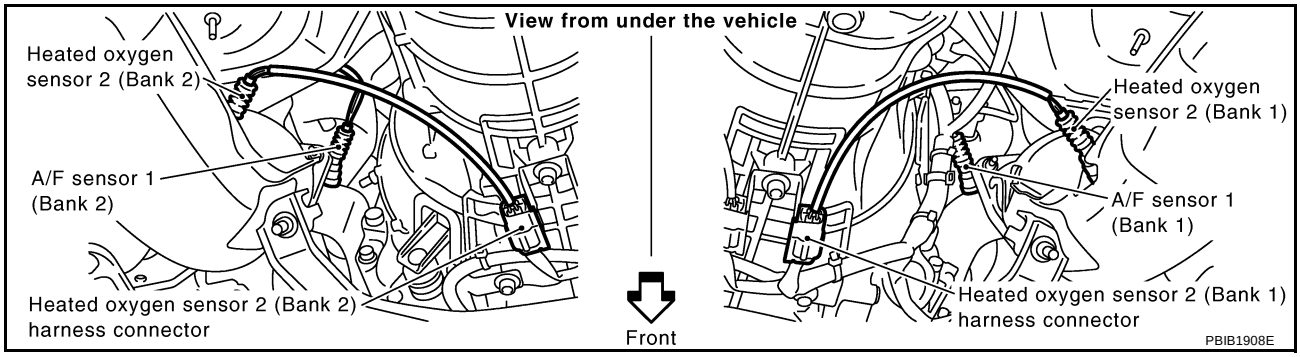



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

### 2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.

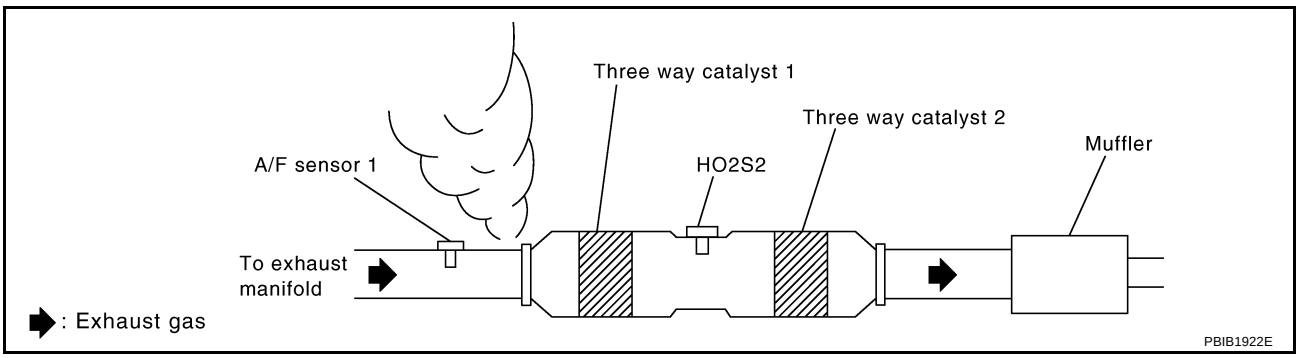



**Tightening torque: 50 N-m (5.1 kg-m, 37 ft-lb)**

>> GO TO 3.

## 3. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst 1.




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.

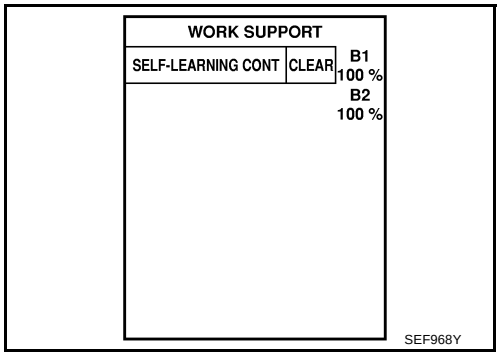
OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

## 5. CLEAR THE SELF-LEARNING DATA

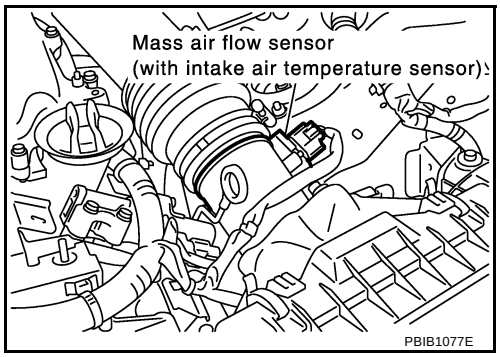
**With CONSULT-II**

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” or “START”.
4. Run engine for at least 10 minutes at idle speed.
   **Is the 1st trip DTC P0171, P172, P0174 or P0175 detected?**
   **Is it difficult to start engine?**




**Without CONSULT-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.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to EC-60, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.
   **Is the 1st trip DTC P0171, P0172, P0174 or P0175 detected?**
   **Is it difficult to start engine?**



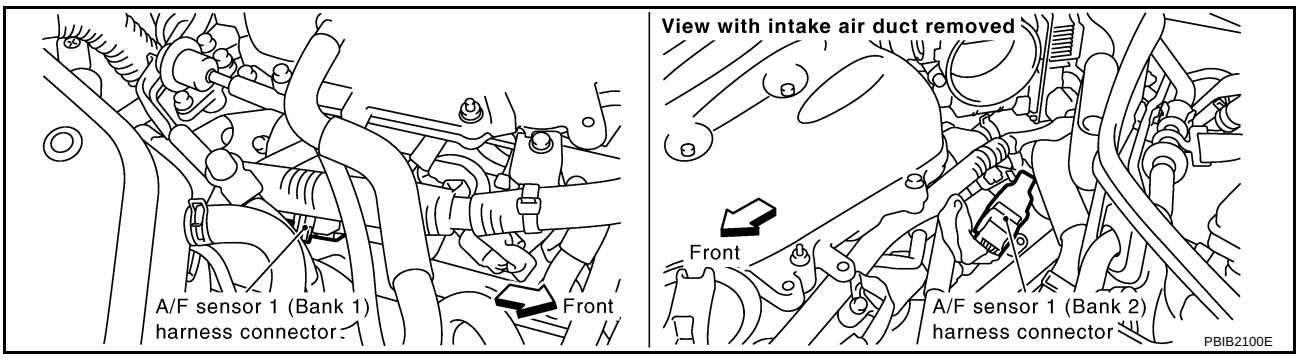

Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0174 or P0172, P0175. Refer to EC-242, "DTC P0171, P0174 FUEL INJECTION SYSTEM FUNCTION" or EC-252, "DTC P0172, P0175 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 6.

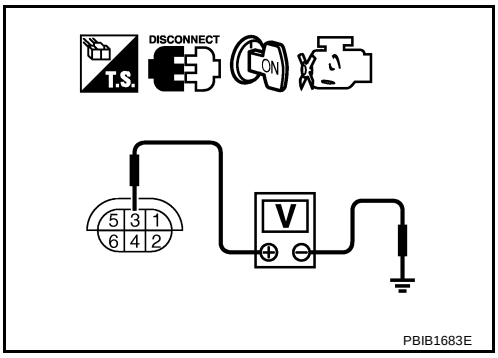
## 6. CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.




3. Turn ignition switch ON.
4. Check voltage between A/F sensor 1 terminal 3 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 M72, F102
- Harness connectors E108, M15
- IPDM E/R harness connector E7
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

## 8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals.
   Refer to Wiring Diagram.

| | A/F sensor 1 terminal | ECM terminal |
|---|---|---|
| Bank 1 | 1 | 16 |
| | 2 | 75 |
| | 5 | 35 |
| | 6 | 56 |
| Bank 2 | 1 | 76 |
| | 2 | 77 |
| | 5 | 57 |
| | 6 | 58 |

**Continuity should exist.**

4. Check harness continuity between the following terminals and ground.
   Refer to Wiring Diagram.

| Bank 1 | | Bank 2 | |
|---|---|---|---|
| A/F sensor 1 terminal | ECM terminal | A/F sensor 1 terminal | ECM terminal |
| 1 | 16 | 1 | 76 |
| 2 | 75 | 2 | 77 |
| 5 | 35 | 5 | 57 |
| 6 | 56 | 6 | 58 |

**Continuity should not exist.**

5. Also check harness for short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 9. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-401, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace A/F sensor 1.

## 10. CHECK MASS AIR FLOW SENSOR

Refer to EC-188, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace mass air flow sensor.

## 11. CHECK PCV VALVE

Refer to EC-43, "POSITIVE CRANKCASE VENTILATION" .

OK or NG

OK >> GO TO 12.
NG >> Repair or replace PCV valve.

## 12. CHECK INTERMITTENT INCIDENT

Perform EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

# Removal and Installation

ABS00AZE

## AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-26, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

# DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

## Description

ABS00AZF

### SYSTEM DESCRIPTION

| Sensor | Input Signal to ECM | ECM function | Actuator |
|---|---|---|---|
| Crankshaft position sensor (POS)<br>Camshaft position sensor (PHASE) | Engine speed*1 | 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 | | |
| Battery | Battery voltage*1 | | |
| Throttle position sensor | Throttle position | | |
| Accelerator pedal position sensor | Accelerator pedal position | | |
| Air fuel ratio (A/F) sensor 1 | Density of oxygen in exhaust gas (Mixture ratio feedback signal) | | |
| Fuel tank temperature sensor | Fuel temperature in fuel tank | | |
| Wheel sensor*2 | Vehicle speed | | |

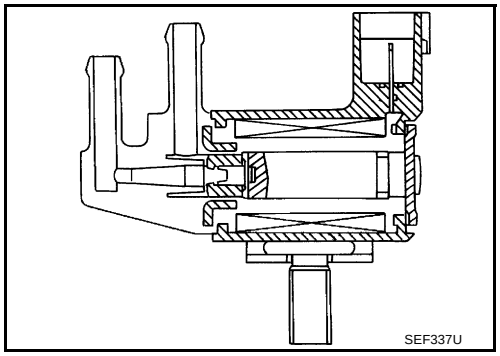
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM through CAN communication line.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

### COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AZG

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| PURG VOL C/V | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle<br>(Accelerator pedal is not depressed even slightly, after engine starting) | 0% |
| | | 2,000 rpm | — |

## On Board Diagnosis Logic

ABS00AZH

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P1444<br>1444 | EVAP canister purge volume control solenoid valve | The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed. | ● EVAP control system pressure sensor<br>● EVAP canister purge volume control solenoid valve (The valve is stuck open.)<br>● EVAP canister vent control valve<br>● EVAP canister<br>● Hoses (Hoses are connected incorrectly or clogged.) |

## DTC Confirmation Procedure

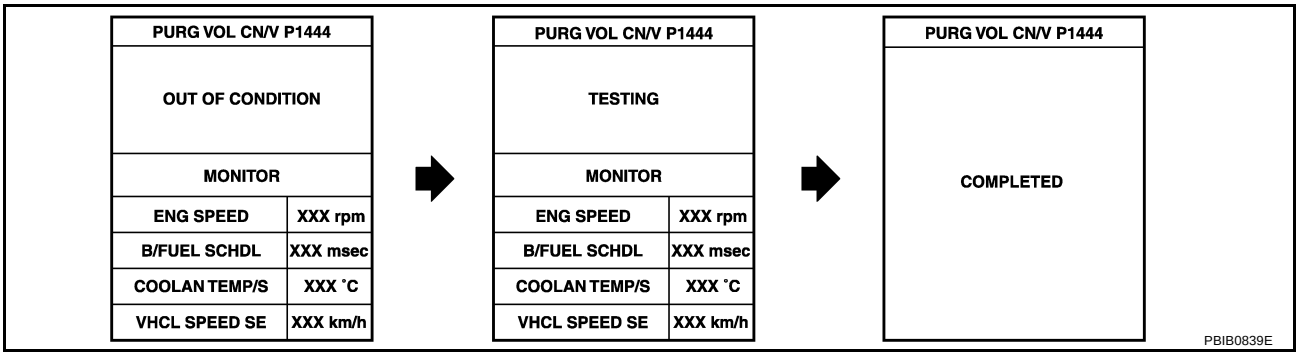
ABS00AZI

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**
**Always perform test at a temperature of 5°C (41°F) or more.**

### WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
5. Touch “START”.




6. Start engine and let it idle until “TESTING” on CONSULT-II changes to “COMPLETED”. (It will take approximately 10 seconds.)
   **If “TESTING” is not displayed after 5 minutes, retry from step 2.**
7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-548, "Diagnostic Procedure" .

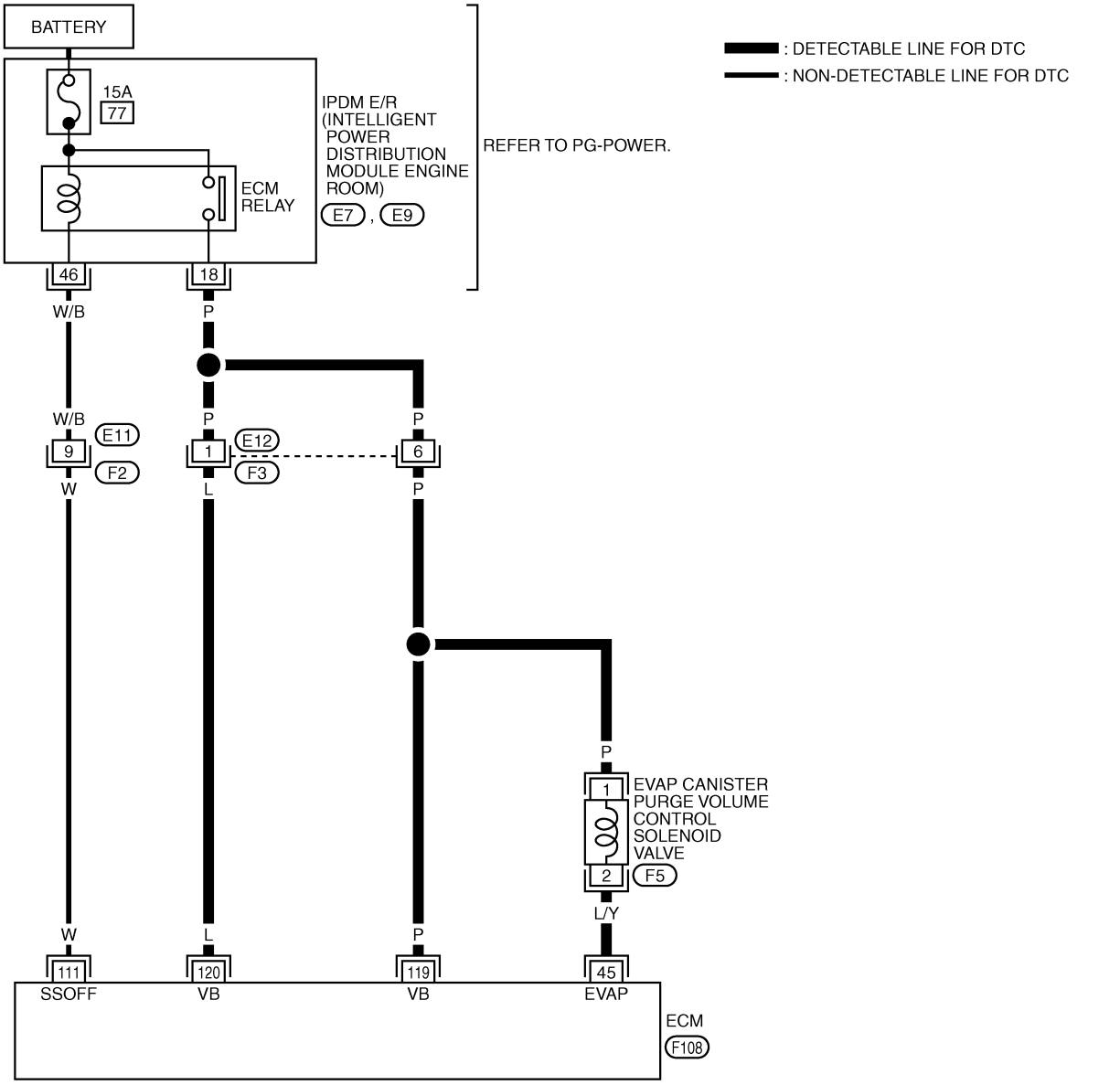
### WITH GST

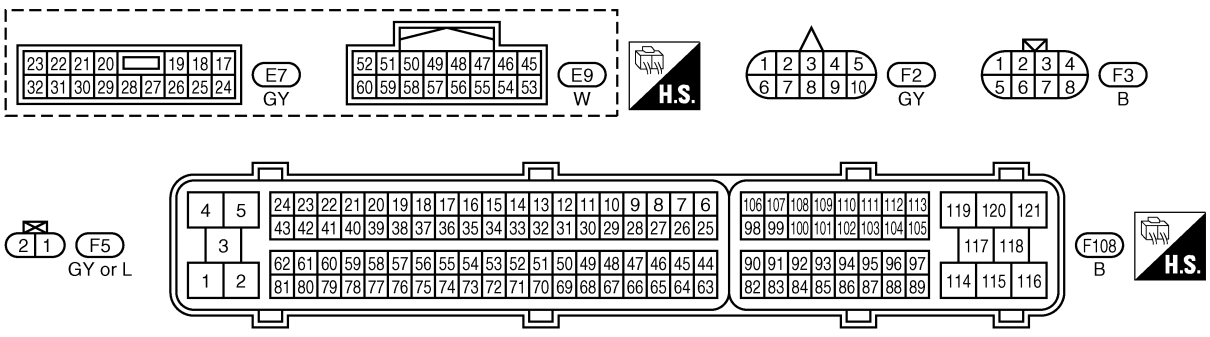
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 20 seconds.
4. Select Service $07 with GST.
5. If 1st trip DTC is detected, go to EC-548, "Diagnostic Procedure" .

## Wiring Diagram

ABS00AZJ

EC-PGC/V-01

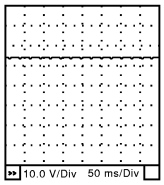
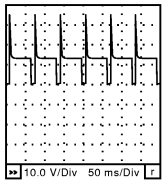



TBWT0747E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

**CAUTION:**
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 45 | L/Y | EVAP canister purge volume control solenoid valve | **[Engine is running]**<br>● Idle speed<br>● Accelerator pedal is not depressed even slightly, after engine starting | BATTERY VOLTAGE<br>(11 - 14V)★<br>  <br><br>SEC990C |
| | | | **[Engine is running]**<br>● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine). | BATTERY VOLTAGE<br>(11 - 14V)★<br>  <br><br>SEC991C |
| 111 | W | ECM relay<br>(Self shut-off) | **[Engine is running]**<br>**[Ignition switch: OFF]**<br>● A few seconds after turning ignition switch OFF | 0 - 1.5V |
| | | | **[Ignition switch: OFF]**<br>● More than a few seconds after turning ignition switch OFF | BATTERY VOLTAGE<br>(11 - 14V) |
| 119<br>120 | P<br>L | Power supply for ECM | **[Ignition switch: ON]** | BATTERY VOLTAGE<br>(11 - 14V) |

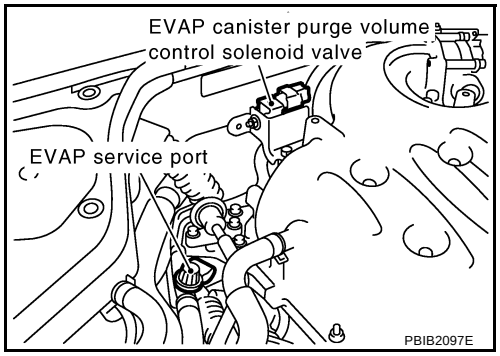
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnostic Procedure

ABS00AZK

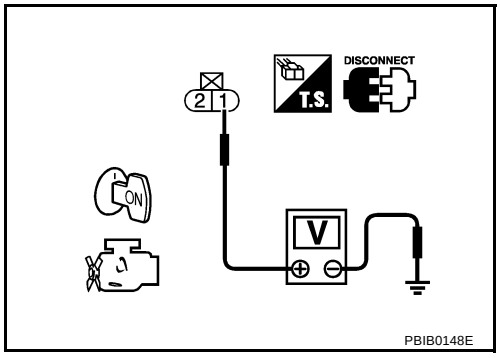
### 1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

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 E12, F3
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

### 3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR 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 5.
NG >> Replace EVAP control system pressure sensor.

## 5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-349, "Component Inspection" .

OK or NG

OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> Replace EVAP control system pressure sensor.

## 6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

**With CONSULT-II**

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Start engine.
4. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

| ACTIVE TEST | |
|---|---|
| PURG VOL CONT/V | XXX % |
| MONITOR | |
| ENG SPEED | XXX rpm |
| A/F ALPHA-B1 | XX % |
| A/F ALPHA-B2 | XX % |
| | |
| | |
| | |
| | |

PBIB1678E

## 7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-550, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.

## 8. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 9.
NG >> Clean the rubber tube using an air blower.

## 9. CHECK EVAP CANISTER VENT CONTROL VALVE

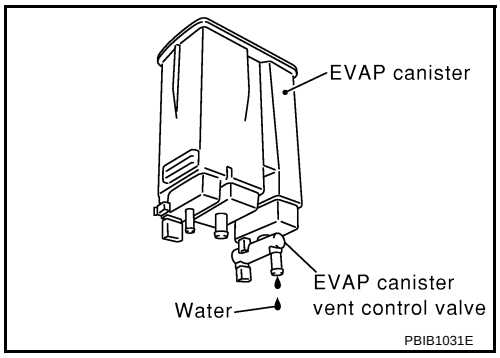
Refer to EC-339, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP canister vent control valve.

## 10. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.




Yes or No

Yes >> GO TO 11.
No >> GO TO 13.

## 11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

**The weight should be less than 2.1 kg (4.6 lb).**

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

## 12. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

## 13. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

# Component Inspection

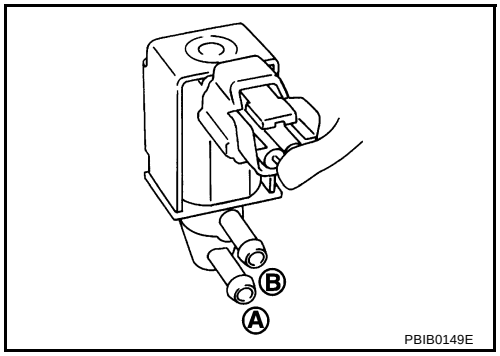
ABS00AZL

### EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

### With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

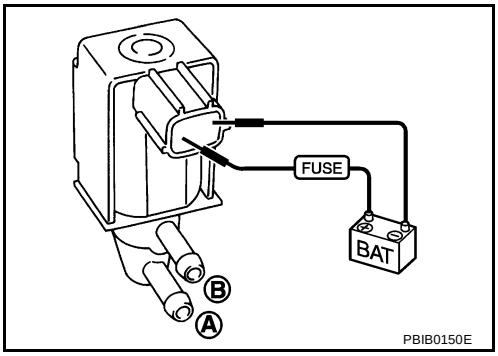
| Condition (PURG VOL CONT/V value) | Air passage continuity between A and B |
|---|---|
| 100% | Yes |
| 0% | No |



### Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

| Condition | Air passage continuity between A and B |
|---|---|
| 12V direct current supply between terminals 1 and 2 | Yes |
| No supply | No |




ABS00AZM

## Removal and Installation

### EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-19, "INTAKE MANIFOLD COLLECTOR" .

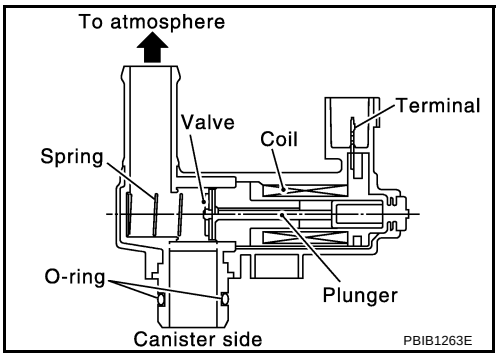
# DTC P1446 EVAP CANISTER VENT CONTROL VALVE

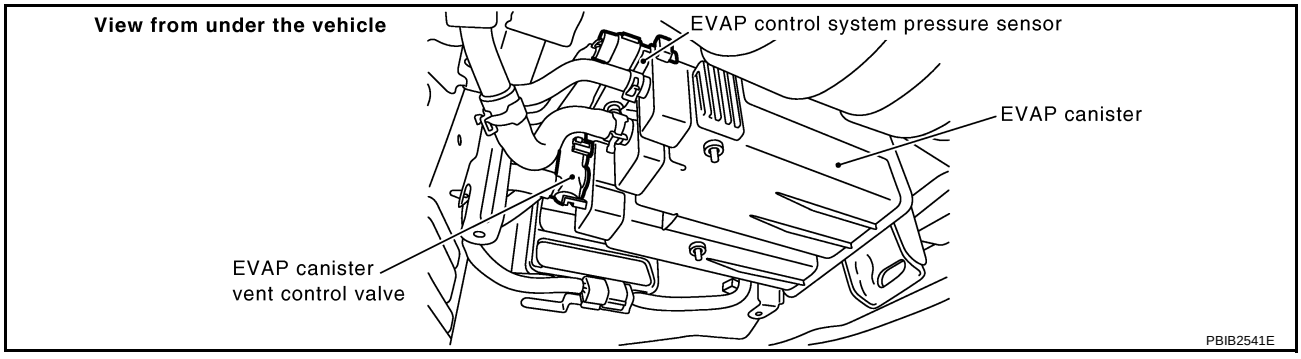
PFP:14935

## Component Description

ABS00AZN

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” diagnosis.




## CONSULT-II Reference Value in Data Monitor Mode

ABS00AZO

Specification data are reference values.

| MONITOR ITEM | CONDITION | SPECIFICATION |
|---|---|---|
| VENT CONT/V | ● Ignition switch: ON | OFF |

## On Board Diagnosis Logic

ABS00AZP

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P1446<br>1446 | EVAP canister vent control valve close | EVAP canister vent control valve remains closed under specified driving conditions. | ● EVAP canister vent control valve<br>● EVAP control system pressure sensor and the circuit<br>● Blocked rubber tube to EVAP canister vent control valve<br>● EVAP canister is saturated with water |

## DTC Confirmation Procedure

ABS00AZQ

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

### WITH CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
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 let it idle for at least 1 minute.
5. Repeat next procedures for 3 times.

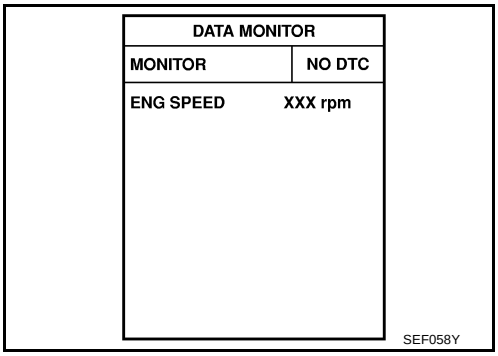
a. Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.
**Never exceed 3 minutes.**

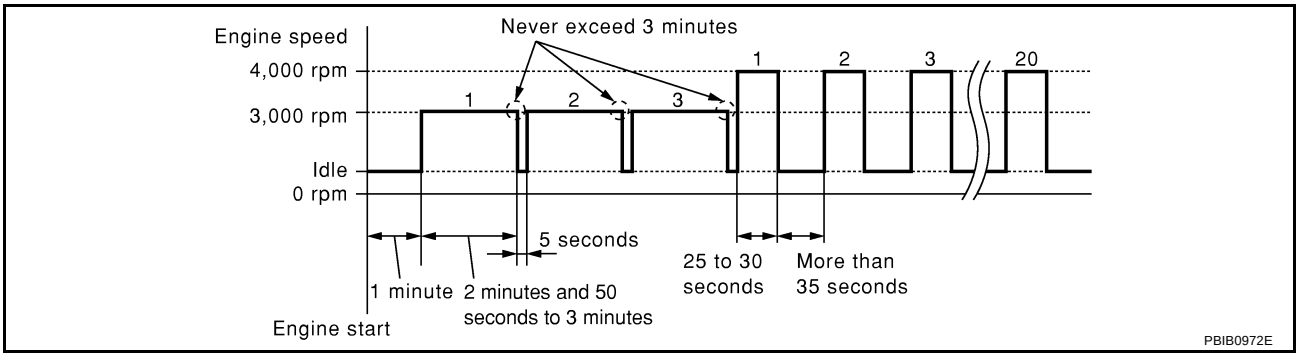
b. Fully released accelerator pedal and keep engine idle for about 5 seconds.

6. If 1st trip DTC is detected, go to EC-555, "Diagnostic Procedure" .
If 1st trip DTC is not detected, go to the next step.
7. Repeat next procedure for 20 times.

a. Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.

b. Fully released accelerator pedal and keep engine idle for at least 35 seconds.




8. If 1st trip DTC is detected, go to EC-555, "Diagnostic Procedure" .

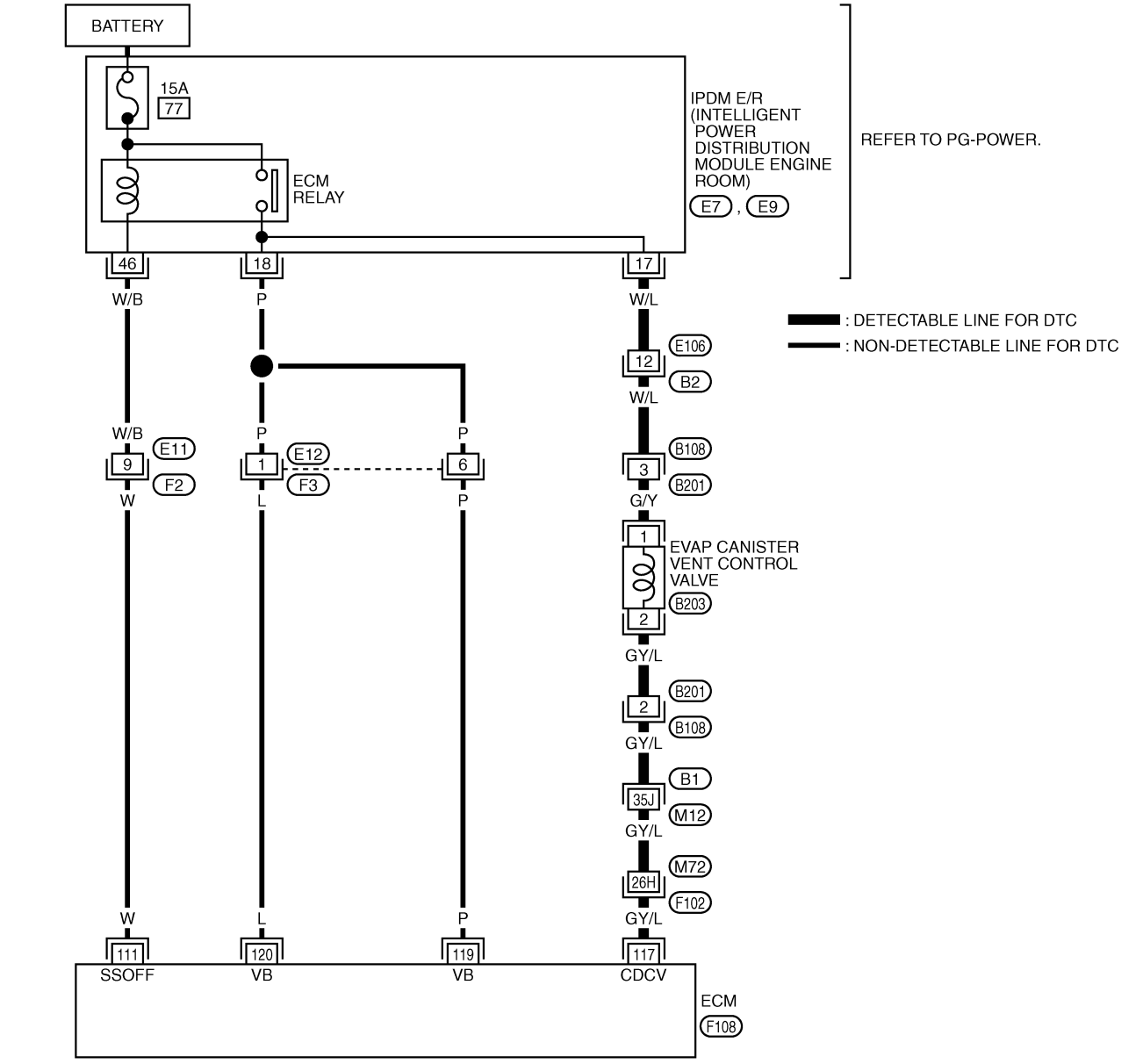
### WITH GST

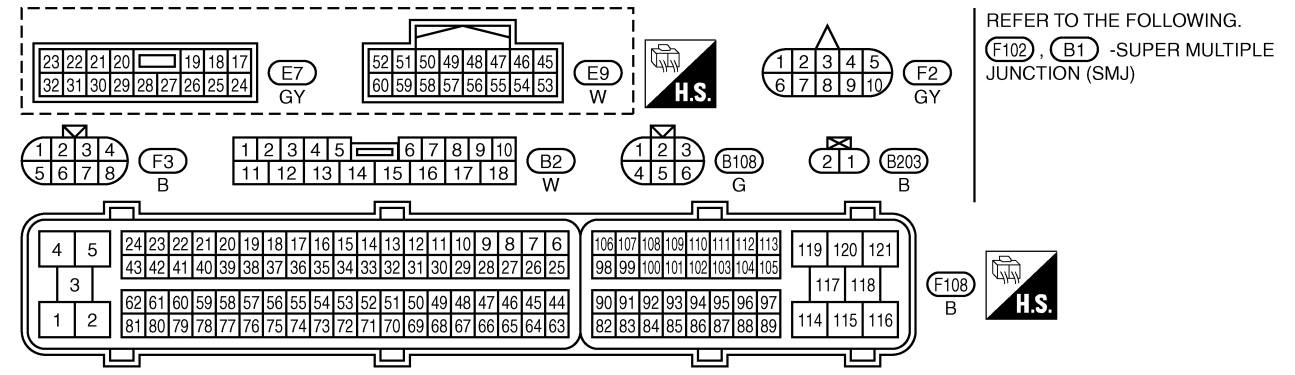
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

ABS00AZR

EC-VENT/V-01




TBWT0661E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

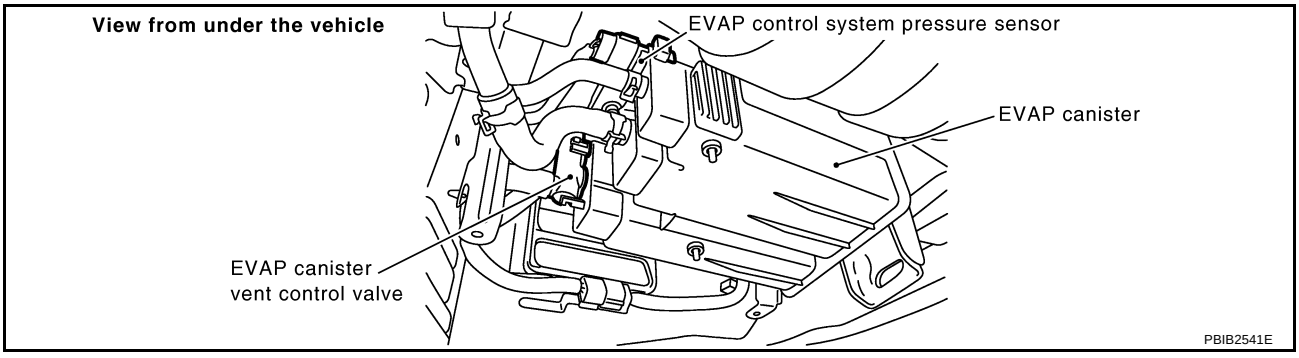
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 111 | W | ECM relay (Self shut-off) | **[Engine is running]** **[Ignition switch: OFF]** ● A few seconds after turning ignition switch OFF | 0 - 1.5V |
| | | | **[Ignition switch: OFF]** ● More than a few seconds after turning ignition switch OFF | BATTERY VOLTAGE (11 - 14V) |
| 117 | GY/L | EVAP canister vent control valve | **[Ignition switch: ON]** | BATTERY VOLTAGE (11 - 14V) |
| 119<br>120 | P<br>L | Power supply for ECM | **[Ignition switch: ON]** | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

ABS00AZS

### 1. CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Disconnect rubber tube connected to EVAP canister vent control valve.




3. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 2.
NG >> Clean rubber tube using an air blower.

### 2. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-557, "EVAP CANISTER VENT CONTROL VALVE" .

OK or NG

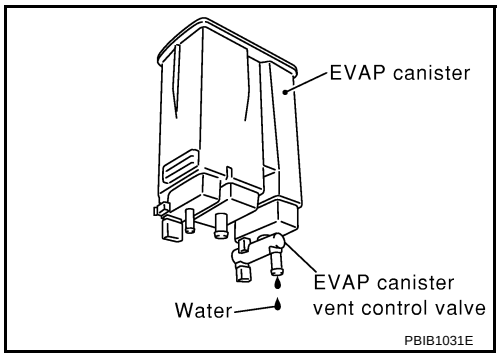
OK >> GO TO 3.
NG >> Replace EVAP canister vent control valve.

## 3. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.

Yes or No

Yes >> GO TO 4.
No >> GO TO 6.




## 4. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

**The weight should be less than 2.1 kg (4.6 lb).**

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

## 5. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

## 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

Refer to EC-349, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP control system pressure sensor.

## 8. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

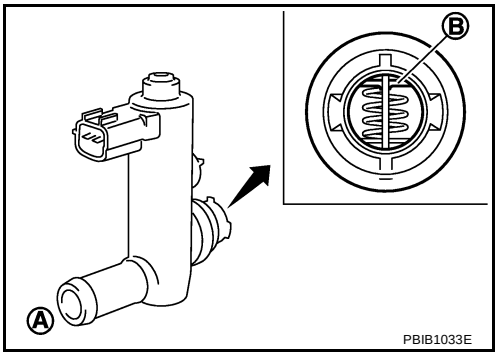
## Component Inspection

ABS00AZT

### EVAP CANISTER VENT CONTROL VALVE

#### With CONSULT-II

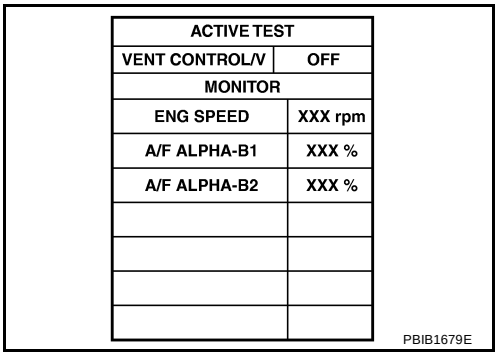
1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
   If NG, replace EVAP canister vent control valve.
   If OK, go to next step.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch ON.




5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
6. Check air passage continuity and operation delay time.
   **Make sure new O-ring is installed properly.**

| Condition VENT CONTROL/V | Air passage continuity between A and B |
|---|---|
| ON | No |
| OFF | Yes |

**Operation takes less than 1 second.**

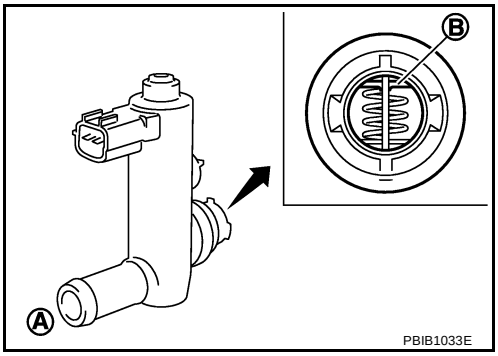



If NG, replace EVAP canister vent control valve.
If OK, go to next step.

7. Clean the air passage (Portion **A** to **B** ) of EVAP canister vent control valve using an air blower.
8. Perform step 6 again.

#### Without CONSULT-II

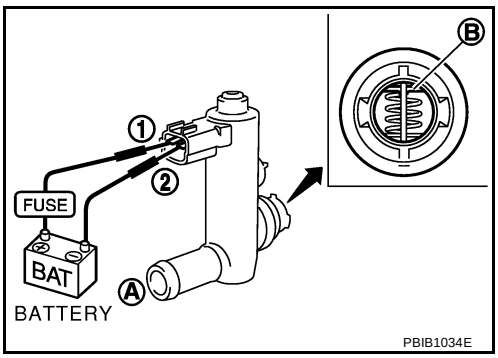
1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.




3. Check air passage continuity and operation delay time under the following conditions.
   **Make sure new O-ring is installed properly.**

| Condition | Air passage continuity between A and B |
|---|---|
| 12V direct current supply between terminals 1 and 2 | No |
| OFF | Yes |

**Operation takes less than 1 second.**




If NG, replace EVAP canister vent control valve.
If OK, go to next step.

4. Clean the air passage (Portion **A** to **B** ) of EVAP canister vent control valve using an air blower.

5. Perform step 3 again.

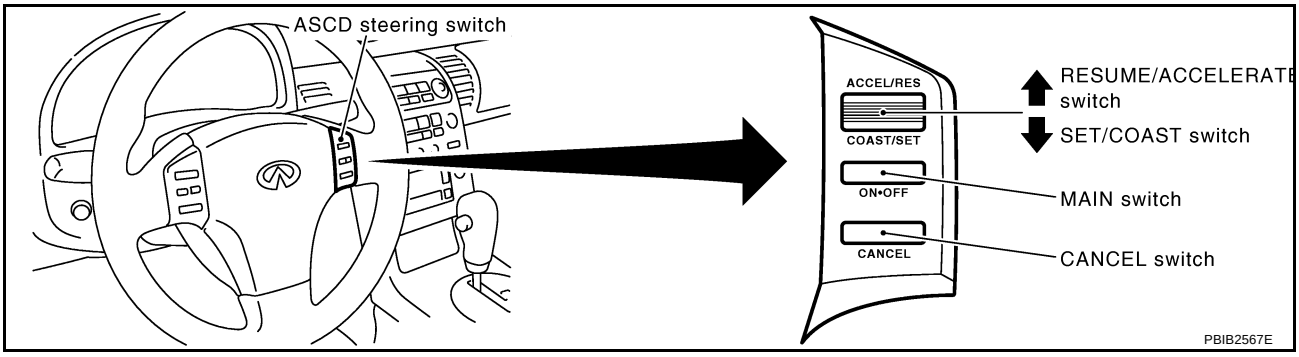
# DTC P1564 ASCD STEERING SWITCH

PFP:25551

## Component Description

ABS00AZU

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.




Refer to EC-28, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

## CONSULT-II Reference Value in Data Monitor Mode

ABS00AZV

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| MAIN SW | ● Ignition switch: ON | MAIN switch: Pressed | ON |
| | | MAIN switch: Released | OFF |
| CANCEL SW | ● Ignition switch: ON | CANCEL switch: Pressed | ON |
| | | CANCEL switch: Released | OFF |
| RESUME/ACC SW | ● Ignition switch: ON | RESUME/ACCELERATE switch: Pressed | ON |
| | | RESUME/ACCELERATE switch: Released | OFF |
| SET SW | ● Ignition switch: ON | SET/COAST switch: Pressed | ON |
| | | SET/COAST switch: Released | OFF |

## On Board Diagnosis Logic

ABS00AZW

**This self-diagnosis has the one trip detection logic.**
**The MIL will not light up for this diagnosis.**

**NOTE:**
**If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-392, "DTC P0605 ECM".**

| DTC No. | Trouble Diagnosis Name | DTC Detecting Condition | Possible Cause |
|---|---|---|---|
| P1564<br>1564 | ASCD steering switch | ● An excessively high voltage signal from the ASCD steering switch is sent to ECM.<br>● ECM detects that input signal from the ASCD steering switch is out of the specified range.<br>● ECM detects that the ASCD steering switch is stuck ON. | ● Harness or connectors (The switch circuit is open or shorted.)<br>● ASCD steering switch<br>● ECM |

## DTC Confirmation Procedure

ABS00AZX

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
4. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. If DTC is detected, go to EC-563, "Diagnostic Procedure" .

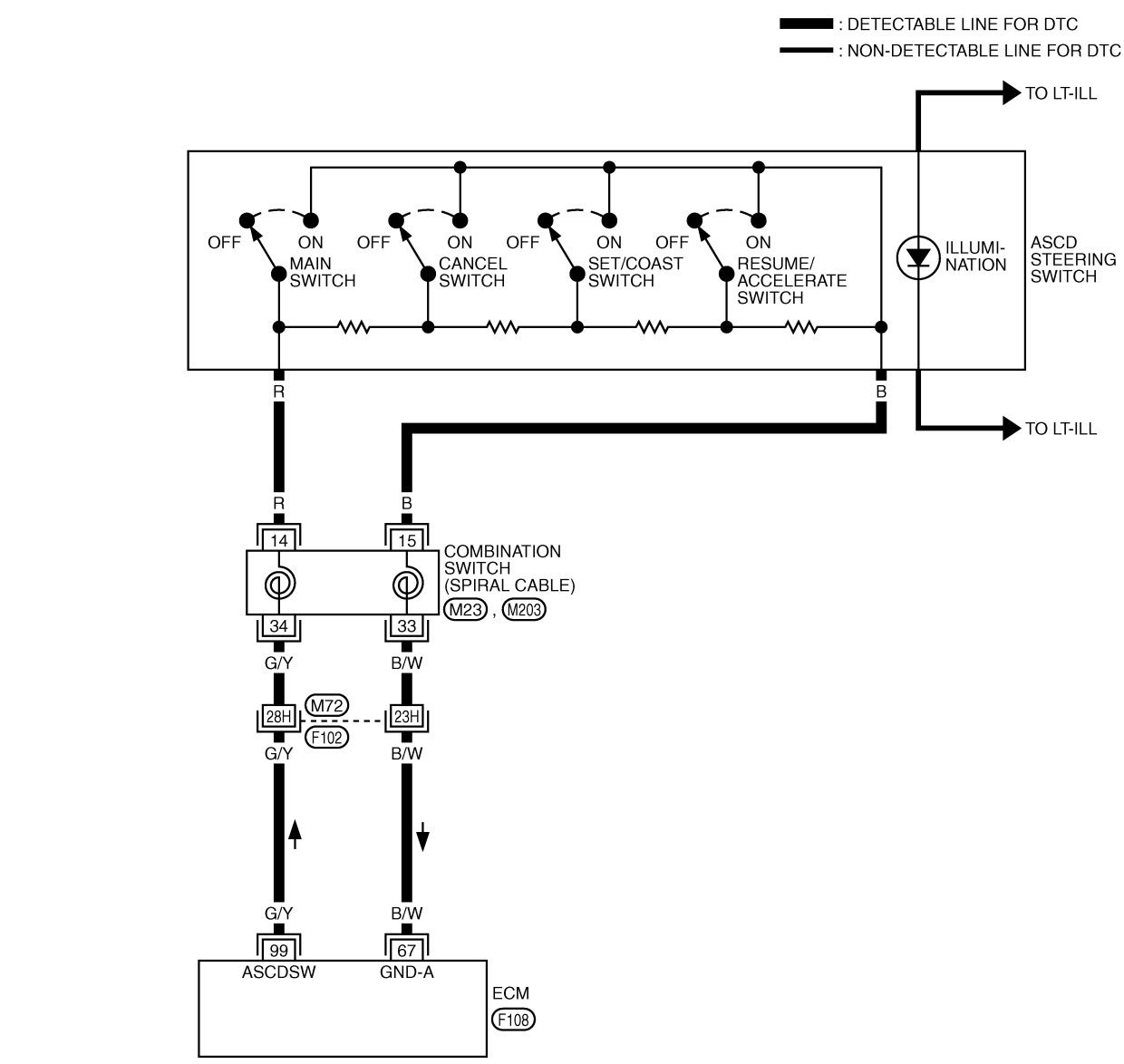
### WITH GST

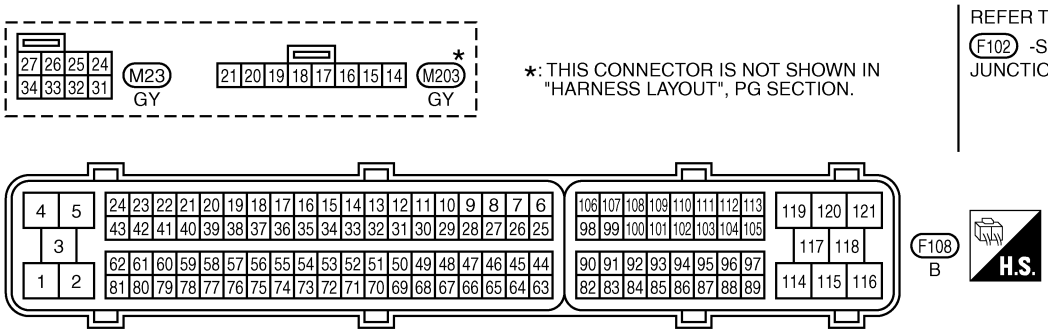
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

ABS00AZY

EC-ASC/SW-01




TBWM0775E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

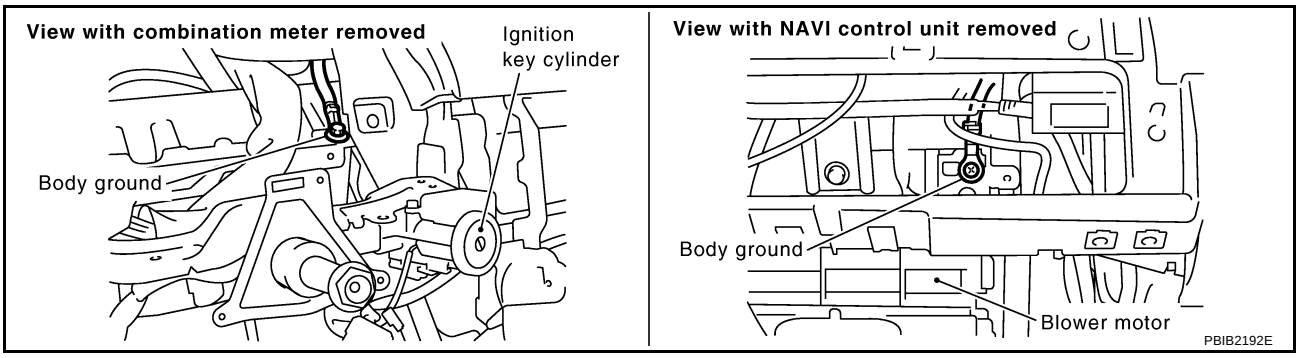
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 67 | B/W | Sensor ground | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 99 | G/Y | ASCD steering switch | **[Ignition switch: ON]**<br>● ASCD steering switch: OFF | Approximately 4V |
| | | | **[Ignition switch: ON]**<br>● MAIN switch: Pressed | Approximately 0V |
| | | | **[Ignition switch: ON]**<br>● CANCEL switch: Pressed | Approximately 1V |
| | | | **[Ignition switch: ON]**<br>● RESUME/ACCELERATE switch: Pressed | Approximately 3V |
| | | | **[Ignition switch: ON]**<br>● SET/COAST switch: Pressed | Approximately 2V |

## Diagnostic Procedure

ABS00AZZ

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .




OK or NG

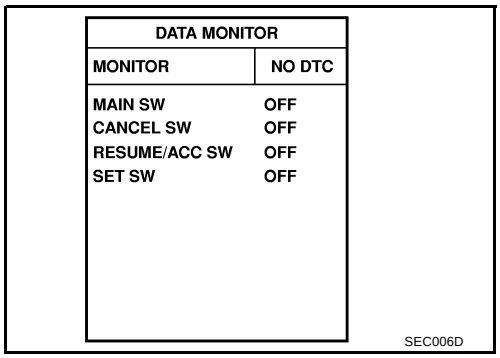
OK >> GO TO 2.
NG >> Repair or replace ground connections.

## 2. CHECK ASCD STEERING SWITCH CIRCUIT

**With CONSULT-II**

1. Turn ignition switch ON.
2. Select “MAIN SW”, “RESUME/ACC SW”, “SET SW” and “CANCEL SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check each item indication under the following conditions.

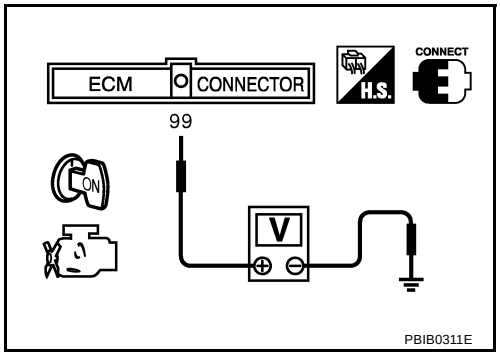
| Switch | Monitor item | Condition | Indication |
|---|---|---|---|
| MAIN switch | MAIN SW | Pressed | ON |
| | | Released | OFF |
| CANCEL switch | CANCEL SW | Pressed | ON |
| | | Released | OFF |
| RESUME/ACCEL-ERATE switch | RESUME/ACC SW | Pressed | ON |
| | | Released | OFF |
| SET/COAST switch | SET SW | Pressed | ON |
| | | Released | OFF |




**Without CONSULT-II**

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 99 and ground with pressing each button.

| Switch | Condition | Voltage [V] |
|---|---|---|
| MAIN switch | Pressed | Approx. 0 |
| | Released | Approx. 4 |
| CANCEL switch | Pressed | Approx. 1 |
| | Released | Approx. 4 |
| RESUME/ACCELERATE switch | Pressed | Approx. 3 |
| | Released | Approx. 4 |
| SET/COAST switch | Pressed | Approx. 2 |
| | Released | Approx. 4 |




OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

## 3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect combination switch harness connector M203.
4. Check harness continuity between combination switch terminal 15 and ECM terminal 67. Refer to Wiring Diagram.

**Continuity should exist.**

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M72, F102
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 99 and combination switch terminal 14. Refer to Wiring Diagram.

**Continuity should exist.**

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M72, F102
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 7. CHECK ASCD STEERING SWITCH

Refer to EC-566, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace steering wheel.

## 8. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

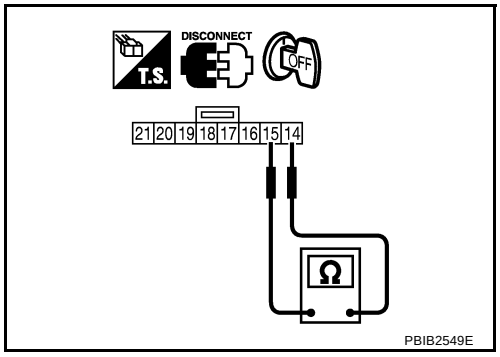
## Component Inspection

ABS00B00

### ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M203.
2. Check continuity between combination switch (spiral cable) terminals 14 and 15 with pushing each switch.

| Switch | Condition | Resistance [Ω] |
|---|---|---|
| MAIN switch | Pressed | Approx. 0 |
| | Released | Approx. 4,000 |
| CANCEL switch | Pressed | Approx. 250 |
| | Released | Approx. 4,000 |
| RESUME/ACCELERATE switch | Pressed | Approx. 1,480 |
| | Released | Approx. 4,000 |
| SET/COAST switch | Pressed | Approx. 660 |
| | Released | Approx. 4,000 |



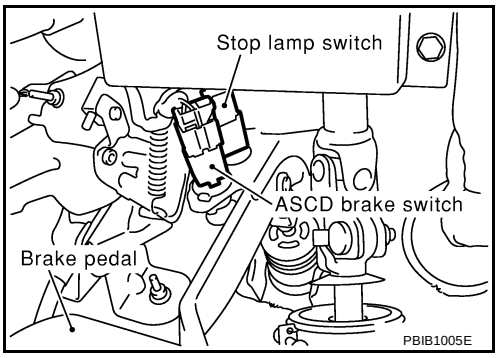
# DTC P1572 ASCD BRAKE SWITCH

PFP:25320

## Component Description

ABS00B01

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-28, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.




## CONSULT-II Reference Value in Data Monitor Mode

ABS00B02

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| BRAKE SW 1<br>(ASCD brake switch) | ● Ignition switch: ON | ● Brake pedal: Fully released (A/T)<br>● Brake pedal and clutch pedal: Fully released (M/T) | ON |
| | | ● Brake pedal: Slightly depressed (A/T)<br>● Brake pedal and/or clutch pedal: Slightly depressed (M/T) | OFF |
| BRAKE SW 2<br>(Stop lamp switch) | ● Ignition switch: ON | Brake pedal: Fully released | OFF |
| | | Brake pedal: Slightly depressed | ON |

## On Board Diagnosis Logic

ABS00DFC

**This self-diagnosis has the one trip detection logic.**
**The MIL will not light up for this diagnosis.**

**NOTE:**

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-392, "DTC P0605 ECM"**
- **This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

| DTC No. | Trouble Diagnosis Name | DTC Detecting Condition | | Possible Cause |
|---|---|---|---|---|
| P1572<br>1572 | ASCD brake switch | A) | When the vehicle speed is above 30km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to ECM at the same time. | ● Harness or connectors (The stop lamp switch circuit is shorted.)<br>● Harness or connectors (The ASCD brake switch circuit is shorted.) |
| | | B) | ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving | ● Harness connectors (The ASCD clutch switch circuit is shorted.) (M/T models)<br>● Stop lamp switch<br>● ASCD brake switch<br>● ASCD clutch switch (M/T models)<br>● Incorrect stop lamp switch installation<br>● Incorrect ASCD brake switch installation<br>● Incorrect ASCD clutch switch installation (M/T models)<br>● ECM |

## DTC Confirmation Procedure

ABS00DFD

**CAUTION:**

**Always drive vehicle at a safe speed.**

**NOTE:**

- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

**TESTING CONDITION:**

**Steps 4 and 5 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.**

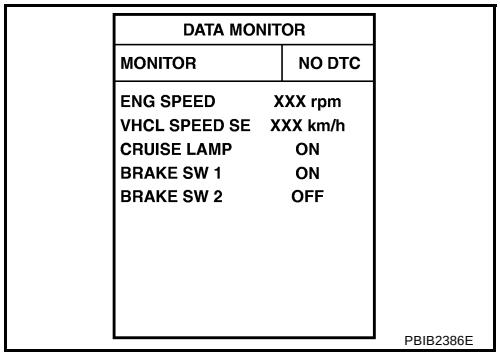
### WITH CONSULT-II

1. Start engine (VDC switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Press MAIN switch and make sure that CRUISE indicator lights up.
4. Drive the vehicle for at least 5 consecutive seconds under the following condition.

| | |
|---|---|
| VHCL SPEED SE | More than 30 km/h (19 MPH) |
| Shift lever | Suitable position |

If 1st trip DTC is detected, go to EC-572, "Diagnostic Procedure" .

If 1st trip DTC is not detected, go to the following step.




5. Drive the vehicle for at least 5 consecutive seconds under the following condition.

| | |
|---|---|
| VHCL SPEED SE | More than 30 km/h (19 MPH) |
| Shift lever | Suitable position |
| Driving location | Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed. |

6. If 1st trip DTC is detected, go to EC-572, "Diagnostic Procedure" .

### WITH GST

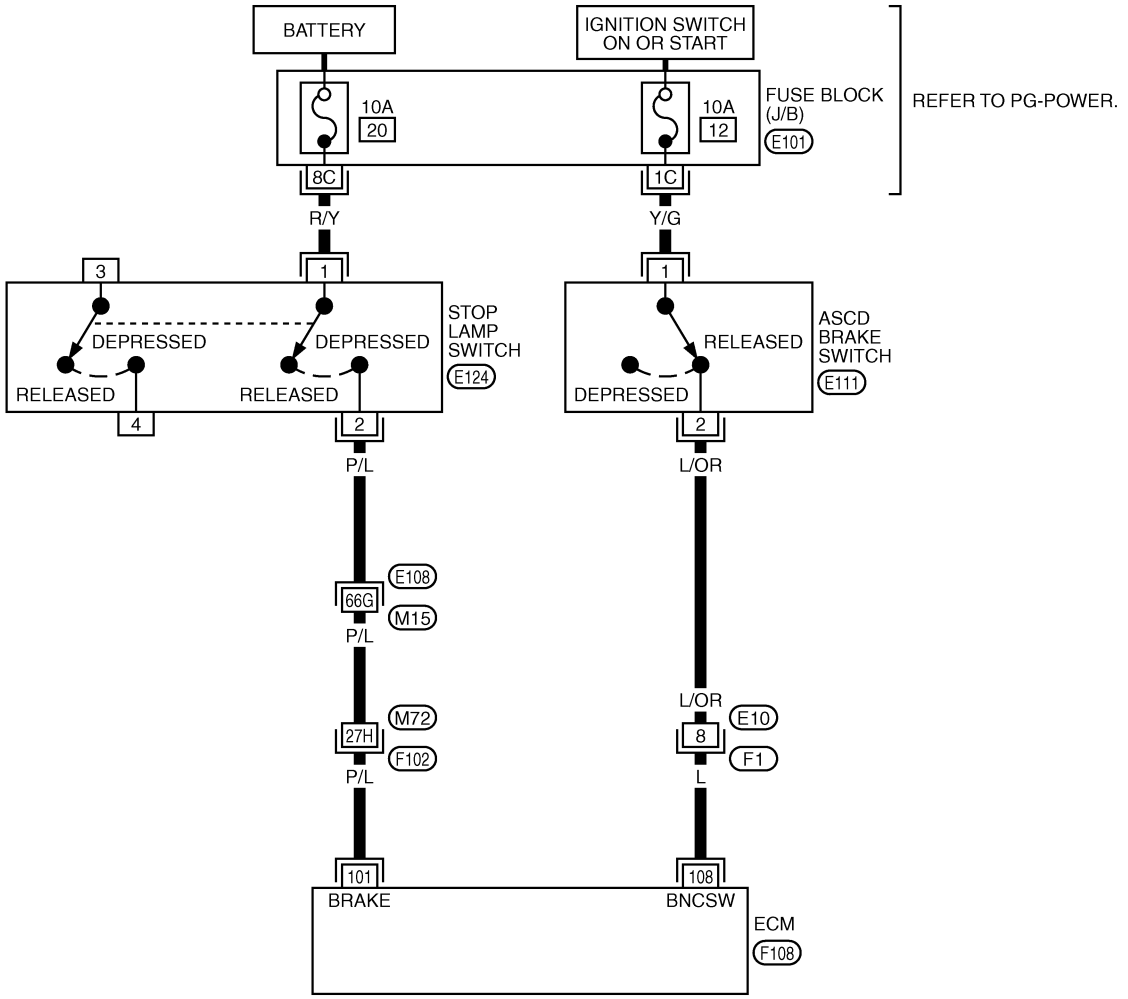
Follow the procedure “WITH CONSULT-II” above.

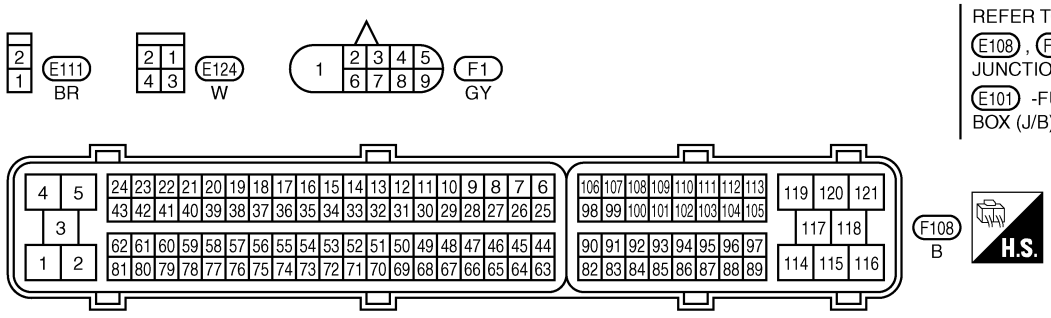
## Wiring Diagram
### A/T MODEL

ABS00B05

EC-ASC/BS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC




REFER TO THE FOLLOWING.
E108 , F102 -SUPER MULTIPLE JUNCTION (SMJ)
E101 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWM0776E

Specification data are reference values and are measured between each terminal and ground.

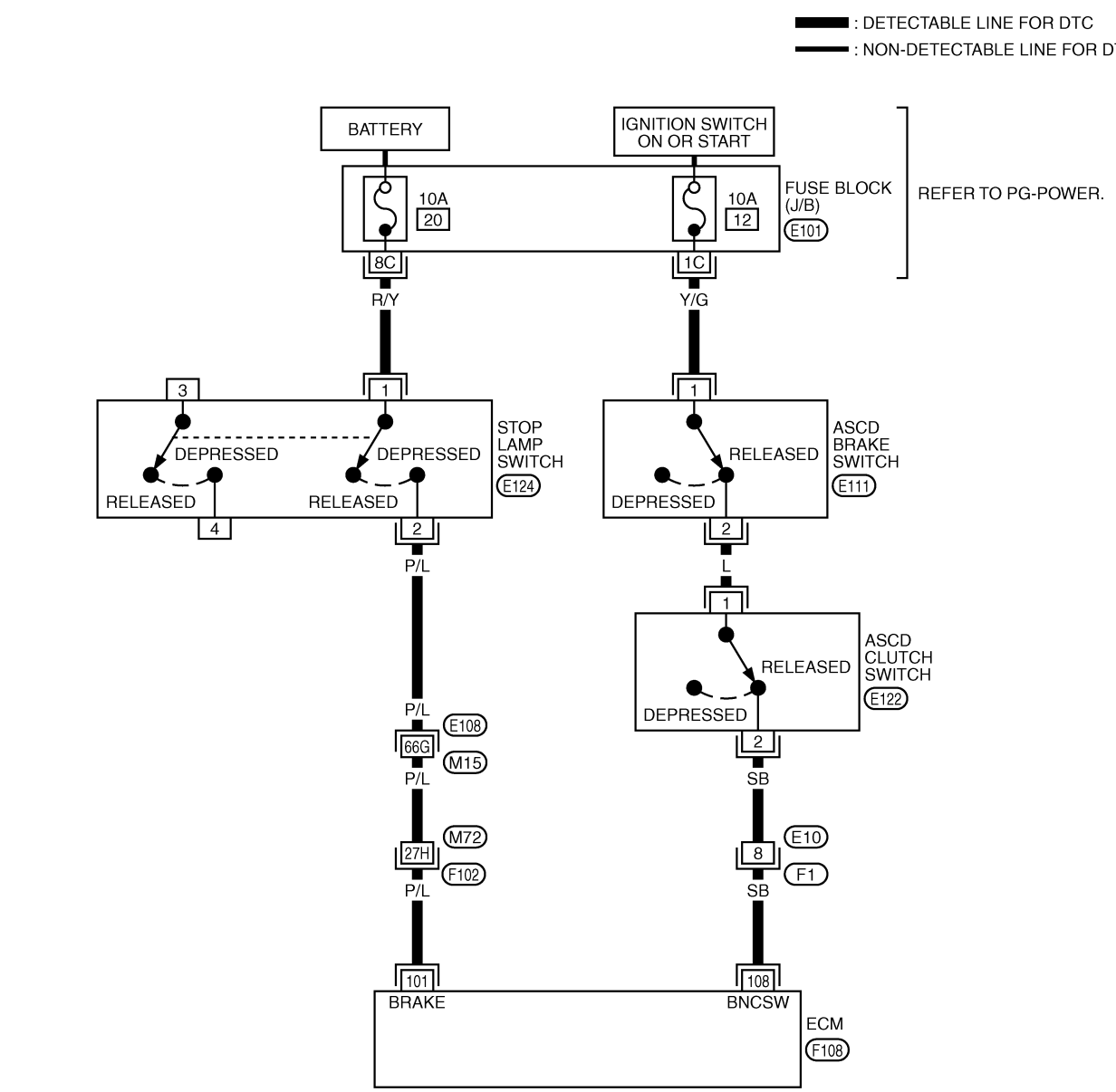
**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 101 | P/L | Stop lamp switch | **[Ignition switch: OFF]**<br>● Brake pedal: Fully released | Approximately 0V |
| | | | **[Ignition switch: OFF]**<br>● Brake pedal: Slightly depressed | BATTERY VOLTAGE<br>(11 - 14V) |
| 108 | L | ASCD brake switch | **[Ignition switch: ON]**<br>● Brake pedal: Slightly depressed | Approximately 0V |
| | | | **[Ignition switch: ON]**<br>● Brake pedal: Fully released | BATTERY VOLTAGE<br>(11 - 14V) |

## M/T MODEL

EC-ASC/BS-02




TBWM0777E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 101 | P/L | Stop lamp switch | **[Ignition switch: OFF]**<br>● Brake pedal: Fully released | Approximately 0V |
| | | | **[Ignition switch: OFF]**<br>● Brake pedal: Slightly depressed | BATTERY VOLTAGE (11 - 14V) |
| 108 | L | ASCD brake switch | **[Ignition switch: ON]**<br>● Brake pedal and/or clutch pedal: Slightly depressed | Approximately 0V |
| | | | **[Ignition switch: ON]**<br>● Brake pedal and clutch pedal: Fully released | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

ABS00B06

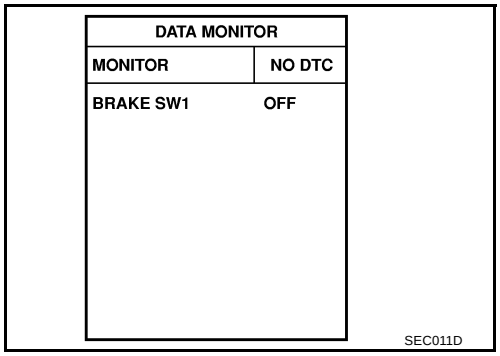
### A/T MODELS

### 1. CHECK OVERALL FUNCTION-I

**With CONSULT-II**

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

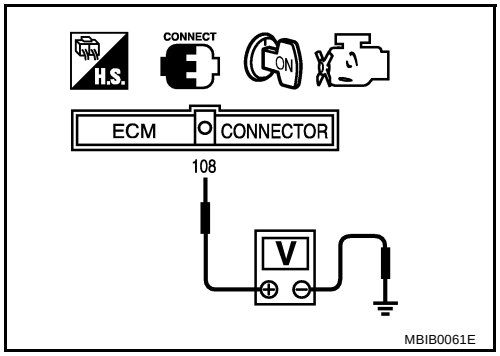
| CONDITION | INDICATION |
|---|---|
| Brake pedal: Slightly depressed | OFF |
| Brake pedal: Fully released | ON |




**Without CONSULT-II**

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

| CONDITION | VOLTAGE |
|---|---|
| Brake pedal: Slightly depressed | Approximately 0V |
| Brake pedal: Fully released | Battery voltage |




OK or NG

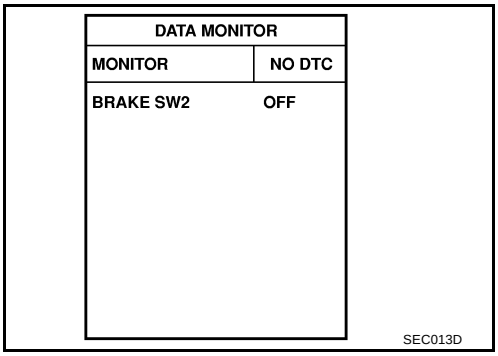
OK >> GO TO 2.
NG >> GO TO 3.

## 2. CHECK OVERALL FUNCTION-II

**With CONSULT-II**

1. Select “BRAKE SW2” in “DATA MONITOR” mode with CONSULT-II.
2. Check “BRAKE SW2” indication under the following conditions.

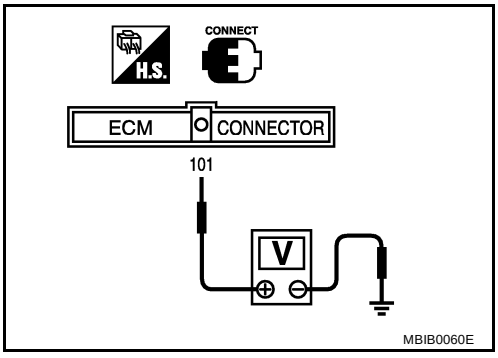
| CONDITION | INDICATION |
|---|---|
| Brake pedal: Fully released | OFF |
| Brake pedal: Slightly depressed | ON |




**Without CONSULT-II**

Check voltage between ECM terminal 101 and ground under the following conditions.

| CONDITION | VOLTAGE |
|---|---|
| Brake pedal: Fully released | Approximately 0V |
| Brake pedal: Slightly depressed | Battery voltage |

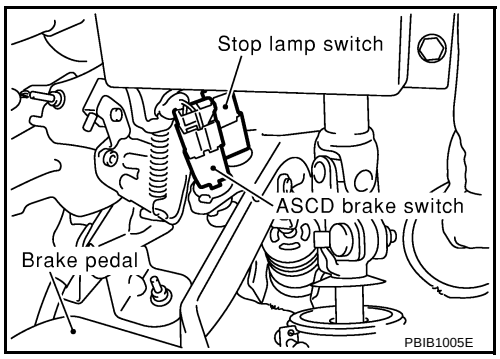



OK or NG

OK >> GO TO 13.
NG >> GO TO 8.

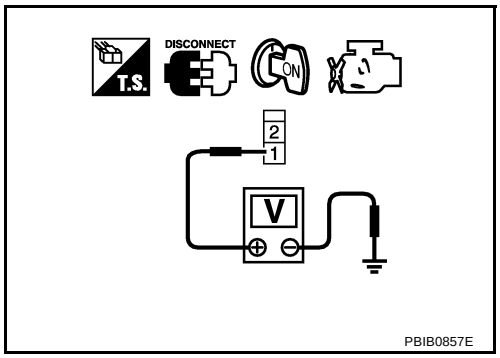
## 3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.




4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-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 E101
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 5. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open or short between ECM and ASCD brake switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 7. CHECK ASCD BRAKE SWITCH

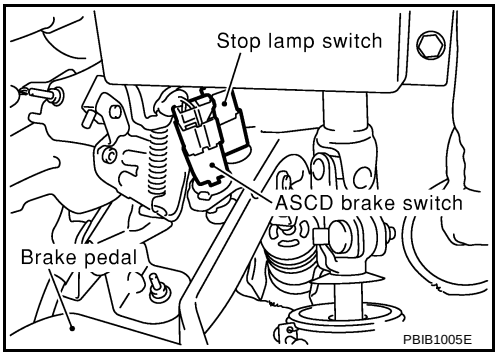
Refer to EC-582, "Component Inspection"

OK or NG

OK >> GO TO 13.
NG >> Replace ASCD brake switch.

## 8. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.

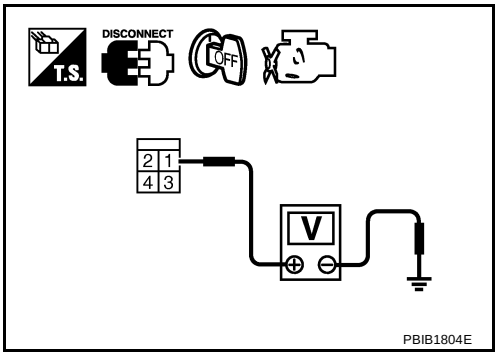



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT -II or tester.

**Voltage: Battery voltage**

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.




## 9. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E101
- 10A fuse
- Harness for open or short between stop lamp switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 10. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

## 11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness connectors M72, F102
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 12. CHECK STOP LAMP SWITCH

Refer to EC-582, "Component Inspection"

OK or NG

OK >> GO TO 13.
NG >> Replace stop lamp switch.

## 13. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

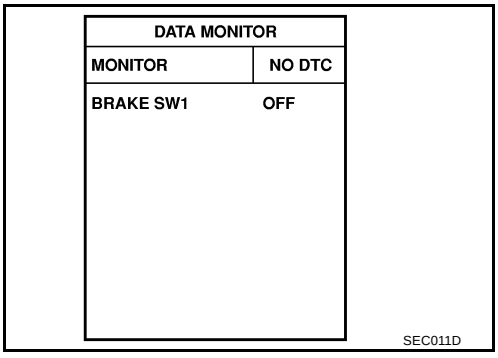
## M/T MODELS

### 1. CHECK OVERALL FUNCTION-I

**With CONSULT-II**

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

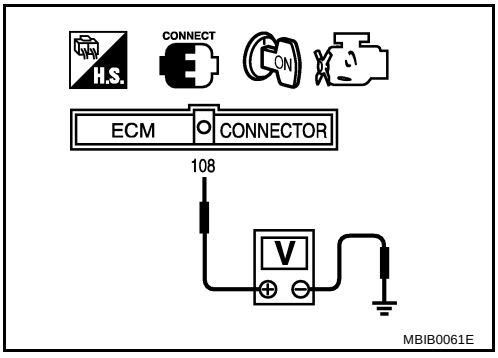
| CONDITION | INDICATION |
|---|---|
| Brake pedal and/or clutch pedal: Slightly depressed | OFF |
| Brake pedal and clutch pedal: Fully released | ON |




**Without CONSULT-II**

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

| CONDITION | VOLTAGE |
|---|---|
| Brake pedal and/or clutch pedal: Slightly depressed | Approximately 0V |
| Brake pedal and clutch pedal: Fully released | Battery voltage |




OK or NG

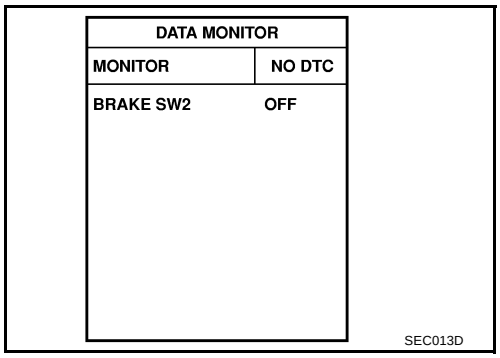
OK >> GO TO 2.
NG >> GO TO 3.

## 2. CHECK OVERALL FUNCTION-II

**With CONSULT-II**

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

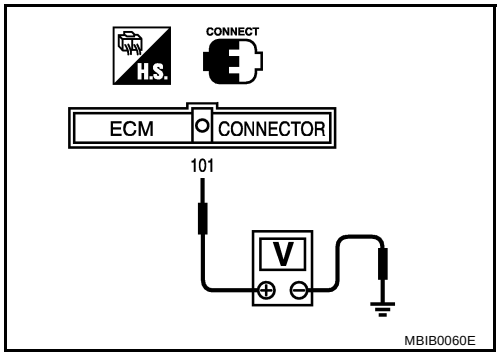
| CONDITION | INDICATION |
|---|---|
| Brake pedal: Fully released | OFF |
| Brake pedal: Slightly depressed | ON |




**Without CONSULT-II**

Check voltage between ECM terminal 101 and ground under the following conditions.

| CONDITION | VOLTAGE |
|---|---|
| Brake pedal: Fully released | Approximately 0V |
| Brake pedal: Slightly depressed | Battery voltage |

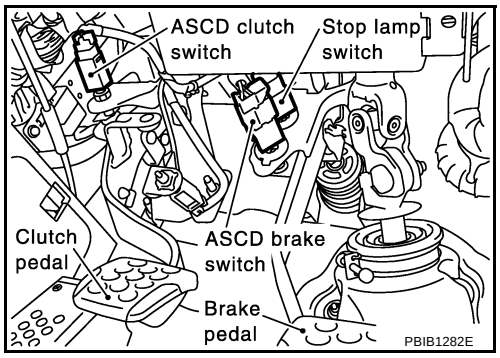



OK or NG

OK >> GO TO 16.
NG >> GO TO 11.

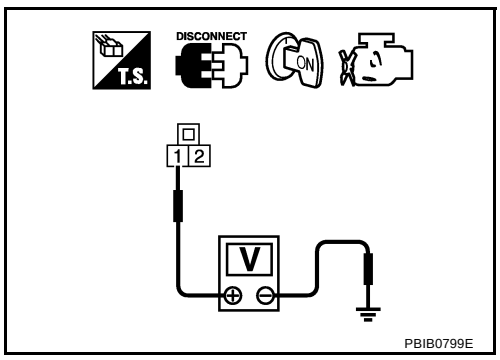
## 3. CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.




4. Check voltage between ASCD clutch switch terminal 1 and ground under the following conditions with CONSULT-II or tester.

| CONDITION | VOLTAGE |
|---|---|
| Brake pedal: Fully released | Battery voltage |
| Brake pedal: Slightly depressed | Approximately 0V |

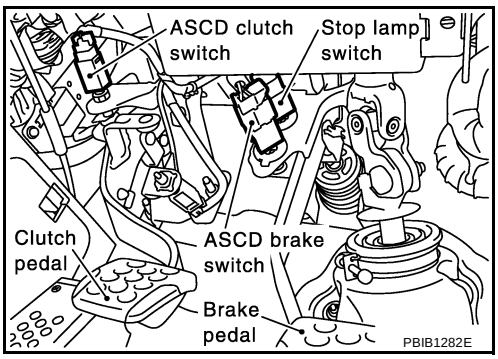



OK or NG

OK >> GO TO 8.
NG >> GO TO 4.

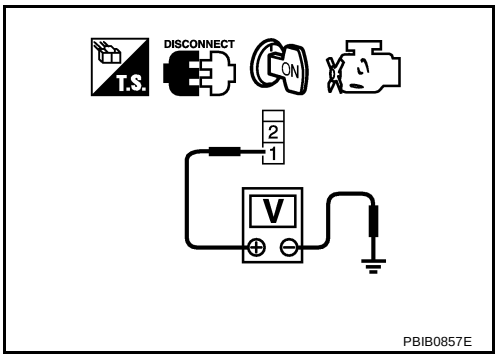
## 4. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.




4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**




OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E101
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 7. CHECK ASCD BRAKE SWITCH

Refer to EC-582, "Component Inspection"

OK or NG

OK >> GO TO 16.
NG >> Replace ASCD brake switch.

## 8. CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ASCD clutch switch terminal 2 and ECM terminal 108. Refer to Wiring Diagram.

**Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

## 9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open or short between ECM and ASCD clutch switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 10. CHECK ASCD CLUTCH SWITCH

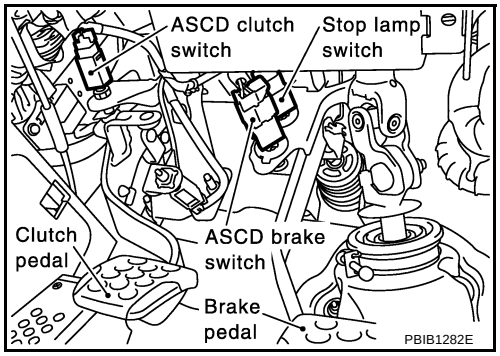
Refer to EC-582, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Replace ASCD clutch switch.

## 11. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.

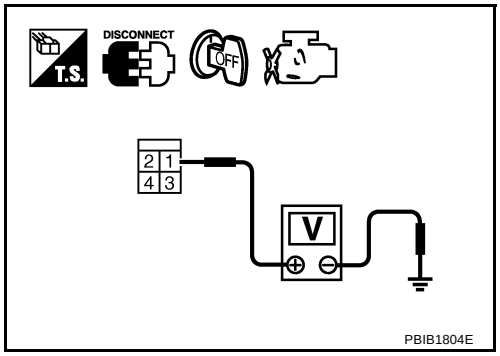



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT -II or tester.

**Voltage: Battery voltage**

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.



## 12. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E101
- 10A fuse
- Harness for open or short between stop lamp switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 13. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

## 14. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness connectors M72, F102
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 15. CHECK STOP LAMP SWITCH

Refer to EC-582, "Component Inspection"

OK or NG

OK >> GO TO 16.
NG >> Replace stop lamp switch.

## 16. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

## Component Inspection

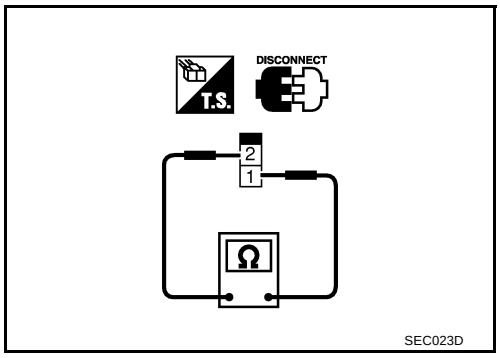
ABS00B07

### ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

| Condition | Continuity |
|---|---|
| Brake pedal: Fully released. | Should exist. |
| Brake pedal: Slightly depressed. | Should not exist. |

If NG, adjust ASCD brake switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

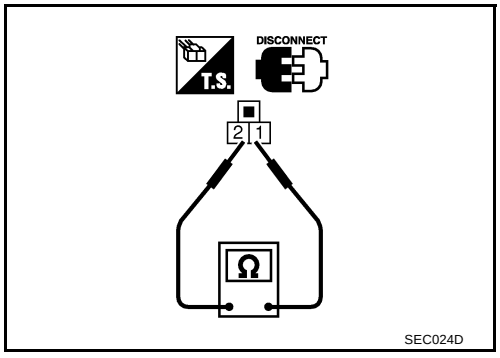



### ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

| Condition | Continuity |
|---|---|
| Clutch pedal: Fully released. | Should exist. |
| Clutch pedal: Slightly depressed. | Should not exist. |

If NG, adjust ASCD clutch switch installation, refer to CL-5, "CLUTCH PEDAL" , and perform step 3 again.

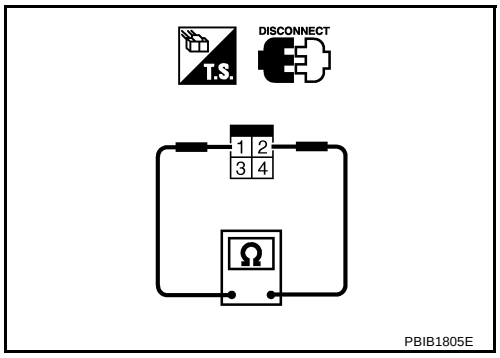



### STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

| Condition | Continuity |
|---|---|
| Brake pedal: Fully released. | Should not exist. |
| Brake pedal: Slightly depressed. | Should exist. |

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.



# DTC P1574 ASCD VEHICLE SPEED SENSOR

PFP:31036

## Component Description

ABS00B08

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-28, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

## On Board Diagnosis Logic

ABS00B09

**This self-diagnosis has the one trip detection logic.**
**The MIL will not light up for this diagnosis.**

**NOTE:**

- **If DTC P1574 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-166, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-381, "DTC P0500 VSS"**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-392, "DTC P0605 ECM"**

| DTC No. | Trouble Diagnosis Name | DTC Detecting Condition | Possible Cause |
|---|---|---|---|
| P1574<br>1574 | ASCD vehicle speed sensor | ECM detects a difference between two vehicle speed signals is out of the specified range. | ● Harness or connectors (The CAN communication line is open or shorted.)<br>● Combination meter<br>● VDC/TCS/ABS control unit<br>● Wheel sensor<br>● TCM (A/T models)<br>● ECM |

## DTC Confirmation Procedure

ABS00B0A

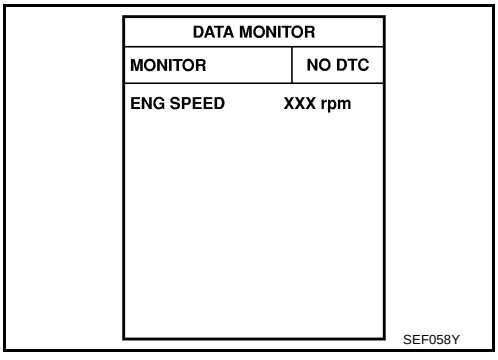
**CAUTION:**
**Always drive vehicle at a safe speed.**

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**
**Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.**

### WITH CONSULT-II

1. Start engine (VDC switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at more than 40 km/h (25 MPH).
4. If DTC is detected, go to EC-584, "Diagnostic Procedure" .




### WITH GST

Follow the procedure “WITH CONSULT-II” above.

## Diagnostic Procedure

ABS00B0B

### 1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-38, "OBD-II Diagnostic Trouble Code (DTC)" .

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

### 2. CHECK DTC WITH VDC/TCS/ABS CONTROL UNIT

Refer to BRC-10, "TROUBLE DIAGNOSIS" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

### 3. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

# DTC P1706 PNP SWITCH

PFP:32006

## Component Description

ABS00B0C

When the selector lever position is P or N (A/T), Neutral (M/T), park/neutral position (PNP) switch is ON.
ECM detects the position because the continuity of the line (the ON signal) exists.
Then the TCM sends the PNP switch signal to the ECM via combination meter. (A/T models)

## CONSULT-II Reference Value in Data Monitor Mode

ABS00B0D

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| P/N POSI SW | ● Ignition switch: ON | Shift lever: P or N (A/T), Neutral (M/T) | ON |
| | | Shift lever: Except above position | OFF |

## On Board Diagnosis Logic

ABS00B0E

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P1706<br>1706 | Park/neutral position switch | The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving. | ● Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.]<br>● Park/neutral position (PNP) switch<br>● TCM (A/T models)<br>● Combination meter (A/T models) |

## DTC Confirmation Procedure

ABS00B0F

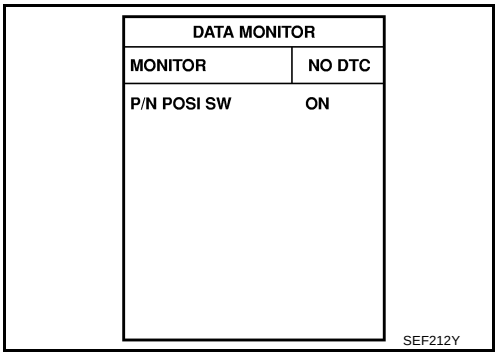
**CAUTION:**
**Always drive vehicle at a safe speed.**

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II. Then check the “P/N POSI SW” signal under the following conditions.

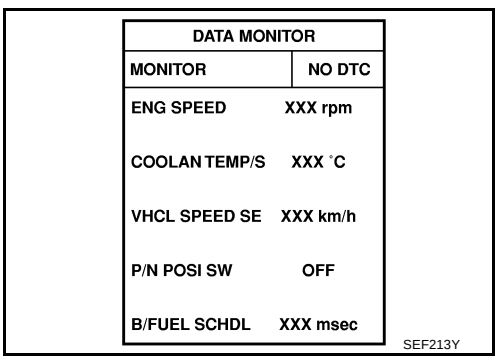
| Position (Shift lever) | Known-good signal |
|---|---|
| N or P position (A/T)<br>Neutral position (M/T) | ON |
| Except above position | OFF |




If NG, go to EC-590, "Diagnostic Procedure" .
If OK, go to following step.

3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

| | |
|---|---|
| ENG SPEED | 1,400 - 6375 rpm |
| COOLAN TEMP/S | More than 70°C (158°F) |
| B/FUEL SCHDL | 2.0 - 31.8 msec |
| VHCL SPEED SE | More than 64 km/h (40 MPH) |
| Shift lever | Suitable position |




6. If 1st trip DTC is detected, go to EC-590, "Diagnostic Procedure" .

## Overall Function Check

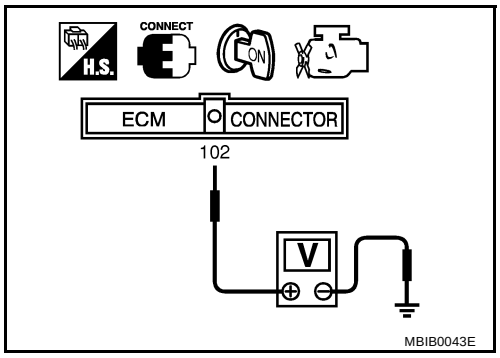
ABS00B0G

Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

**WITH GST**

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 102 (PNP switch signal) and ground under the following conditions.

| Condition (Shift lever) | Voltage (Known good data) |
|---|---|
| P or N position (A/T)<br>Neutral position (M/T) | Approx. 0V |
| Except above position | BATTERY VOLTAGE<br>(11 - 14V) |




3. If NG, go to EC-590, "Diagnostic Procedure" .

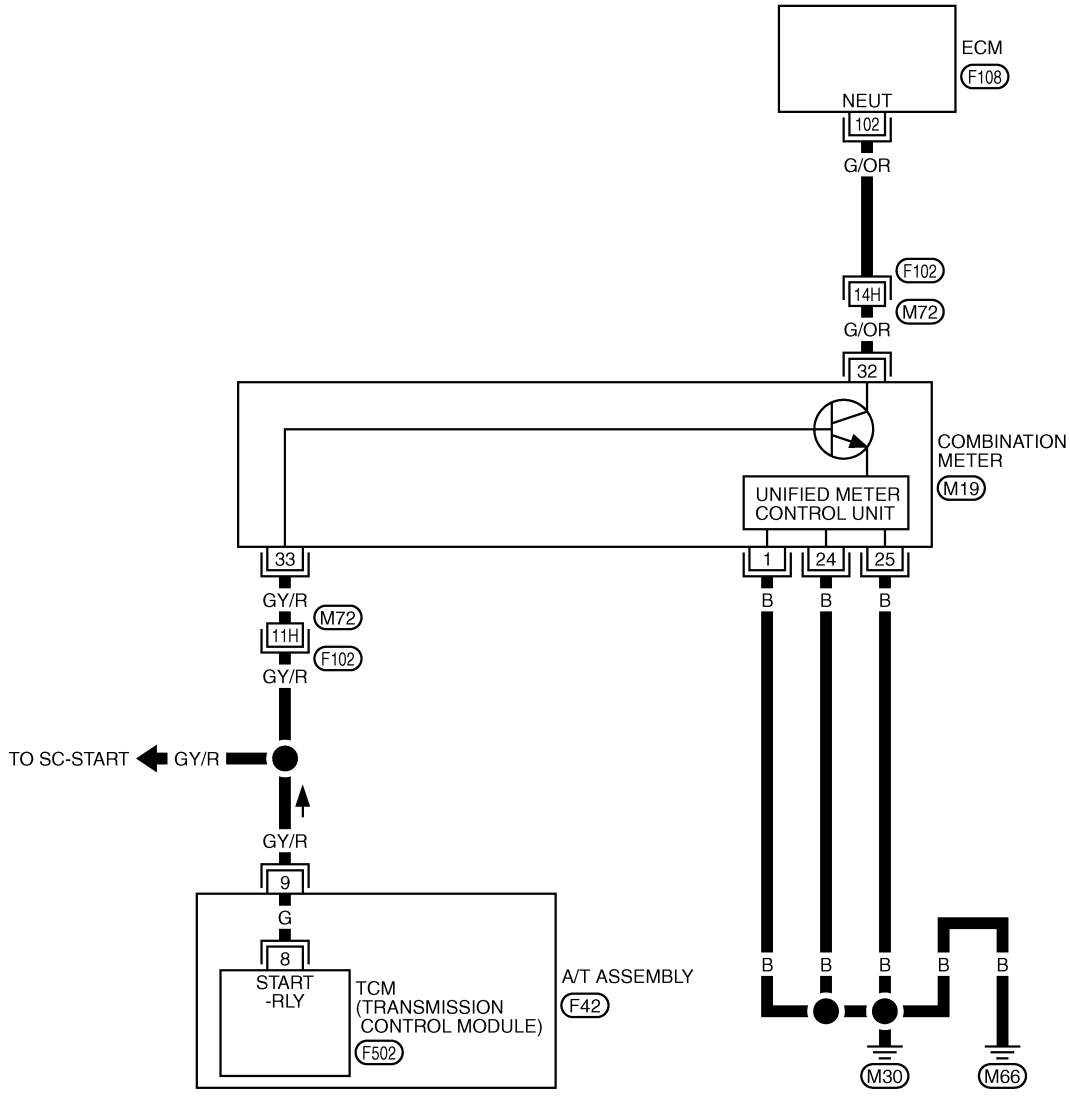
## Wiring Diagram
### A/T MODELS

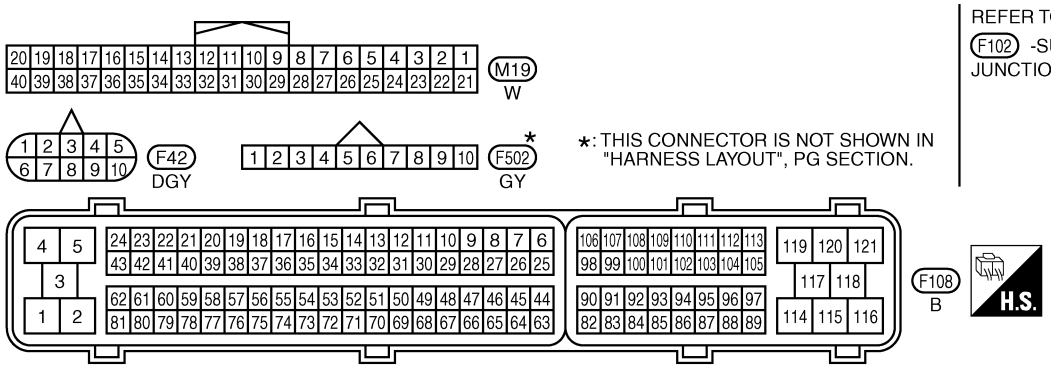
ABS00B0H



EC-PNP/SW-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC




REFER TO THE FOLLOWING.
F102 -SUPER MULTIPLE JUNCTION (SMJ)

TBWM0778E

Specification data are reference values and are measured between each terminal and ground.

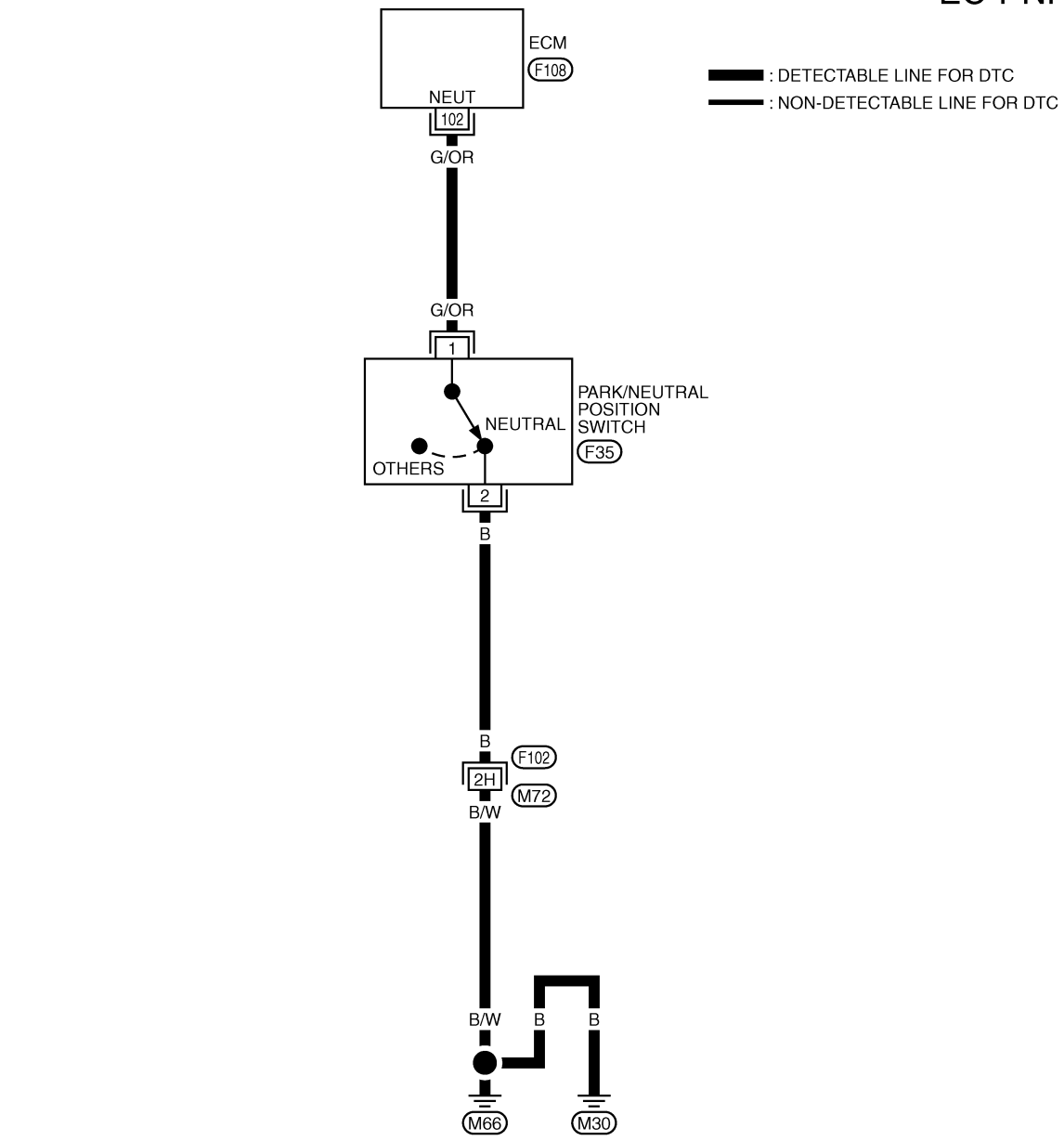
**CAUTION:**

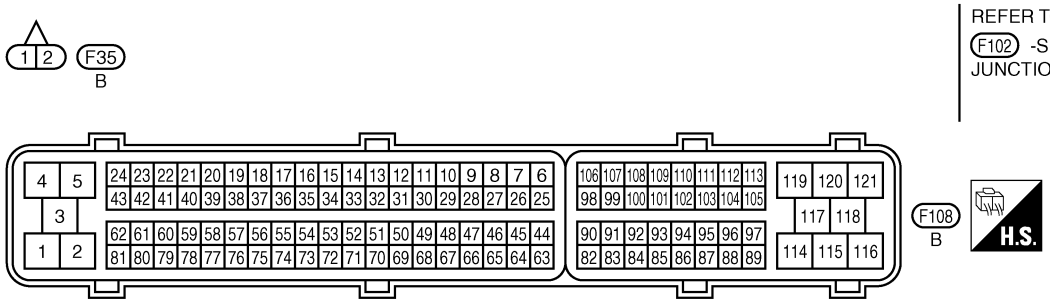
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 102 | G/OR | PNP switch | **[Ignition switch: ON]**<br>● Selector lever: P or N | Approximately 0V |
| | | | **[Ignition switch: ON]**<br>● Except above position | BATTERY VOLTAGE<br>(11 - 14V) |

## M/T MODELS

EC-PNP/SW-02




REFER TO THE FOLLOWING.
F102 -SUPER MULTIPLE JUNCTION (SMJ)

TBWM0779E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 102 | G/OR | PNP switch | **[Ignition switch: ON]**<br>● Shift lever: Neutral | Approximately 0V |
| | | | **[Ignition switch: ON]**<br>● Except above position | BATTERY VOLTAGE<br>(11 - 14V) |

## Diagnostic Procedure

ABS00B0I

### A/T MODELS

### 1. CHECK DTC WITH TCM

Refer to AT-38, "OBD-II Diagnostic Trouble Code (DTC)" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

### 2. CHECK STARTING SYSTEM

Turn ignition switch OFF, then turn it to START.

**Does starter motor operate?**

Yes or No

Yes >> GO TO 3.
No >> Refer to SC-9, "STARTING SYSTEM" .

### 3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect A/T assembly harness connector.
3. Disconnect combination meter harness connector.
4. Check harness continuity between A/T assembly terminal 9 and combination meter terminal 33. Refer to Wiring Diagram.

**Continuity should exist.**

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

### 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F102, M72
- Harness for open or short between A/T assembly and combination meter

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 5. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Check harness continuity between combination meter terminal 24, 1 and ground.
   Refer to Wiring Diagram.

   **Continuity should exist.**

2. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to power in harness or connectors.

## 6. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-III

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and combination meter terminal 32.
   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 F102, M72
- 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.

## 8. CHECK COMBINATION METER

Refer to DI-4, "COMBINATION METERS" .

OK or NG

OK >> GO TO 9.
NG >> Replace combination meter

## 9. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-IV

1. Check harness continuity between A/T assembly terminal 9 and TCM terminal 8.
   Refer to AT-114, "DTC P0615 START SIGNAL CIRCUIT" .

   **Continuity should exist.**

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 10. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

## M/T MODELS

### 1. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect Park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and ground.
   Refer to Wiring Diagram.

   **Continuity should exist.**

4. Also check harness for short to power.

OK or NG

OK >> GO TO 3
NG >> GO TO 2.

### 2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F102, M72
- Harness for open or short between PNP switch and ground

>> Repair open circuit or short to power in harness or connectors.

### 3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and PNP switch terminal 1.
   Refer to Wiring Diagram.

   **Continuity should exist.**

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

### 4. CHECK PNP SWITCH

Refer to MT-12, "NEUTRAL POSITION SWITCH" .

OK or NG

OK >> GO TO 5.
NG >> Replace PNP switch.

### 5. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

# DTC P1805 BRAKE SWITCH

PFP:25320

## Description

ABS00B0J

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

## CONSULT-II Reference Value in Data Monitor Mode

ABS00B0K

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| BRAKE SW | ● Ignition switch: ON | Brake pedal: Fully released | OFF |
| | | Brake pedal: Slightly depressed | ON |

## On Board Diagnosis Logic

ABS00B0L

**The MIL will not light up for this diagnosis.**

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P1805<br>1805 | Brake switch | A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving. | ● Harness or connectors (The stop lamp switch circuit is open or shorted.)<br>● Stop lamp switch |

### FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode.

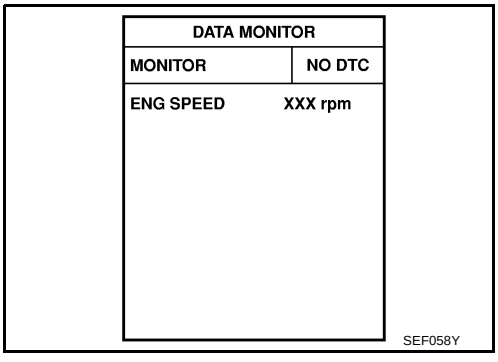
| Engine operating condition in fail-safe mode | |
|---|---|
| ECM controls the electric throttle control actuator by regulating the throttle opening to a small range.<br>Therefore, acceleration will be poor. | |
| Vehicle condition | Driving condition |
| When engine is idling | Normal |
| When accelerating | Poor acceleration |

## DTC Confirmation Procedure

ABS00B0M

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-II.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. If 1st trip DTC is detected, go to EC-595, "Diagnostic Procedure" .



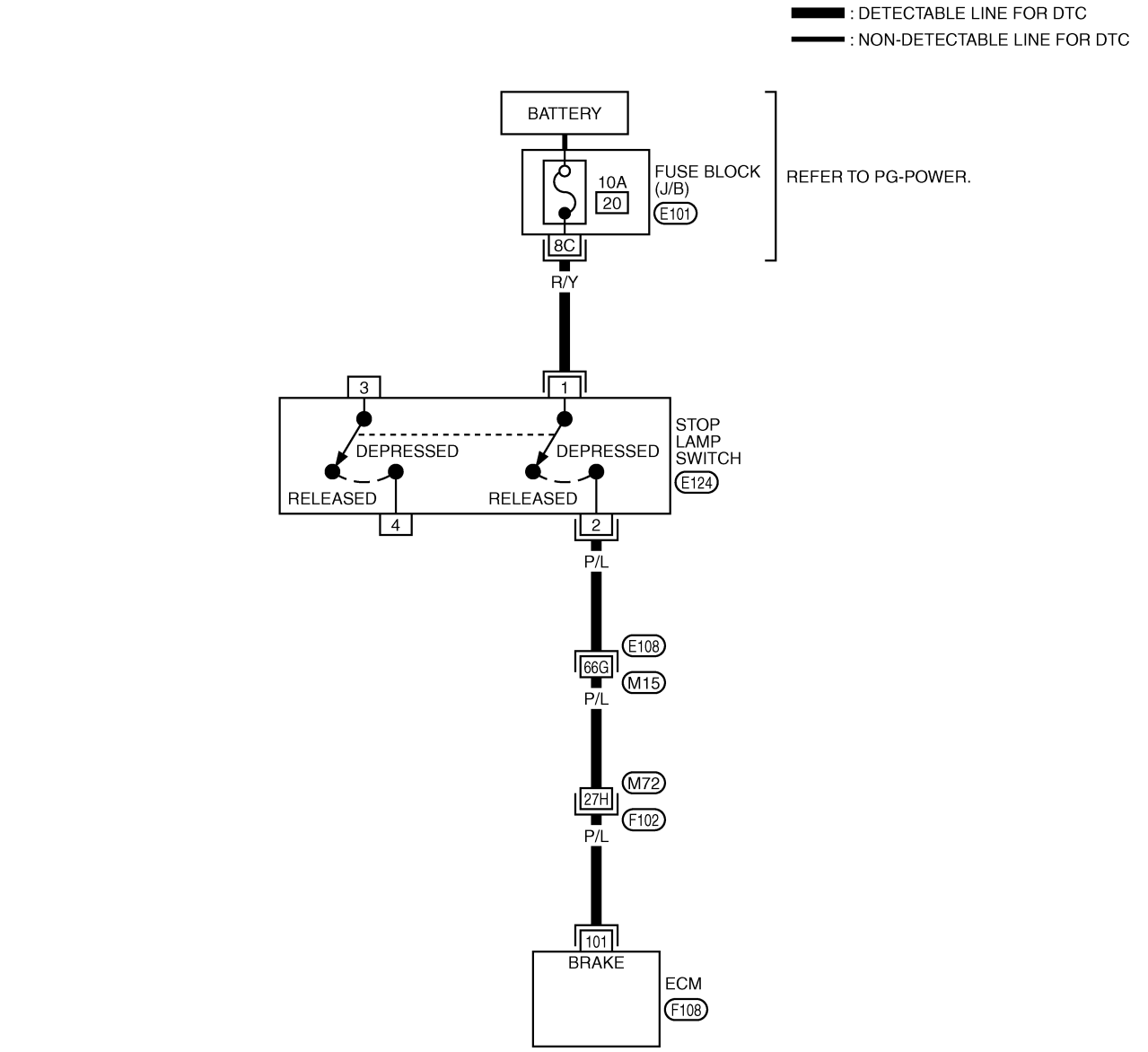

### WITH GST

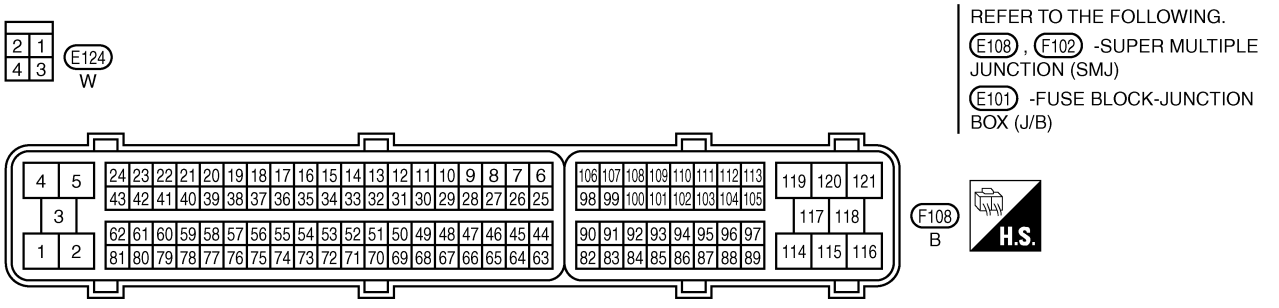
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

ABS00B0N

EC-BRK/SW-01




TBWM0780E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 101 | P/L | Stop lamp switch | **[Ignition switch: OFF]**<br>● Brake pedal: Fully released | Approximately 0V |
| | | | **[Ignition switch: OFF]**<br>● Brake pedal: Slightly depressed | BATTERY VOLTAGE<br>(11 - 14V) |

## Diagnostic Procedure

ABS00B0O

### 1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

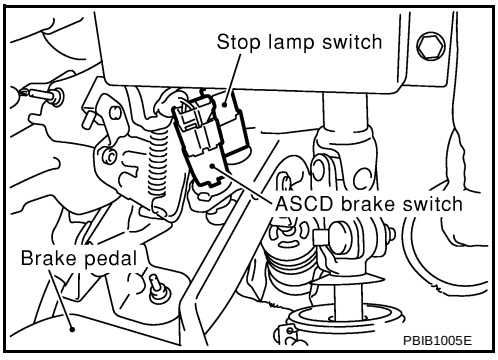
| Brake pedal | Stop lamp |
|---|---|
| Fully released | Not illuminated |
| Slightly depressed | Illuminated |

OK or NG

OK >> GO TO 4.
NG >> GO TO 2.

### 2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.

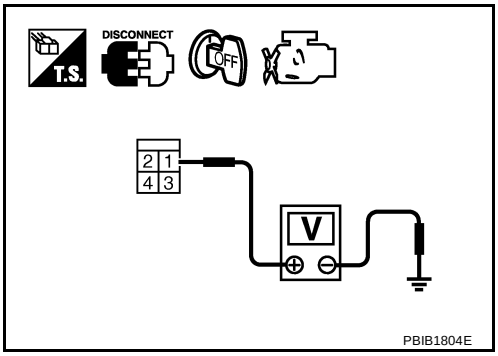



2. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



## 3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Fuse block (J/B) connector E101
- Harness for open and short between stop lamp switch and fuse

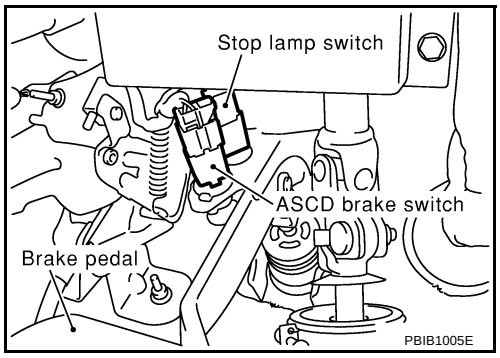
>> Repair open circuit or short to ground or short to power in harness or connectors.

## 4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect stop lamp switch harness connector.
3. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2.
   Refer to Wiring Diagram.

**Continuity should exist.**

4. Also check harness for short to ground and short to power.




OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness connectors M72, F102
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 6. CHECK STOP LAMP SWITCH

Refer to EC-597, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace stop lamp switch.

## 7. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

## Component Inspection

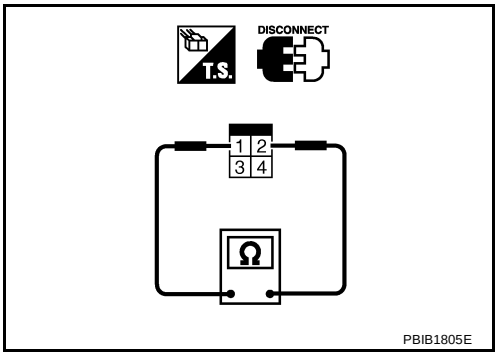
ABS00B0P

### STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

| Condition | Continuity |
|---|---|
| Brake pedal: Fully released. | Should not exist. |
| Brake pedal: Slightly depressed. | Should exist. |

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.



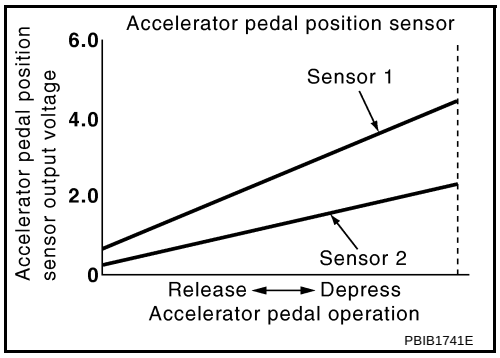
# DTC P2122, P2123 APP SENSOR

PFP:18002

## Component Description

ABS00B0Q

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.




## CONSULT-II Reference Value in Data Monitor Mode

ABS00B0R

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| ACCEL SEN 1 | ● Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | 0.5 - 1.0V |
| | | Accelerator pedal: Fully depressed | 4.0 - 4.8V |
| ACCEL SEN 2* | ● Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | 0.3 - 1.2V |
| | | Accelerator pedal: Fully depressed | 3.9 - 4.8V |
| CLSD THL POS | ● Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | ON |
| | | Accelerator pedal: Slightly depressed | OFF |

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

## On Board Diagnosis Logic

ABS00B0S

**These self-diagnoses have the one trip detection logic.**

**NOTE:**
**If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-472, "DTC P1229 SENSOR POWER SUPPLY" .**

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P2122<br>2122 | Accelerator pedal position sensor 1 circuit low input | An excessively low voltage from the APP sensor 1 is sent to ECM. | ● Harness or connectors (The APP sensor 1 circuit is open or shorted.)<br>● Accelerator pedal position sensor (APP sensor 1) |
| P2123<br>2123 | Accelerator pedal position sensor 1 circuit high input | An excessively high voltage from the APP sensor 1 is sent to ECM. | |

### FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

| Engine operating condition in fail-safe mode |
|---|
| ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.<br>ECM regulates the opening speed of the throttle valve to be slower than the normal condition.<br>So, the acceleration will be poor. |

## DTC Confirmation Procedure

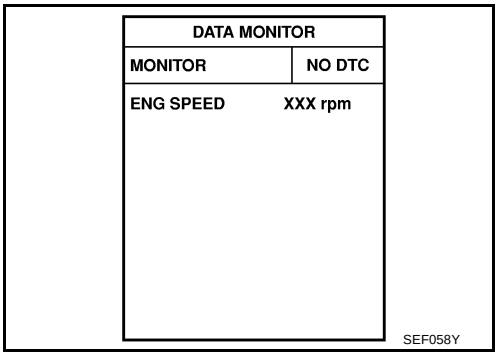
ABS00B0T

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**
**Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-601, "Diagnostic Procedure" .



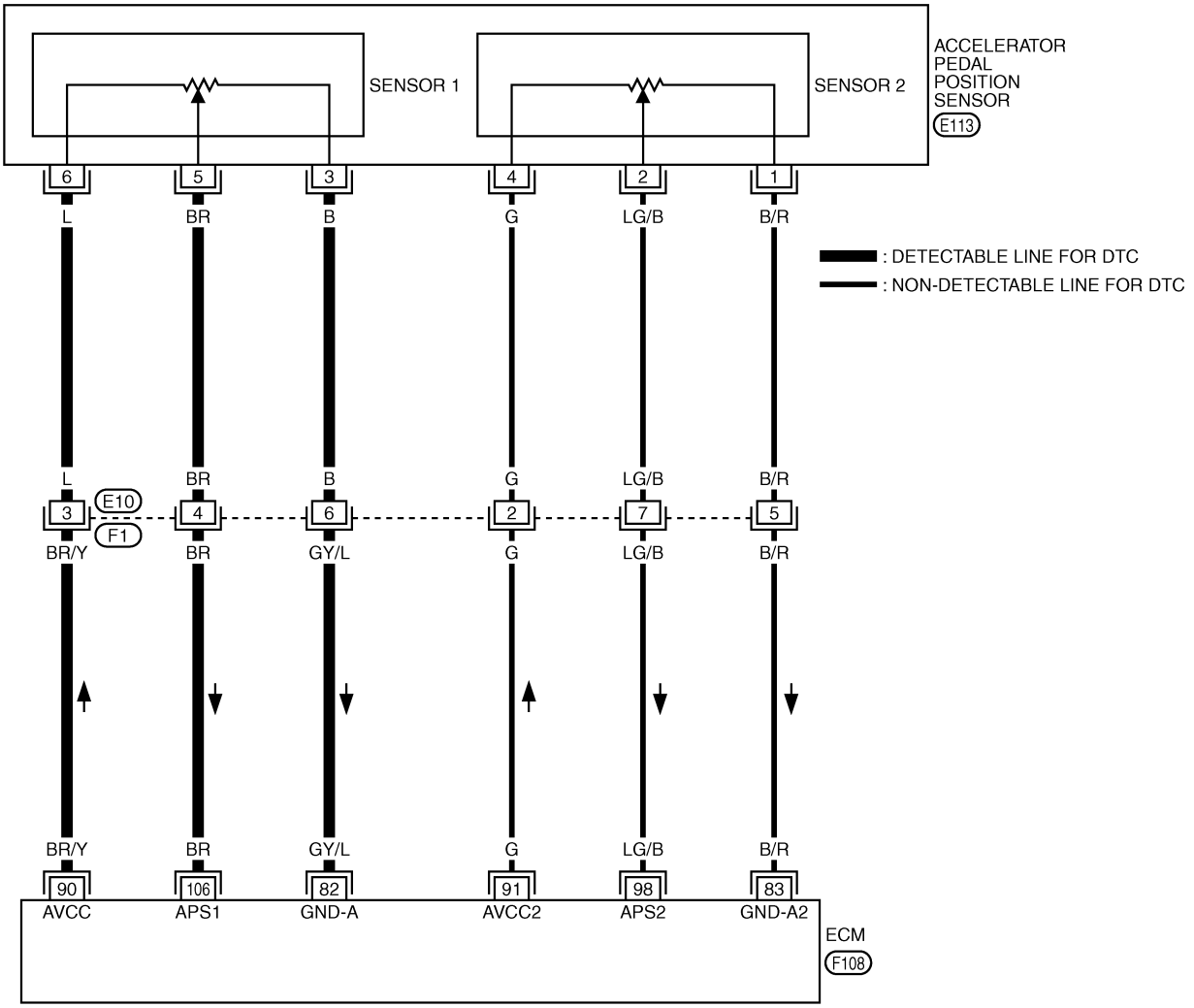

### WITH GST

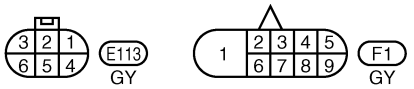
Follow the procedure “WITH CONSULT-II” above.

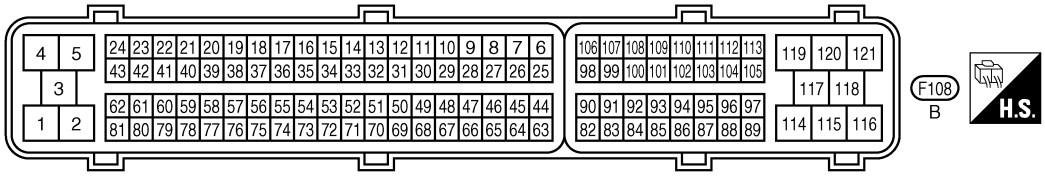
## Wiring Diagram

ABS00B0U

EC-APPS1-01




TBWM0781E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

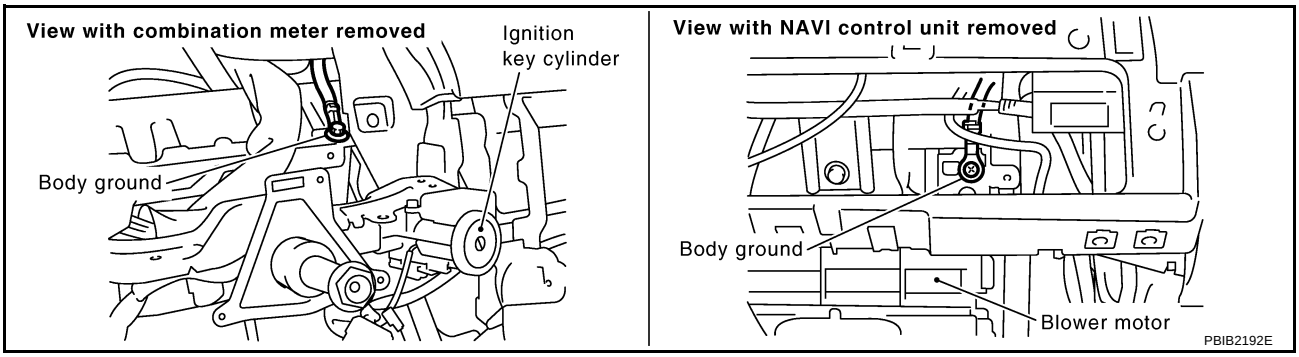
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 82 | GY/L | Sensor ground (Accelerator pedal position sensor 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 83 | B/R | Sensor ground (Accelerator pedal position sensor 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 90 | BR/Y | Sensor power supply (Accelerator pedal position sensor 1) | **[Ignition switch: ON]** | Approximately 5V |
| 91 | G | Sensor power supply (Accelerator pedal position sensor 2) | **[Ignition switch: ON]** | Approximately 5V |
| 98 | LG/B | Accelerator pedal position sensor 2 | **[Ignition switch: ON]**<br>● Engine stopped<br>● Accelerator pedal: Fully released | 0.15 - 0.60V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>● Accelerator pedal: Fully depressed | 1.95 - 2.40V |
| 106 | BR | Accelerator pedal position sensor 1 | **[Ignition switch: ON]**<br>● Engine stopped<br>● Accelerator pedal: Fully released | 0.5 - 1.0V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>● Accelerator pedal: Fully depressed | 3.9 - 4.7V |

## Diagnostic Procedure

ABS00B0V

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

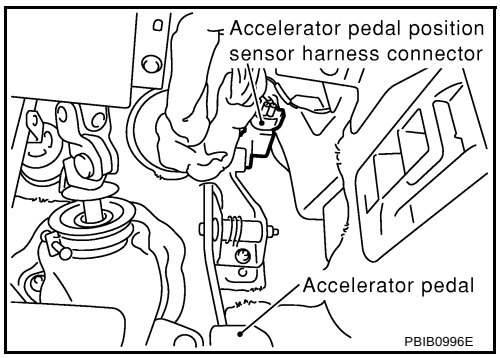



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

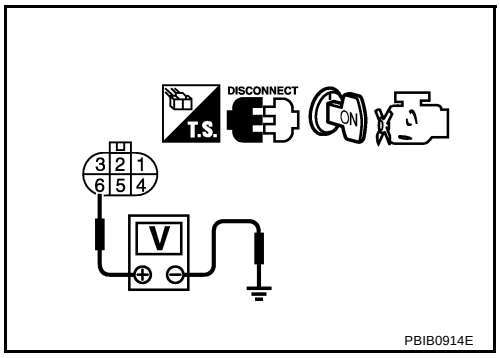
## 2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.




3. Check voltage between APP sensor terminal 6 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**




OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

## 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 4. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 3 and ECM terminal 82. Refer to Wiring Diagram.

**Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 6. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 5. Refer to Wiring Diagram.

**Continuity should exist.**

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 8. CHECK APP SENSOR

Refer to EC-626, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

## 9. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-88, "Accelerator Pedal Released Position Learning" .
3. Perform EC-88, "Throttle Valve Closed Position Learning" .
4. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

## 10. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

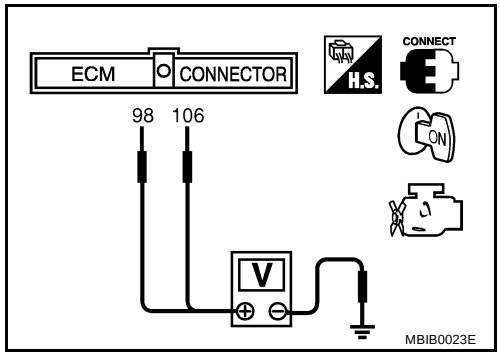
# Component Inspection

ABS00B0W

## ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

| Terminal | Accelerator pedal | Voltage |
|---|---|---|
| 106 (Accelerator pedal position sensor 1) | Fully released | 0.5 - 1.0V |
| | Fully depressed | 3.9 - 4.7V |
| 98 (Accelerator pedal position sensor 2) | Fully released | 0.15 - 0.60V |
| | Fully depressed | 1.95 - 2.40V |



4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-88, "Accelerator Pedal Released Position Learning" .
6. Perform EC-88, "Throttle Valve Closed Position Learning" .
7. Perform EC-89, "Idle Air Volume Learning" .

## Removal and Installation

ABS00B0X

### ACCELERATOR PEDAL

Refer to ACC-3, "ACCELERATOR CONTROL SYSTEM" .

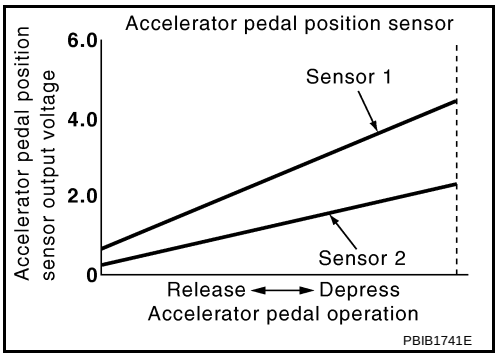
# DTC P2127, P2128 APP SENSOR

PFP:18002

## Component Description

ABS00B0Y

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.




## CONSULT-II Reference Value in Data Monitor Mode

ABS00B0Z

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| ACCEL SEN 1 | ● Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | 0.5 - 1.0V |
| | | Accelerator pedal: Fully depressed | 4.0 - 4.8V |
| ACCEL SEN 2* | ● Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | 0.3 - 1.2V |
| | | Accelerator pedal: Fully depressed | 3.9 - 4.8V |
| CLSD THL POS | ● Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | ON |
| | | Accelerator pedal: Slightly depressed | OFF |

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

## On Board Diagnosis Logic

ABS00B10

**These self-diagnoses have the one trip detection logic.**

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P2127<br>2127 | Accelerator pedal position sensor 2 circuit low input | An excessively low voltage from the APP sensor 2 is sent to ECM. | ● Harness or connectors (The APP sensor 2 circuit is open or shorted.) (The TP sensor circuit is shorted.)<br>● Accelerator pedal position sensor (APP sensor 2)<br>● Electric throttle control actuator (TP sensor 1 and 2) |
| P2128<br>2128 | Accelerator pedal position sensor 2 circuit high input | An excessively high voltage from the APP sensor 2 is sent to ECM. | |

### FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

| Engine operating condition in fail-safe mode |
|---|
| ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.<br>ECM regulates the opening speed of the throttle valve to be slower than the normal condition.<br>So, the acceleration will be poor. |

## DTC Confirmation Procedure

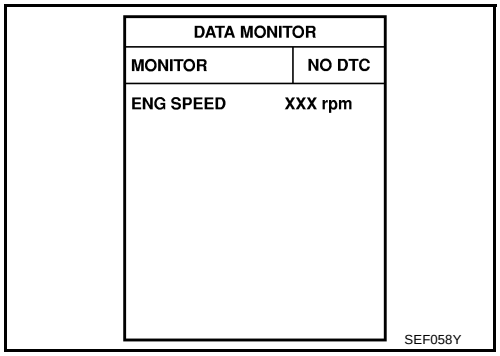
ABS00B11

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**
**Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-608, "Diagnostic Procedure" .



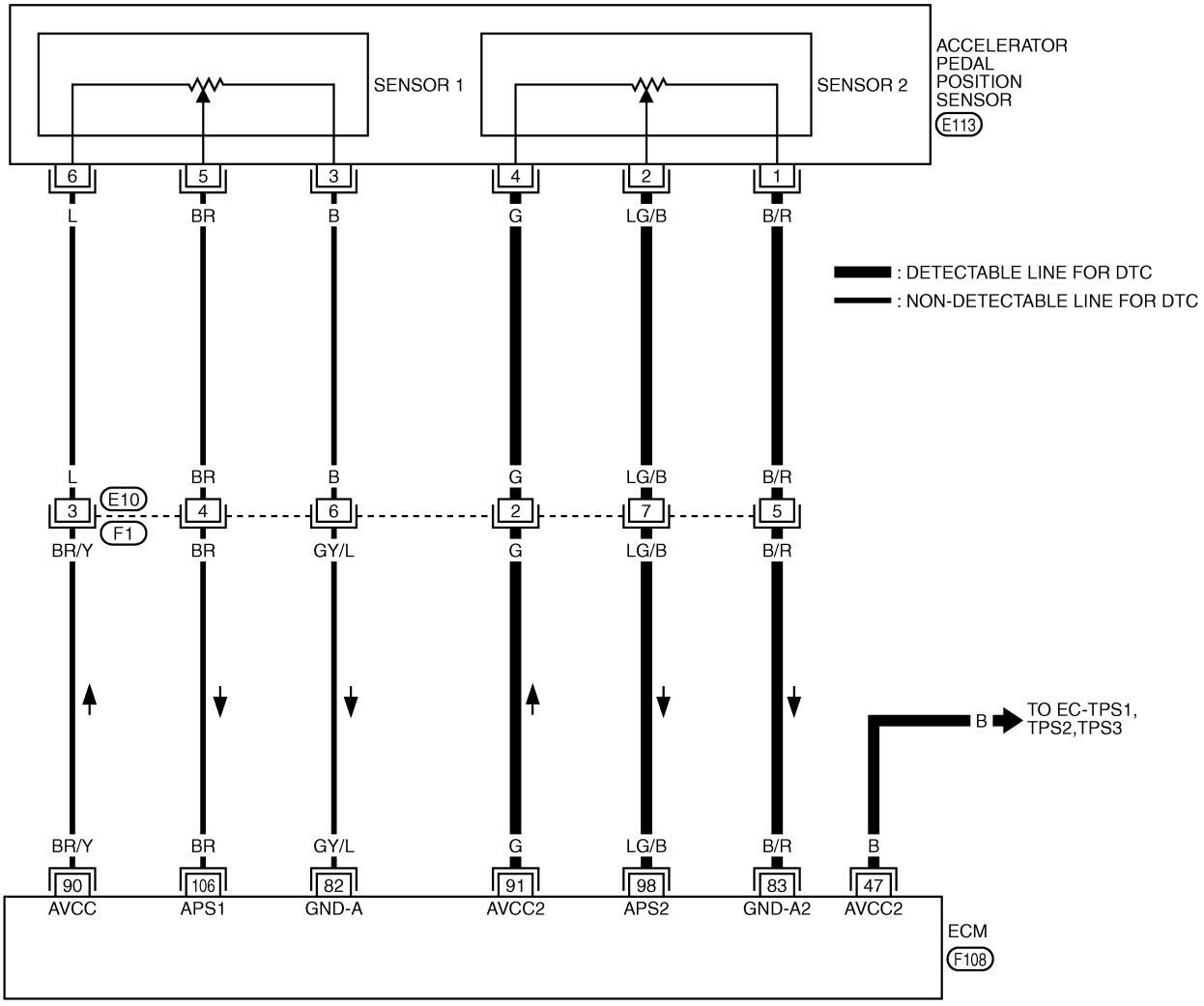

### WITH GST

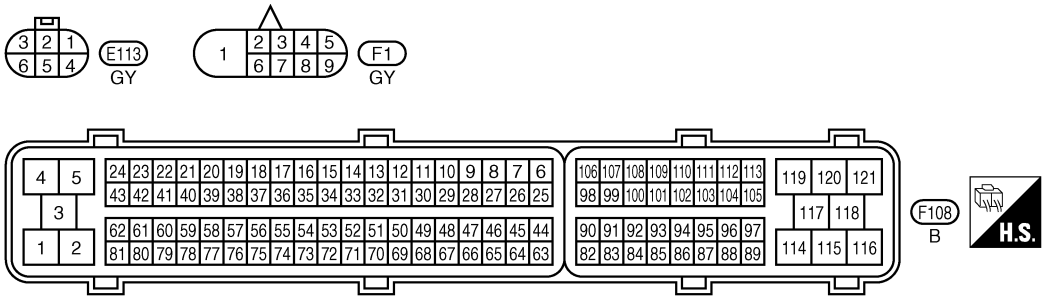
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

ABS00B12

EC-APPS2-01




TBWM0782E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

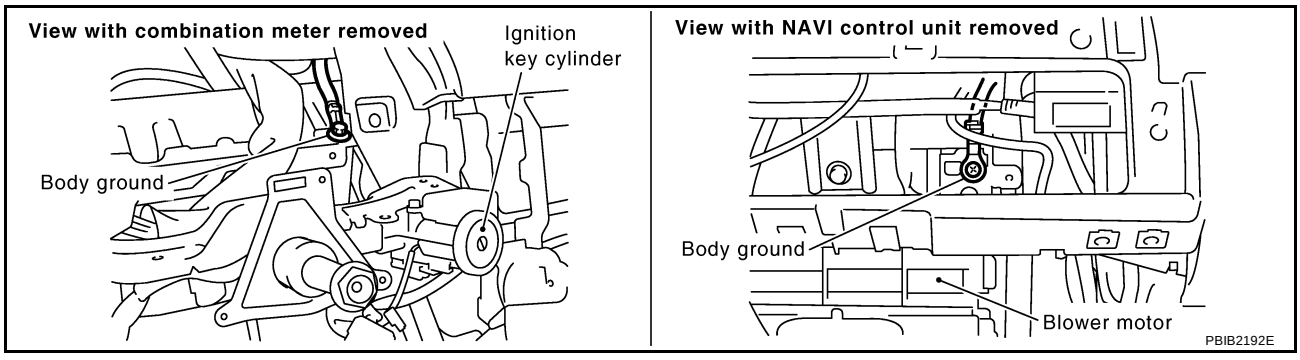
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 47 | B | Sensor power supply (Throttle position sensor) | **[Ignition switch: ON]** | Approximately 5V |
| 82 | GY/L | Sensor ground (Accelerator pedal position sensor 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 83 | B/R | Sensor ground (Accelerator pedal position sensor 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 90 | BR/Y | Sensor power supply (Accelerator pedal position sensor 1) | **[Ignition switch: ON]** | Approximately 5V |
| 91 | G | Sensor power supply (Accelerator pedal position sensor 2) | **[Ignition switch: ON]** | Approximately 5V |
| 98 | LG/B | Accelerator pedal position sensor 2 | **[Ignition switch: ON]**<br>● Engine stopped<br>● Accelerator pedal: Fully released | 0.15 - 0.60V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>● Accelerator pedal: Fully depressed | 1.95 - 2.40V |
| 106 | BR | Accelerator pedal position sensor 1 | **[Ignition switch: ON]**<br>● Engine stopped<br>● Accelerator pedal: Fully released | 0.5 - 1.0V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>● Accelerator pedal: Fully depressed | 3.9 - 4.7V |

## Diagnostic Procedure

ABS00B13

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

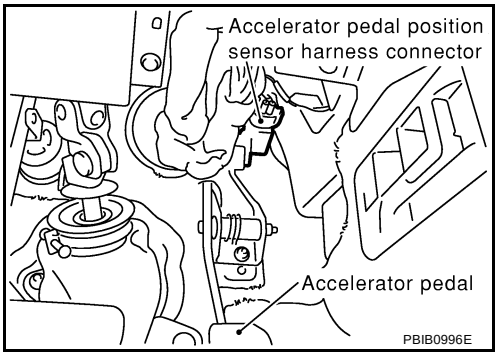



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

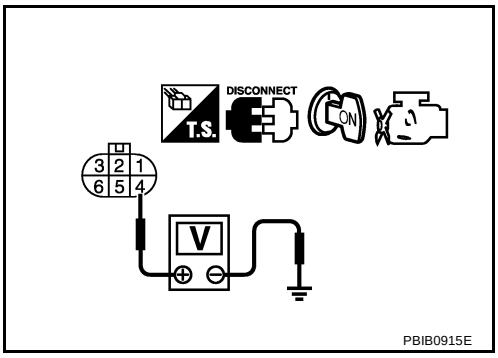
## 2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.




3. Check voltage between APP sensor terminal 4 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**




OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

## 3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 91. 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 connectors E10, F1
- Harness for open between ECM and APP sensor

>> Repair or replace open circuit.

## 5. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

| ECM terminal | Sensor terminal | Reference Wiring Diagram |
|---|---|---|
| 47 | Electric throttle control actuator terminal 1 | EC-614 |
| 91 | APP sensor terminal 4 | EC-607 |

OK or NG

OK >> GO TO 6.
NG >> Repair short to ground or short to power in harness or connectors.

## 6. CHECK THROTTLE POSITION SENSOR

Refer to EC-618, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> GO TO 7.

## 7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-88, "Throttle Valve Closed Position Learning" .
3. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

## 8. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 83.
   Refer to Wiring Diagram.

**Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

## 9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 10. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 98 and APP sensor terminal 2.
   Refer to Wiring Diagram.

**Continuity should exist.**

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

## 11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 12. CHECK APP SENSOR

Refer to EC-611, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

## 13. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-88, "Accelerator Pedal Released Position Learning" .
3. Perform EC-88, "Throttle Valve Closed Position Learning" .
4. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

## 14. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

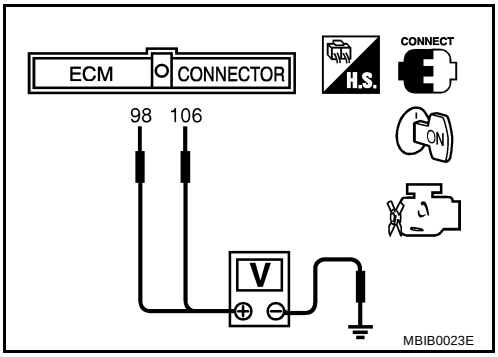
# Component Inspection

ABS00B14

### ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

| Terminal | Accelerator pedal | Voltage |
|---|---|---|
| 106 (Accelerator pedal position sensor 1) | Fully released | 0.5 - 1.0V |
| | Fully depressed | 3.9 - 4.7V |
| 98 (Accelerator pedal position sensor 2) | Fully released | 0.15 - 0.60V |
| | Fully depressed | 1.95 - 2.40V |




4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-88, "Accelerator Pedal Released Position Learning" .
6. Perform EC-88, "Throttle Valve Closed Position Learning" .
7. Perform EC-89, "Idle Air Volume Learning" .

# Removal and Installation

ABS00B15

### ACCELERATOR PEDAL

Refer to ACC-3, "ACCELERATOR CONTROL SYSTEM" .

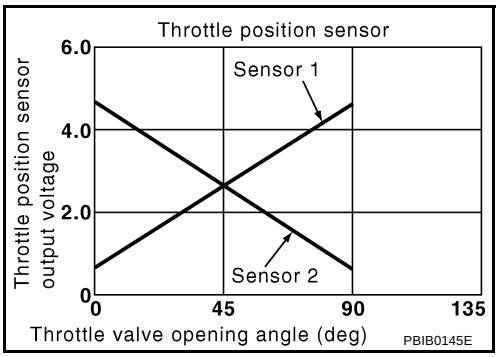
# DTC P2135 TP SENSOR

PFP:16119

## Component Description

ABS00B16

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.




## CONSULT-II Reference Value in Data Monitor Mode

ABS00B17

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| THRTL SEN 1<br>THRTL SEN 2* | ● Ignition switch: ON (Engine stopped)<br>● Shift lever: D (A/T) or 1st (M/T) | Accelerator pedal: Fully released | More than 0.36V |
| | | Accelerator pedal: Fully depressed | Less than 4.75V |

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

## On Board Diagnosis Logic

ABS00B18

**This self-diagnosis has the one trip detection logic.**

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P2135<br>2135 | Throttle position sensor circuit range/performance problem | Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2. | ● Harness or connector (The TP sensor 1 and 2 circuit is open or shorted.) (The APP sensor 2 circuit is shorted.)<br>● Electric throttle control actuator (TP sensor 1 and 2)<br>● Accelerator pedal position sensor (APP sensor 2) |

### FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

| Engine operation condition in fail-safe mode |
|---|
| ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.<br>ECM regulates the opening speed of the throttle valve to be slower than the normal condition.<br>So, the acceleration will be poor. |

## DTC Confirmation Procedure

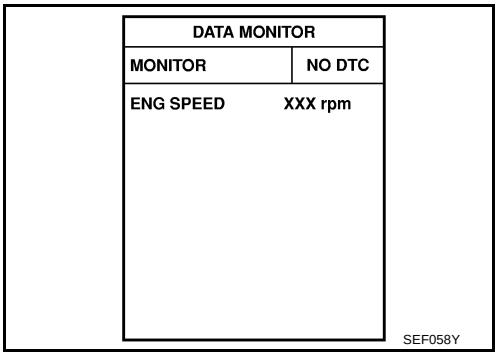
ABS00B19

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**
**Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-615, "Diagnostic Procedure" .



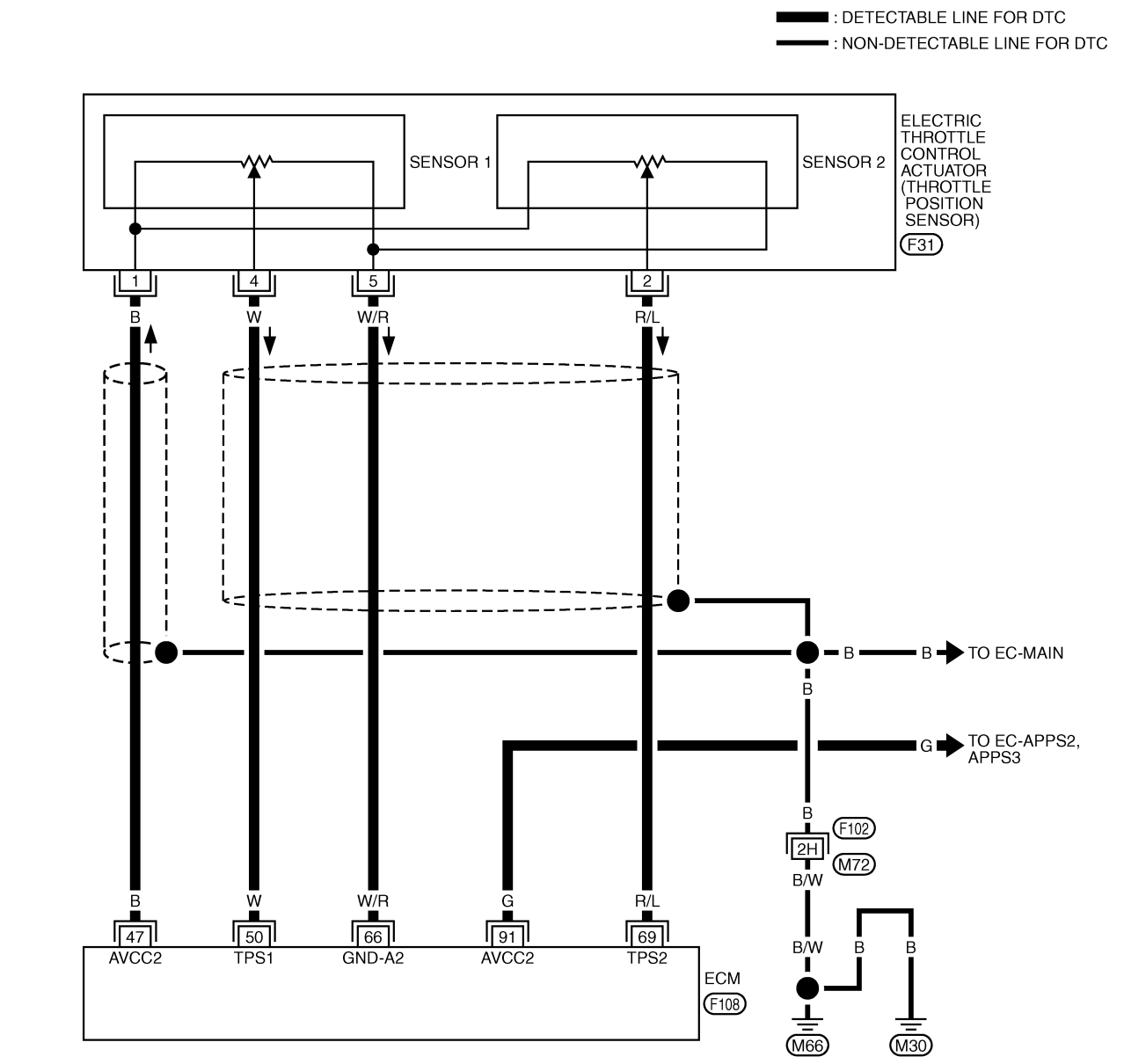

### WITH GST

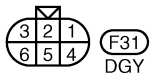
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

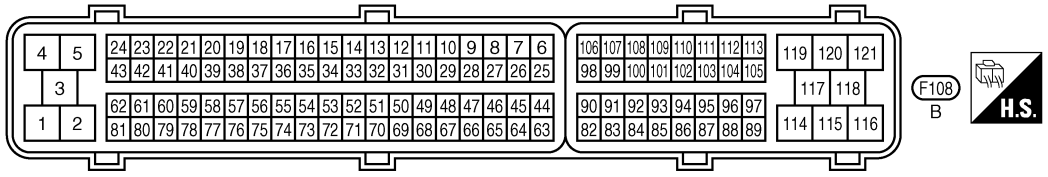
ABS00B1A

EC-TPS3-01




REFER TO THE FOLLOWING.
F102 -SUPER MULTIPLE JUNCTION (SMJ)




TBWM0783E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

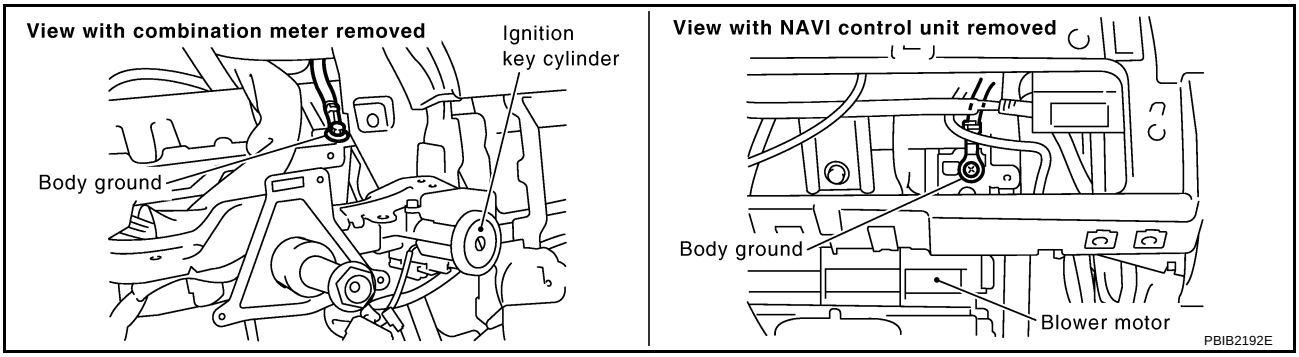
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 47 | B | Sensor power supply (Throttle position sensor) | **[Ignition switch: ON]** | Approximately 5V |
| 50 | W | Throttle position sensor 1 | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully released | More than 0.36V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully depressed | Less than 4.75V |
| 66 | W/R | Sensor ground (Throttle position sensor) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 69 | R/L | Throttle position sensor 2 | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully released | Less than 4.75V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>● Shift lever: D (A/T) or 1st (M/T)<br>● Accelerator pedal: Fully depressed | More than 0.36V |
| 91 | G | Sensor power supply (Accelerator pedal position sensor 2) | **[Ignition switch: ON]** | Approximately 5V |

## Diagnostic Procedure

ABS00B1B

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

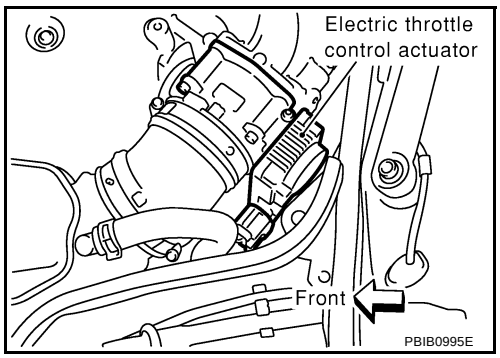



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

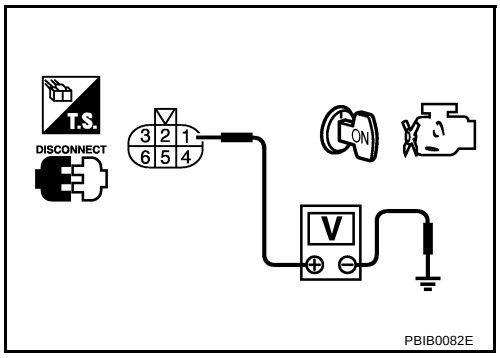
## 2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.




3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**




OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

## 3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

**Continuity should exist.**

OK or NG

OK >> GO TO 4.
NG >> Repair or replace open circuit.

## 4. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

| ECM terminal | Sensor terminal | Reference Wiring Diagram |
|---|---|---|
| 47 | Electric throttle control actuator terminal 1 | EC-614 |
| 91 | APP sensor terminal 4 | EC-607 |

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

## 5. CHECK APP SENSOR

Refer to EC-611, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

## 6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-88, "Accelerator Pedal Released Position Learning" .
3. Perform EC-88, "Throttle Valve Closed Position Learning" .
4. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

## 7. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 5 and ECM terminal 66. Refer to Wiring Diagram.

**Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 8. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following;
   ECM terminal 50 and electric throttle control actuator terminal 4,
   ECM terminal 69 and electric throttle control actuator terminal 2.
   Refer to Wiring Diagram.

**Continuity should exist.**

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 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-618, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

## 10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-88, "Throttle Valve Closed Position Learning" .
3. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

## 11. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

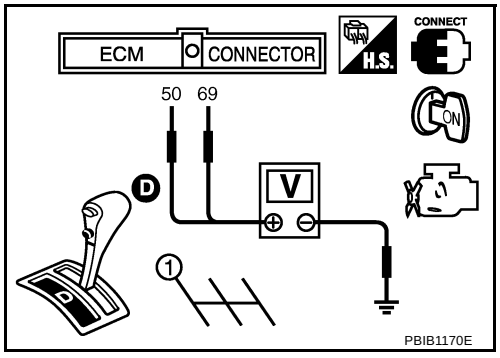
## Component Inspection

ABS00B1C

### THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-88, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set shift lever to D (A/T) or 1st (M/T) position.
5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

| Terminal | Accelerator pedal | Voltage |
|---|---|---|
| 50 (Throttle position sensor 1) | Fully released | More than 0.36V |
| | Fully depressed | Less than 4.75V |
| 69 (Throttle position sensor 2) | Fully released | Less than 4.75V |
| | Fully depressed | More than 0.36V |




6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-88, "Throttle Valve Closed Position Learning" .
8. Perform EC-89, "Idle Air Volume Learning" .

## Removal and Installation

ABS00B1D

### ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-19, "INTAKE MANIFOLD COLLECTOR" .

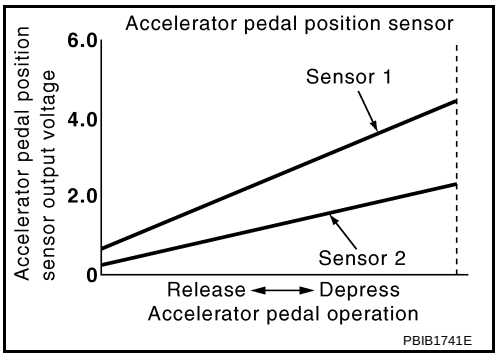
# DTC P2138 APP SENSOR

PFP:18002

## Component Description

ABS00B1E

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.




## CONSULT-II Reference Value in Data Monitor Mode

ABS00B1F

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| ACCEL SEN 1 | ● Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | 0.5 - 1.0V |
| | | Accelerator pedal: Fully depressed | 4.0 - 4.8V |
| ACCEL SEN 2* | ● Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | 0.3 - 1.2V |
| | | Accelerator pedal: Fully depressed | 3.9 - 4.8V |
| CLSD THL POS | ● Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | ON |
| | | Accelerator pedal: Slightly depressed | OFF |

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

## On Board Diagnosis Logic

ABS00B1G

**This self-diagnosis has the one trip detection logic.**

**NOTE:**
**If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-472, "DTC P1229 SENSOR POWER SUPPLY" .**

| DTC No. | Trouble diagnosis name | DTC detecting condition | Possible cause |
|---|---|---|---|
| P2138<br>2138 | Accelerator pedal position sensor circuit range/performance problem | Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2. | ● Harness or connector (The APP sensor 1 and 2 circuit is open or shorted.) (The TP sensor circuit is shorted.)<br>● Accelerator pedal position sensor (APP sensor 1 and 2)<br>● Electric throttle control actuator (TP sensor 1 and 2) |

### FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

| Engine operating condition in fail-safe mode |
|---|
| ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.<br>ECM regulates the opening speed of the throttle valve to be slower than the normal condition.<br>So, the acceleration will be poor. |

## DTC Confirmation Procedure

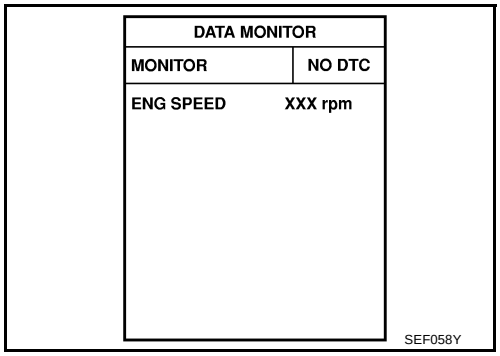
ABS00B1H

**NOTE:**
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

**TESTING CONDITION:**
**Before performing the following procedure, confirm that battery voltage is more than 10V at idle.**

### WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-622, "Diagnostic Procedure" .



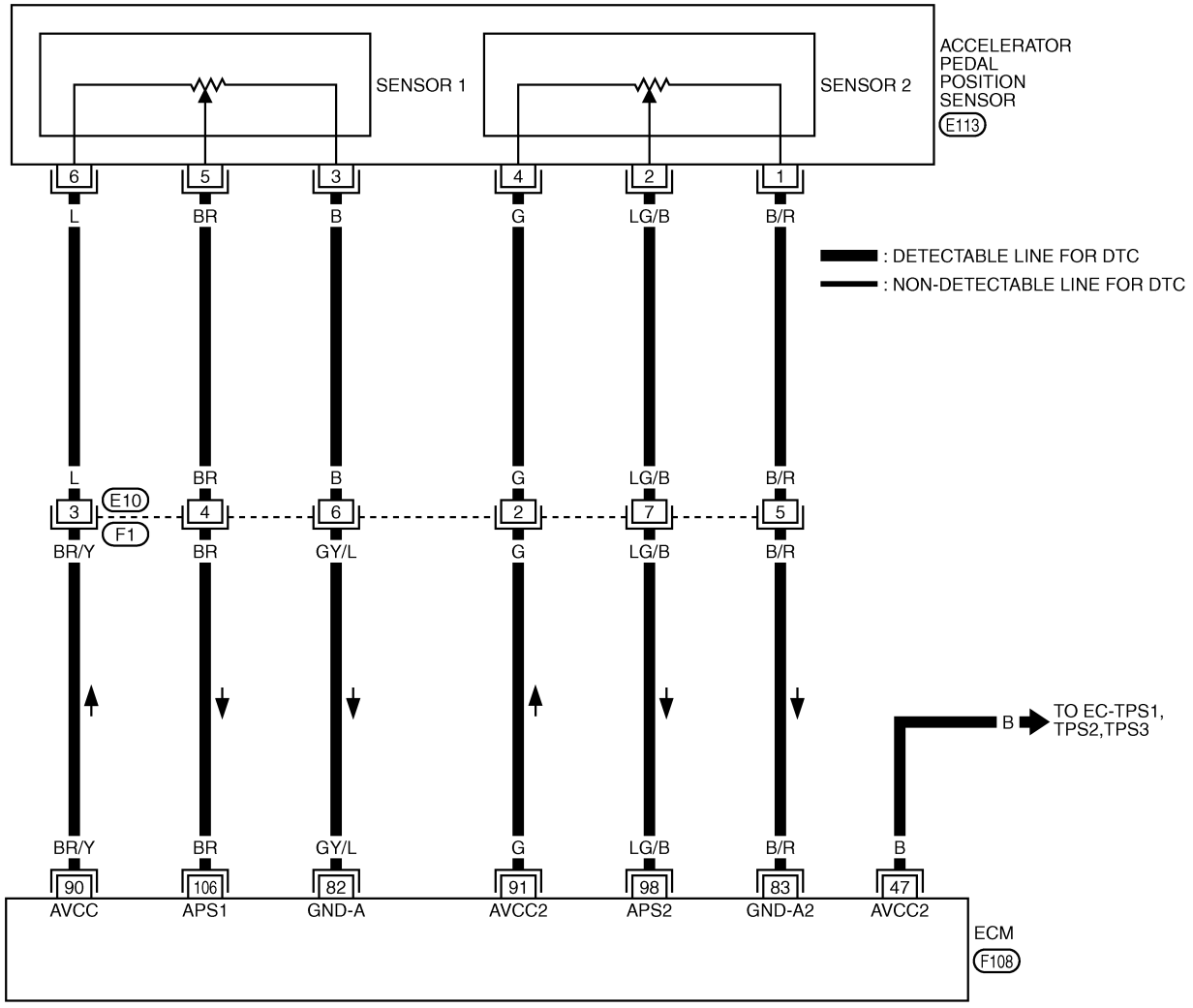

### WITH GST

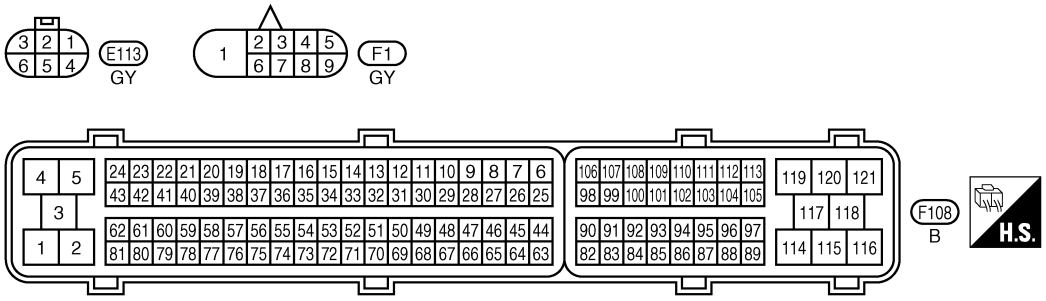
Follow the procedure “WITH CONSULT-II” above.

## Wiring Diagram

ABS00B1I

EC-APPS3-01




TBWM0784E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

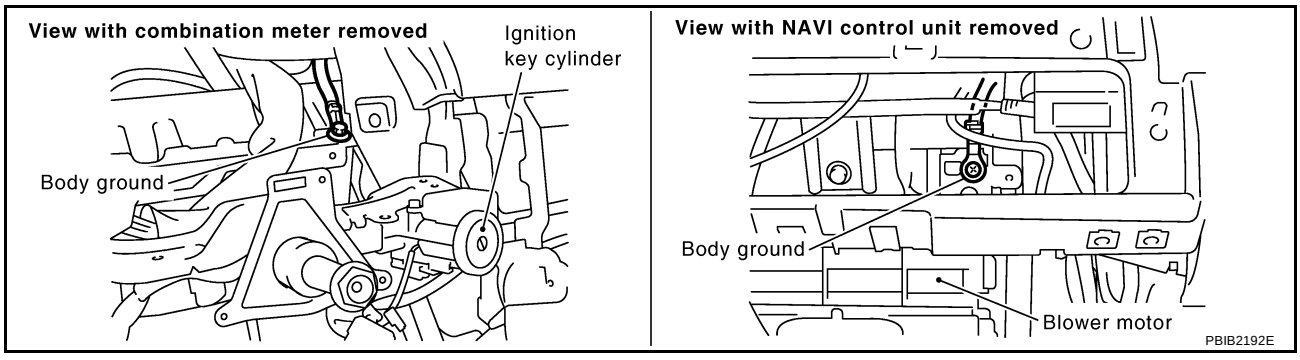
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 47 | B | Sensor power supply (Throttle position sensor) | **[Ignition switch: ON]** | Approximately 5V |
| 82 | GY/L | Sensor ground (Accelerator pedal position sensor 1) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 83 | B/R | Sensor ground (Accelerator pedal position sensor 2) | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 90 | BR/Y | Sensor power supply (Accelerator pedal position sensor 1) | **[Ignition switch: ON]** | Approximately 5V |
| 91 | G | Sensor power supply (Accelerator pedal position sensor 2) | **[Ignition switch: ON]** | Approximately 5V |
| 98 | LG/B | Accelerator pedal position sensor 2 | **[Ignition switch: ON]**<br>● Engine stopped<br>● Accelerator pedal: Fully released | 0.15 - 0.60V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>● Accelerator pedal: Fully depressed | 1.95 - 2.40V |
| 106 | BR | Accelerator pedal position sensor 1 | **[Ignition switch: ON]**<br>● Engine stopped<br>● Accelerator pedal: Fully released | 0.5 - 1.0V |
| | | | **[Ignition switch: ON]**<br>● Engine stopped<br>● Accelerator pedal: Fully depressed | 3.9 - 4.7V |

## Diagnostic Procedure

ABS00B1J

### 1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

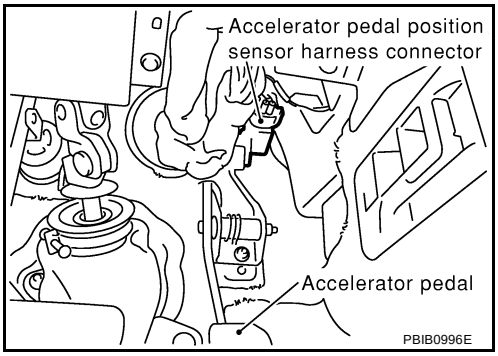



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

## 2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

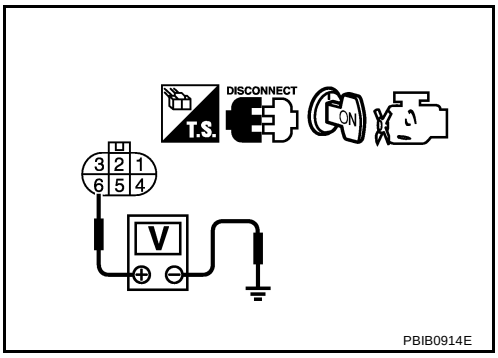



3. Check voltage between APP sensor terminal 6 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.




## 3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

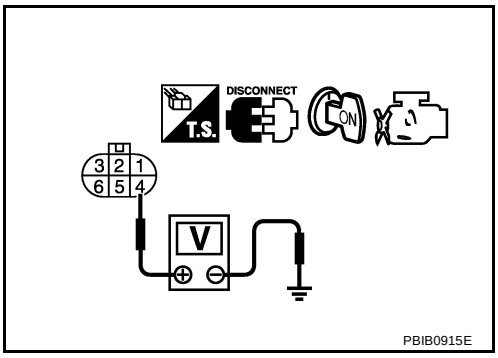
## 4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

Check voltage between APP sensor terminal 4 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**

OK or NG

OK >> GO TO 10.
NG >> GO TO 5.



## 5. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 91.
   Refer to Wiring Diagram.

**Continuity should exist.**

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open between ECM and APP sensor

>> Repair or replace open circuit.

## 7. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

| ECM terminal | Sensor terminal | Reference Wiring Diagram |
|---|---|---|
| 47 | Electric throttle control actuator terminal 1 | EC-614 |
| 91 | APP sensor terminal 4 | EC-621 |

OK or NG

OK >> GO TO 8.
NG >> Repair short to ground or short to power in harness or connectors.

## 8. CHECK THROTTLE POSITION SENSOR

Refer to EC-618, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> GO TO 9.

## 9. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-88, "Throttle Valve Closed Position Learning" .
3. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

## 10. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following;
   APP sensor terminal 1 and ECM terminal 83,
   APP sensor terminal 3 and ECM terminal 82.
   Refer to Wiring Diagram.

   **Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

## 11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 12. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following;
   ECM terminal 106 and APP sensor terminal 5,
   ECM terminal 98 and APP sensor terminal 2.
   Refer to Wiring Diagram.

   **Continuity should exist.**

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

## 13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open or short between ECM and APP sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 14. CHECK APP SENSOR

Refer to EC-626, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

## 15. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-88, "Accelerator Pedal Released Position Learning" .
3. Perform EC-88, "Throttle Valve Closed Position Learning" .
4. Perform EC-89, "Idle Air Volume Learning" .

>> **INSPECTION END**

## 16. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

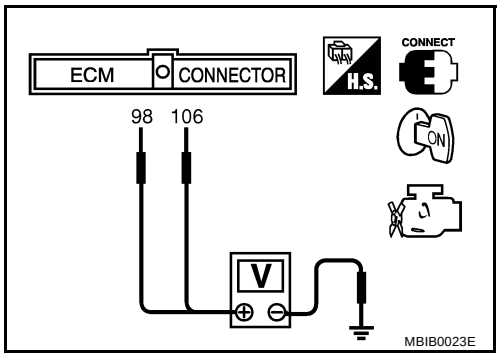
>> **INSPECTION END**

# Component Inspection

ABS00B1K

### ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.




| Terminal | Accelerator pedal | Voltage |
|---|---|---|
| 106 (Accelerator pedal position sensor 1) | Fully released | 0.5 - 1.0V |
| | Fully depressed | 3.9 - 4.7V |
| 98 (Accelerator pedal position sensor 2) | Fully released | 0.15 - 0.60V |
| | Fully depressed | 1.95 - 2.40V |

4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-88, "Accelerator Pedal Released Position Learning" .
6. Perform EC-88, "Throttle Valve Closed Position Learning" .
7. Perform EC-89, "Idle Air Volume Learning" .

# Removal and Installation

ABS00B1L

### ACCELERATOR PEDAL

Refer to ACC-3, "ACCELERATOR CONTROL SYSTEM" .

# IGNITION SIGNAL

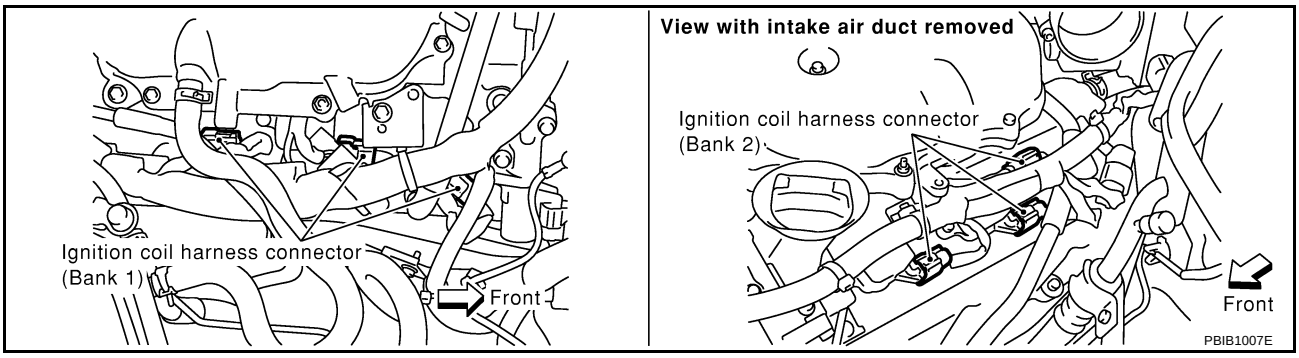
PFP:22448

## Component Description

ABS00B1M

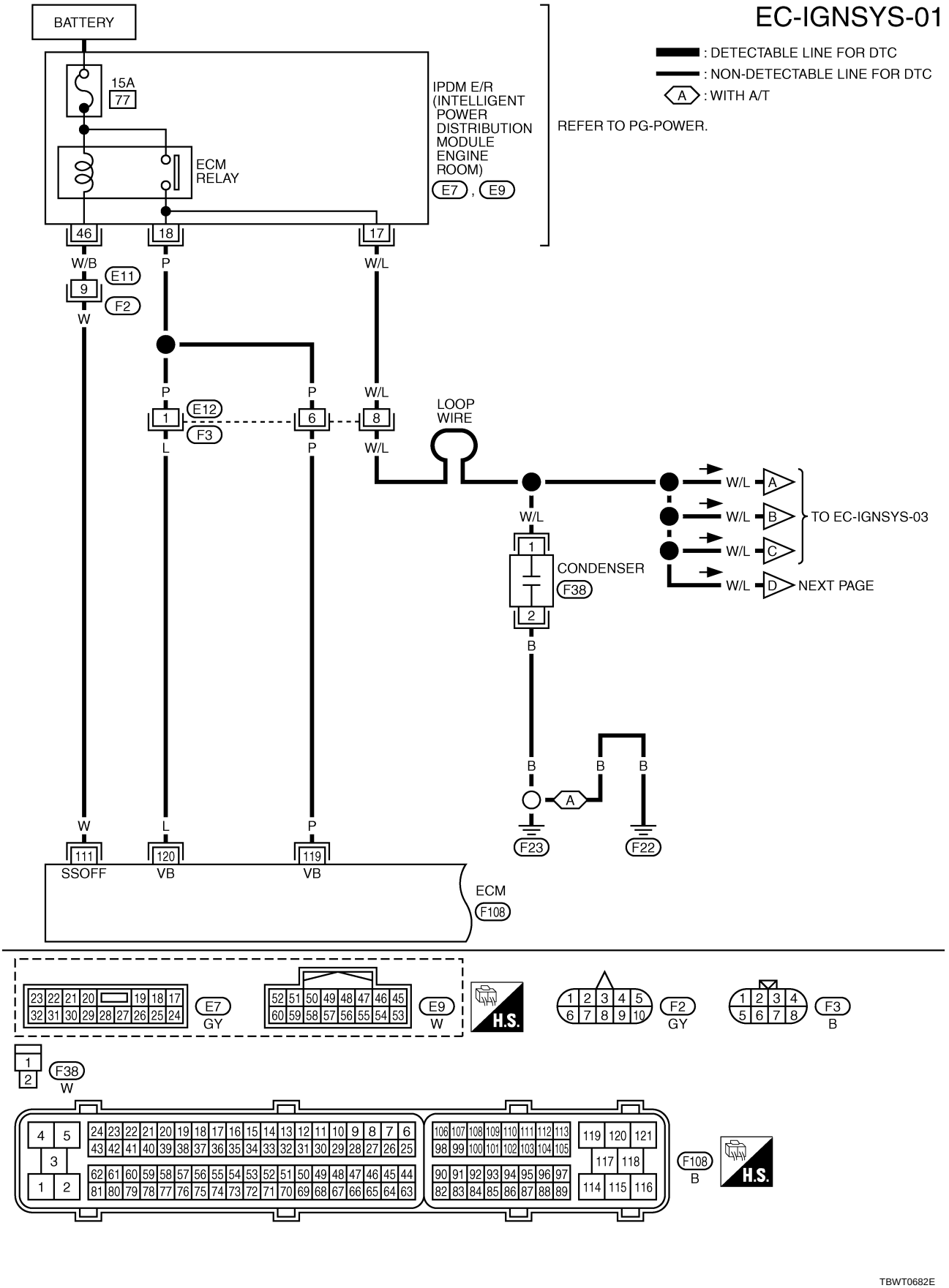
### IGNITION COIL & POWER TRANSISTOR

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.



## Wiring Diagram

ABS00B1N




TBWT0682E

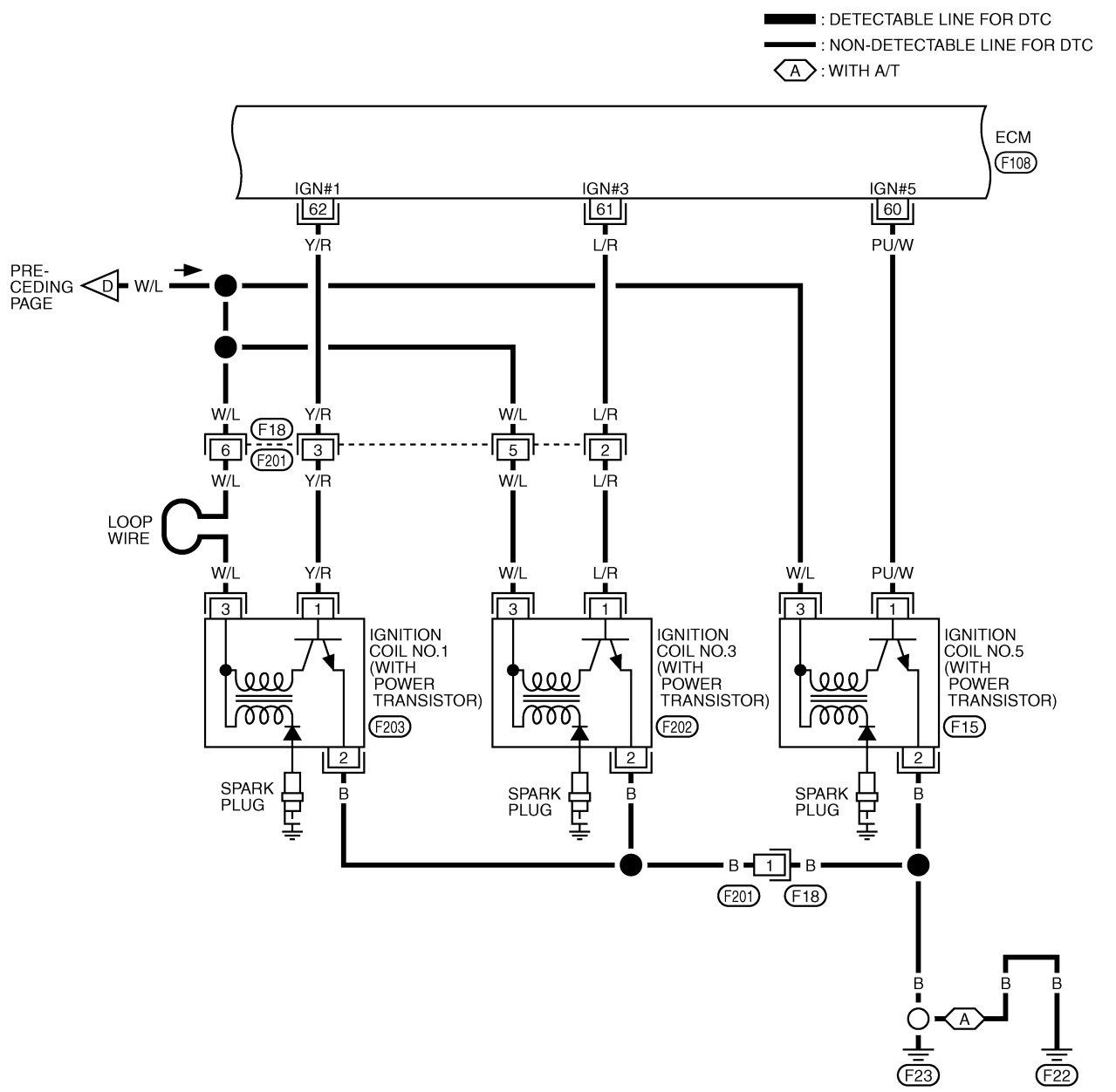
Specification data are reference values and are measured between each terminal and ground.

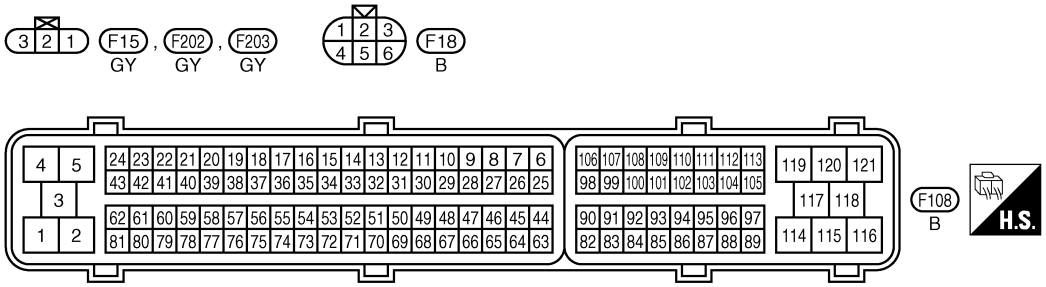
**CAUTION:**

**Do not use ECM ground terminals when measuring input/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) |
|---|---|---|---|---|
| 111 | W | ECM relay (Self shut-off) | **[Engine is running]**<br>**[Ignition switch: OFF]**<br>● A few seconds after turning ignition switch OFF | 0 - 1.5V |
| | | | **[Ignition switch: OFF]**<br>● More than a few seconds after turning ignition switch OFF | BATTERY VOLTAGE (11 - 14V) |
| 119<br>120 | P<br>L | Power supply for ECM | **[Ignition switch: ON]** | BATTERY VOLTAGE (11 - 14V) |

EC-IGNSYS-02

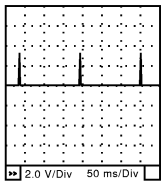
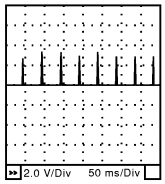



TBWM0785E

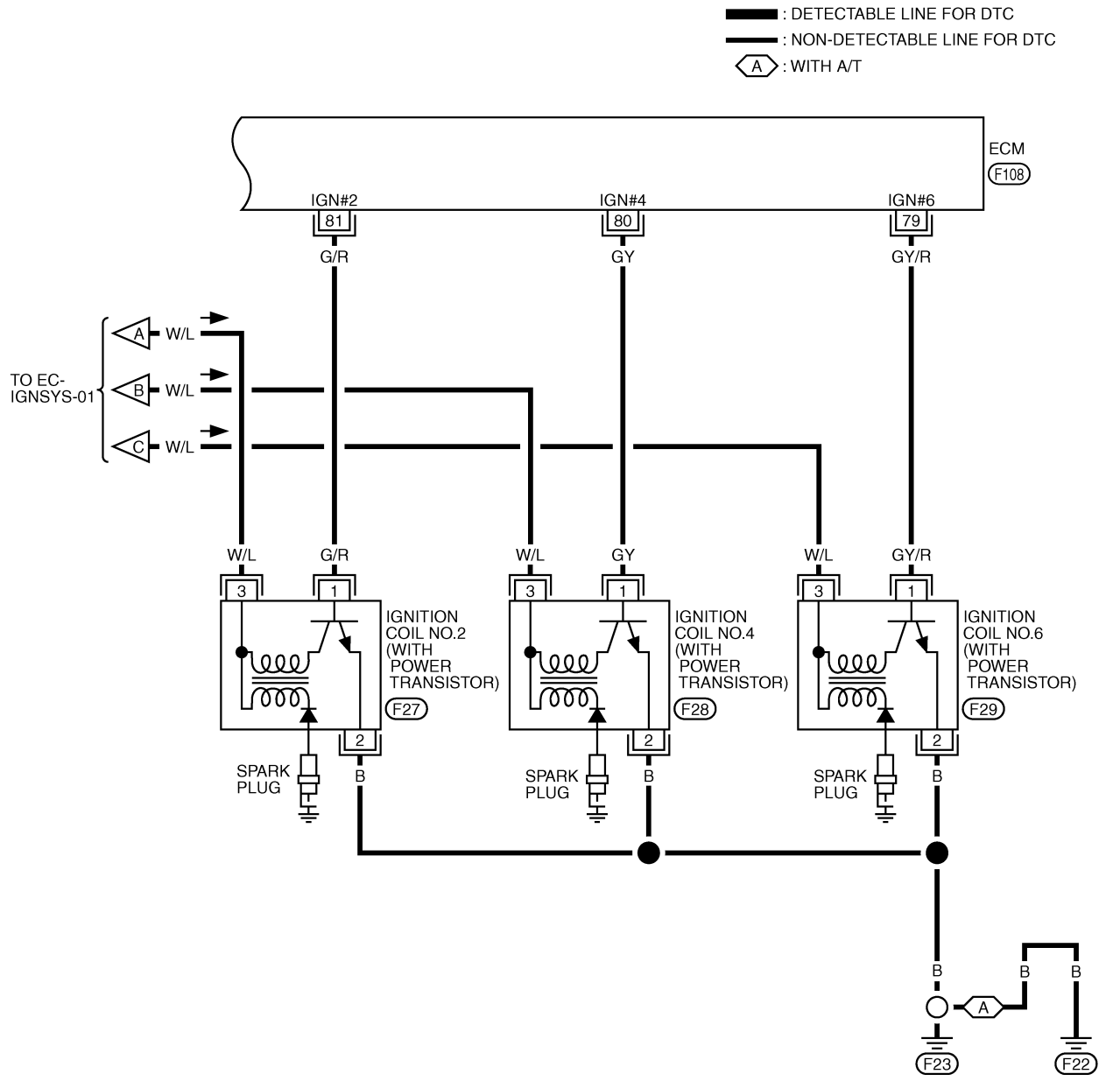
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

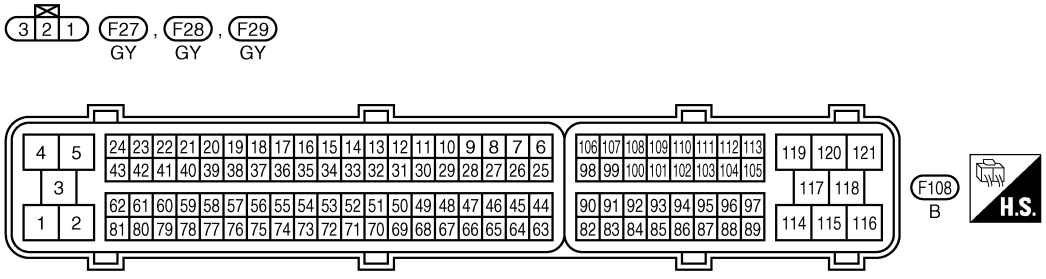
**CAUTION:**
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 60<br>61<br>62 | PU/W<br>L/R<br>Y/R | Ignition signal No. 5<br>Ignition signal No. 3<br>Ignition signal No. 1 | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | 0 - 0.2V★<br>  <br><br>SEC986C |
| | | | **[Engine is running]**<br>● **Warm-up condition**<br>● Engine speed: 2,500 rpm. | 0.1 - 0.4V★<br>  <br><br>SEC987C |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

EC-IGNSYS-03

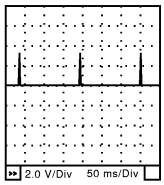
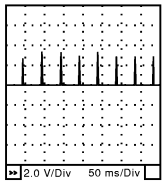



TBWT0463E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

**CAUTION:**
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 79<br>80<br>81 | GY/R<br>GY<br>G/R | Ignition signal No. 6<br>Ignition signal No. 4<br>Ignition signal No. 2 | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | 0 - 0.2V★<br>  <br><br>SEC986C |
| | | | **[Engine is running]**<br>● **Warm-up condition**<br>● Engine speed: 2,500 rpm. | 0.1 - 0.4V★<br>  <br><br>SEC987C |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnostic Procedure

ABS00DFE

### 1. CHECK ENGINE START

Turn ignition switch OFF, and restart engine.
**Is engine running?**

Yes or No

Yes (With CONSULT-II)>>GO TO 2.
Yes (Without CONSULT-II)>>GO TO 3.
No >> GO TO 4.

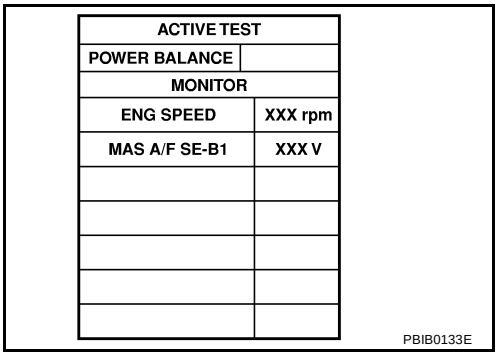
### 2. CHECK OVERALL FUNCTION

**With CONSULT-II**

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
2. Make sure that each circuit produces a momentary engine speed drop.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

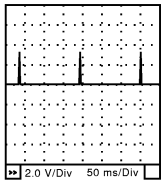


## 3. CHECK OVERALL FUNCTION

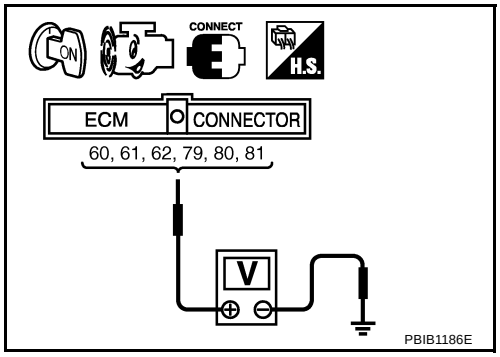
**Without CONSULT-II**

1. Let engine idle.
2. Read the voltage signal between ECM terminals 60, 61, 62, 79, 80, 81 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.

   **NOTE:**
   The pulse cycle changes depending on rpm at idle.




SEC986C




PBIB1186E

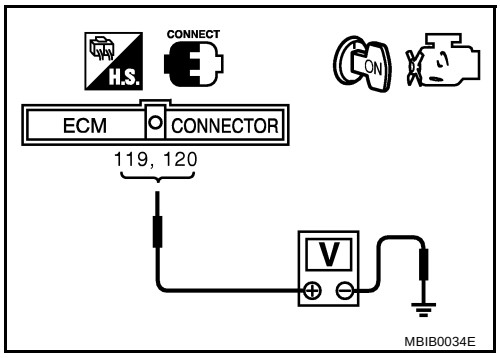
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

## 4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

   **Voltage: Battery voltage**



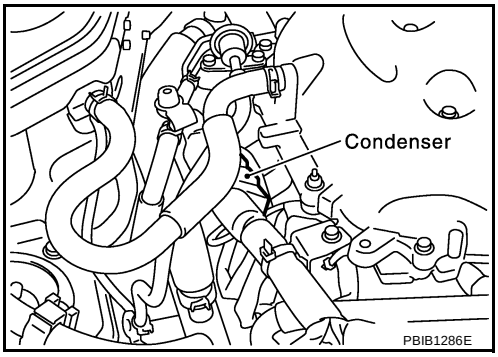

MBIB0034E

OK or NG

OK >> GO TO 5.
NG >> Go to EC-157, "POWER SUPPLY AND GROUND CIRCUIT" .

## 5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.

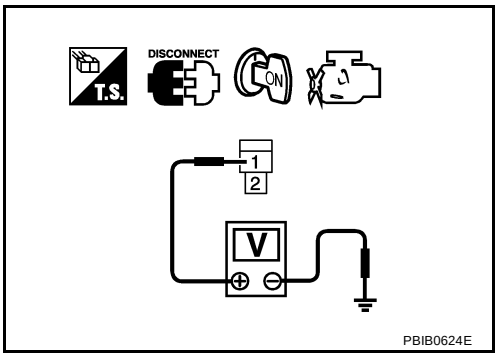



4. Check voltage between condenser terminal 1 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

OK >> GO TO 8.
NG >> GO TO 6.




## 6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E7.
3. Check harness continuity between IPDM E/R terminal 17 and condenser terminal 1. Refer to Wiring Diagram.

**Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 17.
NG >> GO TO 7.

## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E12, F3
- Harness for open or short between IPDM E/R and condenser

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 8. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between condenser terminal 2 and ground.
   Refer to Wiring Diagram.

   **Continuity should exist.**

3. Also check harness for short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to power in harness or connectors.

## 9. CHECK CONDENSER

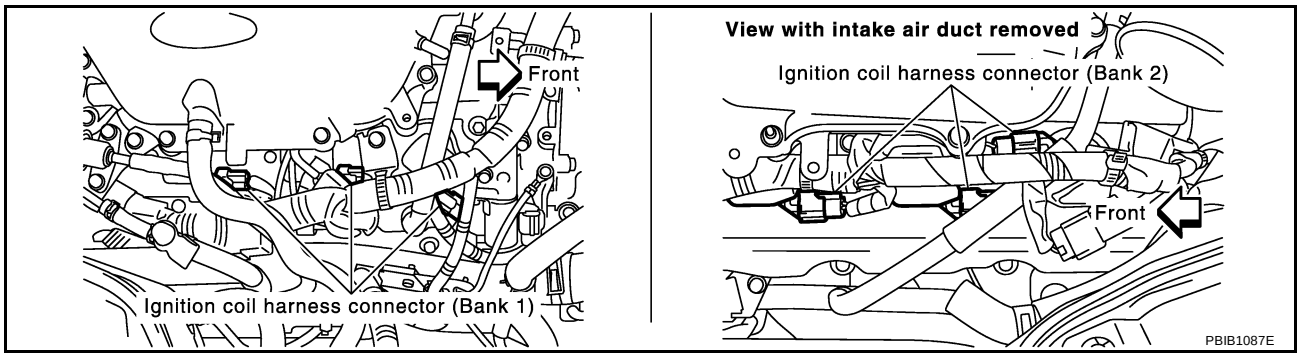
Refer to EC-638, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace condenser.

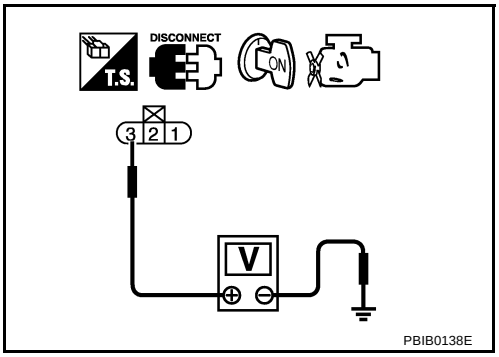
## 10. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil harness connector.




4. Turn ignition switch ON.
5. Check voltage between ignition coil terminal 3 and ground with CONSULT-II or tester.

   **Voltage: Battery voltage**




OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

## 11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F18, F201
- Harness for open or short between ignition coil and harness connector F3

>> Repair or replace harness or connectors.

## 12. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ignition coil terminal 2 and ground.
   Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

## 13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F18, F201
- Harness for open or short between ignition coil and ground

>> Repair open circuit or short to power in harness or connectors.

## 14. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 60, 61, 62, 79, 80, 81 and ignition coil terminal 1.
   Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

## 15. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F18, F201
- Harness for open or short between ignition coil and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 16. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-638, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace ignition coil with power transistor.

## 17. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

## Component Inspection

ABS00B1P

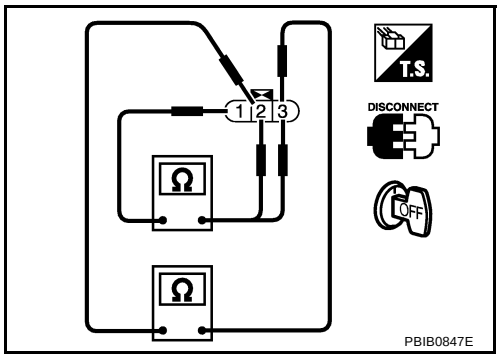
### IGNITION COIL WITH POWER TRANSISTOR

**CAUTION:**

**Do the following procedure in the place where ventilation is good without the combustible.**

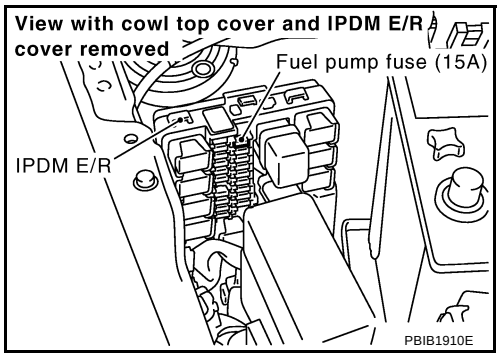
1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

| Terminal No. (Polarity) | Resistance Ω [at 25°C (77°F)] |
|---|---|
| 1 and 2 | Except 0 or ∞ |
| 1 and 3 | Except 0 |
| 2 and 3 | |



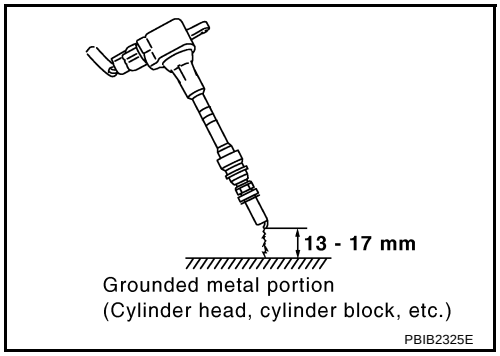

4. If NG, Replace ignition coil with power transistor.
   If OK, go to next step.
5. Turn ignition switch OFF.
6. Reconnect all harness connectors disconnected.
7. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

   **NOTE:**
   Do not use CONSULT-II to release fuel pressure, or fuel pressure applies again during the following procedure.
8. Start engine.
9. After engine stalls, crank it two or three times to release all fuel pressure.
10. Turn ignition switch OFF.
11. Remove ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
12. Remove ignition coil and spark plug of the cylinder to be checked.




13. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
14. Connect spark plug and harness connector to ignition coil.
15. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
16. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded part.

    **Spark should be generated.**




    **CAUTION:**
    - **Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
    - **It might cause to damage the ignition coil if the gap of more than 17 mm is taken.**

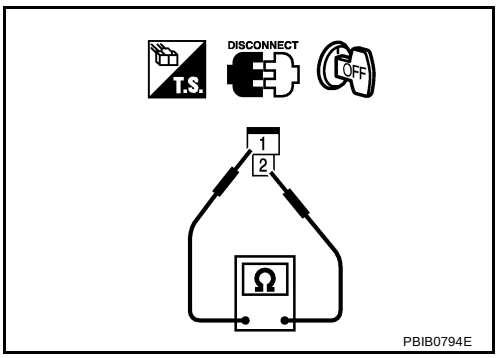
    **NOTE:**
    **When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.**
17. If NG, Replace ignition coil with power transistor.

### CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.

3. Check resistance between condenser terminals 1 and 2.

**Resistance: Above 1MΩ [at 25°C (77°F)]**




ABS00B1Q

## Removal and Installation

### IGNITION COIL WITH POWER TRANSISTOR

Refer to EM-43, "IGNITION COIL" .

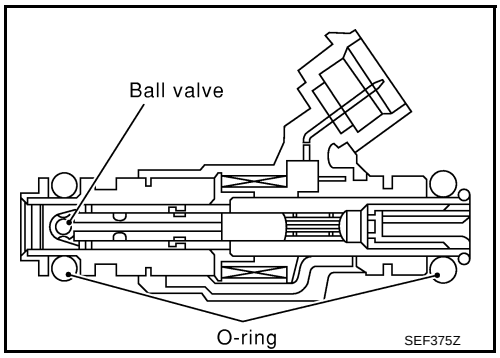
# INJECTOR CIRCUIT

PFP:16600

## Component Description

ABS00B1R

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

ABS00B1S

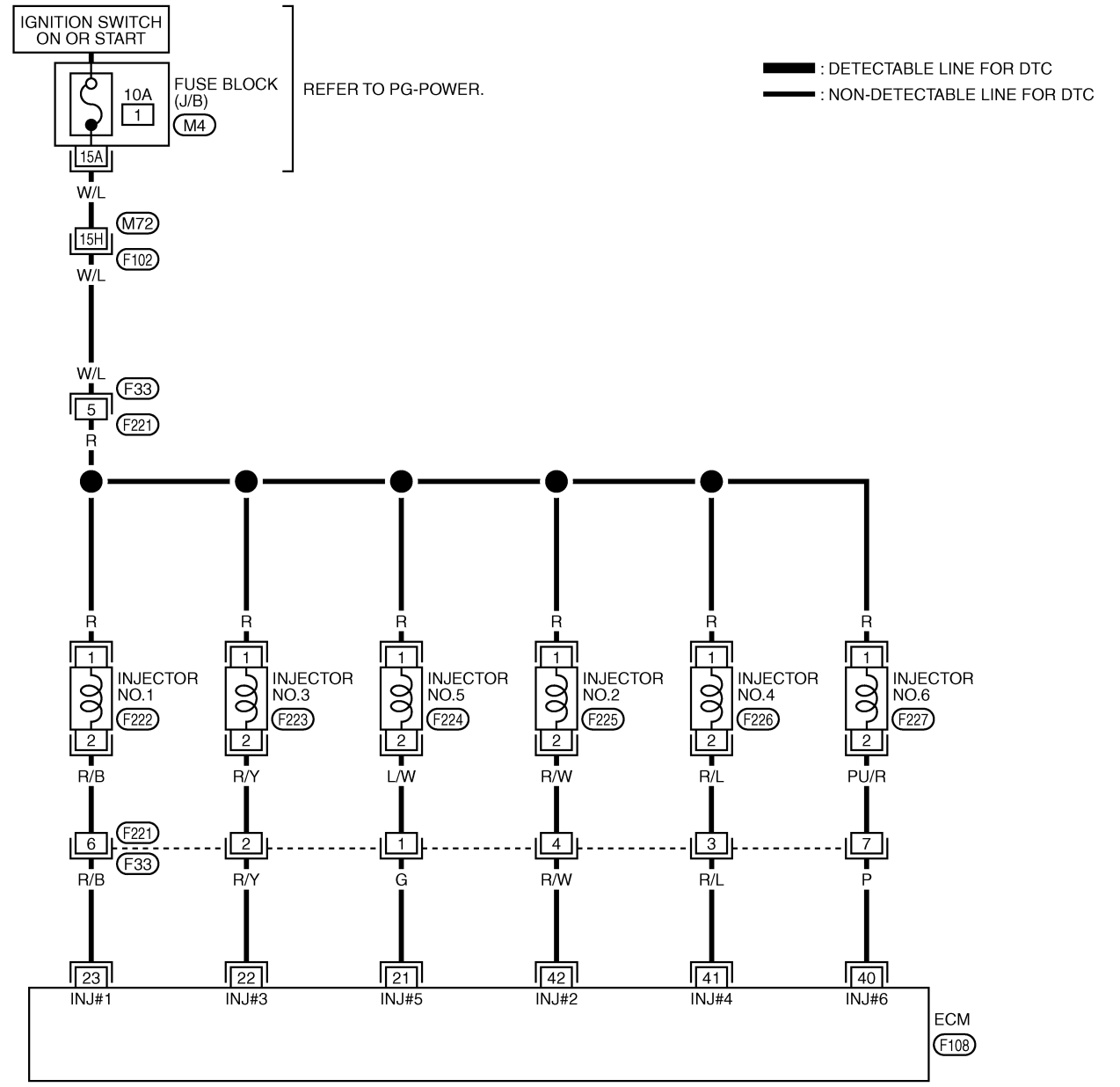
Specification data are reference values.

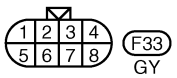
| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| B/FUEL SCHDL | See EC-146, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" . | | |
| INJ PULSE-B1<br>INJ PULSE-B2 | ● Engine: After warming up<br>● Shift lever: P or N (A/T), Neutral (M/T)<br>● Air conditioner switch: OFF<br>● No-load | Idle | 2.0 - 3.0 msec |
| | | 2,000 rpm | 1.9 - 2.9 msec |

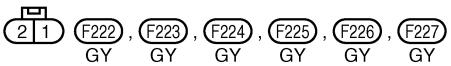
## Wiring Diagram

ABS00B1T

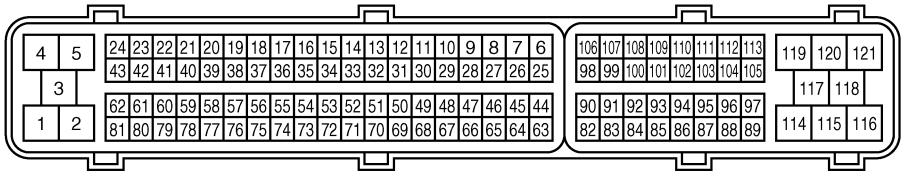
EC-INJECT-01



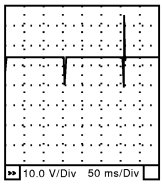
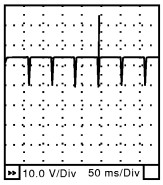

REFER TO THE FOLLOWING.
F102 -SUPER MULTIPLE JUNCTION (SMJ)
M4 -FUSE BLOCK-JUNCTION BOX (J/B)




TBWM0786E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

**CAUTION:**
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 21<br>22<br>23<br>40<br>41<br>42 | G<br>R/Y<br>R/B<br>P<br>R/L<br>R/W | Injector No. 5<br>Injector No. 3<br>Injector No. 1<br>Injector No. 6<br>Injector No. 4<br>Injector No. 2 | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | BATTERY VOLTAGE<br>(11 - 14V)★<br>  <br><br>SEC984C |
| | | | **[Engine is running]**<br>● **Warm-up condition**<br>● Engine speed: 2,000 rpm | BATTERY VOLTAGE<br>(11 - 14V)★<br>  <br><br>SEC985C |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

## Diagnostic Procedure

ABS00DFF

### 1. INSPECTION START

Turn ignition switch to START.
**Is any cylinder ignited?**

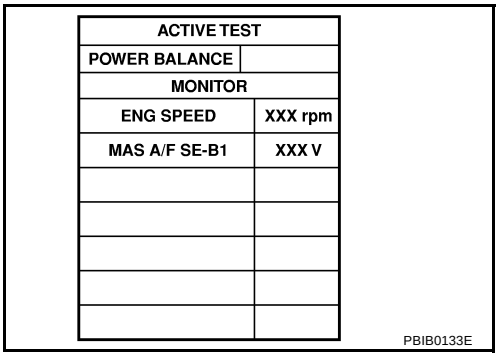
Yes or No

Yes (With CONSULT-II)>>GO TO 2.
Yes (without CONSULT-II)>>GO TO 3.
No >> GO TO 6.

### 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.



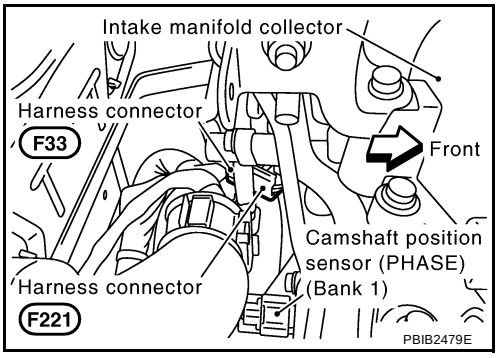

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 6.

## 3. CHECK FUNCTION OF INJECTOR-I

**Without CONSULT-II**

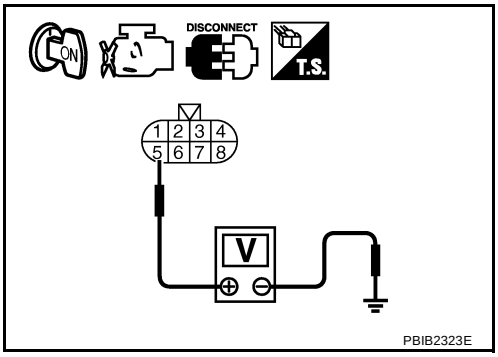
1. Turn ignition switch OFF.
2. Disconnect harness connector F33, F221
3. Turn ignition switch ON.




4. Check voltage between harness connector F33 terminal 5 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

5. Turn ignition switch OFF.
6. Disconnect ECM harness connector.
7. Check harness continuity between harness connector F33 and ECM as follows.
   Refer to Wiring Diagram.




| Cylinder | Harness connector F33 terminal | ECM terminal |
|---|---|---|
| 1 | 6 | 23 |
| 2 | 4 | 42 |
| 3 | 2 | 22 |
| 4 | 3 | 41 |
| 5 | 1 | 21 |
| 6 | 7 | 40 |

**Continuity should exist.**

8. 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

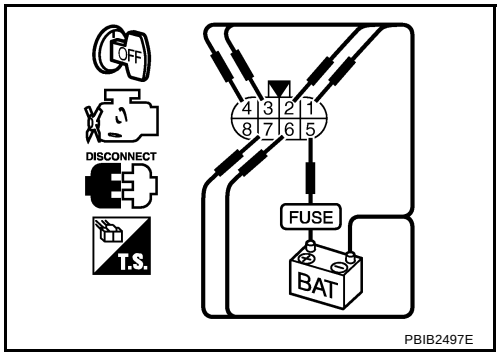
Check the following.

- Harness connectors M72, F102
- Harness connectors F33, F221
- Fuse block (J/B) connector M4
- 10A fuse
- Harness for open or short between harness connector F33 and fuse
- Harness for open or short between harness connector F33 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 5. CHECK FUNCTION OF INJECTOR-II

Provide battery voltage between harness connector F221 as follows and then interrupt it. Listen to each injector operating sound.




| Cylinder | Harness connector F221 terminal | |
|---|---|---|
| | (+) | (–) |
| 1 | 5 | 6 |
| 2 | 5 | 4 |
| 3 | 5 | 2 |
| 4 | 5 | 3 |
| 5 | 5 | 1 |
| 6 | 5 | 7 |

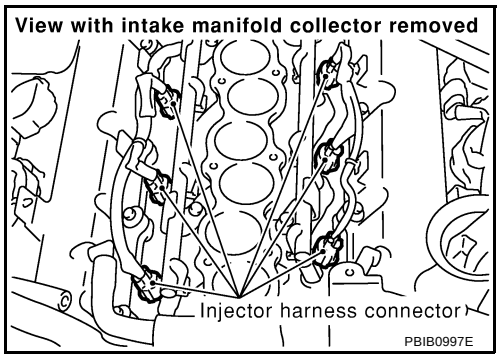
**Operating sound should exist.**

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 6.

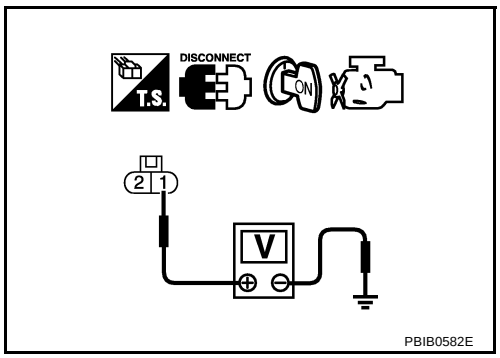
## 6. CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect injector harness connector.




3. Turn ignition switch ON.
4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**




OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M72, F102
- Harness connectors F33, F221
- Fuse block (J/B) connector M4
- 10A fuse
- Harness for open or short between injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 8. CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 21, 22, 23, 40, 41, 42. Refer to Wiring Diagram.

**Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

## 9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F221, F33
- Harness for open or short between injector and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 10. CHECK INJECTOR

Refer to EC-645, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace injector.

## 11. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

# Component Inspection

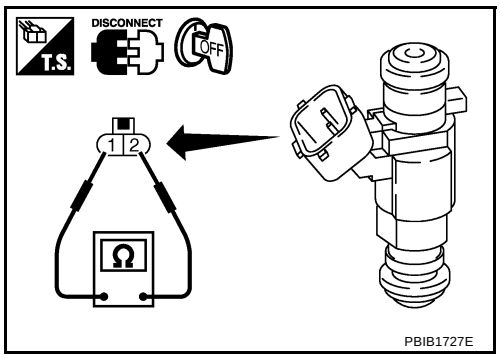
ABS00B1V

### INJECTOR

1. Disconnect injector harness connector.

2. Check resistance between terminals as shown in the figure.

**Resistance: 11.1 - 14.5Ω [at 10 - 60°C (50 - 140°F)]**




## Removal and Installation

ABS00B1W

### INJECTOR

Refer to EM-46, "FUEL INJECTOR AND FUEL TUBE" .

# FUEL PUMP CIRCUIT

PFP:17042

## Description

ABS00B1X

### SYSTEM DESCRIPTION

| Sensor | Input Signal to ECM | ECM Function | Actuator |
|---|---|---|---|
| Crankshaft position sensor (POS)<br>Camshaft position sensor (PHASE) | Engine speed* | Fuel pump control | Fuel pump relay |
| Battery | Battery voltage* | | |

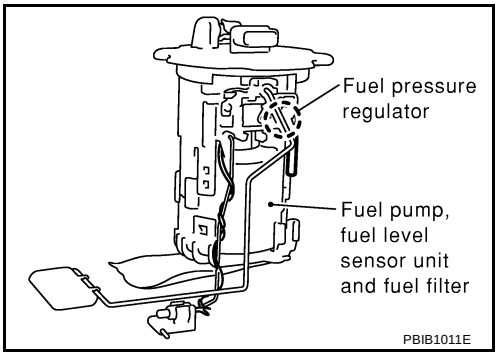
*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

| Condition | Fuel pump operation |
|---|---|
| Ignition switch is turned to ON. | Operates for 1 second. |
| Engine running or cranking | Operates. |
| When engine is stopped | Stops in 1.5 seconds. |
| Except as shown above | Stops. |

### COMPONENT DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.




## CONSULT-II Reference Value in Data Monitor Mode

ABS00B1Y

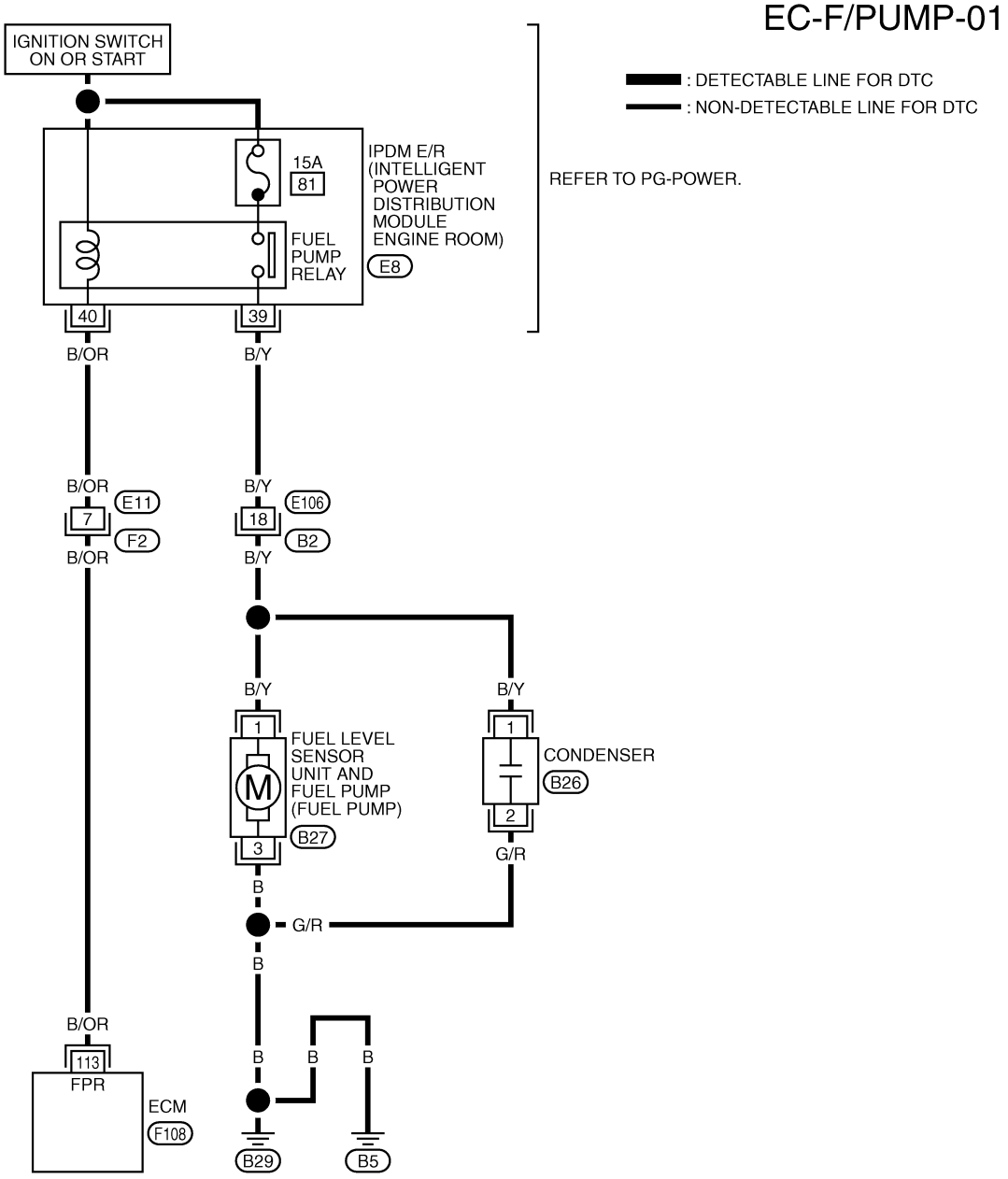
Specification data are reference values.

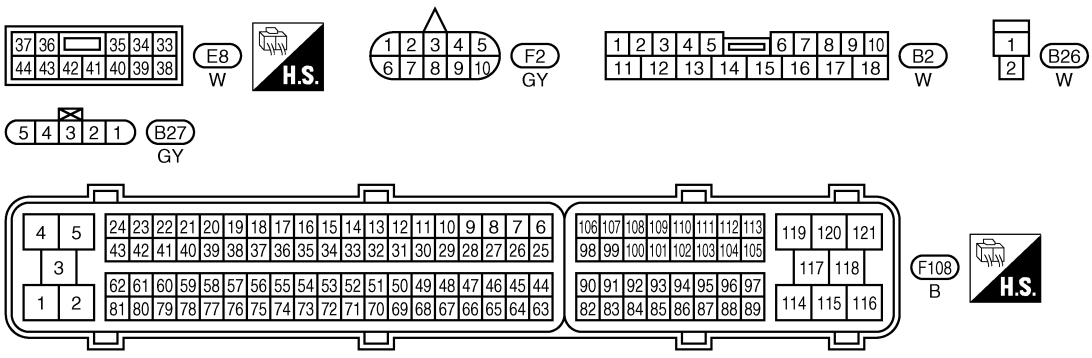
| MONITOR ITEM | CONDITION | SPECIFICATION |
|---|---|---|
| FUEL PUMP RLY | ● For 1 second after turning ignition switch ON<br>● Engine running or cranking | ON |
| | ● Except above conditions | OFF |

## Wiring Diagram

ABS00B1Z

EC-F/PUMP-01




TBWT0683E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

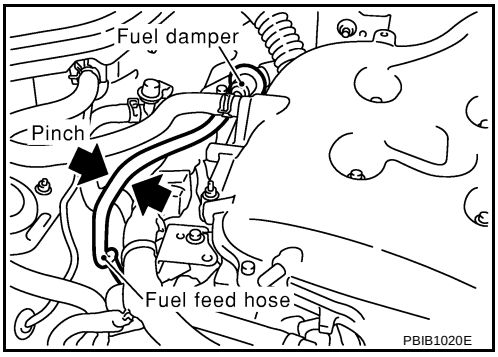
| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 113 | B/OR | Fuel pump relay | **[Ignition switch: ON]**<br>● For 1 second after turning ignition switch ON<br>**[Engine is running]** | 0 - 1.5V |
| | | | **[Ignition switch: ON]**<br>● More than 1 second after turning ignition switch ON. | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

ABS00B20

### 1. CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.
   **Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.**



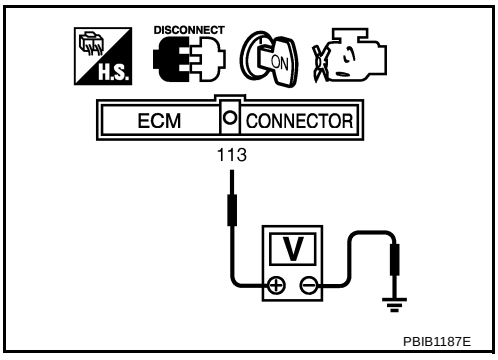

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

### 2. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check voltage between ECM terminal 113 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**



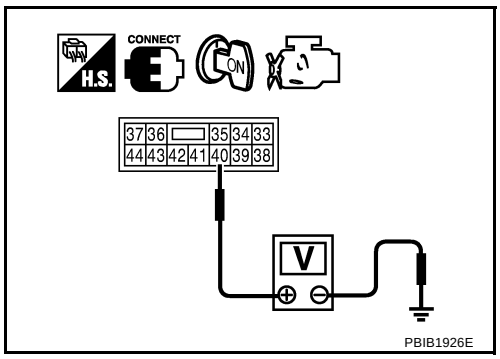

OK or NG

OK >> GO TO 5.
NG >> GO TO 3.

## 3. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between IPDM E/R terminal 40 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**




OK or NG

OK >> GO TO 4.
NG >> GO TO 13.

## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E11, F2
- Harness for open or short between IPDM E/R and ECM

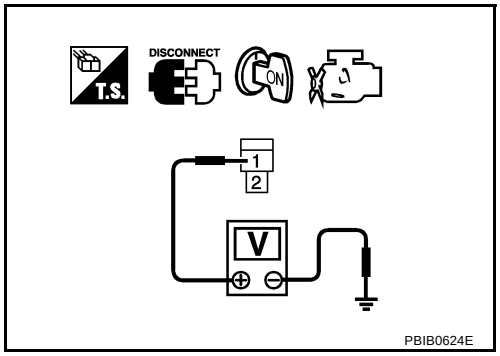
>> Repair open circuit or short to ground or short to power in harness or connectors.

## 5. CHECK CONDENSER POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect condenser harness connector.
4. Turn ignition switch ON.
5. Check voltage between condenser terminal 1 and ground with CONSULT-II or tester.

**Voltage: Battery voltage should exist for 1 second after ignition switch is turned ON.**

6. Also check harness for short to ground and short to power.




OK or NG

OK >> GO TO 9.
NG >> GO TO 6.

## 6. CHECK 15A FUSE

1. Turn ignition switch OFF.
2. Disconnect 15A fuse.
3. Check 15A fuse.

OK or NG

OK >> GO TO 7.
NG >> Replace fuse.

## 7. CHECK CONDENSER POWER SUPPLY CIRCUIT-II

1. Disconnect IPDM E/R harness connector E8.
2. Check harness continuity between IPDM E/R terminal 39 and condenser terminal 1. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> GO TO 8.

## 8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, B2
- Harness for open or short between IPDM E/R and condenser

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 9. CHECK CONDENSER GROUND CIRCUIT

1. Check harness continuity between condenser terminal 2 and ground. Refer to Wiring Diagram.

**Continuity should exist.**

2. Also check harness for short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to power in harness or connectors.

## 10. CHECK CONDENSER

Refer to EC-652, "Component Inspection" .

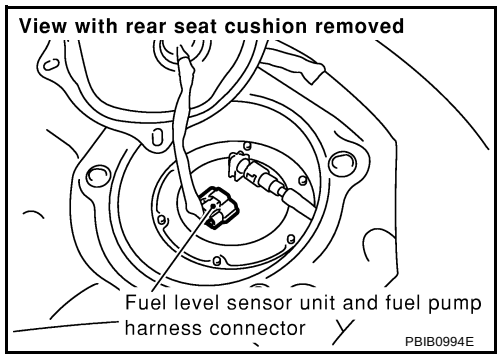
OK or NG

OK >> GO TO 11.
NG >> Replace condenser.

## 11. CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Disconnect harness connectors E106, B2.
4. Check harness continuity between the following;
   “fuel level sensor unit and fuel pump” terminal 1 and harness connector B2 terminal 18,
   “fuel level sensor unit and fuel pump” terminal 3 and ground.
   Refer to Wiring Diagram.

**Continuity should exist.**




5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 12. CHECK FUEL PUMP

Refer to EC-652, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace fuel pump.

## 13. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace IPDM E/R.
NG >> Repair or replace harness or connectors.

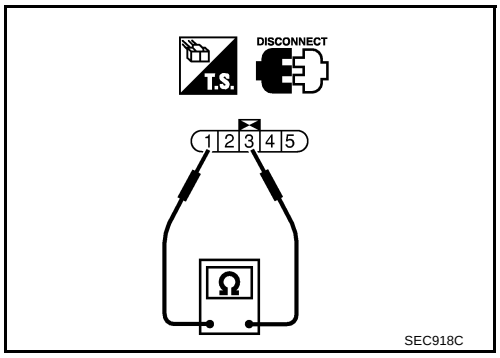
# Component Inspection

ABS00B21

### FUEL PUMP

1. Disconnect “fuel level sensor unit and fuel pump” harness connector.
2. Check resistance between “fuel level sensor unit and fuel pump” terminals 1 and 3.

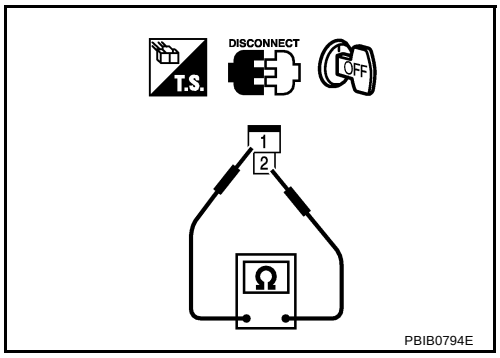
**Resistance: 0.2 – 5.0Ω [at 25°C (77°F)]**




### CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals 1 and 2.

**Resistance: Above 1MΩ [at 25°C (77°F)]**




# Removal and Installation

ABS00B22

### FUEL PUMP

Refer to FL-4, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

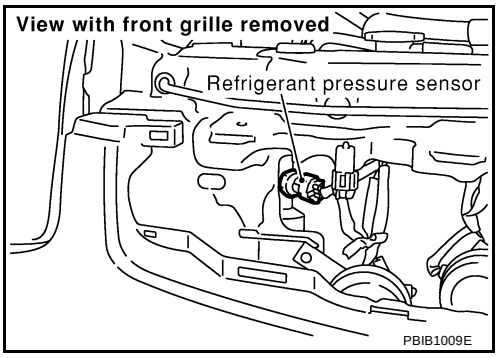
# REFRIGERANT PRESSURE SENSOR

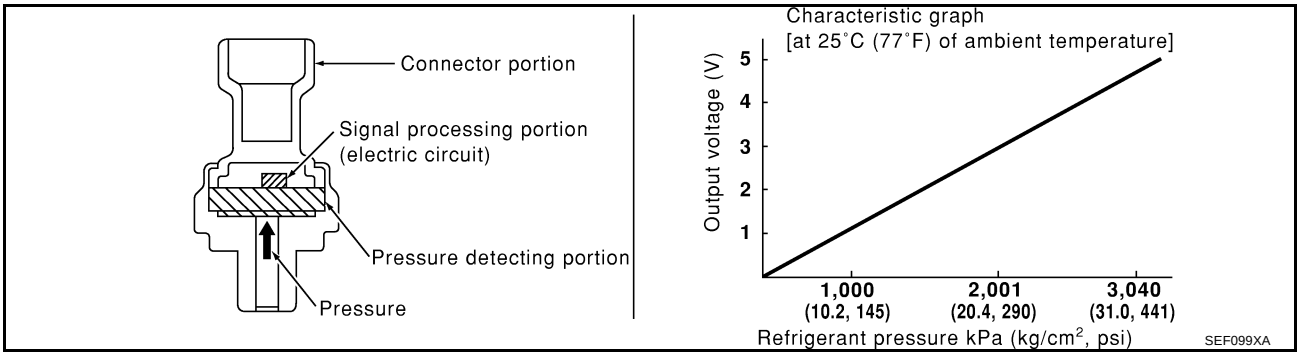
PFP:92136

## Component Description

ABS00B23

The refrigerant pressure sensor is installed at the liquid tank of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



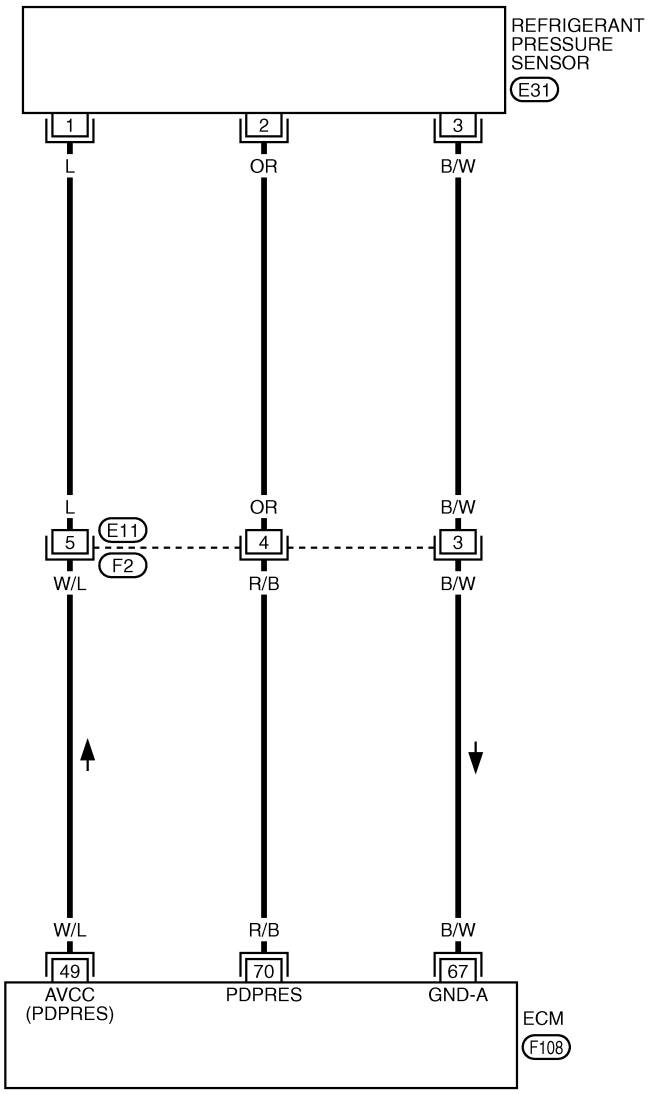



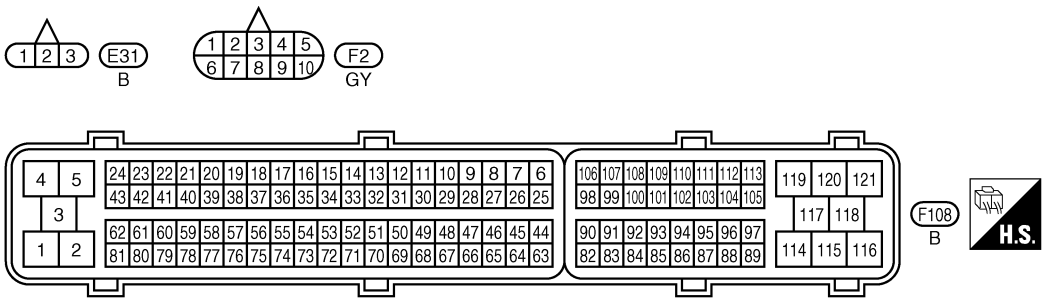
## Wiring Diagram

ABS00B24

EC-RP/SEN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC




TBWM0787E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/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) |
|---|---|---|---|---|
| 49 | W/L | Sensor power supply (Refrigerant pressure sensor) | **[Ignition switch: ON]** | Approximately 5V |
| 67 | B/W | Sensor ground | **[Engine is running]**<br>● **Warm-up condition**<br>● Idle speed | Approximately 0V |
| 70 | R/B | Refrigerant pressure sensor | **[Engine is running]**<br>● **Warm-up condition**<br>● Both A/C switch and blower switch: ON. (Compressor operates.) | 1.0 - 4.0V |

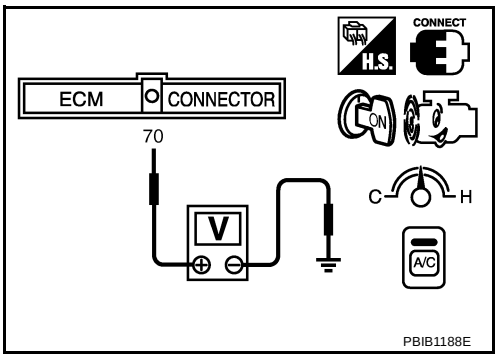
## Diagnostic Procedure

ABS00B25

### 1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower switch ON.
3. Check voltage between ECM terminal 70 and ground with CONSULT-II or tester.

**Voltage: 1.0 - 4.0V**

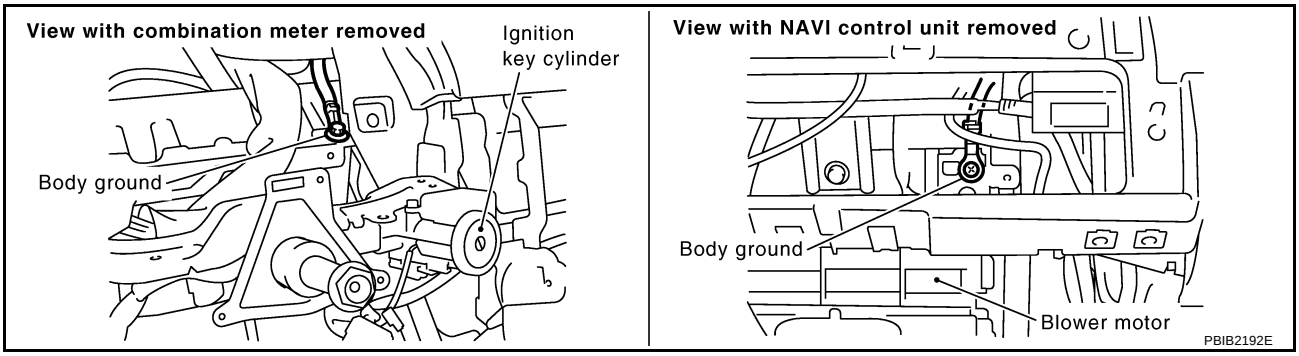



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

### 2. CHECK GROUND CONNECTIONS

1. Turn A/C switch and blower switch OFF.
2. Stop engine.
3. Turn ignition switch OFF.
4. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .

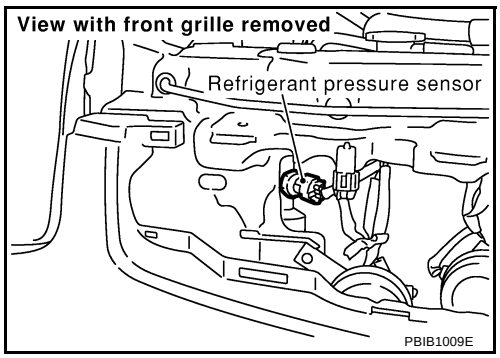



OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

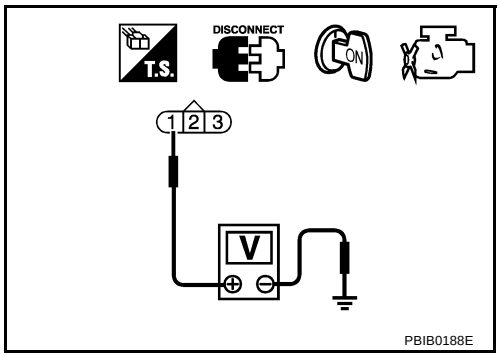
## 3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.




3. Check voltage between refrigerant pressure sensor terminal 1 and ground with CONSULT-II or tester.

**Voltage: Approximately 5V**




OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

## 4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E11, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 5. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between refrigerant pressure sensor terminal 3 and ECM terminal 67. Refer to Wiring Diagram.

**Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E11, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 7. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 70 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

## 8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E11, F2
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 9. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace refrigerant pressure sensor.
NG >> Repair or replace.

# Removal and Installation

ABS00B26

## REFRIGERANT PRESSURE SENSOR

Refer to ATC-155, "Removal and Installation of Refrigerant Pressure Sensor" .

# ELECTRICAL LOAD SIGNAL

PFP:25350

## Description

ABS00B27

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line from BCM to ECM via IPDM E/R.

## CONSULT-II Reference Value in Data Monitor Mode

ABS00B28

Specification data are reference values.

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| LOAD SIGNAL | ● Ignition switch: ON | Rear window defogger switch is ON and/or lighting switch is in 2nd. | ON |
| | | Rear window defogger switch is OFF and lighting switch is OFF. | OFF |

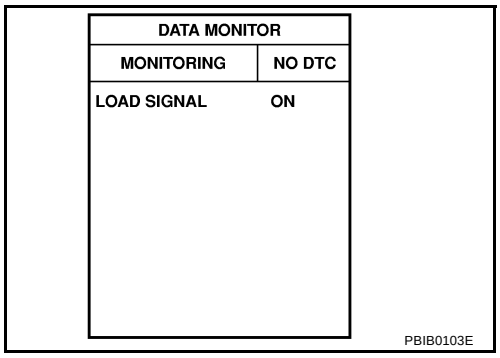
## Diagnostic Procedure

ABS00B29

### 1. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

1. Turn ignition switch ON.
2. Connect CONSULT-II and select “DATA MONITOR” mode.
3. Select “LOAD SIGNAL” and check indication under the following conditions.

| Condition | Indication |
|---|---|
| Rear window defogger switch: ON | ON |
| Rear window defogger switch: OFF | OFF |



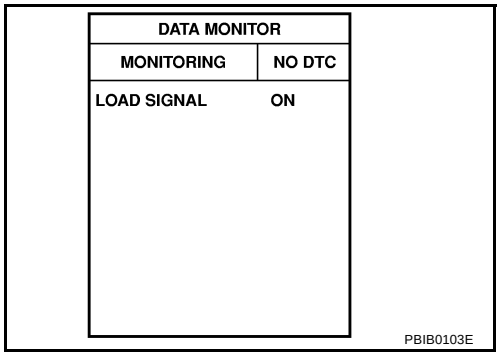

OK or NG

OK >> GO TO 2.
NG >> GO TO 3.

### 2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Check “LOAD SIGNAL” indication under the following conditions.

| Condition | Indication |
|---|---|
| Lighting switch: ON at 2nd position | ON |
| Lighting switch: OFF | OFF |




OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

### 3. CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to GW-86, "REAR WINDOW DEFOGGER" .

>> **INSPECTION END**

### 4. CHECK HEADLAMP SYSTEM

Refer to LT-7, "HEADLAMP (FOR USA)" or LT-38, "HEADLAMP (FOR CANADA) - DAYTIME LIGHT SYSTEM -" .

>> **INSPECTION END**

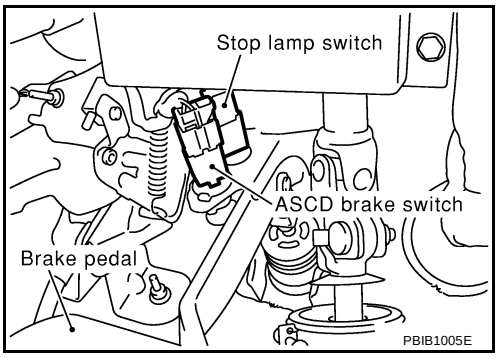
# ASCD BRAKE SWITCH

PFP:25320

## Component Description

ABS00B2A

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-28, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.




## CONSULT-II Reference Value in Data Monitor Mode

ABS00B2B

Specification data are reference values.

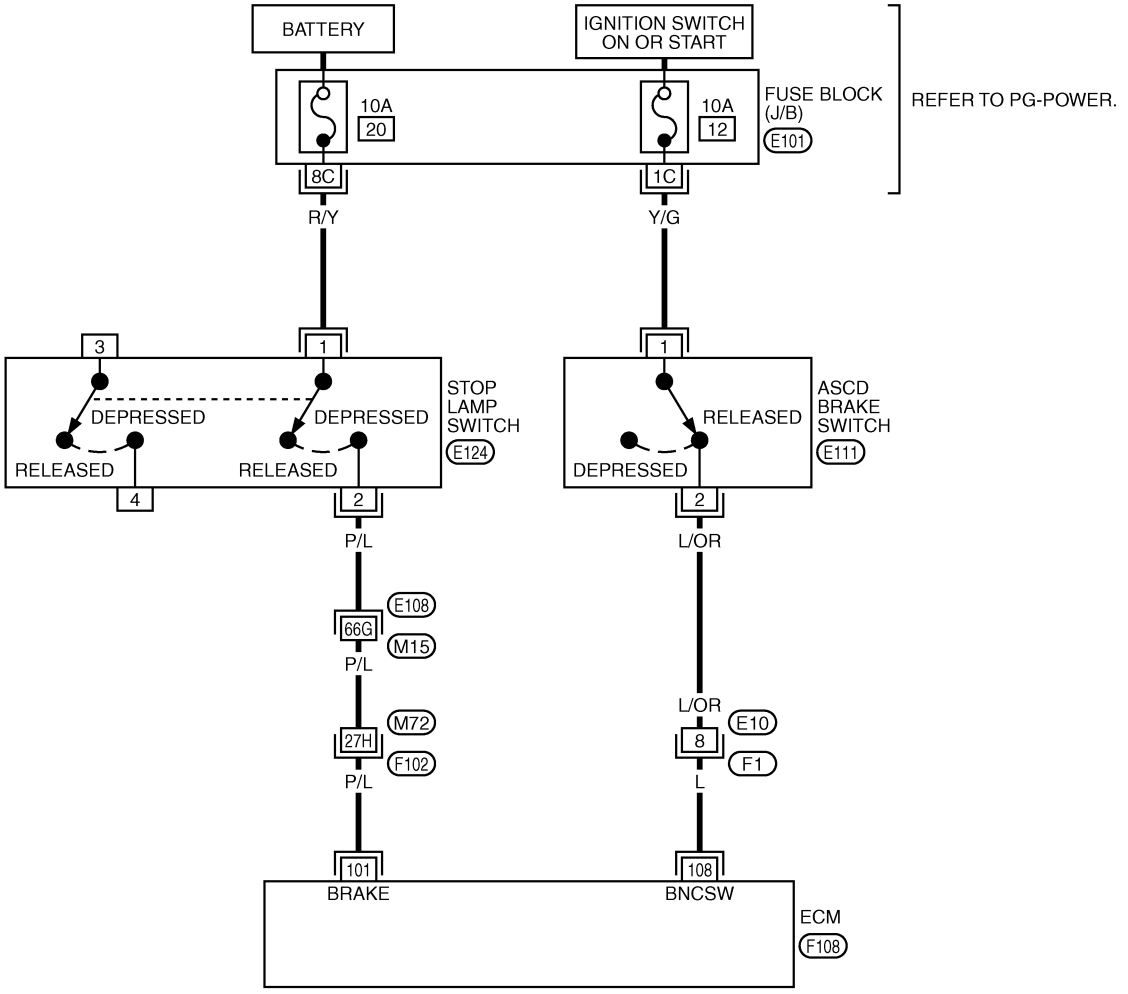
| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| BRAKE SW 1<br>(ASCD brake switch) | ● Ignition switch: ON | ● Brake pedal: Fully released (A/T)<br>● Brake pedal and clutch pedal: Fully released (M/T) | ON |
| | | ● Brake pedal: Slightly depressed (A/T)<br>● Brake pedal and/or clutch pedal: Slightly depressed (M/T) | OFF |
| BRAKE SW 2<br>(Stop lamp switch) | ● Ignition switch: ON | Brake pedal: Fully released | OFF |
| | | Brake pedal: Slightly depressed | ON |

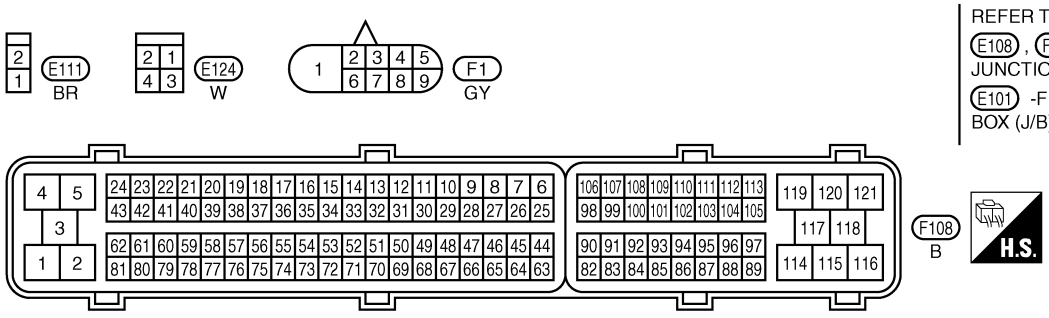
## Wiring Diagram
### A/T MODEL

ABS00B2C

EC-ASCBOF-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC




REFER TO THE FOLLOWING.
E108 , F102 -SUPER MULTIPLE JUNCTION (SMJ)
E101 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWM0788E

Specification data are reference values and are measured between each terminal and ground.

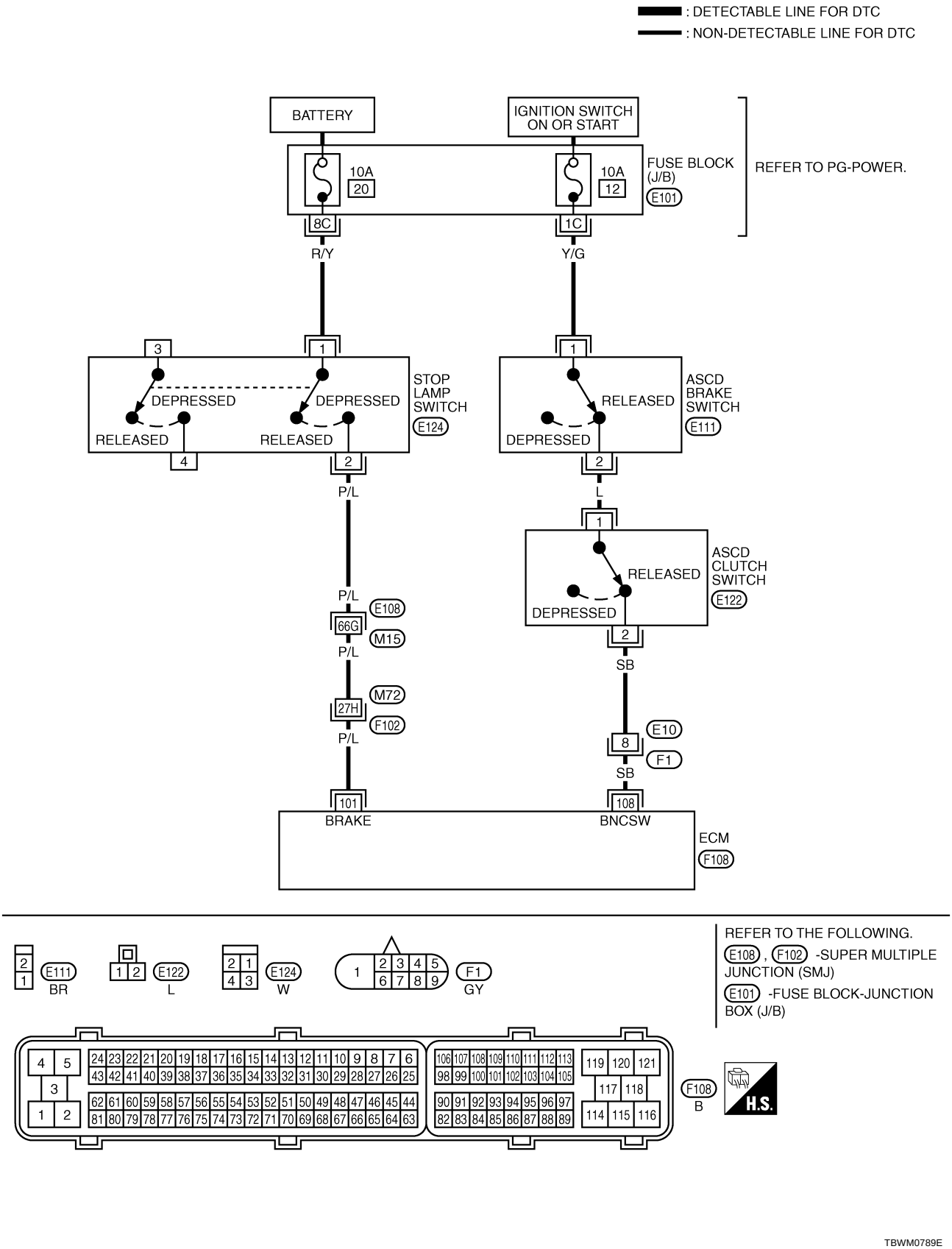
**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 101 | P/L | Stop lamp switch | **[Ignition switch: OFF]**<br>● Brake pedal: Fully released | Approximately 0V |
| | | | **[Ignition switch: OFF]**<br>● Brake pedal: Slightly depressed | BATTERY VOLTAGE<br>(11 - 14V) |
| 108 | L | ASCD brake switch | **[Ignition switch: ON]**<br>● Brake pedal: Slightly depressed | Approximately 0V |
| | | | **[Ignition switch: ON]**<br>● Brake pedal: Fully released | BATTERY VOLTAGE<br>(11 - 14V) |

## M/T MODEL

EC-ASCBOF-02




TBWM0789E

Specification data are reference values and are measured between each terminal and ground.

**CAUTION:**

**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**

| TERMINAL NO. | WIRE COLOR | ITEM | CONDITION | DATA (DC Voltage) |
|---|---|---|---|---|
| 101 | P/L | Stop lamp switch | **[Ignition switch: OFF]**<br>● Brake pedal: Fully released | Approximately 0V |
| | | | **[Ignition switch: OFF]**<br>● Brake pedal: Slightly depressed | BATTERY VOLTAGE (11 - 14V) |
| 108 | L | ASCD brake switch | **[Ignition switch: ON]**<br>● Brake pedal and/or clutch pedal: Slightly depressed | Approximately 0V |
| | | | **[Ignition switch: ON]**<br>● Brake pedal and clutch pedal: Fully released | BATTERY VOLTAGE (11 - 14V) |

## Diagnostic Procedure

ABS00B2D

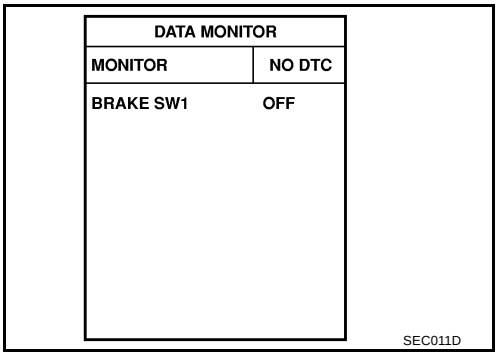
### A/T MODELS

### 1. CHECK OVERALL FUNCTION-I

**With CONSULT-II**

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

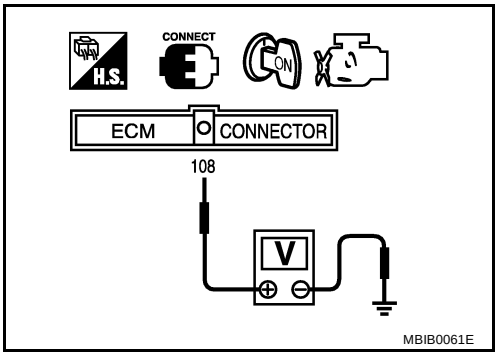
| CONDITION | INDICATION |
|---|---|
| Brake pedal: Slightly depressed | OFF |
| Brake pedal: Fully released | ON |




**Without CONSULT-II**

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

| CONDITION | VOLTAGE |
|---|---|
| Brake pedal: Slightly depressed | Approximately 0V |
| Brake pedal: Fully released | Battery voltage |




OK or NG

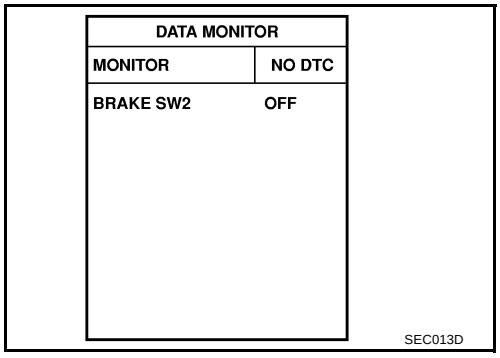
OK >> GO TO 2.
NG >> GO TO 3.

## 2. CHECK OVERALL FUNCTION-II

**With CONSULT-II**

1. Select “BRAKE SW2” in “DATA MONITOR” mode with CONSULT-II.
2. Check “BRAKE SW2” indication under the following conditions.

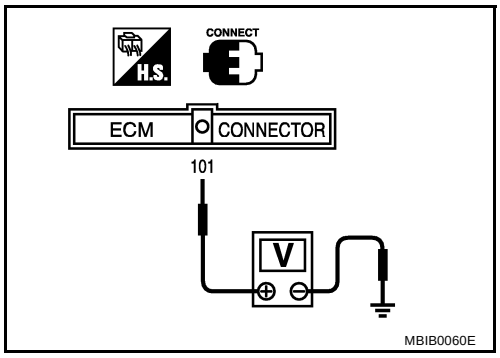
| CONDITION | INDICATION |
|---|---|
| Brake pedal: Slightly depressed | OFF |
| Brake pedal: Fully released | ON |




**Without CONSULT-II**

Check voltage between ECM terminal 101 and ground under the following conditions.

| CONDITION | VOLTAGE |
|---|---|
| Brake pedal: Slightly depressed | Approximately 0V |
| Brake pedal: Fully released | Battery voltage |

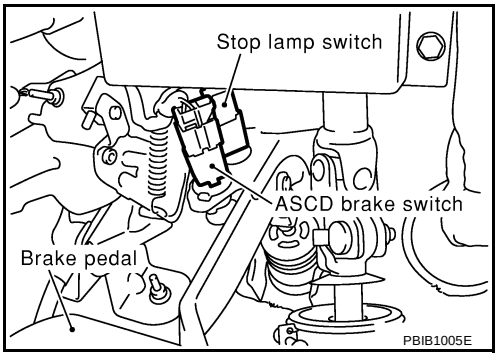



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 8.

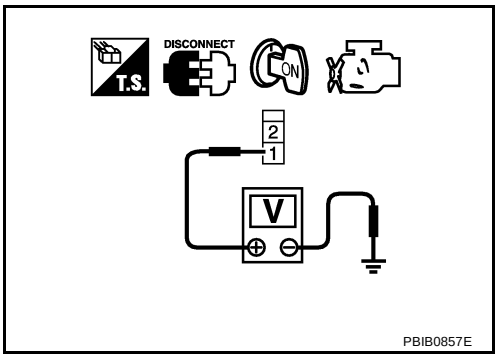
## 3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.




4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-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 E101
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 5. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

## 6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open or short between ECM and ASCD brake switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 7. CHECK ASCD BRAKE SWITCH

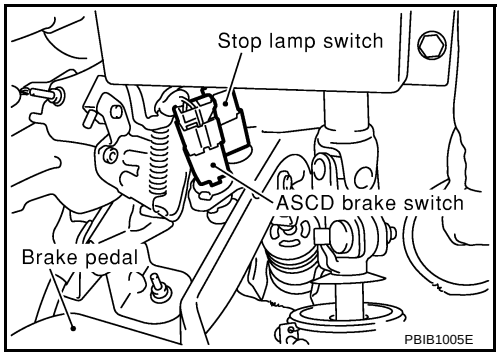
Refer to EC-673, "Component Inspection"

OK or NG

OK >> GO TO 13.
NG >> Replace ASCD brake switch.

## 8. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.

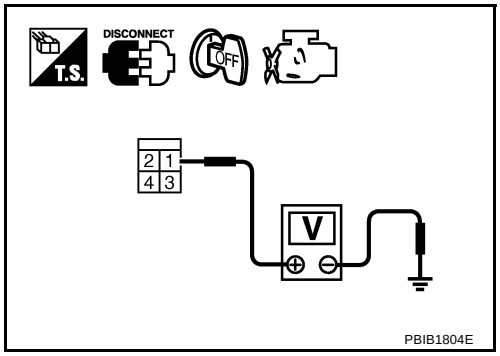



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT -II or tester.

**Voltage: Battery voltage**

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.




## 9. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E101
- 10A fuse
- Harness for open or short between stop lamp switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 10. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

## 11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness connectors M72, F102
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 12. CHECK STOP LAMP SWITCH

Refer to EC-673, "Component Inspection"

OK or NG

OK >> GO TO 13.
NG >> Replace stop lamp switch.

## 13. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

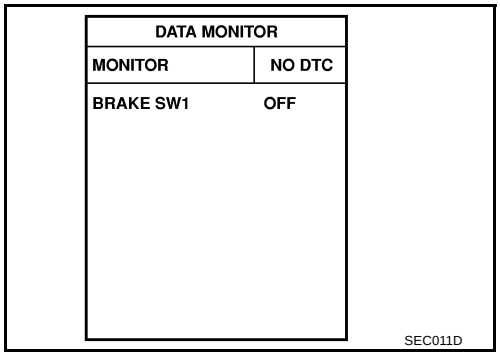
## M/T MODELS

### 1. CHECK OVERALL FUNCTION-I

**With CONSULT-II**

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

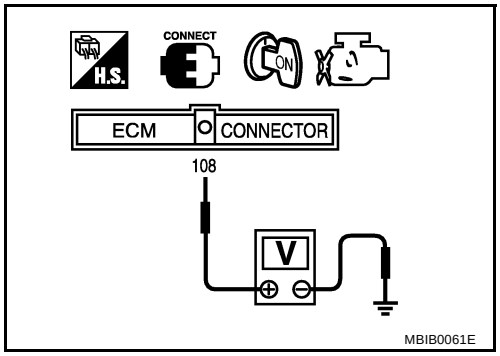
| CONDITION | INDICATION |
|---|---|
| Brake pedal and/or clutch pedal: Slightly depressed | OFF |
| Brake pedal and clutch pedal: Fully released | ON |




**Without CONSULT-II**

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

| CONDITION | VOLTAGE |
|---|---|
| Brake pedal and/or clutch pedal: Slightly depressed | Approximately 0V |
| Brake pedal and clutch pedal: Fully released | Battery voltage |




OK or NG

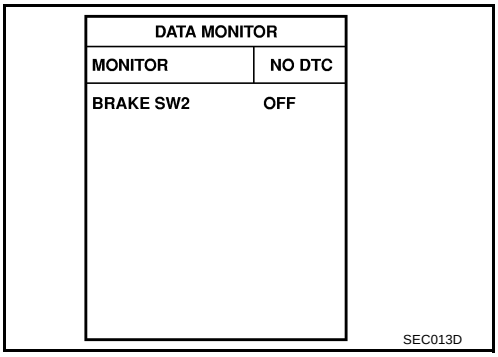
OK >> GO TO 2.
NG >> GO TO 3.

## 2. CHECK OVERALL FUNCTION-II

**With CONSULT-II**

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

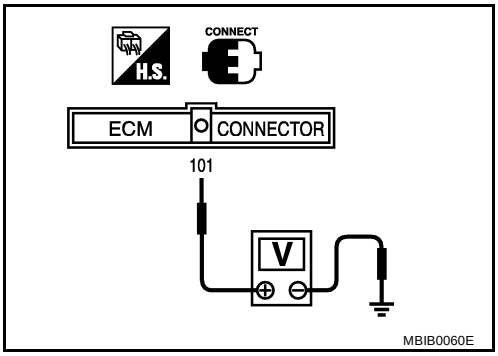
| CONDITION | INDICATION |
|---|---|
| Brake pedal: Fully released | OFF |
| Brake pedal: Slightly depressed | ON |




**Without CONSULT-II**

Check voltage between ECM terminal 101 and ground under the following conditions.

| CONDITION | VOLTAGE |
|---|---|
| Brake pedal: Fully released | Approximately 0V |
| Brake pedal: Slightly depressed | Battery voltage |

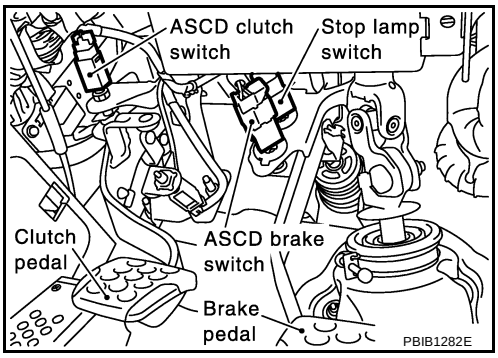



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11.

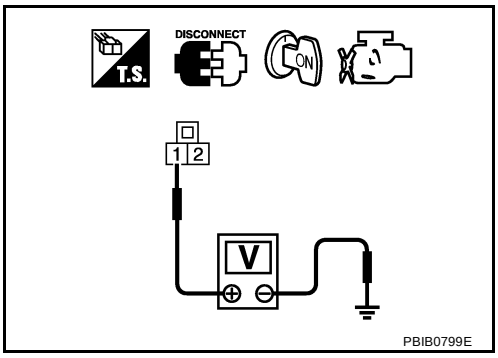
## 3. CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.




4. Check voltage between ASCD clutch switch terminal 1 and ground under the following conditions with CONSULT-II or tester.

| CONDITION | VOLTAGE |
|---|---|
| Brake pedal: Fully released | Battery voltage |
| Brake pedal: Slightly depressed | Approximately 0V |

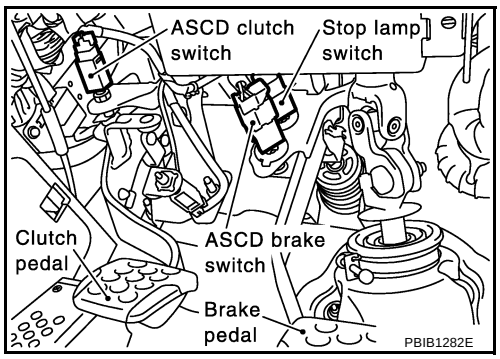



OK or NG

OK >> GO TO 8.
NG >> GO TO 4.

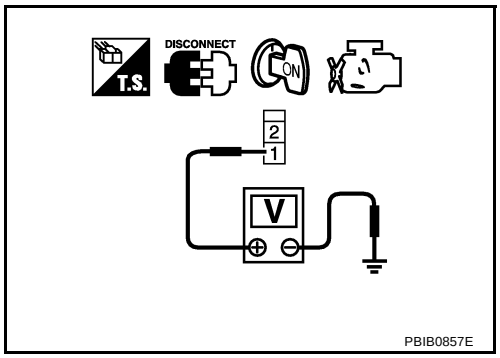
## 4. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.




4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**




OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

## 5. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E101
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 7. CHECK ASCD BRAKE SWITCH

Refer to EC-673, "Component Inspection"

OK or NG

OK >> GO TO 16.
NG >> Replace ASCD brake switch.

## 8. CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ASCD clutch switch terminal 2 and ECM terminal 108. Refer to Wiring Diagram.

**Continuity should exist.**

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

## 9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F1
- Harness for open or short between ECM and ASCD clutch switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 10. CHECK ASCD CLUTCH SWITCH

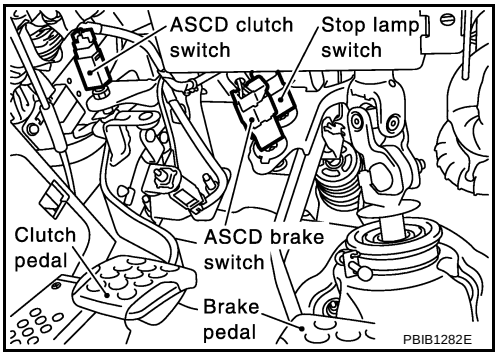
Refer to EC-673, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Replace ASCD clutch switch.

## 11. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.

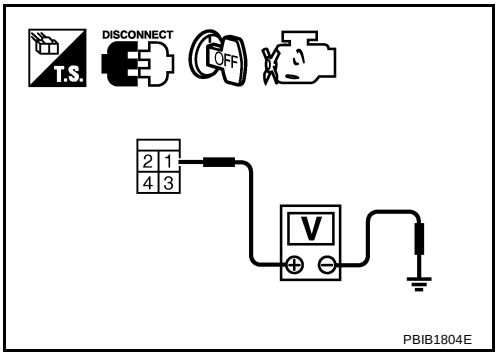



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.



## 12. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector E101
- 10A fuse
- Harness for open or short between stop lamp switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 13. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

## 14. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M15
- Harness connectors M72, F102
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 15. CHECK STOP LAMP SWITCH

Refer to EC-673, "Component Inspection"

OK or NG

OK >> GO TO 16.
NG >> Replace stop lamp switch.

## 16. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

## Component Inspection

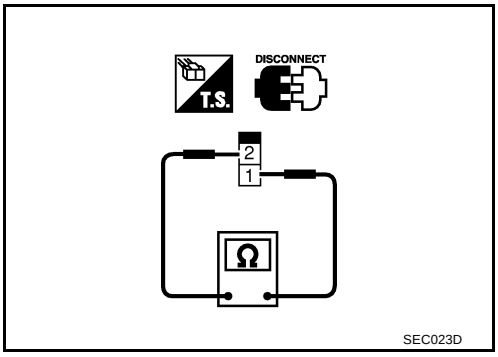
ABS00B2E

### ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

| Condition | Continuity |
|---|---|
| Brake pedal: Fully released. | Should exist. |
| Brake pedal: Slightly depressed. | Should not exist. |

If NG, adjust ASCD brake switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

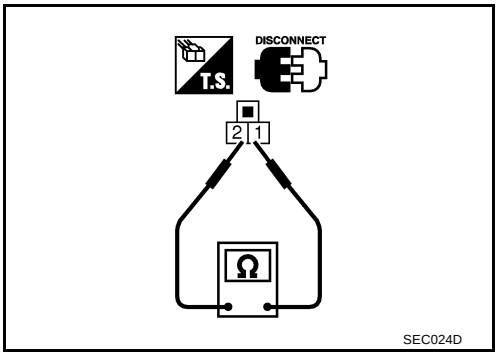



### ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

| Condition | Continuity |
|---|---|
| Clutch pedal: Fully released. | Should exist. |
| Clutch pedal: Slightly depressed. | Should not exist. |

If NG, adjust ASCD clutch switch installation, refer to CL-5, "CLUTCH PEDAL" , and perform step 3 again.

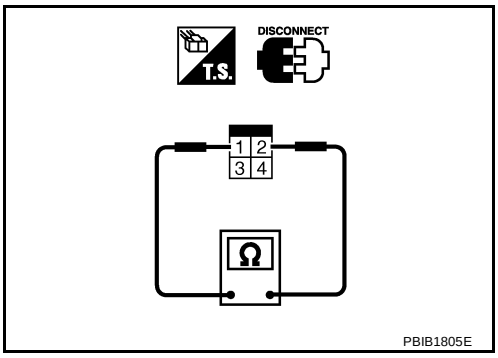



### STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

| Condition | Continuity |
|---|---|
| Brake pedal: Fully released. | Should not exist. |
| Brake pedal: Slightly depressed. | Should exist. |

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.



# ASCD INDICATOR

PFP:24814

## Component Description

ABS00B2F

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE indicator illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.
SET indicator illuminates when following conditions are met.

- CRUISE indicator is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET indicator remains lit during ASCD control.
Refer to EC-28, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

## CONSULT-II Reference Value in Data Monitor Mode

ABS00B2G

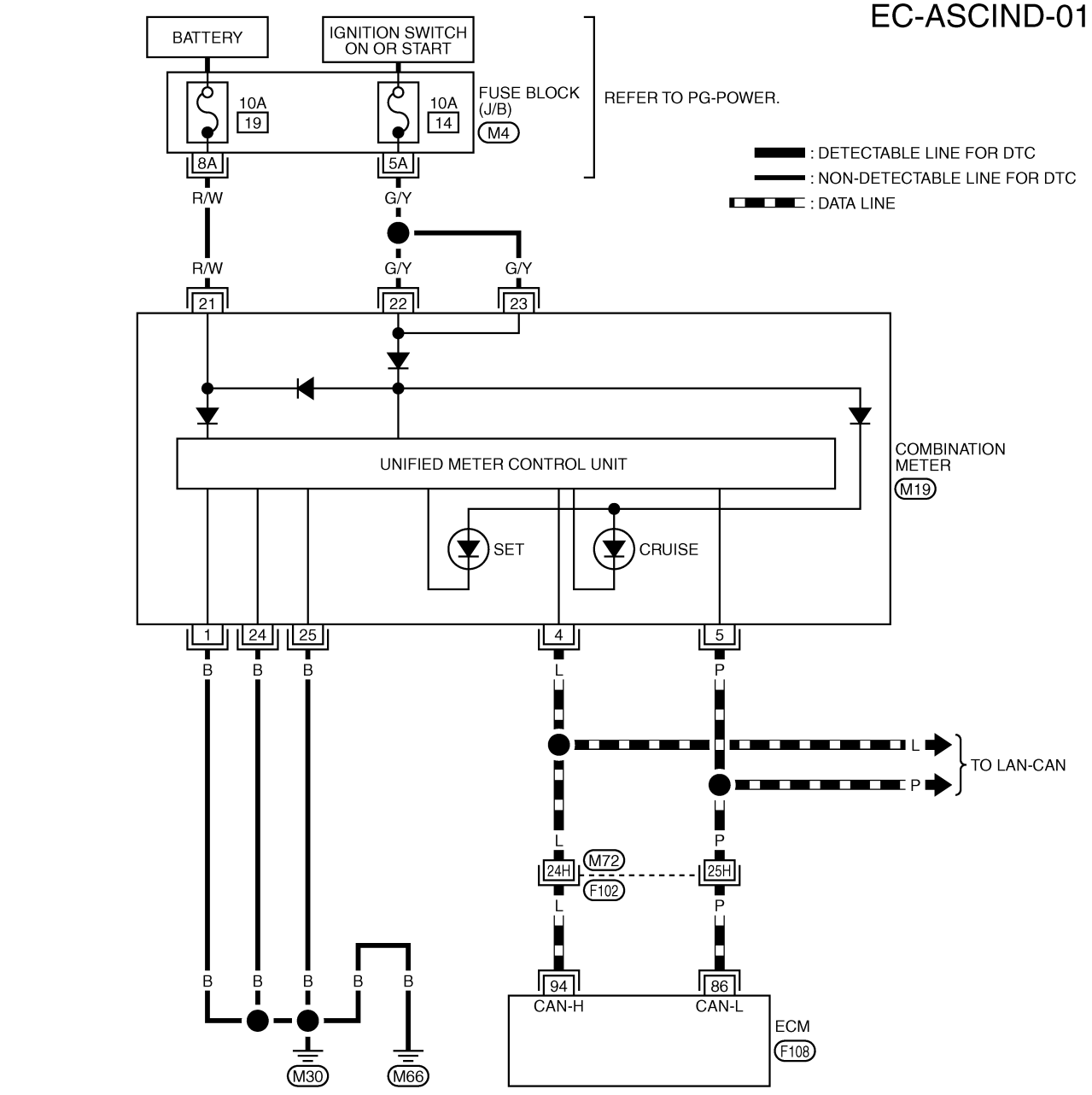
Specification data are reference value.

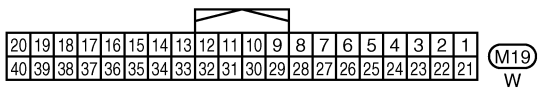
| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| CRUISE LAMP | Ignition switch: ON | MAIN switch: Pressed at the 1st time → at the 2nd time | ON → OFF |
| SET LAMP | ● MAIN switch: ON<br>● When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH) | ASCD: Operating | ON |
| | | ASCD: Not operating | OFF |

## Wiring Diagram

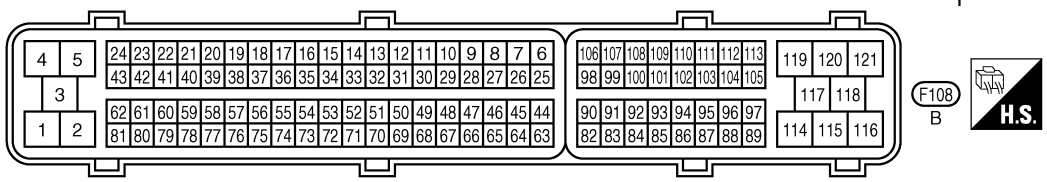
ABS00B2H

EC-ASCIND-01




REFER TO THE FOLLOWING.
F102 -SUPER MULTIPLE JUNCTION (SMJ)
M4 -FUSE BLOCK-JUNCTION BOX (J/B)




TBWM0790E

## Diagnostic Procedure

ABS00B2I

### 1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

| ASCD INDICATOR | CONDITION | | SPECIFICATION |
|---|---|---|---|
| CRUISE LAMP | Ignition switch: ON | MAIN switch: Pressed at the 1st time → at the 2nd time | ON → OFF |
| SET LAMP | ● MAIN switch: ON<br>● When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH) | ADCD: Operating | ON |
| | | ASCD: Not operating | OFF |

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

### 2. CHECK DTC

Check that DTC U1000 or U1001 is not displayed.

OK or NG

OK >> GO TO 3.
NG >> Perform trouble diagnoses for DTC U1000, U1001. Refer to EC-166, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

### 3. CHECK COMBINATION METER OPERATION

Does combination meter operate normally?

Yes or No

Yes >> GO TO 4.
No >> Check combination meter circuit. Refer to DI-4, "COMBINATION METERS" .

### 4. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

# SNOW MODE SWITCH

PFP:25310

## Description

ABS00B2J

The snow mode switch signal is sent to the combination meter from the snow mode switch. The combination meter then sends the signal to the ECM by CAN communication line.
The snow mode is used for driving or starting the vehicle on snowy roads or slippery areas. If the snow mode is activated, the vehicle speed will not be accelerated immediately than your original pedal in due to avoid the vehicle slip. In other words, ECM controls the rapid engine torque change by controlling the electric throttle control actuator operating speed.

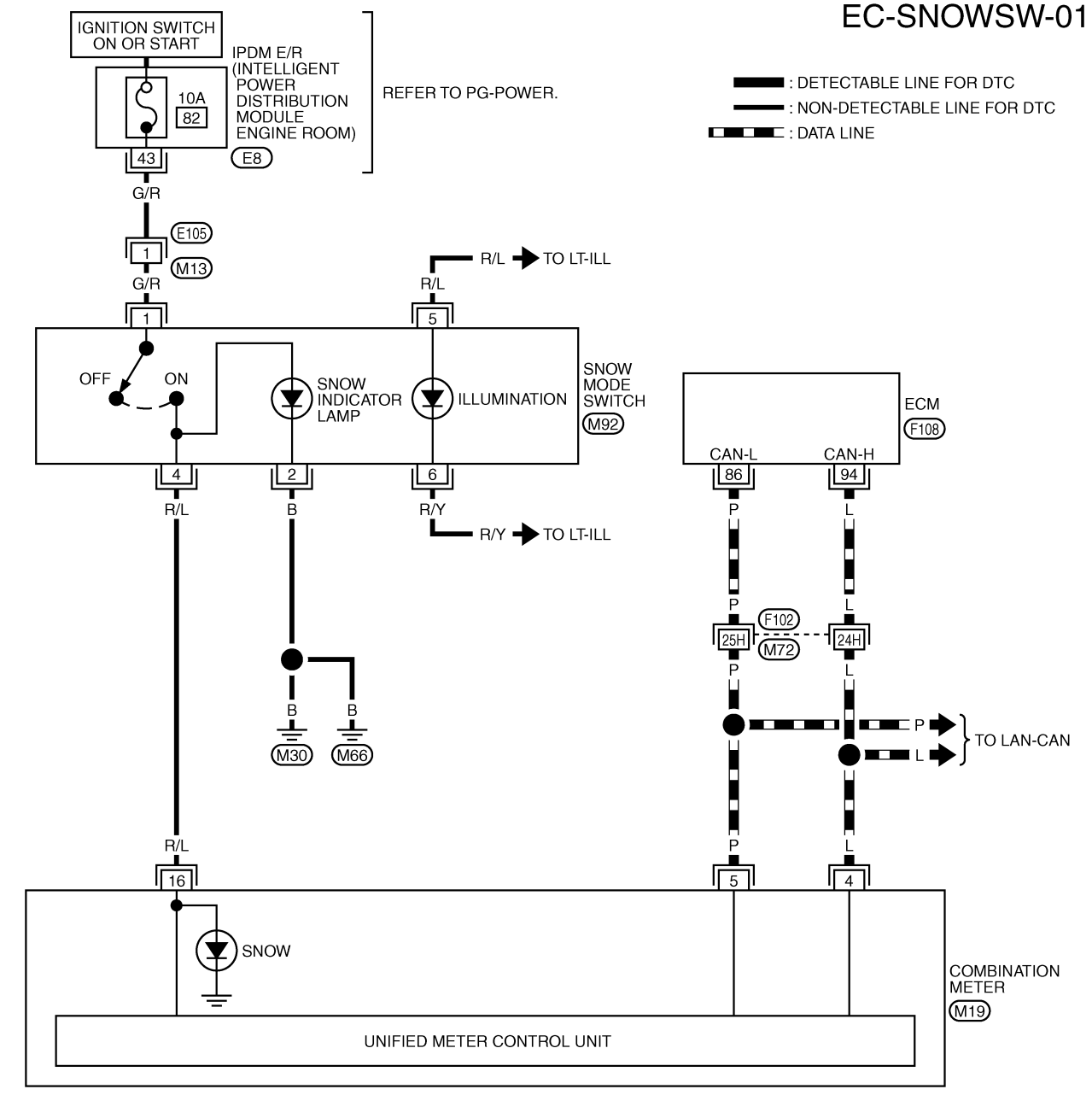
## CONSULT-II Reference Value in the Data Monitor Mode

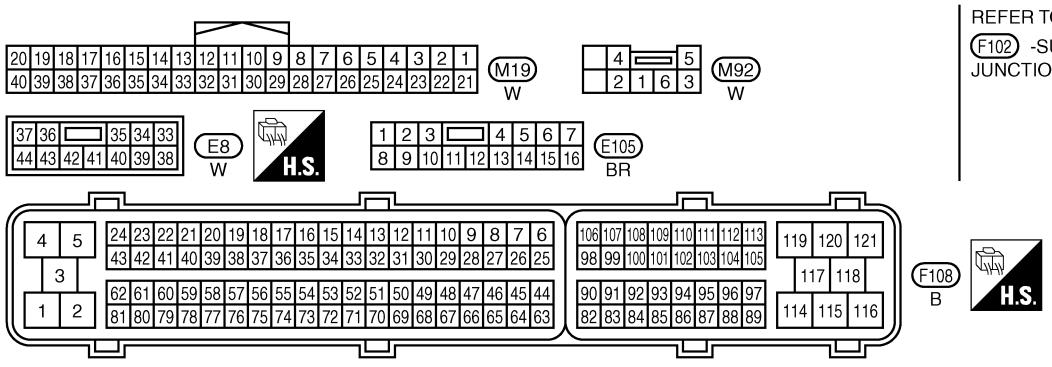
ABS00B2K

| MONITOR ITEM | CONDITION | | SPECIFICATION |
|---|---|---|---|
| SNOW MODE SW | ● Ignition switch: ON | Snow mode switch: ON | ON |
| | | Snow mode switch: OFF | OFF |

## Wiring Diagram

ABS00B2L




REFER TO THE FOLLOWING.
F102 -SUPER MULTIPLE JUNCTION (SMJ)

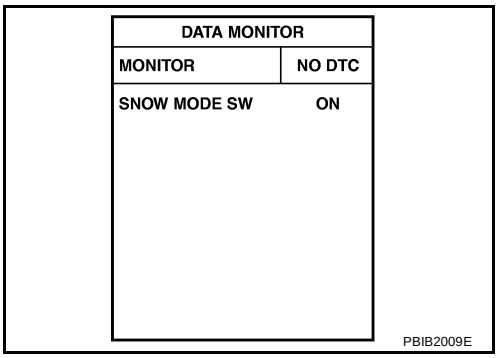
TBWM0791E

## Diagnostic Procedure

ABS00B2M

### 1. CHECK OVERALL FUNCTION-I

1. Turn ignition switch ON.
2. Select “SNOW MODE SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “SNOW MODE SW” indication under the following conditions.




| CONDITION | INDICATION |
|---|---|
| Snow mode switch: ON | ON |
| Snow mode switch: OFF | OFF |

4.

OK or NG

OK >> GO TO 2.
NG >> GO TO 3.

### 2. CHECK OVERALL FUNCTION-II

1. Turn ignition switch ON.
2. Check snow indicator in the snow mode switch under the following conditions.

| CONDITION | INDICATOR |
|---|---|
| Snow mode switch: ON | Illuminated |
| Snow mode switch: OFF | Not illuminated |

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

### 3. CHECK DTC

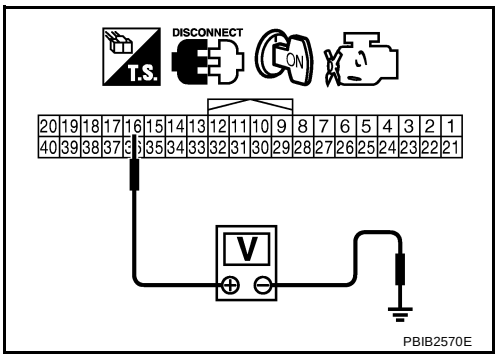
Check that DTC U1000 or U1001 is not displayed.

OK or NG

OK >> GO TO 4.
NG >> Perform trouble diagnoses for DTC U1000, U1001. Refer to EC-166, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

### 4. CHECK SNOW MODE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect combination meter harness connector.
3. Turn ignition switch ON.
4. Check voltage between combination meter terminal 16 and ground under the following conditions with CONSULT-II or tester.




| CONDITION | VOLTAGE |
|---|---|
| Snow mode switch: ON | battery voltage (11 – 14V) |
| Snow mode switch: OFF | 0V |

OK or NG

OK >> GO TO 5.
NG >> GO TO 6.

## 5. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

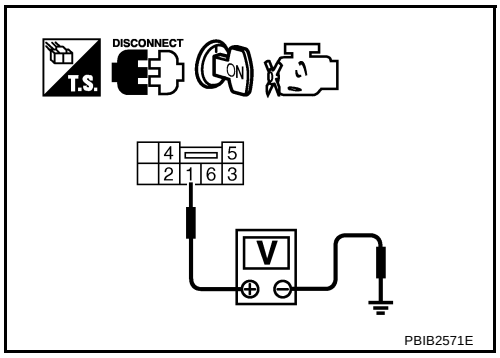
OK or NG

OK >> Replace combination meter.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

## 6. CHECK SNOW MODE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect snow mode switch harness connector.
3. Turn ignition switch ON.
4. Check voltage between snow mode switch terminal 1 and ground with CONSULT-II or tester.

**Voltage: Battery voltage**




OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

## 7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M13
- IPDM E/R harness connector E8
- 10A fuse
- Harness for open or short between snow mode switch and fuse.

>> Repair open circuit or short to ground or short to power in harness or connectors.

## 8. CHECK SNOW MODE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between snow mode switch terminal 4 and combination meter terminal 16. 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 SNOW MODE SWITCH

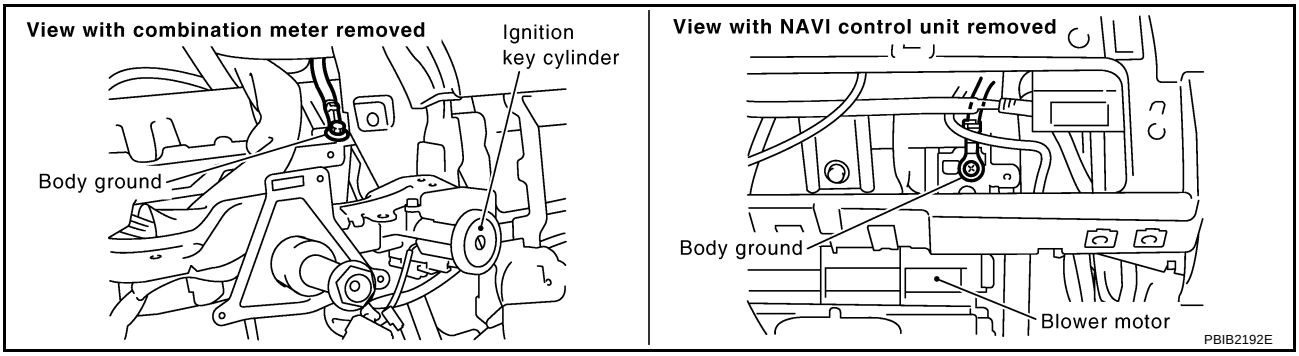
Refer to EC-682, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace snow mode switch.

## 10. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-164, "Ground Inspection" .




OK or NG

OK >> GO TO 12.
NG >> Repair or replace ground connections.

## 11. CHECK SNOW INDICATOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect snow mode switch harness connector.
2. Check harness continuity between snow mode switch terminal 2 and ground. Refer to Wiring Diagram.

**Continuity should exist.**

3. Also check harness for short to power.

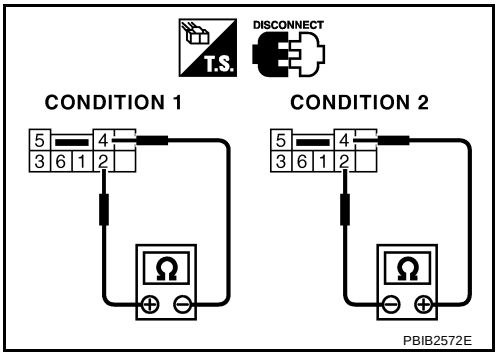
OK or NG

OK >> GO TO 12.
NG >> Repair open circuit or short to power in harness or connectors.

## 12. CHECK SNOW INDICATOR

Check continuity between snow mode switch terminals 2 and 4 under the following conditions.

| Condition | Continuity |
|---|---|
| 1 | Should exist. |
| 2 | Should not exist. |




OK or NG

OK >> GO TO 13.
NG >> Replace snow mode switch.

## 13. CHECK INTERMITTENT INCIDENT

Refer to EC-156, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

## Component Inspection

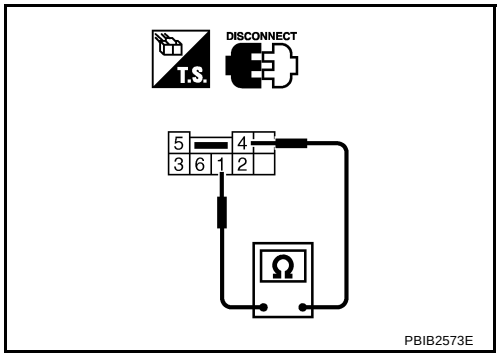
ABS00B2N

### SNOW MODE SWITCH

1. Check snow mode switch continuity between terminals 1 and 4 under the following condition.

| CONDITION | CONTINUITY |
|---|---|
| Snow mode switch: ON | Should exist |
| Snow mode switch: OFF | Should not exist |

2. If NG, replace snow mode switch.

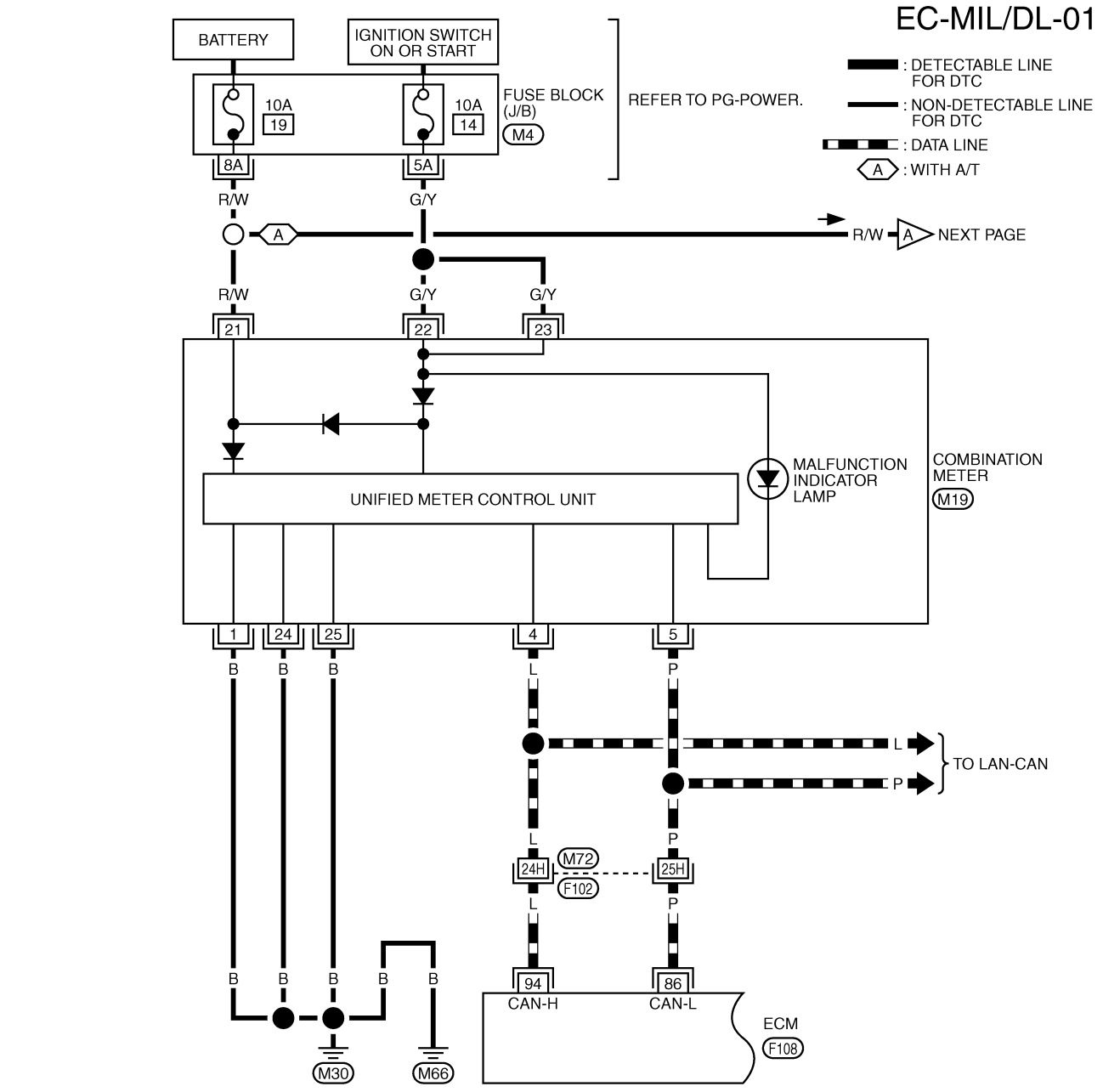


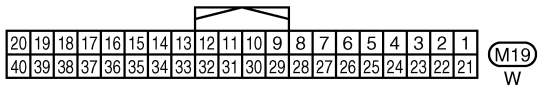
# MIL AND DATA LINK CONNECTOR

PFP:24814

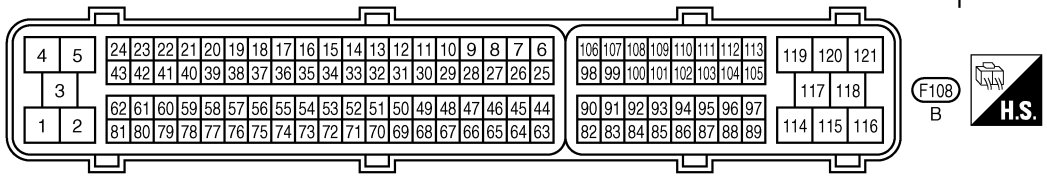
## Wiring Diagram

ABS00B2O

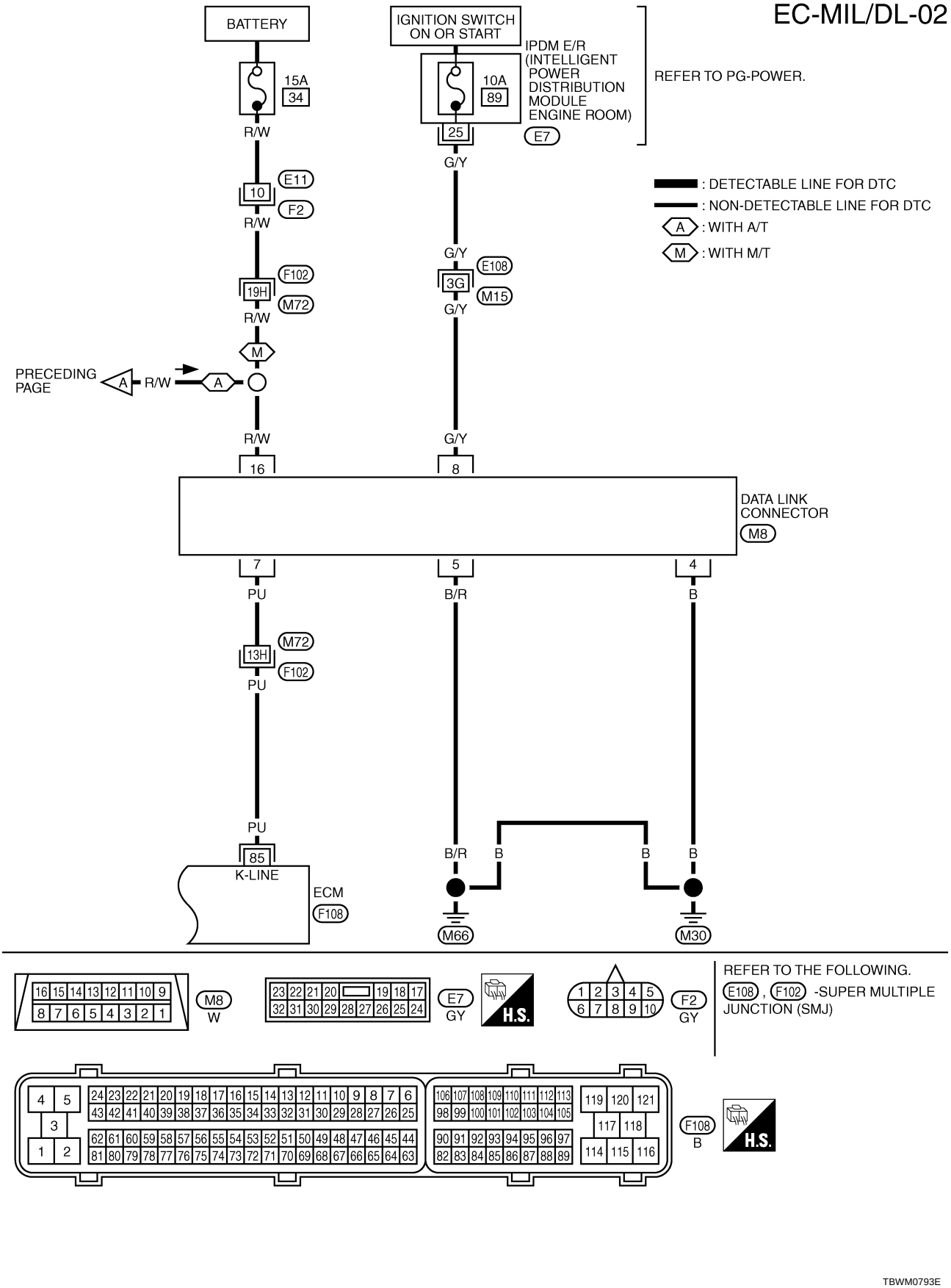



REFER TO THE FOLLOWING.
F102 -SUPER MULTIPLE JUNCTION (SMJ)
M4 -FUSE BLOCK-JUNCTION BOX (J/B)




TBWM0792E


EC-MIL/DL-02
BATTERY
15A
34
R/W
E11
10
F2
R/W
F102
19H
M72
R/W
M
PRECEDING PAGE
A
R/W
A
R/W
16
IGNITION SWITCH ON OR START
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
10A
89
25
E7
G/Y
G/Y
E108
3G
M15
G/Y
G/Y
8
REFER TO PG-POWER.
: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
A : WITH A/T
M : WITH M/T
DATA LINK CONNECTOR
M8
7
PU
M72
13H
F102
PU
PU
85
K-LINE
ECM
F108
5
B/R
4
B
B/R
B
B
B
M66
M30
M8
W
E7
GY
H.S.
F2
GY
REFER TO THE FOLLOWING.
E108 , F102 -SUPER MULTIPLE JUNCTION (SMJ)
F108
B
H.S.

TBWM0793E

# SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

## Fuel Pressure

ABS00B30

| | |
|---|---|
| Fuel pressure at idling kPa (kg/cm$^2$ , psi) | Approximately 350 (3.57, 51) |

## Idle Speed and Ignition Timing

ABS00B31

| | | | |
|---|---|---|---|
| Target idle speed | A/T | No-load* (in P or N position) | 650±50 rpm |
| | M/T | No-load* (in Neutral position) | |
| Air conditioner: ON | A/T | In P or N position | 775 rpm or more |
| | M/T | In Neutral position | |
| Ignition timing | A/T | In P or N position | 15° ± 5° BTDC |
| | M/T | In Neutral position | |

*: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

## Calculated Load Value

ABS00B32

| Conditions | Calculated load value% (Using CONSULT-II or GST) |
|---|---|
| At idle | 5 - 35 |
| At 2,500 rpm | 5 - 35 |

## Mass Air Flow Sensor

ABS00B33

| | |
|---|---|
| Supply voltage | Battery voltage (11 - 14V) |
| Output voltage at idle | 0.9 - 1.2V* |
| Mass air flow (Using CONSULT-II or GST) | 2.0 - 6.0 g·m/sec at idle*<br>7.0 - 20.0 g·m/sec at 2,500 rpm* |

*: Engine is warmed up to normal operating temperature and running under no-load.

## Intake Air Temperature Sensor

ABS00B34

| Temperature °C (°F) | Resistance kΩ |
|---|---|
| 25 (77) | 1.94 - 2.06 |
| 80 (176) | 0.295 - 0.349 |

## Engine Coolant Temperature Sensor

ABS00B35

| Temperature °C (°F) | Resistance kΩ |
|---|---|
| 20 (68) | 2.1 - 2.9 |
| 50 (122) | 0.68 - 1.00 |
| 90 (194) | 0.236 - 0.260 |

## Air Fuel Ratio (A/F) Sensor 1 Heater

ABS00B36

| | |
|---|---|
| Resistance [at 25°C (77°F)] | 2.3 - 4.3Ω |

## Heated Oxygen Sensor 2 Heater

ABS00B37

| | |
|---|---|
| Resistance [at 25°C (77°F)] | 5.0 - 7.0Ω |

## Crankshaft Position Sensor (POS)

ABS00B38

Refer to EC-298, "Component Inspection" .

## Camshaft Position Sensor (PHASE)

ABS00B39

Refer to EC-307, "Component Inspection" .

## Throttle Control Motor

ABS00B3A

| | |
|---|---|
| Resistance [at 25°C (77°F)] | Approximately 1 - 15Ω |

## Injector

ABS00B3B

| | |
|---|---|
| Resistance [at 10 - 60°C (50 - 140°F)] | 11.1 - 14.5Ω |

## Fuel Pump

ABS00B3C

| | |
|---|---|
| Resistance [at 25°C (77°F)] | 0.2 – 5.0Ω |